2017 Policy Report on Gender Barriers in Science and Engineering in the Asia and Pacific Nations

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Foreword

We are happy to circulate the APNN (Asia and Pacific Nation Network) survey results again this year. This annual study that began in 2014 is the joint international survey among 13 member countries conducted by The Association of Korean Woman Scientists and Engineers (KWSE) as part of the international cooperation policy project. The report is published in both Korean and English and distributed to all members of the International Network of Women Engineers and Scientists (INWES) as well as to international organizations like UNESCO to be utilized as reference for policy development in each member country. KWSE has held policy forums with APNN members to discuss results of the joint studies for policy development unique to each country. In 2016, KWSE visited VAFIW in Hanoi, Vietnam to discuss with VAFIW members the significance of the 2014, 2015 and 2016 joint studies, with recommendations for policy development for women in STEM in Vietnam. A similar endeavor proceeded in 2017 in Yokohama with JNWES members in Japan.

Following the first survey on the status of gender equality in science and engineering in 2014 and that of the glass ceiling experienced by woman scientists and engineers in 2015, we initiated a study on gender barrier in science and engineering perceived among women in STEM in 2016. Considering that gender barriers and gender inequality were not issues for women alone, the committee decided to conduct the 2017 project on how men in STEM perceived gender barriers. Thus the 2016 survey questions were modified for male respondents comprising of questions on "the perception of gender barrier," "experience of gender barrier," "perception on supporting law or policy to overcome gender barrier," and the "concept of gender equality" in the 2017 questionnaires.

As in previous years, this year's report shows the comparative results among the participating countries after which it outlines the survey results by country in order to be utilized as needed in each member country. However, the analysis of the quantitative human development index (HDI) and gender related indices by UNDP and/or WEF were not included as they are analyzed every other year. The next report of these indices will be included in the 2018 report.

For more than 20 years, there have been repeated concerns raised that low economic participation of highly educated women will be a big obstacle to Korea's national competitiveness. Yet, the problem of gender gap has still not been resolved. There is, therefore, a continuous need for this type of survey and studies as it provides reference data that can contribute to promoting and maximizing the use of professional women in science and engineering.

It is encouraging and significant that the study is conducted annually by the joint efforts of APNN member countries. We hope for the continuation of the international joint survey so that it will build on and develop into the Asian version of "She figures" (the statistical sourcebook published by the EU every three years for gender equality in research and development), which has been the initial goal upon the founding of APNN in 2011. We also hope that it will be of value for the Asia and Pacific nations including Korea in establishing and implementing national policies for human resource development and gender equality in science and engineering.

With best wishes,

November 20, 2017
Jung Sun Kim & Hye Young Park

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1) APNN representative or person who conducted this survey.
APNN is the Asia Pacific regional network of INWES and was established in 2011. Its members include organizations from 13 countries including Australia, New Zealand and Asian countries which are members of INWES. The APNN Meeting is held once a year; meetings were held in Australia in 2011, Malaysia in 2012, Taiwan in 2013, Korea in 2014, Mongolia in 2015, New Zealand in 2016, and Japan in 2017. The first chair organization was KWSE in Korea, the second chair organization was JNWES in Japan, and TWiST was selected as the third chair organization in 2017. Vietnam will hold the APNN Meeting in 2018.

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1. Introduction

1. Introduction

KWSE has been conducting research for policy development related to women scientists and engineers. In 2014, the first international joint survey was initiated on gender-balanced human resource development with the aim to find solutions to resolve gender gap in science and engineering in Asia and the Pacific Nations. Since then, annual reports based on joint surveys have been published and this year's study is a continuation of this endeavor. In 2014, the survey was on gender equality in science and engineering, after which a study on glass ceiling proceeded in 2015. In 2016, a more specified and detailed survey on gender barrier was run among 13 APNN member countries.

The reports of the past three years (2014~2016) showed a rather unusual finding where a large gender economic activity gap was shown among the higher educated in Japan and Korea. Korea has recorded the lowest economic activity rate among the highly educated women of OECD member countries for the past several years, revealing very inefficient utilization of human resources. The survey of APNN members in 12 countries on Perception of Discrimination in 2016 showed a relatively low level of direct experience of discrimination compared to the perception of discrimination. The experiences of being discriminated in participating in a project or becoming a research leader or receiving a research fund or scholarship just because of gender or the experiences of sexual harassment or unfair treatment were somewhat lower than median levels. Each individual's view on gender roles may function as internal gender barriers. The women scientists and engineers who participated in the survey for 2016 appeared to be relatively progressive. However, they also showed conservative aspects by answering that men and women should perform his/her appropriate roles since men were more rational and women were more emotional. The respondents generally had a positive outlook on their careers, and there was strong demand for support policy. The demand was higher as the respondents had higher perception of the importance of equal opportunity, had more positive career expectations, experienced more discriminations, and had a more progressive view on gender role.

The impact of science and technology over "knowledge" in general has accelerated with the issue of the coming of "the Fourth Industrial Revolution" in 2017. The inequality phenomenon of "sexual difference" leading to "sexual discrimination" has gone beyond the existing boundaries of biological difference as well as social and cultural difference. The boundaries of "sex" and "gender" is thus changing. In other words, the "gender" issue that is now firmly ingrained in public understanding has shown to be diverse as well as more complex and compound along with the accelerating social changes led by

science and technology.
The limited opportunities for education worldwide and even more limited opportunities for social roles have hindered and delayed the chances of bringing out the issues on the existence of "gender barrier" against women in science and engineering. The traditional images related to science such as reason, rationality, social authority and objectivity could have been a barrier in introducing the "gender" issues into science and engineering. Unlike other intellectual societies, scientists and engineers are characterized by factors such as communism, universalism, disinterestedness, and organized skepticism.[1] They are even perceived as a tradition of collective intelligence that transcends time and space to write the new world history built on nature and facts that are independent of "human understanding."[2]

Women scientists and engineers in Asia and the Pacific nations will be able to find ways to overcome the “gender barriers” in STEM within the norms and attributes of science itself. Ever since the first recording of human history, scientists and engineers have continuously expanded their fields over time and space. Thus, they have been able to or even lead the efforts to cope with the relatively late revelation of the issues of gender equality. Through collective efforts, it is possible that women in science and engineering will be able to correct and overcome the barriers.

"Sexual discrimination," "gender barrier," and "glass ceiling" will no longer remain as issues relevant to women alone. The "feminism" movement that is recently spreading all over the world is considered to be a process of highlighting the inconvenience and unfairness implied in the reality of inequality. The spreading of perception on gender equality is no longer limited to women, spreading throughout science and engineering.

This study, therefore, focuses on examining the perception of male scientists and engineers in the APNN member countries on gender barrier and the awareness of male scientists and engineers on gender equality. The study is initiated with the basic recognition that resolving gender barrier in STEM will lead to betterment of science and engineering overall. Gender barrier is thus something both male and female scientists and engineers should be working together to resolve. We hope that this study will serve as another starting point for the development of science and engineering in Asia and the Pacific nations.

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1 Four sets of institutional imperatives that define the ethos of modern science as introduced by the sociologist Robert Merton. They are often abbreviated as CUDOS (Robert K. Merton, 1988. "The Sociology of Science," Translated by Hyeon-ho Seok et al. Mineumsa)

2 R. Edelstein argued that the ancient scientists (was supposed to have) pursued divinity and immortality to create "the Second History" by seeking the truth of nature from "the Second City" pursuing collectivity, continuity, sincerity, and public interest beyond time and space (Young-shik Kim, 2013, "Science in History", Changbi Publishers)

2. Survey on Gender Barriers in STEM
: Responses of Male Scientists and Engineers from APNN

2. Survey on Gender Barriers in STEM
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2.1. Background

Since 2014, a joint international survey has been conducted annually among members of the APNN (Asia and Pacific Nations Network). This study is in continuation of that conducted in 2014 on gender equality in science and engineering, in 2015 on glass ceiling experienced by woman scientists and engineers, and the recent survey on gender barrier perceived by women scientists and engineers in the 13 APNN member countries. This year's survey used the same format as that in 2016 with modifications in the questionnaire to suit the male respondents. This is the first attempt to conduct a study on male respondents to find out about their perception on gender barrier in STEM as scientists and engineers.

2.2. The Survey

2.2.1. Targets, Method, and Period

Male respondents from 12 countries except for Australia among the 13 APNN member countries(Nepal, New Zealand, Malaysia, Mongolia, Bangladesh, Vietnam, Sri Lanka, India, Japan, Taiwan, Pakistan, Korea, and Australia) participated in the survey for 2017. The member organization in each country(Nepal: WISE-Nepal, New Zealand: IPENZ, Malaysia: IEM, Mongolia: WSTEM, Bangladesh: WISE-Bangladesh, Vietnam: VAFIW, Sri Lanka: WISE-Sri Lanka, India: WISE-India, Japan: JNWES, Taiwan: TWiST, Pakistan: WESTIP, Korea: KWSE) organized and conducted the online and offline survey. The questionnaire was available in Korean, English. Japanese and Mongolian, depending on the country at which the study took place. The original questionnaire was prepared in Korean and English while representatives of the member countries chose to translate the English version into their native language as needed.

The survey lasted for about 8 weeks starting from May 31, 2017 when the introductory email was sent and ended on July 31, 2017. In the case of offline survey, the member organizations collected the answers through email (image file) or postal service(original copy). Sri Lanka, Bangladesh, Vietnam, Taiwan, Nepal, Mongolia, and India conducted the offline survey only while Korea conducted both offline and online surveys. Malaysia, New Zealand, and Pakistan participated only in the online survey. We then collected and compiled the online and offline survey results and analyzed them statistically.

2.2.2. The Questionnaire

The questionnaire was aimed for male scientists and engineers in APNN member countries. Questions were asked in categories which include those on the general status of respondents, the male/female ratio in their major field, the perception of gender barriers in STEM, the indirect experience of discriminations in STEM, the need for policies to resolve gender barriers in STEM, and how gender equality was perceived. The following table shows the specific questions for each category (Table 2.1).

2.2.3. Analysis of Survey Result

The retrieved questionnaires were subject to data cleaning, and the answers to the open questions were pre-coded with reference to the response distribution and input. After the input, 20 questionnaires were randomly extracted to check for coding errors. The coding results were analyzed using SPSS Statistics version 23.0.

① Descriptive Statistics

The descriptive analysis of responses to all questions including the general status was conducted.

② Cross-country and relative analysis

The analysis of general status of respondents and the difference according to country were done using the t-test and one-way ANOVA. The difference was analyzed for the category level as well as for each question, and the Scheffe test was performed to compare the groups.

The Pearson correlation analysis was conducted to determine the correlation between the variables.

③ General analysis

The multiple regression analysis was performed to investigate the variables that affect the key dependent variables and the relative contribution of each those variables.

Table 2.1. Organization of Survey

Category		Question
General Status of Respondent		① Year of birth
		② Year of College Entrance
		③ Major Field
		④ Final degree (BS, MS or Ph.D.)
		⑤ Occupation
		⑥ Position/Title
		⑦ Marital status
		⑧ Working couple (Y/N)
		⑨ Number of children
		⑩ Nationality
		⑪ Is there National policy to resolve gender barrier (Y/N)
Gender Barrier	Male/Female Ratio	① The male/female ratio of my department during my university(college) education is (was)
		(If having taken graduate course) ② The male/female ratio of my department while at graduate school is (was)
		③ The male/female ratio of my current workplace is
		④ The male/female ratio at management level at my current workplace is
	Perception of Discrimination	① Girls and boys were equally encouraged to choose their majors in STEM during their education period.
		② It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.
		③ Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.
		④ Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.
		⑤ Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues.
	Indirect Experience of Discrimination	① Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female.
		② Woman in STEM is disadvantaged in participating or leading a research project because she is female.
		③ Woman in STEM being sexually harassed or treated unfairly
		④ Woman in STEM leaving work due to her marriage, pregnancy or childcare
	Career Outlook	① I believe things will turn out fine in the future career for women in STEM
	Need of Support Policy	① It is crucial to have strong policy support to solve gender inequality in the STEM field.
		② It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.
	Perception of Gender Equality	① In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves.
		② Primary breadwinners(who take care of financial obligations) of households should be men.
		③ Women are born to have a way of caring children that men are not capable of in the same way.
		④ In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.
		⑤ I believe gender equality will be fully achieved only if women are given equal opportunities as men.

3. Result of Survey of APNN Members on Gender Barrier

3. Results of the Survey on Gender Barrier among APNN Member Countries

3.1. General Respondent Profiles

As of July 31, 2017, a total of 1,294 responses were collected from 12 APNN member countries. About 100 male scientists and engineers participated in the survey in all countries except New Zealand and Malaysia. Details of the e respondents' nationality, age, marital status, number of children, occupation, double income status, and field of major are described below.

◦ **Nationality**

Out of the 1,294 respondents, 224 (17.3%) were from Japan, 133 (10.3%) were from Korea, and 114 (8.8%) were from Taiwan. Sri Lanka, Mongolia, Vietnam, India, Nepal, and Pakistan recorded 107, 106, 104, 103, 98 and 96 respectively. The number of respondents from New Zealand and Malaysia were 54 and 55, respectively.

◦ **Age**

Regarding age groups, 443 respondents (34.2%) were in their 30's (aged 30 - 39), 432 respondents (33.4%) were 29 years or younger, 252 respondents (19.5%) were in their 40's (aged 40 - 49), and 167 respondents (12.9%) were 50 years or older. The average age of the respondents was 36.03.

◦ **Marital status**

The result of the 2017 survey on female scientists and engineers showed that the marital status was an important factor that affected gender barrier in terms of career management and promotion This questionnaire therefore also included questions on the marital status to check if a similar correlation would be found in men. Altogether, 811 respondents (63.3%) were married while 452 respondents (35.3%) were single, and 19 respondents (1.5%) were divorced or "other".

◦ **Number of children**

681 respondents (52.6%) answered that they had children. Among them, 326 respondents (47.9%) were with 2, 233 respondents (34.2%) 1, and 122 respondents (17.9%) 3 or more. The average number of children was 1.88.

◦ **Occupation**

The largest percentage among respondents were engineers at 461 (35.6%) followed by researchers at 262 (20.3%) others at 259 (20.0%), professors or teacher at 256 respondents (19.8%), and healthcare professionals at 56 (4.3%).

◦ **Double income status**

One of the questions added this year was whether the respondents who had a spouse or partner were working couples. 803 or 62.0% of total respondents answered the question. Among them, 503 respondents (62.6%) indicated that they were double-income couples while 293 (36.5%) as single-income couples, and 7 respondents (0.9%) as others.

◦ **Major field of study**

Regarding the major of respondents, engineering accounted for 56.3% at 720, followed by natural science at 365 (28.5%), medicine and pharmacy at 124 (9.7%), and social science at 55 (4.3%). Other occupations included education at 10 respondents (0.8%) and humanities at 5 respondents (0.4%).

Table 3.1 Respondents Status

(Unit: Person, %)

Classification	Number of Respondents	%
Nationality	1,294	
Nepal	98	7.6
New Zealand	54	4.2
Malaysia	55	4.3
Mongolia	106	8.2
Bangladesh	100	7.7
Vietnam	104	8.0
Sri Lanka	107	8.3
India	103	8.0
Japan	224	17.3
Taiwan	114	8.8
Pakistan	96	7.4
Korea	133	10.3
Age		
29 years or younger	432	33.4
30 - 39	443	34.2
40 - 49	252	19.5
Over 50	167	12.9
Average age	36.03 (sd=11.152)	
Marital status		
Single	452	35.3
Married	811	63.3
Others (including divorced)	19	1.5
Number of children*		
1	233	34.2
2	326	47.9
3 or more	122	17.9
Average number of children	1.88 (sd=0.815)	

Classification	Number of Respondents	%
Occupation		
Professor/Teacher	256	19.8
Researcher	256	20.3
Healthcare professional	55	4.3
Engineer	461	35.6
Others	259	20.0
Double income status (married)		
Double income	503	62.6
Single income	293	36.5
Others	7	0.9
Major field of study		
Humanities	5	0.4
Social sciences	55	4.3
Natural sciences	365	28.5
Medicine	124	9.7
Education	10	0.8
Engineering	720	56.3

3.2. Cross-country comparison of Gender Barriers in 12 APNN member countries

3.2.1. Descriptive Statistical Analysis

Table 3.2 Average for Each Question: Total Respondents

(Unit: Point)

Classifications		Question	Average	Median	Standard Deviation
② Male/Female Ratio	1	The male/female ratio of my department during my university(college) education is (was)	1.89	1.0	1.125
	2	(If having taken graduate course) The male/female ratio of my department while at graduate school is (was)	1.99	2.0	1.069
	3	The male/female ratio of my current workplace is	2.05	2.0	1.128
	4	The male/female ratio at management level at my current workplace is	1.89	2.0	1.107
		Average	1.96	1.8	0.857
③ Perception of Discrimination	1	Girls and boys were equally encouraged to choose their majors in STEM during their education period.	2.07	2.0	1.077
	2	It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.	2.98	3.0	1.169
	3	Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.	2.40	2.0	1.102
	4	Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.	2.90	3.0	1.134
	5	Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues.	2.29	2.0	1.141
		Average	2.53	2.6	0.703
④ Indirect Experience of Discrimination	1	Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female.	1.68	1.0	0.868
	2	Woman in STEM is disadvantaged in participating or leading a research project because she is female.	1.67	1.0	0.833
	3	Woman in STEM being sexually harassed or treated unfairly	2.03	2.0	0.906
	4	Woman in STEM leaving work due to her marriage, pregnancy or childcare	2.89	3.0	1.041
		Average	2.07	2.0	0.629
* Career Outlook	1	I believe things will turn out fine in the future career for women in STEM	4.18	4.0	0.863
⑤ Need of Support Policy	1	It is crucial to have strong policy support to solve gender inequality in the STEM field.	3.88	4.0	1.015
	2	It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.	3.14	3.0	1.257
		Average	3.51	3.50	0.934

Classifications		Question	Average	Median	Standard Deviation
⑥ Perception of Gender Equality	1	In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves.	2.62	2.0	1.231
	2	Primary breadwinners(who take care of financial obligations) of households should be men.	3.27	3.0	1.281
	3	Women are born to have a way of caring children that men are not capable of in the same way.	2.96	3.0	1.299
	4	In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.	3.60	4.0	1.278
	5	I believe gender equality will be fully achieved only if women are given equal opportunities as men.	2.15	2.0	1.122
		Average	2.92	3.0	0.785

· The questions ②, ③, ⑤, and ⑥ are evaluated on a Likert-type scale (5 points).
· ② 1. Mostly men, 2. Slightly more men, 3. Similar ratio of men and women, 4. Slightly more women, 5. Mostly women
· ② Male/Female Ratio: The lower score indicates more men.
· ③, ⑤, ⑥ 1. Very agreeable, 2. Somewhat agreeable, 3. Neutral, 4. Not agreeable, 5. Not agreeable at all
· ③ Perception of Discrimination: The higher score, the higher Perception of Discrimination.
· ④ Indirect Experience of Discrimination: Higher the score, the more experience of indirect discrimination.
· ④ 1. I have seen it. 2. I have heard of it. 3. I have not seen or heard of it but am aware of it. 4. I have not seen it or heard of it.
  * Career outlook: A higher score means that the respondent thinks the career of women is bright in his field of major.
· ⑤ need of support policy: The higher score indicates more needs.
· ⑥ Perception of Gender Equality: The higher score the score, the higher the Perception of Gender Equality.
· The results of ③, ④, and ⑤ were reversely coded, but the first and third questions of ③ Perception of Discrimination are excluded from reverse coding because of the nature of the questions.

The questionnaire consisted of 6 sections. The responses to the first section were personal information which have been summarized in section 3.1; this is considered as ①. The following five of them were asked in Likert-type scale as shown in the "classifications" column in Table 3.2. and starts with ②.
How to interpret the responses to these five sections ② to ⑥ are summarized as follows:

② Male/Female Ratio

The median value of 3 indicates that the respondents perceive a balance in male/female ratio. Values lower than 3 means there are more men while higher than 3 refers to more women.

③ Perception of Discrimination

The questions in this category asked to what level respondents perceived gender barrier against women in STEM. Out of the 5-point scale, higher values indicate better perception of gender barrier.

④ Indirect Experience of Discrimination

The questions in this category asked whether the respondents were aware of discrimination against women in STEM indirectly. Unlike other sections, a 4-point Likert-type scale was used. The higher score means the respondents were more aware of discrimination against women in STEM.

⑤ Policy needs

Out of the 5-point Likert-type scale, a higher score means that the respondents see the need for policy to resolve gender barriers.

⑥ Perception of Gender Equality

Out of the 5 point Likert-type scale, higher value indicates stronger awareness of the gender equality concept.

Answers to some questions were reversely coded according to the nature of the category and question to assure the consistent analysis. The reverse-coded questions were questions 1 and 3 of ③, all of ④ and all of ⑤.

The analysis of results to responses from the 1,294 respondents from 12 counties to each category is described below.

◦ **Male/Female Ratio: There are more men**

The ratio of male to female in the respondents' fields of major was 1.96 meaning that respondents felt there were somewhat more males than females. The answer to the ratio of male to female in the Field of major at college → Field of major at graduate school → Field of major at current work → Manager or higher position at current work was 1.89 → 1.99 → 2.05 → 1.89. There were more men than women regardless of their education period and/or work period. While the ratio slightly increased by 0.1p and 0.6 points at the graduate school level and the current work level, the ratio at the management or higher position dropped back to the college level.

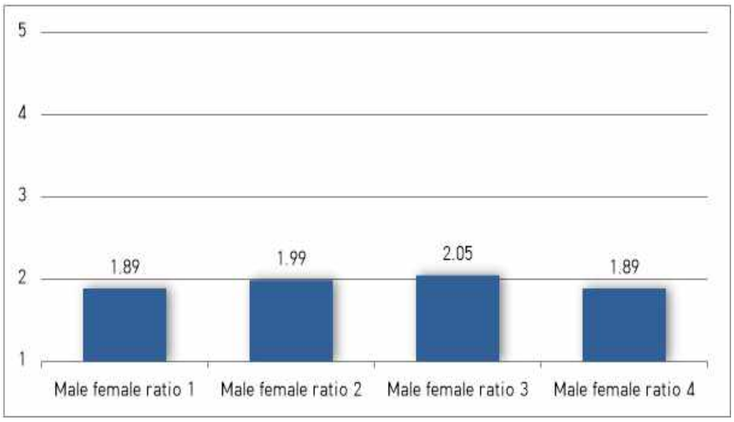


Figure 3.1 Response to Question on Male/Female ratio in Respondent's Field of Major (Unit: Point)

◦ Male/Female ratio 1. Ratio of male and female students in your major when you were in college
◦ Male/Female ratio 2. Ratio of male and female students in your major when you were in college
◦ Male/Female ratio 3. Ratio of male and female employees in your major field at your work
◦ Male/Female ratio 4. Ratio of male and female managers or higher in your major field at your work

◦ **Perception of Discrimination** : The overall response was below "Neutral."

The average perception level of 1,294 male scientists and engineers from 12 countries on discrimination was below neutral at 2.53 points. The awareness of "It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications," was the highest at 2.98 points. It was followed by "Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.," at 2.90 points, "Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level." at 2.40 points, and "Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues.," at 2.29 points. "Girls and boys were equally encouraged to choose their majors in STEM during their education period," received the lowest score at 2.07 points.

The ascending order of the score is the encouragement to enter the career in STEM

→ Wage gap → Job allocation and evaluation → To become a leader or tenured professor → To find a job.

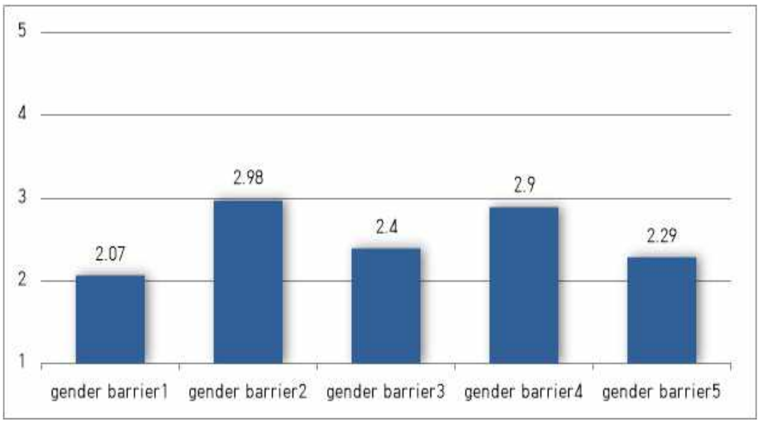


Figure 3.2 Response to Question on Perception of Discrimination (Unit: Point)

◦ Gender barrier 1. Girls and boys were equally encouraged to choose their majors in STEM during their education period.
◦ Gender barrier 2. It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.
◦ Gender barrier 3. Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.
◦ Gender barrier 4. Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.
◦ Gender barrier 5. Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues.

◦ **Indirect experience** : Level of recognition of possible discrimination

The average level of male scientists and engineers from 12 countries having indirectly experienced discrimination against female scientists and engineers was 2.07 or neutral (The questions were in a 4.0 Likert-type scale). In average, the male scientist and engineers were aware that there was discrimination against women in STEM even if they had not directly seen or heard of it.

"Woman in STEM leaving work due to her marriage, pregnancy or childcare," received the highest score of 2.89 points on indirect experience followed by "Woman in STEM being sexually harassed or treated unfairly," at 2.03 points. "Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female.," and "Woman in STEM is disadvantaged in participating or leading a research project because she is female" received the below average score of 1.68 points and 1.67 points, respectively.

The descending order of the score on indirect experience of discrimination by respondents is Marriage, childbirth, or child rearing → Sexual harassment or unfair treatment → To receive research fund or scholarship → To participate or lead projects.

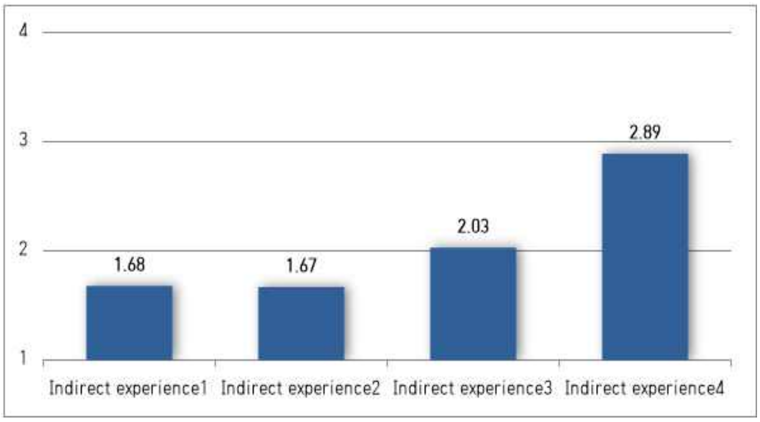


Figure 3.3 Response to Question on Indirect Experience of Discrimination (Unit: Point)

◦ Indirect experience 1. Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female.
◦ Indirect experience 2. Woman in STEM is disadvantaged in participating or leading a research project because she is female.
◦ Indirect experience 3. Woman in STEM being sexually harassed or treated unfairly
◦ Indirect experience 4. Woman in STEM leaving work due to her marriage, pregnancy or childcare

◦ **Career outlook and Policy need** : The Career outlook for women in the respondents' fields of major is positive. The need of support policy is also above "neutral"

1,294 male scientists and engineers in 12 APNN countries had higher than "Neutral" view at 4.18 out of 5 points on Career outlook of females in their fields of major.

They responded positively to the need for policy to support women in STEM. However, the response to the need for active measures and quota to resolve gender barrier was close to neutral at 3.14.

◦ **Gender equality** : Lower gender equality in society perceived compared to gender equality in family

The average score of answer to the last question on perception of gender equality was close to "Neutral" at 2.92 points (out of 5.0). The awareness of respondents on gender equality varied according to the question, and the respondents had a higher awareness of gender role or economic role within the family, which were commonly recognized as a private domain, than the awareness of social role. It is also noteworthy that the respondents showed high scores for "equal opportunity leads to gender equality." There is as was in the case of the 2016 report a possibility that the respondents were not fully aware of the difference among equal opportunity, equal condition and equal outcome.

The question that showed the highest awareness level was “In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.” (3.6 points), followed by “Primary breadwinners (who take care of financial obligations) of households should be men.” (3.27 points), “Women are born to have a way of caring children that men are not capable of in the same way.” (2.96 points), and “In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves.” (2.62 points). The question that received the lowest point was “I believe gender equality will be fully achieved only if women are given equal opportunities as men.” (2.15 points).

In summary, the respondents had a higher awareness in the order of Family hierarchy → Family financial responsibility → Childcare → Division of general roles → Equality of opportunity leading to equality of result.

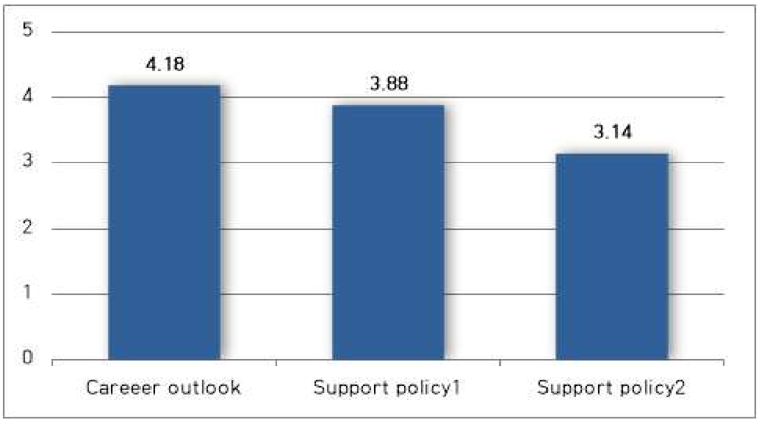


Figure 3.4 Need of Support Policy for Resolution of Gender Barrier (Unit: Point)

- Career Outlook: I believe things will turn out fine in the future career for women in STEM
- Policy Need 1. It is crucial to have strong policy support to solve gender inequality in the STEM field.
- Policy Need 2. It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.

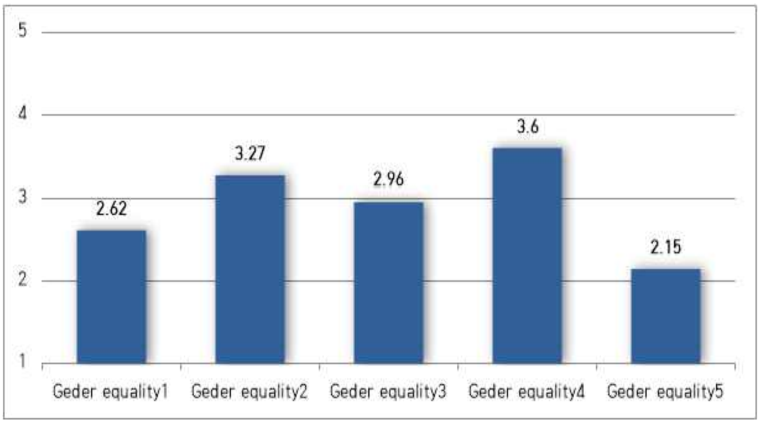


Figure 3.5 Response to Question on Perception of Gender Equality (Unit: Point)

◦ Gender equality 1. In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves.
◦ Gender equality 2. Primary breadwinners(who take care of financial obligations) of households should be men.
◦ Gender equality 3. Women are born to have a way of caring children that men are not capable of in the same way.
◦ Gender equality 4. In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.
◦ Gender equality 5. I believe gender equality will be fully achieved only if women are given equal opportunities as men.

A special note is necessary on the last question of “I believe gender equality will be fully achieved only if women are given equal opportunities as men.” which asks on the understanding of the difference between equality and equity. The implication of this question is whether there is a limit to the argument that 'equal opportunities' can lead to equal outcomes. It asked whether the respondents understood or accepted that it was difficult to resolve the gender difference from historical, biological and social difference by simply “providing equal opportunity.”

Although it has already been 22 years since the adaptation of gender mainstreaming strategy at the 4th World Conference on Women in Beijing, it is possible that some of the male respondents may not have adequate understanding of this question on gender equality, due to their national and/or cultural background

3.2.2. Respondent Profile by Country

The following table shows the general profiles of male scientists and engineers who answered the survey in each country.

Table 3.3 Respondent Profile in Each Country

Country	Average Age	Marital status		Average Number of Children[3]	Field of Major		Occupation		(Married) Double Income	
Nepal	35.70	Single	34.7	0.85	Humanities	-	Professor/Teacher	2.0	Double income	57.8
		Married	65.3		Social Studies	1.0	Researcher	5.1	Single income	37.5
		Others	-		Natural Sciences	12.4	Healthcare professional	1.0	Others	4.7
					Medicine	-	Engineer (company, R&D center, etc.)	79.6		
					Education	-	Others	12.2		
					Engineering	86.6				
New Zealand	43.35	Single	13.0	1.43	Humanities	-	Professor/Teacher	3.7	Double income	58.1
		Married	79.6		Social Studies	1.9	Researcher	-	Single income	39.5
		Others	7.4		Natural Sciences	1.9	Healthcare professional	-	Others	2.3
					Medicine	-	Engineer (company, R&D center, etc.)	92.6		
					Education	-	Others	3.7		
					Engineering	96.3				
Malaysia	37.16	Single	45.5	1.42	Humanities	-	Professor/Teacher	21.8	Double income	70.0
		Married	54.5		Social Studies	1.8	Researcher	-	Single income	30.0
		Others	-		Natural Sciences	5.5	Healthcare professional	-	Others	-
					Medicine		Engineer (company, R&D center, etc.)	56.4		
					Education		Others	21.8		
					Engineering	92.7				
Mongolia	32.29	Single	28.3	1.30	Humanities		Professor/Teacher	17.0	Double income	72.5
		Married	65.1		Social Studies	13.9	Researcher	1.9	Single income	27.5
		Others	6.6		Natural Sciences		Healthcare professional	0.9	Others	-
					Medicine		Engineer (company, R&D center, etc.)	72.6		
					Education	7.9	Others	7.5		
					Engineering	78.2				
Bangladesh	27.15	Single	64.0	0.43	Humanities		Professor/Teacher	13.1	Double income	44.1
		Married	35.0		Social Studies	9.0	Researcher	28.3	Single income	55.9
		Others	1.0		Natural Sciences	30.0	Healthcare professional	2.0	Others	
					Medicine	2.0	Engineer (company, R&D center, etc.)	45.5		
					Education		Others	11.1		
					Engineering	59.0				
Vietnam	34.06	Single	13.0	1.63	Humanities	1.9	Professor/Teacher	52.9	Double income	100.0
		Married	87.0		Social Studies	9.6	Researcher	-	Single income	-
		Others	-		Natural Sciences	5.8	Healthcare professional	-	Others	-
					Medicine		Engineer (company, R&D center, etc.)	32.7		
					Education		Others	14.4		
					Engineering	82.7				

[3] Including no response

Country	Average Age	Marital status		Average Number of Children[3]	Field of Major		Occupation		(Married) Double Income	
Sri Lanka	38.42	Single	32.1	1.16	Humanities		Professor/Teacher	12.1	Double income	69.4
					Social Studies	5.7	Researcher	11.2		
		Married	64.2		Natural Sciences	32.1	Healthcare professional	8.4	Single income	30.6
					Medicine	10.4	Engineer (company, R&D center, etc.)	28.0		
		Others	3.8		Education	0.9			Others	-
					Engineering	50.9	Others	40.2		
India	41.76	Single	13.6	1.21	Humanities		Professor/Teacher	33.3	Double income	36.0
					Social Studies		Researcher	25.5		
		Married	86.4		Natural Sciences	53.4	Healthcare professional	4.9	Single income	64.0
					Medicine	5.8	Engineer (company, R&D center, etc.)	25.5		
		Others	-		Education				Others	-
					Engineering	40.8	Others	10.8		
Japan	33.58	Single	52.3	0.29	Humanities		Professor/Teacher	27.6	Double income	62.1
					Social Studies	0.5	Researcher	20.8		
		Married	47.2		Natural Sciences	44.7	Healthcare professional	3.2	Single income	36.9
					Medicine	22.1	Engineer (company, R&D center, etc.)	4.1		
		Others	0.5		Education	0.5			Others	1.0
					Engineering	32.3	Others	44.3		
Taiwan	41.32	Single	38.6	1.23	Humanities	2.7	Professor/Teacher	19.3	Double income	76.8
					Social Studies	6.2	Researcher	18.4		
		Married	60.5		Natural Sciences	59.3	Healthcare professional	14.0	Single income	23.2
					Medicine	16.8	Engineer (company, R&D center, etc.)	21.9		
		Others	0.9		Education				Others	-
					Engineering	15.0	Others	26.3		
Pakistan	34.06	Single	41.1	1.00	Humanities		Professor/Teacher	18.8	Double income	47.3
					Social Studies	5.2	Researcher	10.4		
		Married	57.9		Natural Sciences	4.2	Healthcare professional	14.6	Single income	52.7
					Medicine	26.0	Engineer (company, R&D center, etc.)	52.1		
		Others	1.1		Education				Others	-
					Engineering	64.6	Others	4.2		
Korea	38.62	Single	25.6	1.08	Humanities		Professor/Teacher	3.8	Double income	51.0
					Social Studies		Researcher	84.2		
		Married	74.4		Natural Sciences	42.1	Healthcare professional	-	Single income	46.9
					Medicine	9.8	Engineer (company, R&D center, etc.)	3.0		
		Others	-		Education				Others	2.0
					Engineering	48.1	Others	9.0		

Country	Average Age	Marital status		Average Number of Children[3]	Field of Major		Occupation		(Married) Double Income	
Total	36.03	Single	35.3	0.99	Humanities	0.4	Professor/Teacher	19.8	Double income	62.6
					Social Studies	4.3	Researcher	20.3		
		Married	63.3		Natural Sciences	28.5	Healthcare professional	4.3	Single income	36.5
					Medicine	9.7	Engineer (company, R&D center, etc.)	35.6		
					Education	0.8				
		Others	1.5		Engineering	56.3	Others	20.0	Others	0.9

◦ **Average age** : 43.45 in New Zealand, 27.15 in Bangladesh, and 30's in most other countries

The average age of respondents from New Zealand was the highest at 43.35 while that from Bangladesh was the lowest at 27.15. In addition to New Zealand, the average ages of respondents from India and Taiwan were 41.76 and 41.32, respectively. The countries from which the average age of respondents was 30's were Korea at 38.62, Sri Lanka at 38.42, Malaysia at 37.16, Nepal at 35.70, Vietnam and Pakistan at 34.06, Japan at 33.58, and Mongolia at 32.29.

◦ **Marital status** : The portion of married people was the highest in Vietnam and India with more than 80% and the lowest in Bangladesh with 35.0%.

The portion of married people was high in average among the respondents from 12 countries. It was highest in Vietnam (87.0%) and India (86.4%) and the lowest in Bangladesh (35.0%) where the average age of the respondents was 20's.
The countries where the portion of married respondents was more than 50% were Vietnam (87.0%), Indonesia (86.4%), New Zealand (79.6%), Korea (74.4%), Nepal (65.3%), Mongolia (65.1%), Sri Lanka (64.2%), Taiwan (60.5%), Pakistan (57.9%), and Malaysia (54.5%). The countries where the married respondents were less than 50% were Japan (47.2%) and Bangladesh (35.0%). New Zealand had the highest portion of respondents who answered other (including divorced) with 7.4%.

◦ **Average number of children** : Vietnam had the highest number of children with 1.63 while Japan had the smallest with 0.29.

The average number of children of respondents was 1.63 in Vietnam, 1.43 in New Zealand, 1.42 in Malaysia, 1.30 in Mongolia, 1.23 in Taiwan, 1.16 in Sri Lanka, 1.08 in Korea, and 1.00 in Pakistan. The countries where the average number of children of respondents was fewer than 1 were Nepal (0.85), Bangladesh (0.43) and Japan (0.29).[4]

[4] The average number of children includes the respondents who did not answer the question.

◦ **Field of major** : More than 90% of the respondents in New Zealand and Malaysia were in engineering while more than 50% of the respondents in Taiwan and India were in natural sciences. There was a relatively high number of respondents in medicine and pharmacy in Pakistan and Japan and social science in Mongolia and Vietnam.

The major fields of the respondents were engineering (56.3%), followed by science (28.5%), medical science (9.7%) and social science (4.3%). The distribution of respondents' fields of major varied from country to country. The countries in which more than 50% of respondents were in engineering were New Zealand (96.3%), Malaysia (92.7%), Nepal (86.6%), Vietnam (82.7%), Mongolia (78.2%), Pakistan (64.6%), Bangladesh (59.9%), and Sri Lanka (50.9%). The countries in which less than 50% of respondents were in engineering were Korea (48.1%), India (40.8%), Japan (32.3%), and Taiwan (15.0%). The countries which had most respondents in natural science were Taiwan (59.3%), India (53.4%), Japan (44.7%), Korea (42.1%), and Bangladesh (30.0%). The countries which had relatively more respondents in medicine and pharmacy were Pakistan (26.0%) and Japan (22.1%) while Mongolia (13.9%) and Vietnam (9.6%) had more respondents in social science than in other countries.

◦ **Occupation of the respondents** : 92.6% of respondents in New Zealand were engineers while 84.2% of respondents in Korea were researchers. There were relatively many teachers/professors in Vietnam, healthcare professionals in Pakistan, and other professions in Japan.

Among the respondents in the 12 countries, engineers (35.6%) were the most followed by researchers (20.3%), other professions (20.0%), teachers/professors (19.8%), and healthcare professionals (4.3%).

The distribution of respondents' occupations also varied from country to country. The number of engineers was relatively high in the countries where there were many engineering majors, and there were relatively many researchers where there were many people in natural science.

The countries with relatively many respondents who worked as engineers included New Zealand (92.6%), Nepal (79.6%), Mongolia (72.6%), and Pakistan (52.1%). Korea had exceptionally high number of respondents who answered researcher as occupation at 84.2%. There were a relatively high number of researchers in India (25.5%) and Japan (20.8%) while there were a relatively high number of teachers/professors in Vietnam (52.9%), India (33.3%), Japan (27.6%), Taiwan (19.3%), and Pakistan (18.8%). There were a relatively high number of healthcare professionals in Pakistan (14.6%), Taiwan (14.0%), and Sri Lanka (8.2%). There were a relatively high number of other professionals in Japan (44.3%), Sri Lanka (40.2%), and Taiwan (26.3%).

◦ **Double-income status**[5] : The number was the highest in Vietnam with 100% and the lowest in India with 36.0%

62.6% of respondents from 12 countries were classified as “double income” meaning that both the husband and wife earn incomes. In Vietnam, 100% of married or coupled respondents said they had double incomes. Other countries that showed a high rate of double incomes were Taiwan (76.8%), Mongolia (72.5%), Malaysia (70.0%), Sri Lanka (69.4%), Japan (62.1%), New Zealand (58.1%), Nepal (57.8%), and Korea (51.0%). The countries that showed a high rate of single income were India (64.0%), Bangladesh (55.9%), and Pakistan (52.7%).

3.2.3. Comparison of Responses by Country

The following table shows the responses by each of the 12 APNN member countries.

While respondents answered that there are more males than females in STEM, the countries that indicated that there were relatively more females than other countries were Mongolia (2.72) and India (2.68). The countries that showed relatively more women in STEM than in other countries were Pakistan (1.45) and New Zealand (1.49).

While the overall perception of discrimination was slightly lower than neutral, the countries that showed relatively high awareness were Vietnam (2.98) and Mongolia/Bangladesh (2.75 each) while, the country that showed relatively low awareness was India (1.74).

The indirect experience of discrimination against women in STEM by male scientists and engineers is “being aware of it without seeing or hearing of it.” The countries showing relatively high level of indirect experience were India (2.60) and Bangladesh (2.51) while the countries showing relatively low level were Korea (1.81) and Mongolia (1.82).

On the need for policy, the respondents agreed at the level of higher than neutral. The countries that showed relatively high level of agreement were Vietnam (4.34) and India (4.00) while the country that showed the lowest level of agreement was New Zealand (2.84).

While the level of Perception of Gender Equality was neutral, the countries that showed the relatively high awareness were New Zealand (3.67) and Sri Lanka (3.37), and the countries that showed the relatively low awareness were India (2.31), Pakistan (2.36), and Bangladesh (2.38).

[5] A total of 830 respondents answered “Married” or “Others” as marital status, and 803 (96.7%) of them answered “Double incomes.” The figure is based on the answer of the 803 respondents.

Table 3.4 Comparison of Average by Country

Subject	Male/Female Ratio		Gender Barrier		Indirect Experience		Support Policy		Gender Equality	
	Average	SD	Average	SD	Average	SD	Average	SD	Average	SD
Nepal	1.60	0.596	2.22	0.642	1.95	0.514	3.73	0.754	3.28	0.566
New Zealand	**1.49**	0.516	2.60	0.880	2.09	0.519	**2.84**	1.063	**3.67**	0.648
Malaysia	1.95	0.887	2.44	0.633	1.93	0.594	3.36	0.945	2.79	0.797
Mongolia	**2.72**	0.771	2.75	0.461	**1.82**	0.578	3.26	0.791	2.93	0.588
Bangladesh	1.52	0.731	2.75	0.648	**2.51**	0.632	3.31	1.010	2.38	0.653
Vietnam	2.08	1.096	**2.98**	0.374	2.11	0.769	**4.34**	0.709	2.60	0.781
Sri Lanka	2.58	0.988	2.40	0.676	2.26	0.612	3.48	0.953	3.37	0.688
India	**2.68**	0.385	**1.74**	0.441	**2.60**	0.261	**4.00**	0.847	**2.31**	0.715
Japan	1.74	0.611	2.61	0.604	1.87	0.522	3.46	0.788	3.16	0.582
Taiwan	1.94	0.863	2.62	0.730	2.14	0.669	3.71	0.841	2.88	0.882
Pakistan	**1.45**	0.595	2.43	0.793	2.01	0.640	3.10	0.827	**2.36**	0.733
Korea	1.72	0.665	2.63	0.762	**1.81**	0.546	3.21	0.972	3.20	0.637
Overall Average	1.96	0.858	2.53	0.703	2.07	0.629	3.51	0.934	2.92	0.785
F	38.596		24.508		21.570		20.555		38.106	
P *** (p<.001)	***		***		***		***		***	

Note: ***p<.001, **p<.01, *p<.05

◦ **Male/Female ratio**

: A lower score means relatively more males, and a higher score means relatively more females (5-point scale). 3 points mean that there is a gender balance.

The male/female ratio in the respondents' fields of major was 1.96 meaning that there were relatively more men than women. The countries that showed a relatively high ratio of women in STEM were Mongolia (2.72), India (2.68), and Sri Lanka (2.58). The countries that showed the lowest ratio of women among the 12 countries were Pakistan (1.47) and New Zealand (1.49).

A statistically significant level (F=38.598, p<.000) of difference was observed among countries. The post-verification showed that the differences between countries were largest in the order of Mongolia, India, and Sri Lanka > Vietnam, Malaysia, Taiwan, Japan, Korea, and Nepal > Bangladesh and New Zealand > Pakistan[6].

[6] Although the differences between countries varied widely, the details are omitted here. The average level of the countries classified by post-verification was ranked in the descending order of score, and the countries included in two groups were included in the high score group. The responses were compared by country in the same way for all response categories.

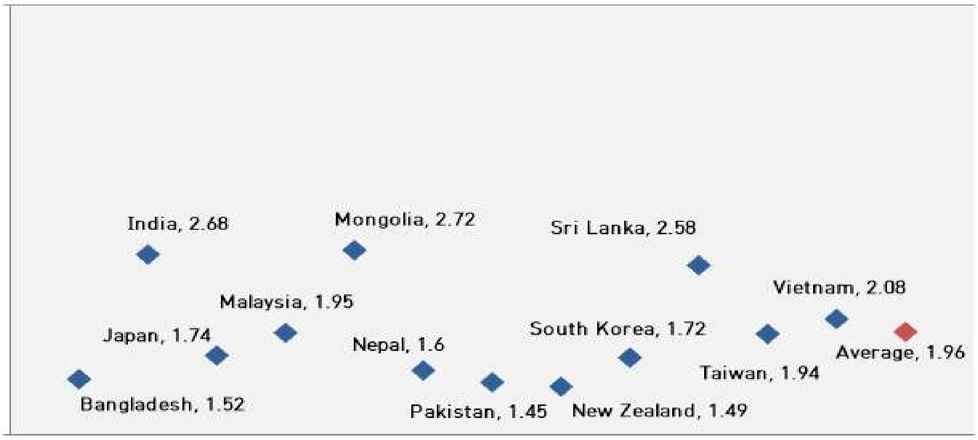


Figure 3.6 Comparison of Answers to Male/Female Ratio in Respondent's Field of Major by Country (Aggregated)

◦ **Perception of Discrimination**

: The higher score, the higher Perception of Gender Equality (5-point scale).

The average score of the respondents' perception of discrimination was 2.53 points which was below the neutral level. The countries that showed high level of awareness of discrimination were Vietnam (2.98), Mongolia/Bangladesh (2.75 each), Korea (2.63), Taiwan (2.62), Japan (2.61), and New Zealand (2.6).

The response to the question on gender barrier by country indicated a statistically significant level (F=24.508, p<.000) of difference. The post-verification showed that the differences between countries were largest in the order of Vietnam, Mongolia, Bangladesh, Korea, Taiwan, Japan, and New Zealand > Malaysia, Pakistan, Sri Lanka, and Nepal > India.

Figure 3.7 Comparison of Answers to Perception of Discrimination by Country (Aggregated)

◦ **Indirect Experience of Discrimination**

: The higher score, the more experience of indirect discrimination (4-point scale)

The respondents were asked of (indirect) experience of discrimination against women in STEM in a 4-point scale. The average score of the answers was 2.07 points which was close to “I have not seen or heard of it but am aware of it.” The countries that showed the relatively high score on indirect experience were India (2.60), Bangladesh (2.51), Sri Lanka (2.26), Taiwan (2.14), New Zealand (2.09), and Pakistan (2.01). The countries that showed the relatively low score on indirect experience were Korea (1.81), Mongolia (1.82), Japan (1.87), Nepal (1.95), and Malaysia (1.93).

The response to the question on Indirect Experience of Discrimination by country indicated a statistically significant level (F=21.570, p<.000) of difference. The post-verification showed that the differences among countries were largest in the order of India > Bangladesh, Sri Lanka, and Taiwan > Vietnam, New Zealand, Pakistan, and Nepal, Malaysia > Japan, Mongolia, and Korea.

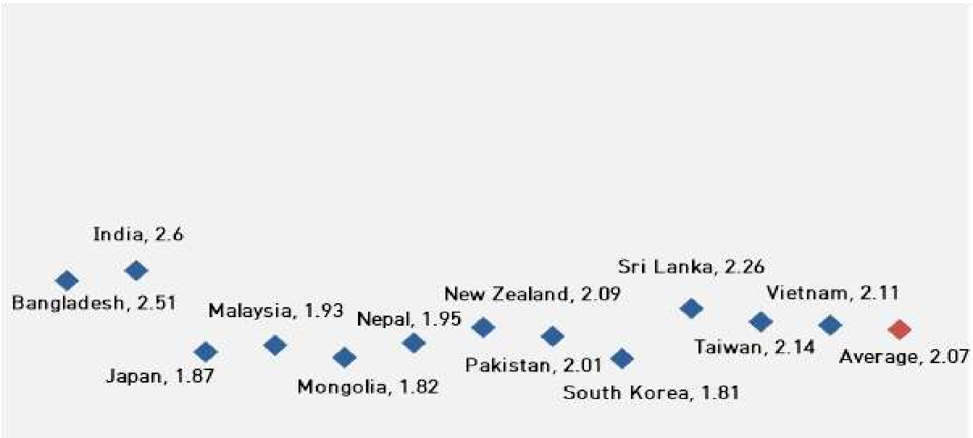


Figure 3.8 Comparison of Answers to Indirect Experience of Discrimination by Country (Aggregated)

◦ **Need of policy**

: A higher score means the respondents agreed more on the need (5-point scale). 3 points mean “Neutral.”

The average score of the answer to the question of the need of policy to overcome gender barrier against female scientists and engineers in STEM was 3.51 meaning that the respondents agreed to the need.

The average score was the highest in the order of Vietnam (4.34), India (4.00), Nepal (3.73), Taiwan (3.71), Sri Lanka (3.48), Japan (3.46), Malaysia (3.36), Bangladesh (3.31), Mongolia (3.26), Korea (3.21), Pakistan (3.10), and New Zealand (2.84).

The response to the question on the need of support policy by country indicated the statistically significant level (F=20.555, p<.000) of difference. The post-verification showed that the differences between countries were largest in the order of Vietnam and India > Nepal, Taiwan, Sri Lanka, and Japan > Malaysia, Bangladesh, Mongolia, and Korea > Pakistan > New Zealand.

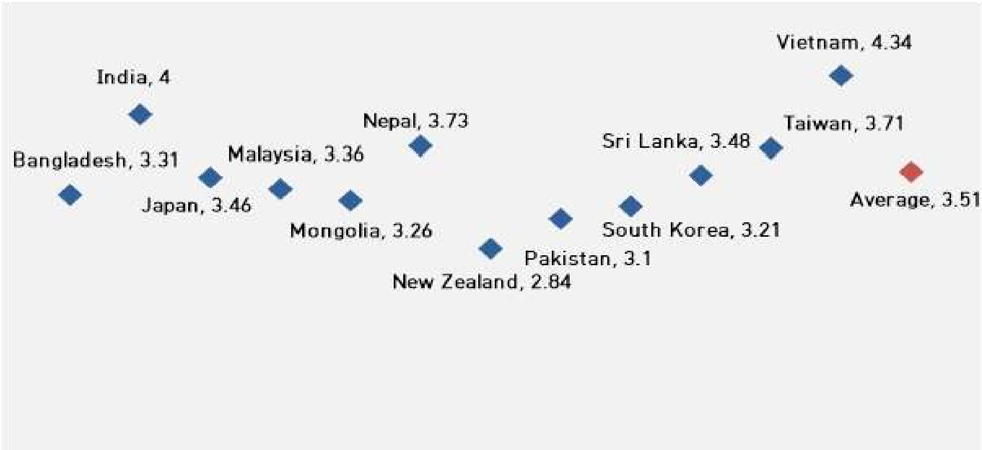


Figure 3.9 Comparison of Answer to need of support policy to Resolve Gender Barrier by Country (Aggregated)

◦ **Perception of gender equality**

: The higher score, the higher Perception of Gender Equality (5-point scale). 3 points mean "Neutral."

The average score of the answer to the question of the Perception of Gender Equality was 2.92 points meaning that the respondents' awareness was close to the neutral level. The countries that showed a relatively high awareness of "gender equality" were New Zealand (3.67), Sri Lanka (3.37), Nepal (3.28), Korea (3.20), and Japan (3.16). The countries that showed the relatively low awareness were India (2.31), Pakistan (2.36), Bangladesh (2.38), Vietnam (2.60), Malaysia (2.79), and Taiwan (2.88).

The response to the question on the Perception of Gender Equality by country indicated a statistically significant level ($F=38.106$, $p<.000$) of difference. The post-verification showed that the difference among countries was largest in the order of New Zealand, Sri Lanka, and Nepal > Korea, Japan, Mongolia, and Taiwan > Malaysia and Vietnam > Bangladesh and Pakistan > India.

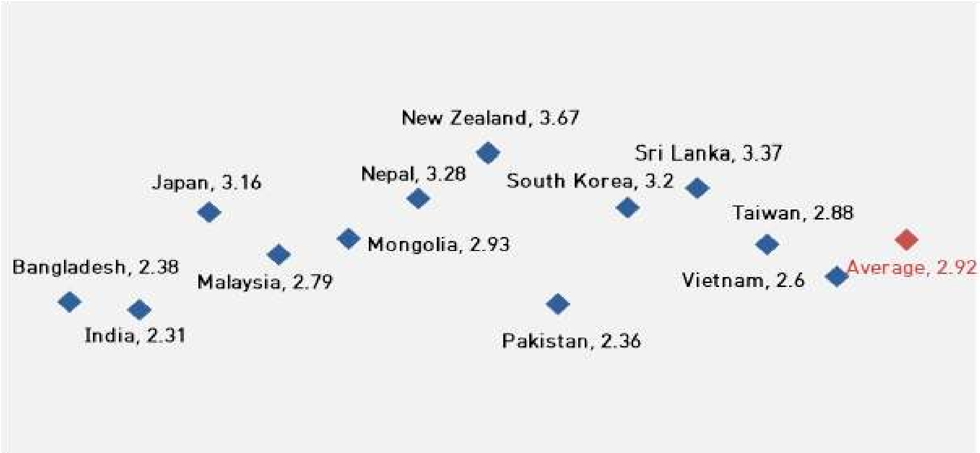


Figure 3.10 Comparison of Answers to Perception of Gender Equality by Country (Aggregated)

3.2.4. Comparison of Responses by Items

This section discusses the result of the analysis of answers to age, marital status, number of children, occupation, and double-income status according to the characteristics of 1,294 respondents in 12 APNN member countries. ANOVA was used for the analysis of answers. The post-verification was performed to check the details of the difference if there was a significant difference.

3.2.4.1. Answer to Question on Male/Female Ratio in Respondents' Fields of Major by Period

◦ **Male/Female ratio 1** : during my university (college) education is (was)
A lower score means relatively more males, and a higher score means relatively more females (5-point scale). 3 points mean that the males and females were in the balance.

The male scientists and engineers in 12 countries were asked on the ratio of male and female students in their major when they were in college. The results are shown in Table 3.5. The overall average was 1.89 meaning that there were relatively more male students. The response results showed the statistically significant differences according to the respondents' occupations ($F = 21.792$, $p <.000$) and the number of children ($F = 3.184$, $p <.05$). The male/female ratio of healthcare professionals was closed to balance (2.82) while the ratio of males was the highest (1.58) among the engineers. There were slightly higher ratio of males among the researchers (2.02), teachers/professors (2.02), and other professionals (2.00).

Table 3.5 Ratio of Male and Female Students in Major in College

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	1.89	1.125		
Age				
29 years or younger	1.84	1.109	0.448	0.719
30 - 39	1.92	1.162		
40 - 49	1.92	1.040		
Over 50	1.90	1.199		
Marital status				
Single	1.86	1.100	1.618	0.199
Married	1.90	1.104		
Others	2.32	1.565		
Number of children				
1	2.03	1.157	3.184*	0.042
2	1.90	1.120		
3 or more	1.71	1.102		
Occupation				
Professor/Teacher	2.02	1.226	21.792***	0.000
Researcher	2.02	1.070		
Healthcare professional	2.82	1.156		
Engineer (company, R&D center, etc.)	1.58	0.960		
Others	2.00	1.176		
Double income status (married)				
Double income	1.88	1.121	0.267	0.766
Single income	1.93	1.085		
Others	1.71	0.951		

Note: ***p<.001, **p<.01, *p<.05

The post-verification of the significance of the number of children showed that the average score of the respondents with three or more children (1.71) was significantly lower than the average score of the respondents with one child (2.03) and had a relatively high ratio of males in the field of major.

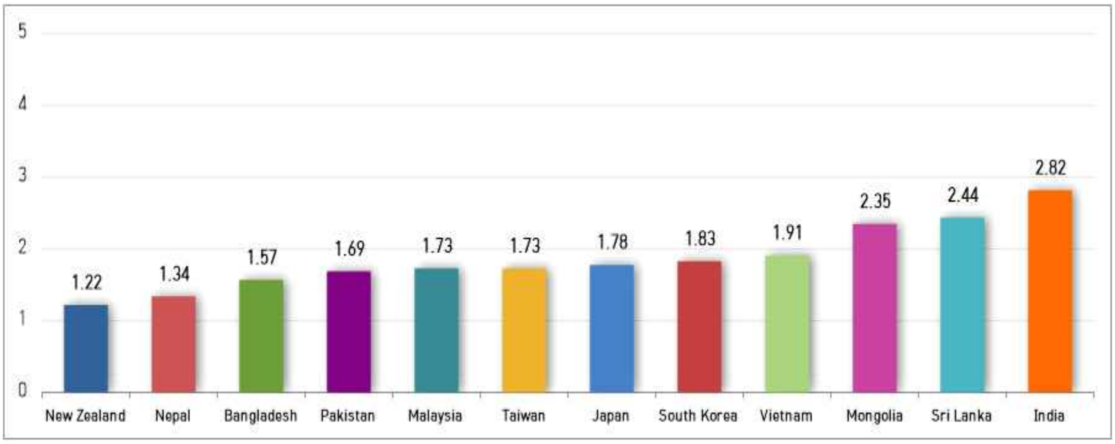


Figure 3.11 Ratio of Male and Female Students in Major in College: Country Average (Unit: Point)

The country average (see above figure) was the highest in India (2.82), followed by Sri Lanka (2.44), Mongolia (2.35), and Vietnam (1.91) showing higher than the APNN average (1.89). The countries that showed lower scores than the APNN average were New Zealand (1.22), Nepal (1.34), Bangladesh (1.57), Pakistan (1.69), Malaysia (1.73), Taiwan (1.73), Japan (1.78), and Korea (1.83).

◦ **Male/Female Ratio 2** : while at graduate school is (was)
A lower score means relatively more men, and a higher score means relatively more women (5-point scale). 3 points mean that the males and females were in the balance.

The male scientists and engineers in 12 countries were asked on the ratio of male and female students in their major when they were in graduate school. Table 3.6 shows the results. The overall average was 1.99 points meaning that there was relatively more male students. The response results showed the statistically significant differences for the respondents' occupations ($F = 13.181$, $p < .000$), the number of children ($F = 3.667$, $p < .05$), and age ($F=3.645$, $p<.05$).

Similar to the ratio indicated in college, the male/female ratio of healthcare professionals during graduate school was closed to balance (2.88) while that of males was high (1.81) among the engineers. There was a slightly higher ratio of males among the teachers/professors (2.09), other professionals (2.08), and researchers (1.94). The statistics were confirmed by the post-verification. In the case of healthcare professionals, the average score was higher than other occupations at the statistically significant level. In the case of engineers, the ratio of males was high in statistically significant level to healthcare professionals, teachers/professors, and other professionals.

The post-verification of the significance of the number of children showed that the average score of the respondents with three or more children (1.77) was significantly lower than the average score of the respondents with one child (2.08) and had a relatively high ratio of men. In the case of age groups, there was the statistically significant difference between the respondents in their 30’s and those in their 50’s. The average score of the respondents in their 50’s (1.80) was lower than that of the respondents in their 30’s (2.1) and had a relatively higher ratio of men.

Table 3.6 Ratio of Male and Female Students in Major in Graduate School

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	1.99	1.069		
Age				
29 years or younger	1.98	1.095	3.645*	0.012
30 - 39	2.10	1.121		
40 - 49	1.94	0.971		
Over 50	1.80	0.985		
Marital status				
Single	2.00	1.103	1.219	0.296
Married	1.96	1.018		
Others	2.32	1.416		
Number of children				
1	2.08	1.061	3.667*	0.026
2	1.97	1.035		
3 or more	1.77	0.960		
Occupation				
Professor/Teacher	2.09	1.076	13.181***	0.000
Researcher	1.94	0.979		
Healthcare professional	2.88	1.100		
Engineer (company, R&D center, etc.)	1.81	1.046		
Others	2.08	1.100		
Double income status (married)				
Double income	1.97	0.999	0.150	0.861
Single income	1.93	1.050		
Others	2.00	1.000		

Note: ***p<.0901, **p<.01, *p<.05

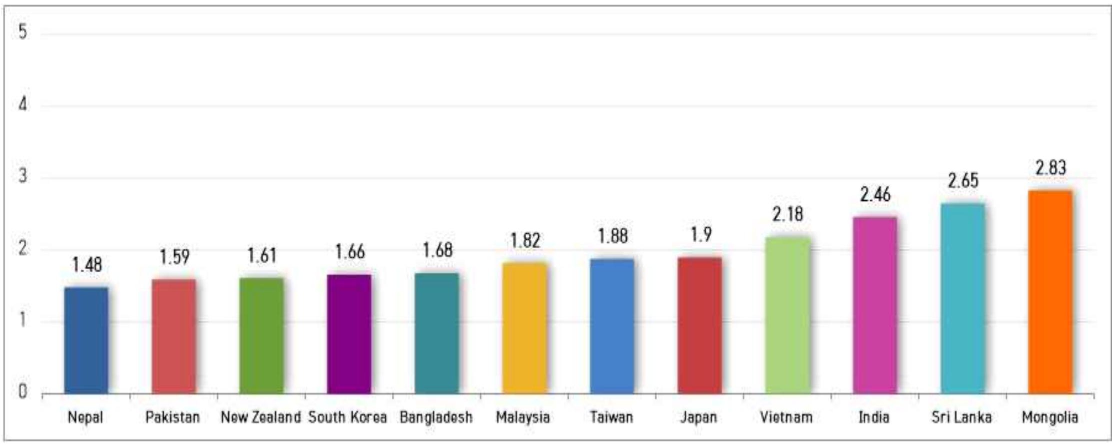


Figure 3.12 Ratio of Male and Female Students in Major in Graduate School Country Average (Unit: Point)

The country average of male/female ratio in graduate school (see above figure) was the highest in Mongolia (2.83), followed by Sri Lanka (2.65), India (2.46), and Vietnam (2.18) showing higher than the APNN average (1.99). The countries that showed the lower score than the APNN average were Nepal (1.48), Pakistan (1.59), New Zealand (1.61), Korea (1.66), Bangladesh (1.68), Taiwan (1.88), and Japan (1.90).

◦ **Male/Female ratio 3** : of my current workplace is
A lower score means relatively more men, and a higher score means relatively more women (5-point scale). 3 points mean that the males and females were in the balance.

The male scientists and engineers in 12 countries were asked on the ratio of male and female students in their fields of major at their current job. Table 3.7 shows the results. The overall average was 2.05 meaning that there were relatively more men. The difference within the respondent group was statistically significant according to the number of children ($F=6.418$, $p<.01$) and occupation ($F=4.385$, $p<.01$).

Table 3.7 Ratio of Male and Female Employees in the Field of Major at Current Job

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	2.05	1.128		
Age				
29 years or younger	2.02	1.163	0.749	0.523
30 - 39	2.02	1.114		
40 - 49	2.14	1.090		
Over 50	2.02	1.115		
Marital status				
Single	2.03	1.123	1.134	0.322
Married	2.04	1.105		
Others	2.42	1.539		
Number of children				
1	2.28	1.192	6.418**	0.002
2	2.06	1.068		
3 or more	1.83	1.150		
Occupation				
Professor/Teacher	2.05	1.163	4.385**	0.002
Researcher	2.04	1.089		
Healthcare professional	2.44	1.229		
Engineer (company, R&D center, etc.)	1.92	1.066		
Others	2.21	1.194		
Double income status (married)				
Double income	2.00	1.100	1.034	0.356
Single income	2.11	1.117		
Others	2.00	1.291		

Note: ***p<.001, **p<.01, *p<.05

The post-verification showed that the respondents with three or more children (2.42) answered that there were higher ratio of men, compared to the respondents with one child (2.28) at a statistically significant level. In the case of occupation, there was a statistically significant difference of the response by the healthcare professions (2.44) and other professionals (2.21) and the response by the engineers (1.92), indicating that the ratio of women was lower among the engineers than the healthcare professionals and other professionals.

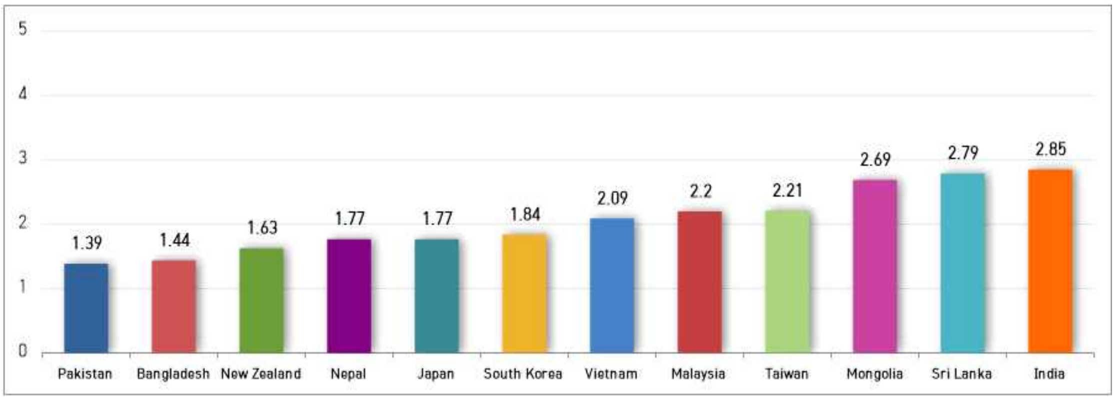


Figure 3.13 Ratio of Male/Female Employees in the Field of Major at Current Work Country Average (Unit: Point)

The country average of male/female ratio in the field of major at their current work (see above figure) was highest in India (2.85), followed by Sri Lanka (2.79), Mongolia (2.69), Taiwan (2.21), Malaysia (2.20), and Vietnam (2.09) showing higher than the APNN average (2.05). The countries that showed the lower score than the APNN average were Pakistan (1.39), Bangladesh (1.44), New Zealand (1.63), Nepal and Japan (1.77 each), and Korea (1.84).

◦ **Male/Female ratio 4 :** at management level at my current workplace is
A lower score means relatively more men, and a higher score means relatively more women (5-point scale). 3 points mean that the men and women were in balance

The male scientists and engineers in 12 countries were asked on the ratio of male and female managers or higher positions in their fields of major at the current job. See Table 3.8 for the results. The overall average was 1.89 meaning that there were relatively more male students. The response results showed the statistically significant differences according to the respondents' ages ($F = 3.331$, $p < .05$) and the number of children ($F = 3.331$, $p < .05$). The post-verification showed that the average score of the respondents in their 50’s or older (1.64) was lower than other age groups at the statistically significant level, meaning that there was a higher ratio of males. In the case of the number of children, the average score of the respondents with three or more children (1.75) was statistically significantly lower than the respondents with one child (2.28) and had the higher ratio of males.

Table 3.8 Ratio of Male and Female Managers or Higher Position in the Field of Major at Current Work

(Unit: Point)

Type	Average	Standard Deviation	F	p
Total	1.89	1.107		
Age				
29 years or younger	1.92	1.116	3.331*	0.019
30 - 39	1.93	1.162		
40 - 49	1.92	1.092		
Over 50	1.64	0.925		
Marital status				
Single	1.92	1.129	0.972	0.379
Married	1.85	1.068		
Others	2.11	1.449		
Number of children				
1	2.09	1.203	4.236*	0.015
2	1.88	1.038		
3 or more	1.75	1.067		
Occupation				
Professor/Teacher	1.94	1.182	1.249	0.288
Researcher	1.81	1.030		
Healthcare professional	1.98	1.090		
Engineer (company, R&D center, etc.)	1.85	1.094		
Others	1.99	1.138		
Double income status (married)				
Double income	1.82	1.027	1.209	0.299
Single income	1.91	1.131		
Others	2.29	1.380		

Note: ***p<.001, **p<.01, *p<.05

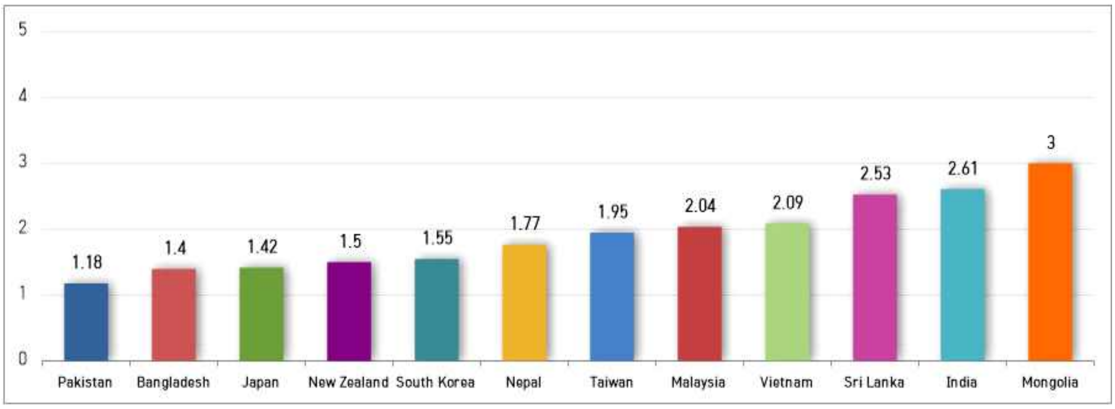


Figure 3.14 Ratio of Male/Female Managers or Higher Position in the Field of Major at Current Work Country Average

The country average of male/female ratio of manager or higher position in the field of major at current work (see above figure) was the highest in **Mongolia (3.00), meaning a balanced male/female ratio**. It was followed by India (2.61), Sri Lanka (2.53), Vietnam (2.09), Malaysia (2.04), and Taiwan (1.95) showing higher than APNN average (1.89). The countries that showed the lower score than the APNN average were **Pakistan (1.18)**, Bangladesh (1.40), Japan (1.42), New Zealand (1.50), Korea (1.55), and Nepal (1.77).

3.2.4.2. Response to Question on Perception of Discrimination

This section discusses the result of the analysis of answers to five questions related to perception of discrimination by male scientists and engineers in 12 APNN member countries.

◦ **Perception of discrimination 1.** "Girls and boys were equally encouraged to choose their majors in STEM during their education period"
The higher score, the higher awareness of discrimination (5-point scale)
3 points mean "Neutral."

The male scientists and engineers in 12 countries were asked on how they agreed to the question of "Girls and boys were equally encouraged to choose their majors in STEM during their education period." See Table 3.9 for the results. The average score of respondents was 2.07 points[7], meaning it was close to "Somewhat agreeable."

Table 3.9 "The female students are encouraged to select the career in STEM during the education period as the male students are."

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	2.07	1.08		
Age				
29 years or younger	2.09	1.075	1.486	0.217
30 - 39	2.12	1.047		
40 - 49	1.95	1.072		
Over 50	2.10	1.166		
Marital status				
Single	2.13	1.047	4.954**	0.007
Married	2.01	1.080		
Others	2.68	1.336		
Number of children				
1	1.84	1.053	3.157*	0.043
2	2.05	1.086		
3 or more	2.09	1.121		
Occupation				
Professor/Teacher	2.21	1.133	5.009**	0.001
Researcher	2.10	1.025		
Healthcare professional	1.69	0.979		
Engineer (company, R&D center, etc.)	1.96	1.091		
Others	2.20	1.038		
Double income status (married)				
Double income	2.03	1.058	0.660	0.517
Single income	1.99	1.113		
Others	2.43	1.397		

Note: ***p<.001, **p<.01, *p<.05

[7] 1. Very agreeable, 2. Somewhat agreeable, 3. Neutral, 4. Somewhat disagreeable, and 5. Not agreeable at all.

The response results showed the statistically significant differences according to the respondents' occupations (F = 5.009, $p < .001$), the marital status (F = 4.954, $p < .01$), and the number of children ($F=3.157$, $p<.05$).

The post-verification showed the statistically significant difference between the average scores of the healthcare professionals (1.69) and the teachers/professors (2.21). The teachers/professors showed the higher score than the healthcare professionals on the question. On the other hand, the respondents who answered “Others (including divorced)” as the marital status showed the lower agreement level, indicating the relatively higher perception of discrimination.

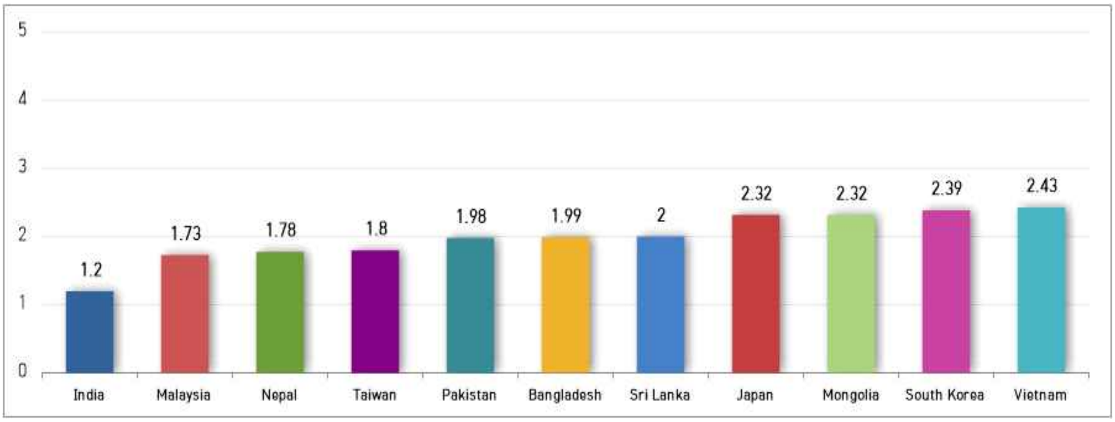


Figure 3.15 “The female students are encouraged to select the career in STEM during the education period as the male students are.” Country Average (unit : point)

The perception of discrimination as indicated by the response to the question “Girls and boys were equally encouraged to choose their majors in STEM during their education period.” was the highest in **New Zealand (2.69)**, followed by Vietnam (2.43), Korea (2.39), Mongolia (2.32), and Japan (2.32) being higher than APNN average (2.07). The countries that showed the score below the APNN average were **India (1.20)**, Malaysia (1.73), Nepal (1.78), Taiwan (1.80), Pakistan (1.98), Bangladesh (1.99), and Sri Lanka (2.00).

◦ **Perception of Discrimination 2.** “It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.”
A higher score means higher awareness of discrimination (more agreeable) (5-point scale). 3 points mean “Neutral.”

The male scientists and engineers in 12 countries were asked on how they agreed to the question of “It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.” Table 3.10 shows the results[8]. The average score of all answers was neutral. The response results showed a statistically significant

[8] 1. Not agreeable at all, 2. Somewhat disagreeable, 3. Neutral, 4. Somewhat agreeable, and 5. Very agreeable (reversely coded)

difference in the number of students (F=5.839, p<.01) and double-income status (F=3.319, p<.05) of the respondents.

The post-verification showed that the respondents who had more children and the double-income respondents answered it was more difficult for the female to get a job in STEM.

Table 3.10 "It is more difficult for a female to find a job in STEM than a male even if the female is equally capable as the male."

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	2.98	1,169		
Age				
29 years or younger	2.99	1.218	1.765	0.152
30 - 39	3.00	1.207		
40 - 49	2.84	1.144		
Over 50	3.08	0.943		
Marital status				
Single	2.95	1.193	0.265	0.768
Married	2.99	1.162		
Others	3.11	1.049		
Number of children				
1	2.80	1.143	5.839**	0.003
2	3.11	1.228		
3 or more	3.16	1.083		
Occupation				
Professor/Teacher	2.94	1.086	0.148	0.964
Researcher	2.96	1.132		
Healthcare professional	2.98	1.446		
Engineer (company, R&D center, etc.)	3.00	1.227		
Others	2.96	1.124		
Double income status (married)				
Double income	3.06	1.179	3.319*	0.037
Single income	2.85	1.129		
Others	3.14	0.900		

Note: ***p<.001, **p<.01, *p<.05

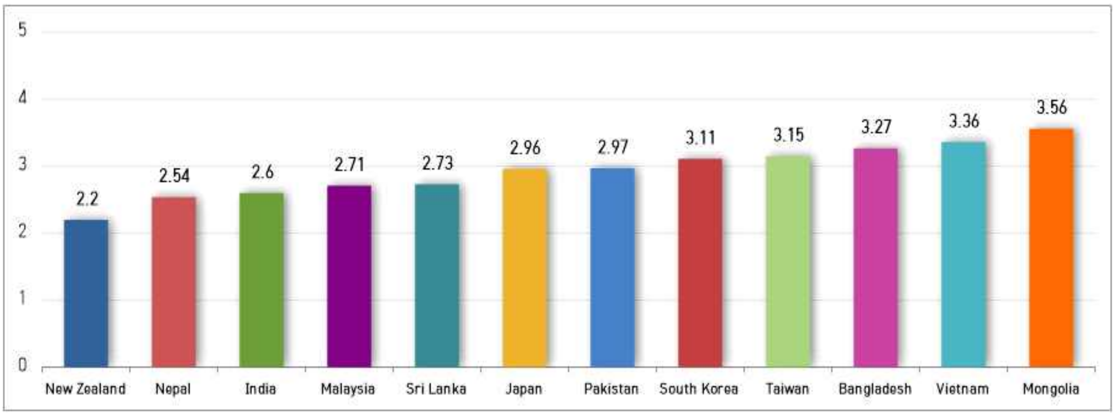


Figure 3.16 "It is more difficult for a female to find a job in STEM than a male even if the female is equally capable as the male." Country Average (Unit : Point)

The country average of perception on discrimination against women even if they have the same capability in STEM (see above figure) was the highest in Mongolia (3.56), followed by Vietnam (3.36), Bangladesh (3.27), Taiwan (3.15), and Korea (3.11) being higher than the APNN. The countries that showed the score below the APNN average were New Zealand (2.20), Nepal (2.54), India (2.60), Malaysia (2.71), Sri Lanka (2.73), Japan (2.96), and Pakistan (2.97).

◦ **Perception of Discrimination 3.** "Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level."
A higher score means higher awareness of discrimination (more agreeable) (5-point scale). 3 points mean "Neutral."

The male scientists and engineers in 12 countries were asked on how they agreed to the question of "Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level." Table 3.11 shows the results.

Table 3.11 "For the same capability and position, the job is fairly distributed and evaluated regardless of gender."

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	2.40	1.102		
Age				
29 years or younger	2.43	1.076	3.918**	0.008
30 - 39	2.50	1.143		
40 - 49	2.22	1.059		
Over 50	2.30	1.094		
Marital status				
Single	2.39	1.035	1.256	0.285
Married	2.39	1.134		
Others	2.79	1.228		
Number of children				
1	2.15	1.140	8.376***	0.000
2	2.54	1.164		
3 or more	2.46	0.972		
Occupation				
Professor/Teacher	2.42	1.097	2.189	0.068
Researcher	2.35	1.103		
Healthcare professional	2.00	1.054		
Engineer (company, R&D center, etc.)	2.44	1.098		
Others	2.44	1.117		
Double income status (married)				
Double income	2.53	1.119	11.792***	0.000
Single income	2.13	1.120		
Others	2.71	1.380		

Note: ***p<.001, **p<.01, *p<.05

The average score of respondents was 2.40 points[9], meaning it was below "Neutral" and close to "Somewhat agreeable."

The response results showed statistically significant differences according to the double-income status (F = 11.792, p <.0.000), the number of children (F = 8.376, p <.000), and the age (F=3.918, p<.01). The post-verification showed the respondents in their 30's, having more children, and in double-income status had the higher awareness of discrimination than the respondents in their 40's, having fewer children, and in single-income status.

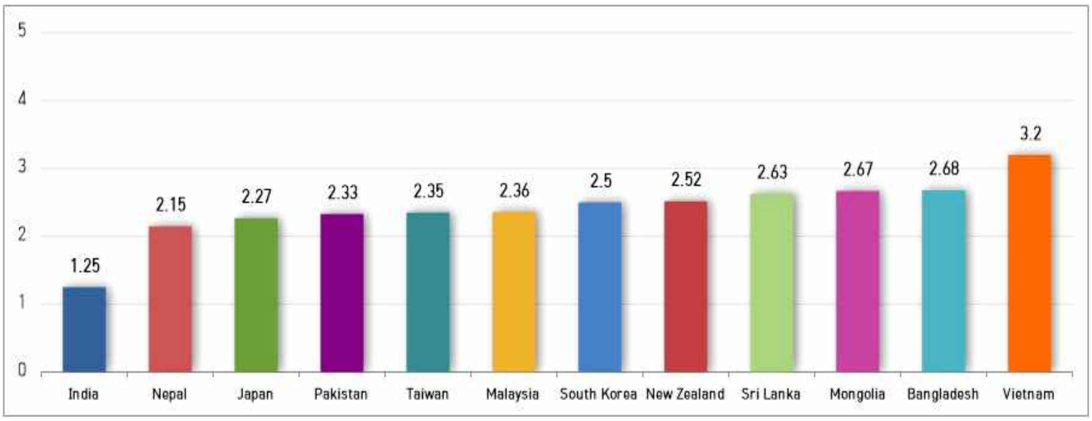


Figure 3.17 "For the same capability and position, the job is fairly distributed and evaluated regardless of gender." Country Average (Unit : Point)

The awareness of discrimination related to fairness in distribution and evaluation of work for the same capability and position in STEM was the highest in Vietnam (3.20), followed by Bangladesh (2.68), Mongolia (2.67), Sri Lanka (2.62), New Zealand (2.52), and Korea (2.50) being higher than the APNN average (2.40). The countries that showed the score below the APNN average were India (1.25), Nepal (2.15), Japan (2.27), Pakistan (2.33), Taiwan (2.35), and Malaysia (2.36).

◦ **Perception of Discrimination 4.** "Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level."
A higher score means higher awareness of discrimination (more agreeable) (5-point scale). 3 points mean "Neutral."

The male scientists and engineers in 12 countries were asked on how they agreed to the question of "Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level." See Table 3.12 for the results. The average score of respondents was 2.90 points[10], meaning it was close to "Neutral."

[9] 1. Very agreeable, 2. Somewhat agreeable, 3. Neutral, 4. Somewhat disagreeable, and 5. Not agreeable at all.

[10] 1. Not agreeable at all, 2. Somewhat disagreeable, 3. Neutral, 4. Somewhat agreeable, and 5. Very agreeable (reversely coded)

The difference between the response groups was statistically significant according to the double-income status of respondents (F=6.445 p<.01). The post-verification showed that the double-income respondents (3.01) had the higher awareness of discrimination than the single-income respondents (2.71) in a statistically significant level. Although it was not statistically significant, the respondents having more children showed higher awareness.

Table 3.12 "It is more difficult for a female scientist to become a research leader or tenured professor than a male scientist."

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	2.90	1.134		
Age				
29 years or younger	2.87	1.119	1.060	0.365
30 - 39	2.98	1.154		
40 - 49	2.84	1.153		
Over 50	2.87	1.076		
Marital status				
Single	2.92	1.103	0.093	0.911
Married	2.90	1.152		
Others	3.00	1.202		
Number of children				
1	2.79	1.201	2.326	0.098
2	2.93	1.139		
3 or more	3.06	1.063		
Occupation				
Professor/Teacher	2.94	1.092	1.296	0.269
Researcher	2.79	1.151		
Healthcare professional	2.91	1.391		
Engineer (company, R&D center, etc.)	2.97	1.135		
Others	2.86	1.088		
Double income status (married)				
Double income	3.01	1.145	6.445**	0.002
Single income	2.71	1.150		
Others	2.86	0.900		

Note: ***p<.001, **p<.01, *p<.05

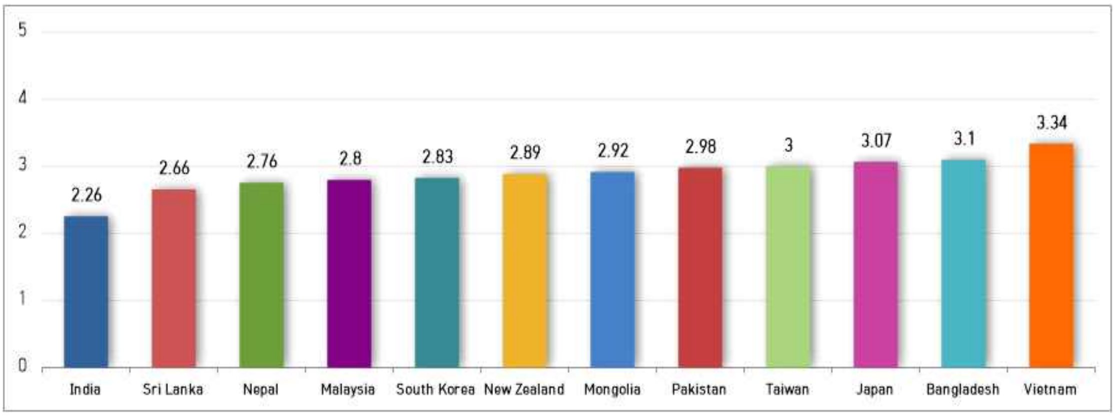


Figure 3.18 "It is more difficult for a female scientist to become a research leader or tenured professor than a male scientist." Country Average (Unit : Point)

The Perception of Discrimination that "Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level." (see above figure) was the highest in Vietnam (3.34), followed by Bangladesh (3.10), Taiwan (3.00), Pakistan (2.98), and Mongolia (2.92). The countries that showed the score below the APNN average were India (2.26), Sri Lanka (2.66), Nepal (2.76), Malaysia (2.80), Korea (2.83), and New Zealand (2.89).

◦ **Perception of Discrimination 5.** "Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues"
A higher score means higher awareness of discrimination (more agreeable) (5-point scale). 3 points mean "Neutral."

The male scientists and engineers in 12 countries were asked on how they agreed to the question of "Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues." See Table 3.13 for the results The average score of respondents was 2.29 points[11], meaning that they tend to disagree with the question.

Table 3.13 "In general, a female receives a smaller wage than an equally qualified male colleague in STEM."

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	2.29	1.141		
Age				
29 years or younger	2.34	1.157	1.166	0.321
30 - 39	2.29	1.112		
40 - 49	2.18	1.153		
Over 50	2.34	1.158		
Marital status				
Single	2.37	1.137	1.634	0.196
Married	2.25	1.143		
Others	2.37	1.257		
Number of children				
1	2.07	1.174	5.321**	0.005
2	2.33	1.152		
3 or more	2.45	1.114		
Occupation				
Professor/Teacher	2.25	1.024	7.328***	0.000
Researcher	2.16	1.113		
Healthcare professional	1.65	1.022		
Engineer (company, R&D center, etc.)	2.40	1.245		
Others	2.43	1.057		
Double income status (married)				
Double income	2.32	1.131	2.483	0.084
Single income	2.13	1.169		
Others	2.29	0.756		

Note: ***p<.001, **p<.01, *p<.05

[11] 1. Not agreeable at all, 2. Somewhat disagreeable, 3. Neutral, 4. Somewhat agreeable, and 5. Very agreeable (reversely coded)

The response results showed a statistically significant difference according to the respondents' occupations (F = 7.328, p <.001) and the number of children (F=5.321, p<.01). The post-verification showed that the healthcare professionals (1.65) tended to show the statistically significantly lower score than all other occupations except the researchers (2.16). The respondents with two or more children showed the higher score than the respondents with one child. In other words, the healthcare professionals showed the lower perception of discrimination than other occupations while the respondents with one child had the higher awareness than the respondents with more children. Although it was not statistically significant, the respondents who were 29 years or younger and the respondents who were over 50 showed the highest average score (2.34 each). The respondents in their 40's (2.18) showed the relatively low score, meaning they had the low awareness of discrimination.

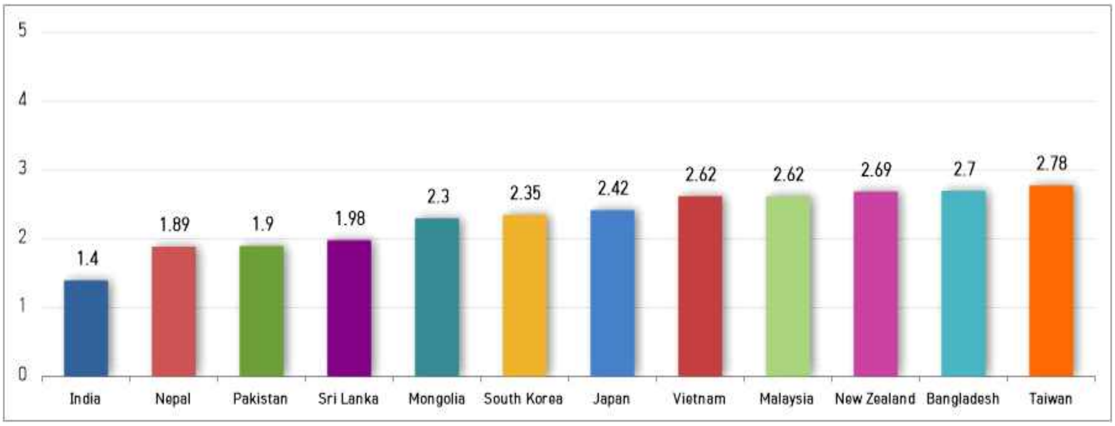


Figure 3.19 "A female receives a smaller wage than an equally qualified male colleague in STEM," Country Average (Unit : Point)

The Perception of Discrimination that "Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues.," (see above figure) was the highest in Taiwan (2.78), followed by Bangladesh (2.70), New Zealand (2.69), Malaysia (2.62), Japan (2.42), Korea (2.35), and Mongolia (2.30) being higher than APNN average (2.29). The countries that showed the score below the APNN average were India (1.40), Nepal (1.89), and Pakistan (1.90).

3.2.4.3. Indirect Experience of Discrimination in STEM

This section discusses the results of the analysis of answers to four questions related to indirect experience of discrimination in STEM as viewed by male scientists and engineers in 12 APNN member countries. The male scientists and engineer showed higher awareness of indirect experience of discrimination on the overall lifecycle of women compared to that of women in school or work. Table 3.14 shows the responses by each of the 12 APNN member countries.

◦ **Indirect Experience of Discrimination 1.**
disadvantaged in receiving research funds or scholarships
A higher score means more indirect experience of discrimination (4-point scale)

The male scientists and engineers in 12 countries were asked on indirect experience of "Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female." As shown in Table 3.14, the average score was lower than mid-level at 1.68 points[12]. The respondents mostly answered "I have not seen or heard of it" or "I have not seen or heard of it but am aware of it."

The response results showed a statistically significant difference according to the respondent's occupation (F = 4.845, p <.001). The average score of the healthcare professionals (1.96) was the highest, followed by the teachers/professors (1.83), other professionals (1.69), and engineers (1.63). The average score of the researchers (1.56) was the lowest. The post-verification showed that the indirect experience of researcher was lower than that of the teachers/professors and healthcare professionals at a statistically significant level.

Table 3.14 Females Being Disadvantaged in Research Fund or Scholarship Because of Gender

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	1.68	0.868		
Age				
29 years or younger	1.61	0.836	1.584	0.191
30 - 39	1.72	0.899		
40 - 49	1.73	0.913		
Over 50	1.65	0.786		
Marital status				
Single	1.63	0.868	1.362	0.257
Married	1.71	0.861		
Others	1.58	0.607		
Number of children				
1	1.84	0.910	1.905	0.150
2	1.70	0.836		
3 or more	1.72	0.865		
Occupation				
Professor/Teacher	1.83	0.946	4.845**	0.001
Researcher	1.56	0.823		
Healthcare professional	1.96	0.902		
Engineer (company, R&D center, etc.)	1.63	0.857		
Others	1.69	0.817		
Double income status (married)				
Double income	1.73	0.857	2.522	0.081
Single income	1.70	0.865		
Others	1.00	0.000		

Note: ***p<.001, **p<.01, *p<.05

[12] 1. I have not seen it or heard of it, 2. I have not seen or heard of it but am aware of it, 3. I have heard of it, 4. I have seen it (reversely coded).

Although it was not statistically significant, the average scores of the respondents who were in their 40’s (1.73) and 30’s (1.72) were higher than those over 50 (1.65) or below 29 (1.61), and the average scores of the married respondents (1.71) and single-income couples (1.73) were higher than that of the singles (1.63) and the single-income couples (1.73), respectively.

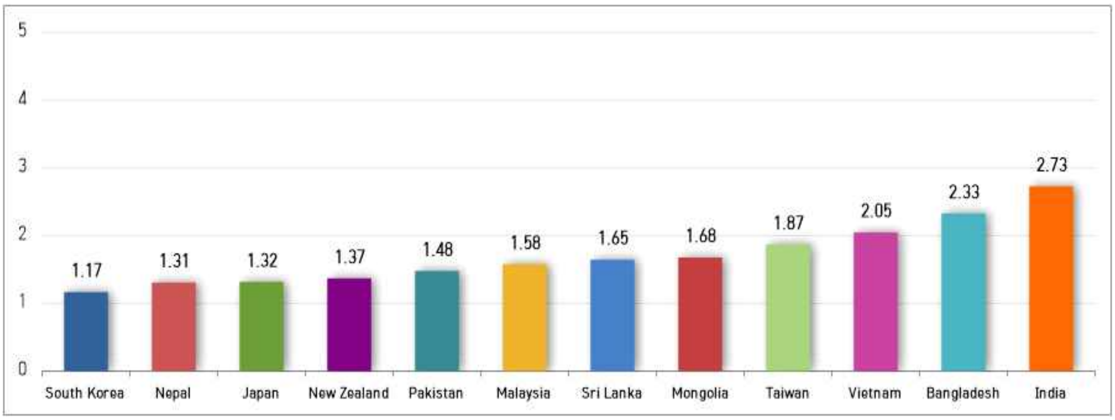


Figure 3.20 Females Being Disadvantaged in Research Fund or Scholarship Because of Gender Country Average

The gender barrier that the females face in research fund or scholarship indirectly experienced by males (see above figure) was **the highest in India (2.73)**, followed by Bangladesh (2.33), Vietnam (2.05), Taiwan (1.87), and Mongolia (1.68) being above the APNN average (1.68), The countries that showed **the score below the APNN average were Korea (1.17)**, Nepal (1.13), Japan (1.32), New Zealand (1.37), Pakistan (1.48), Malaysia (1.58), and Sri Lanka (1.65).

◦ **Indirect Experience of Discrimination 2.**
disadvantaged in participating or leading a research project
A higher score means more indirect experience of discrimination(4-point scale)

The male scientists and engineers in 12 countries were asked on indirect experience of “Woman in STEM is disadvantaged in participating or leading a research project because she is female.” Table 3.15 shows the results. The average score of all respondents was lower than mid-level (1.67 points)[13]. The respondents mostly answered “I have not seen or heard of it” or “I have not seen or heard of it but am aware of it.”

The response results showed a statistically significant difference according to the double-income status ($F = 6.971$, $p <.001$), the occupation ($F = 4.472$, $p <.001$), the age ($F=3.806$, $p<.01$), and the number of children ($F=3.546$, $p<.05$).

13 1. I have not seen it or heard of it, 2. I have not seen or heard of it but am aware of it, 3. I have heard of it, 4. I have seen it (reversely coded).

Table 3.15 Females being disadvantaged in participating in or becoming a project manager because of gender

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	1.67	0.833		
Age				
29 years or younger	1.67	0.814	3.806*	0.010
30 - 39	1.75	0.899		
40 - 49	1.60	0.829		
Over 50	1.52	0.659		
Marital status				
Single	1.69	0.851	0.413	0.662
Married	1.65	0.810		
Others	1.68	0.885		
Number of children				
1	1.56	0.834	3.546*	0.029
2	1.72	0.820		
3 or more	1.77	0.841		
Occupation				
Professor/Teacher	1.79	0.920	4.472**	0.001
Researcher	1.50	0.767		
Healthcare professional	1.76	0.942		
Engineer (company, R&D center, etc.)	1.69	0.837		
Others	1.68	0.755		
Double income status (married)				
Double income	1.73	0.824	6.971**	0.001
Single income	1.52	0.762		
Others	1.43	0.787		

Note: ***p<.001, **p<.01, *p<.05

The post-verification showed that the respondents in their 30', those who had three or more children, the teachers/professors, and the double-income couples had more indirect experiences than those who are 50 years or older, those who had one child, the researchers, and the single-income couples, respectively.

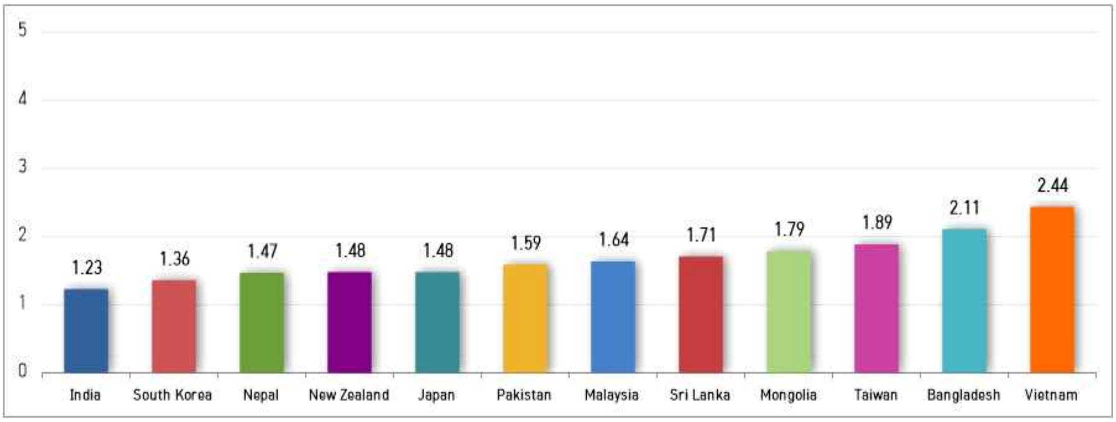


Figure 3.21 Females being disadvantaged in participating in or becoming a project manager because of gender Country Average (Unit : Point)

The discrimination that the females face in participating in or becoming a project manager because of gender (see above figure) was the highest in Vietnam (2.44), followed by Bangladesh (2.11), Mongolia (1.79), and Sri Lanka being above the APNN average (1.67). The countries that showed the score below the APNN average were India (1.23), Korea (1.36), Nepal (1.47), New Zealand and Japan (1.48 each), Pakistan (1.59), and Malaysia (1.64).

◦ **Indirect Experience of Discrimination 3.**
Woman in STEM being sexually harassed or treated unfairly
A higher score means more indirect experience of discrimination (4-point scale).

The male scientists and engineers in 12 countries were asked on indirect experience of "Woman in STEM being sexually harassed or treated unfairly" See Table 3.16 for the results. The average score of all respondents was lower than mid-level (12.03 points)[14]. The respondents mostly answered, "I have not seen or heard of it but am aware of it."

Table 3.16 Females being sexually harassed or treated unfairly at school or work

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	2.03	0.906		
Age				
29 years or younger	1.97	0.907	1.775	0.150
30 - 39	2.02	0.921		
40 - 49	2.12	0.927		
Over 50	2.11	0.817		
Marital status				
Single	2.01	0.903	1.455	0.234
Married	2.04	0.896		
Others	2.37	1.212		
Number of children				
1	2.11	0.903	2.686	0.069
2	1.94	0.896		
3 or more	2.06	0.865		
Occupation				
Professor/Teacher	2.04	0.897	2.228	0.064
Researcher	2.11	0.926		
Healthcare professional	1.80	0.755		
Engineer (company, R&D center, etc.)	2.07	0.947		
Others	1.94	0.834		
Double income status (married)				
Double income	2.00	0.895	1.433	0.239
Single income	2.11	0.906		
Others	1.86	0.378		

Note: ***p<.001, **p<.01, *p<.05

[14] 1. I have not seen it or heard of it, 2. I have not seen or heard of it but am aware of it, 3. I have heard of it, 4. I have seen it (reversely coded).

There were no statistically significant differences among the respondent groups. Although it was not statistically significant, the respondents who were 29 years or younger (1.97) and the healthcare professionals (1.80) showed slightly lower indirect experience than the overall average.

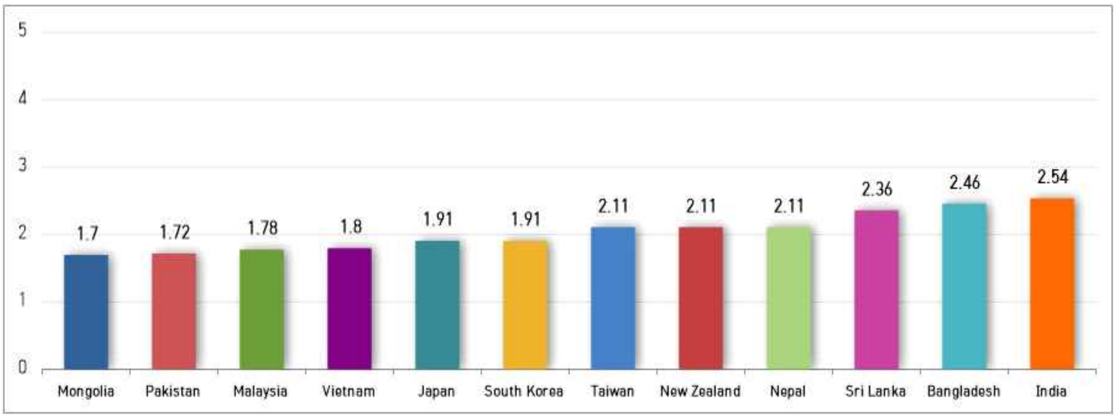


Figure 3.22 Females being sexually harassed or treated unfairly at school or work Country Average

Responses indicating of the indirect experience of females being sexually harassed or treated unfairly at school or work by males (see above figure) was the highest in India (2.54), followed by Bangladesh (2.46), Sri Lanka (2.36), and Nepal, New Zealand and Taiwan (2.11 each) being higher than the APNN average (2.03). The countries that showed the score below the APNN average were Mongolia (1.70), Pakistan (1.72), Malaysia (1.78), Vietnam (1.80), and Japan and Korea (1.91 each). It should be noted that the results are not of the actual mistreatment but of the awareness or perception of male scientists and engineers.

◦ **Indirect Experience of Discrimination 4.**
Woman in STEM leaving work due to her marriage, pregnancy or child care
A higher score means more indirect experience of discrimination (4-point scale).

The male scientists and engineers in 12 countries were asked on indirect experience of “Woman in STEM leaving work due to her marriage, pregnancy or childcare” See Table 3.17 for the results. The overall average of the response (2.89 points)[15] was higher than the middle level that was close to “I have heard of it.”

The response results showed the statistically significant differences according to all respondent characteristics such as the age ($F = 12.852$, $p < .000$), the number of children ($F=11.799$, $p<.000$), double-income status ($F=6.865$, $p<.001$), occupation ($F=5.783$ $p<.000$), and marital status ($F=5.510$, $p<.01$).

The post-verification showed that the older respondents, the married respondents, the

[15] 1. I have not seen it or heard of it, 2. I have not seen or heard of it but am aware of it, 3. I have heard of it, 4. I have seen it (reversely coded).

respondents with one child, the healthcare professionals, and the single-income couple had more indirect experience than the younger respondents, the single respondents, the respondents with three or more children, the engineers and other professionals, and the double-income couples.

Table 3.17 Females having difficulties or resigning from work due to marriage, pregnancy, childbirth, or childbearing

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	2.89	1.041		
Age				
29 years or younger	2.70	1.020	12.852***	0.000
30 - 39	2.86	1.082		
40 - 49	3.10	0.981		
Over 50	3.17	0.948		
Marital status				
Single	2.77	0.978	5.510**	0.004
Married	2.96	1.066		
Others	3.16	0.958		
Number of children				
1	3.19	0.979	11.799***	0.000
2	2.79	1.074		
3 or more	2.75	1.180		
Occupation				
Professor/Teacher	2.95	1.020	5.783***	0.000
Researcher	3.02	1.002		
Healthcare professional	3.35	0.844		
Engineer (company, R&D center, etc.)	2.81	1.108		
Others	2.74	0.974		
Double income status (married)				
Double income	2.86	1.088	6.865**	0.001
Single income	3.12	1.018		
Others	3.57	0.535		

Note: ***p<.001, **p<.01, *p<.05

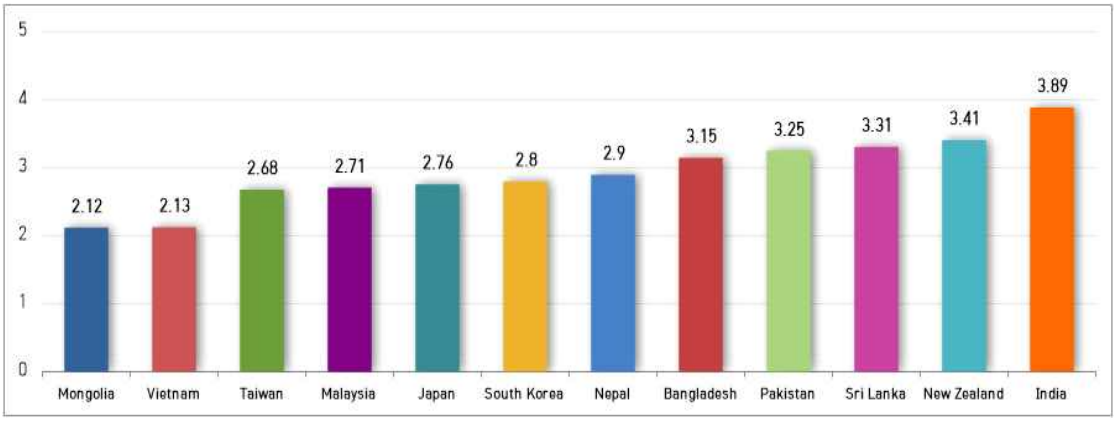


Figure 3.23 Females having difficulties or resigning from work due to marriage, pregnancy, childbirth, or childbearing Country Average (Unit : Point)

The indirect experience of respondents on women having difficulties or resigning from work due to marriage, pregnancy, childbirth, or childbearing (see above figure) was highest in India (3.89), followed by New Zealand (3.41), Sri Lanka (3.31), Pakistan (3.25), Bangladesh (3.15), and Nepal (2.90) being higher than the APNN average (2.89). The countries that showed the score below the APNN average were Mongolia (2.12), Vietnam (2.13), Taiwan (2.68), Malaysia (2.71), Japan (2.76), and Korea (2.80).

3.2.4.4. Career Outlook and Need of Policy to Overcome Gender Barrier in STEM

The male scientists and engineering in the APNN member countries responded to the career outlook of women in STEM to be positive as indicated by the average values being higher than "neutral."

For the four questions related to the need of policy to overcome the gender barrier in STEM, respondents agreed that the support policy was crucial to overcoming "gender barrier" against women. However, the level of agreement on the need for "active measures and quota" to resolve the gender barrier against women was relatively low. Details of the results are as follows.

◦ **Response on career outlook of women in their field**

A higher score means that the respondent thinks the career outlook of women is positive (5-point scale). 3 points mean "Neutral."

The male scientists and engineers from 12 APNN countries' response to "I believe things will turn out fine in the future career for women in STEM" was higher than "Neutral" (4.18 points)[16].

Although the results were statistically significant according to the respondents' occupations ($F=5.783$, $p<.01$), the post-verification showed that the difference among the groups was not clearly revealed. The healthcare professionals (4.40), engineers (4.22), other professionals (4.20), teachers/professors (4.16), and researchers (4.05) were more positive on the career outlook of women. Regarding the ages, positive views were in the order of the respondents who are 50 years or older (4.22), those in their 40's (4.22), 29 years or younger (4.19), and those in their 30's (4.12) The respondents with fewer children had more positive view. Regarding the double-income status, responses were in the order of others (3.57), single-income (3.12), and double income (2.86).

[16] 1. Not agreeable at all, 2. Somewhat disagreeable, 3. Neutral, 4. Somewhat agreeable, and 5. Very agreeable (reversely coded)

Table 3.18 "I believe that the careers of females will be bright in my field of major."

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	4.18	0.863		
Age				
29 years or younger	4.19	0.823	0.887	0.447
30 - 39	4.12	0.914		
40 - 49	4.21	0.853		
Over 50	4.22	0.846		
Marital status				
Single	4.15	0.830	0.467	0.627
Married	4.20	0.882		
Others	4.11	0.937		
Number of children				
1	4.29	0.909	0.652	0.521
2	4.21	0.903		
3 or more	4.19	0.836		
Occupation				
Professor/Teacher	4.16	0.869	2.798*	0.025
Researcher	4.05	0.919		
Healthcare professional	4.40	0.735		
Engineer (company, R&D center, etc.)	4.22	0.813		
Others	4.20	0.899		
Double income status (married)				
Double income	4.20	0.863	0.175	0.840
Single income	4.19	0.921		
Others	4.00	0.816		

Note: ***p<.001, **p<.01, *p<.05

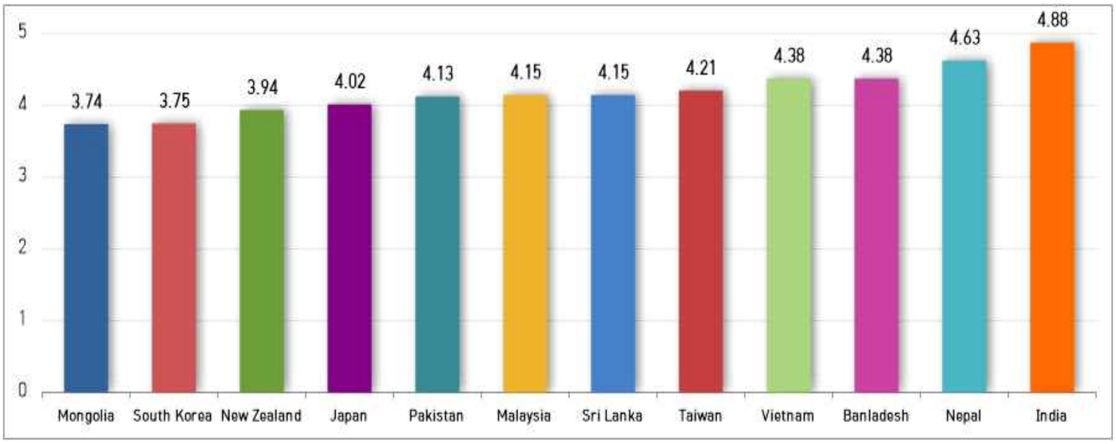


Figure 3.24 "I believe that the careers of females will be bright in my field of major." Country Average

The cross-country evaluation showed the positive view of the career outlook of women in the order of India (4.88), followed by Nepal (4.63), Bangladesh and Vietnam (4.38 each), and Taiwan (4.21), which were countries showing values above the APNN average (4.18). The countries that showed the score below the APNN average were Mongolia (3.74), Korea (3.75), New Zealand (3.94), Japan (4.02), Pakistan (4.13), and Malaysia and Sri Lanka (4.15 each).

◦ **Support policy 1.** The support policy is crucial to overcoming the gender barrier against women in STEM.
A higher score means the respondents agreed more on the need of support policy (5-point scale). 3 points mean "Neutral."

The male scientists and engineers in 12 countries were asked how they agreed on whether "It is crucial to have strong policy support to solve gender inequality in the STEM field." The results are summarized in Table 3.19. The average score was higher than the mid-level (3.88 points)[17], indicating that the respondents were positive on the need for policy to overcome the gender barrier.

The response results show the statistically significant difference to the respondents' occupations ($F=6.151$ $p<.001$), and the researchers (3.65) showed lower agreement level than the healthcare professionals (4.20) and teachers/professors (4.01).

Although it was not statistically significant, the average scores of the respondents who were 50 years or older (4.08) and the respondents in other marital status and double-income status were high.

Table 3.19 "The support policy is crucial to overcoming the gender barrier against women in STEM."

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	3.88	1.015		
Age				
29 years or younger	3.83	0.992	2.599	0.051
30 - 39	3.84	1.022		
40 - 49	3.87	1.037		
Over 50	4.08	1.006		
Marital status				
Single	3.80	0.981	2.485	0.084
Married	3.91	1.034		
Others	4.16	0.958		
Number of children				
1	4.01	1.112	0.284	0.753
2	3.95	0.975		
3 or more	3.95	0.935		
Occupation				
Professor/Teacher	4.01	0.992	6.151***	0.000
Researcher	3.65	1.111		
Healthcare professional	4.20	0.951		
Engineer (company, R&D center, etc.)	3.91	0.973		
Others	3.85	0.981		
Double income status (married)				
Double income	3.92	1.000	0.206	0.814
Single income	3.90	1.106		
Others	4.14	0.690		

Note: ***p<.001, **p<.01, *p<.05

[17] 1. Not agreeable at all, 2. Somewhat disagreeable, 3. Neutral, 4. Somewhat agreeable, and 5. Very agreeable (reversely coded)

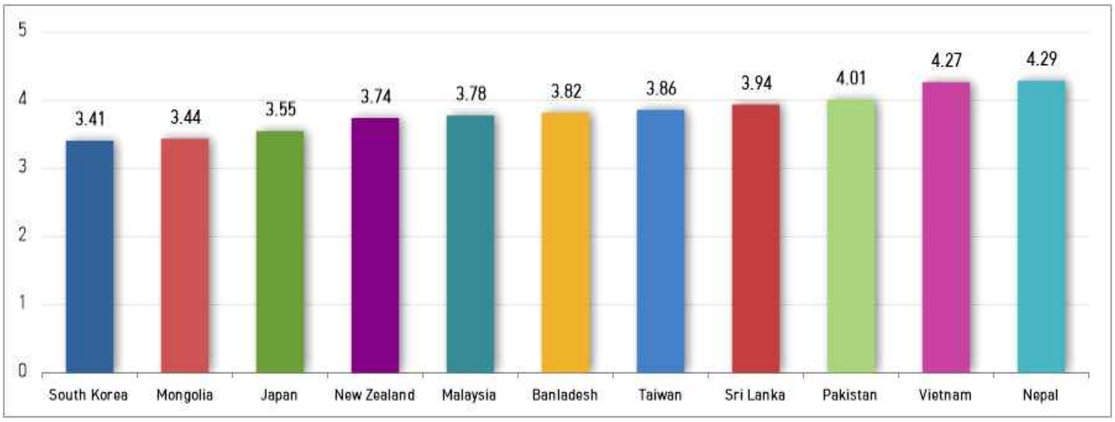


Figure 3.25 "The support policy is crucial to overcoming the gender barrier against women in STEM." Country Average (Unit : Point)

The need of support policy for women in STEM (see above figure) was the highest in India (4.85), followed by Nepal (4.29), Vietnam (4.27), Pakistan (4.01), and Sri Lanka (3.94) being higher than the APNN average (3.88). The countries that showed the score below the APNN average were Korea (3.41), Mongolia (3.44), Japan (3.55), New Zealand (3.74), Malaysia (3.78), Bangladesh (3.82), and Taiwan (3.86).

◦ **Support policy 2.** The active measures and quota are necessary to resolve the gender barrier against women in STEM.
A higher score means the respondents agreed more on the need for active measures and quota (5-point scale). 3 points mean "Neutral."

The male scientists and engineers in 12 countries were asked how they agreed on whether " It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field." See Table 3.20 for the results. The average score of respondents was 3.14 points[18], meaning it was close to "Neutral."

The response results showed a statistically significant difference among the respondents' occupations ($F = 4.704$, $p < .001$), the age ($F = 3.827$, $p < .01$), and the number of children ($F=3.438$, $p<.05$). The post-verification showed that the teachers/professors agreed more than the researchers.

18 1. Not agreeable at all, 2. Somewhat disagreeable, 3. Neutral, 4. Somewhat agreeable, and 5. Very agreeable (reversely coded)

Table 3.20 "The measures such as quota are necessary to resolve the gender barrier against women in STEM."
(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	3.14	1.257		
Age				
29 years or younger	3.15	1.253	3.827*	0.010
30 - 39	3.27	1.284		
40 - 49	3.00	1.177		
Over 50	2.95	1.278		
Marital status				
Single	3.15	1.220	0.123	0.885
Married	3.12	1.278		
Others	3.11	1.243		
Number of children				
1	3.12	1.262	3.438*	0.033
2	3.25	1.326		
3 or more	2.89	1.284		
Occupation				
Professor/Teacher	3.33	1.164	4.704**	0.001
Researcher	2.97	1.201		
Healthcare professional	2.87	1.306		
Engineer (company, R&D center, etc.)	3.07	1.373		
Others	3.29	1.147		
Double income status (married)				
Double income	3.19	1.298	2.710	0.067
Single income	2.98	1.236		
Others	3.43	1.272		

Note: ***p<.001, **p<.01, *p<.05

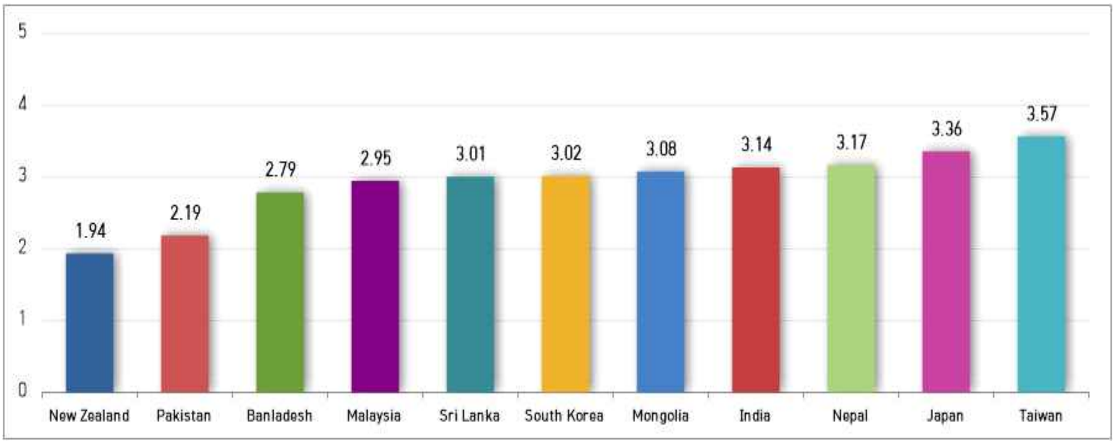


Figure 3.26 "The active measures and quota are necessary to resolve the gender barrier against women in STEM." Country Average (Unit : Point)

The agreement level on the need for active measures and quota to overcome the gender barrier against women in STEM (see above figure) was the highest in Vietnam (4.40), followed by Taiwan (3.57), Japan (3.36), Nepal (3.17), and India (3.14) being above the APNN average (3.14). The countries that showed the score below the APNN average were New Zealand (1.94), Pakistan (2.19), Bangladesh (2.79), Malaysia (2.95), Sri Lanka (3.01), Korea (3.02), and Mongolia (3.08).

3.2.4.5. Perception of Gender Equality

This section discusses the result of the analysis of answers to five questions related to perception of gender equality by male scientists and engineers in 12 APNN member countries. The survey result showed that the respondents had the neutral or higher view of gender equality in average regarding the authority of male in family, the male as the breadwinner, and the role of women in childcare and parenting.

On the other hand, the respondents showed lower than neutral values regarding the separation of role according to gender. The fact that the respondents showed the lowest score on the agreement to the statement "I believe gender equality will be fully achieved only if women are given equal opportunities as men." implies that they had weaker Perception of Gender Equality in the social environment than the family environment.

The younger respondents showed a higher awareness on the questions on gender equality related to the child caring and the equality of opportunity leading to the equality of result. On the other hand, the respondents in their 40's showed the highest score followed in the order of the 50's, 30's, and 29 years or younger on the questions related to the gender role, the breadwinner in the family, and the family hierarchy. It indicated that the older respondents tended to have the higher awareness. Regarding the respondents' occupation, the answers of the teachers/professors showed relatively low scores in all questions except the one related to the equality of opportunity leading to the equality of result while the ranks of the other occupations varied. Details of the results are shown as follows.

◦ **Gender equality 1.** Men and women are different and have different roles. The higher the score, the higher the Perception of Gender Equality (5-point scale). 3 points mean "Neutral."

The male scientists and engineers in 12 countries were asked how they agreed on the statement, "In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves."

The overall average was lower than the mid-level (2.62 points)[19], meaning low perception on gender equality.

The respondents in their 30's or younger showed relatively lower score than those in their 40's or older. The single respondents (2.59) and single-income couples (2.51) showed lower scores than the married respondents (2.62) and the double-income couples (2.68), respectively. Regarding the occupation, the teacher/professors and healthcare professionals (2.49 each) showed low scores. The response results to this question did

[19] 1. Very agreeable, 2. Somewhat agreeable, 3. Neutral, 4. Somewhat disagreeable, and 5. Not agreeable at all.

not show statistically significant differences according to the age, marital status, number of children, occupation, and/or double-income status of respondents. The male scientists and engineers who answered the survey overall showed low scores on perception of gender equality on gender roles.

Table 3.21 Men and women should perform appropriate role for each since men are rational and women are emotional.

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	2.62	1.231		
Age				
29 years or younger	2.55	1.204	1.808	0.144
30 - 39	2.57	1.149		
40 - 49	2.74	1.357		
Over 50	2.72	1.307		
Marital status				
Single	2.59	1.227	1.933	0.145
Married	2.62	1.226		
Others	3.16	1.385		
Number of children				
1	2.47	1.293	1.947	0.144
2	2.66	1.196		
3 or more	2.48	1.214		
Occupation				
Professor/Teacher	2.49	1.232	2.026	0.089
Researcher	2.77	1.289		
Healthcare professional	2.49	1.359		
Engineer (company, R&D center, etc.)	2.63	1.192		
Others	2.58	1.186		
Double income status (married)				
Double income	2.68	1.207	2.115	0.121
Single income	2.51	1.251		
Others	3.00	1.291		

Note: ***p<.001, **p<.01, *p<.05

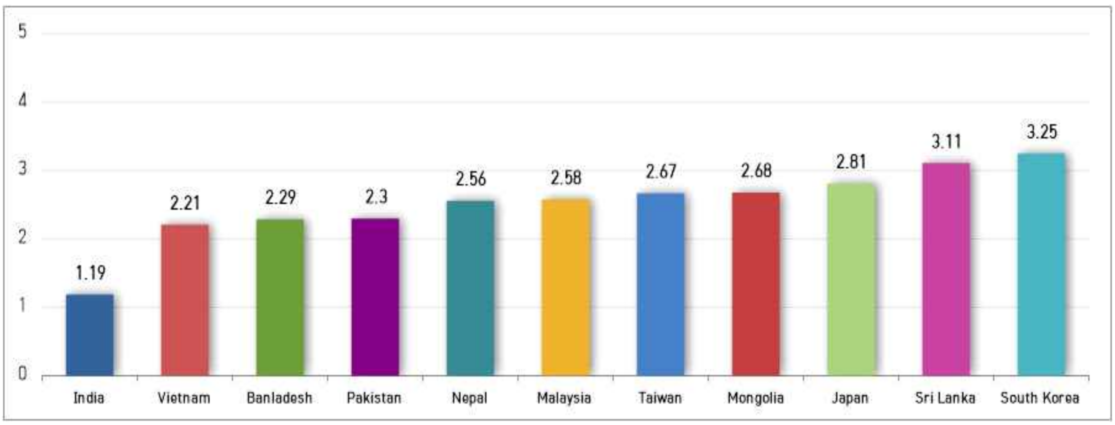


Figure 3.27 Men and women should perform appropriate role for each since men are rational and women are emotional. Country Average (Unit : Point)

The Perception of Gender Equality in regards to the statement “In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves.” (see above figure) was the highest in New Zealand (3.89), followed by Korea (3.25), Sri Lanka (3.11), Japan (2.81), Mongolia (2.68), and Taiwan (2.67) being higher than the APNN average (2.62). The countries that showed the score below the APNN average were India (1.19), Vietnam (2.21), Bangladesh (2.29), Pakistan (2.30), and Nepal (2.56).

◦ **Gender equality 2.** Men should be the bread earner of household. The higher the score, the higher the perception of gender equality (5-point scale). 3 points mean "Neutral."

The male scientists and engineers in 12 countries were asked how they agreed on “Primary breadwinners (who take care of financial obligations) of households should be men.” Results are summarized in Table 3.22 The average score was slightly higher than the middle level (3.27 points)[20] and close to “neutral.”

Table 3.22 Men should be the bread earner of household.

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	3.27	1.281		
Age				
29 years or younger	3.13	1.265	4.486**	0.004
30 - 39	3.24	1.302		
40 - 49	3.49	1.232		
Over 50	3.36	1.295		
Marital status				
Single	3.22	1.307	0.801	0.449
Married	3.31	1.256		
Others	3.37	1.422		
Number of children				
1	3.36	1.279	3.077*	0.047
2	3.26	1.213		
3 or more	3.01	1.345		
Occupation				
Professor/Teacher	3.04	1.290	4.473**	0.001
Researcher	3.47	1.218		
Healthcare professional	2.98	1.581		
Engineer (company, R&D center, etc.)	3.30	1.306		
Others	3.29	1.178		
Double income status (married)				
Double income	3.36	1.237	2.880	0.057
Single income	3.19	1.286		
Others	4.00	0.816		

Note: ***p<.001, **p<.01, *p<.05

[20] 1. Very agreeable, 2. Somewhat agreeable, 3. Neutral, 4. Somewhat disagreeable, and 5. Not agreeable at all.

The response results showed statistically significant differences among the respondent's age ($F = 4.486$, $p < .01$), occupation ($F = 4.473$, $p < .01$), and the number of children ($F=3.077$, $p<.05$).

The post-verification showed that the respondents in their 40's (3.49), those with one child (3.36), and the researchers (3.47) had the statistically significantly higher score than the respondents who were 29 years or younger (3.13), those with three or more children (3.36), and the teachers/professors (3.04) and healthcare professionals (2.98), respectively.

On the other hand, although it was not statistically significant, the average scores of the married respondents (3.31) and the double-income couples (3.36) were higher than the average scores of the single respondents (3.22) and the single-income couples (3.19), respectively

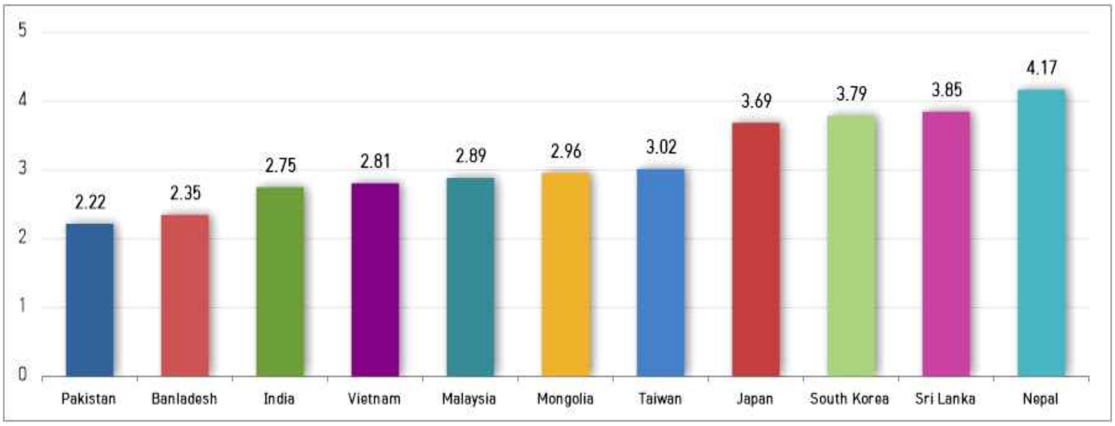


Figure 3.28 Men should be the bread earner of household. Country Average (Unit : Point)

The awareness on gender equality related to males being the breadwinner of family (see above figure) was the highest in New Zealand (4.48), followed by Nepal (4.17), Sri Lanka (3.85), Korea (3.79), and Japan (3.69) being higher than the APNN average (3.27). The countries that showed the score below the APNN average were Pakistan (2.22), Bangladesh (2.35), India (2.75), Vietnam (2.81), Mongolia (2.96), and Taiwan (3.02).

◦ **Gender equality 3.** Women have the innate ability to care for children. The higher score, the higher Perception of Gender Equality (5-point scale). 3 points mean "Neutral."

The male scientists and engineers in 12 countries were asked how they agreed on "Women are born to have a way of caring children that men are not capable of in the same way." Table 3.23 shows the results. The overall average score was at the mid-level (2.96)[21] close to "neutral."

[21] 1. Very agreeable, 2. Somewhat agreeable, 3. Neutral, 4. Somewhat disagreeable, and 5. Not agreeable at all.

The response results showed statistically significant differences among the respondent's occupation (F = 5.069, p ≤.0000). The post-verification showed that the teachers/professors (2.76) had lower Perception of Gender Equality than the healthcare professionals (3.31). On the other hand, although it was not statistically significant, the younger respondents and those with fewer children showed higher Perception of Gender Equality related to child caring and parenting.

Table 3.23 Women have the innate ability that men do not to care for the children.

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	2.96	1.299		
Age				
29 years or younger	3.05	1.268	2.289	0.077
30 - 39	3.00	1.283		
40 - 49	2.86	1.321		
Over 50	2.79	1.357		
Marital status				
Single	2.99	1.288	0.265	0.767
Married	2.95	1.304		
Others	3.11	1.197		
Number of children				
1	3.10	1.286	2.504	0.083
2	2.98	1.312		
3 or more	2.78	1.295		
Occupation				
Professor/Teacher	2.76	1.259	5.069***	0.000
Researcher	2.88	1.213		
Healthcare professional	3.31	1.359		
Engineer (company, R&D center, etc.)	3.13	1.354		
Others	2.87	1.263		
Double income status (married)				
Double income	3.01	1.304	1.954	0.142
Single income	2.84	1.304		
Others	3.43	1.272		

Note: ***p<.001, **p<.01, *p<.05

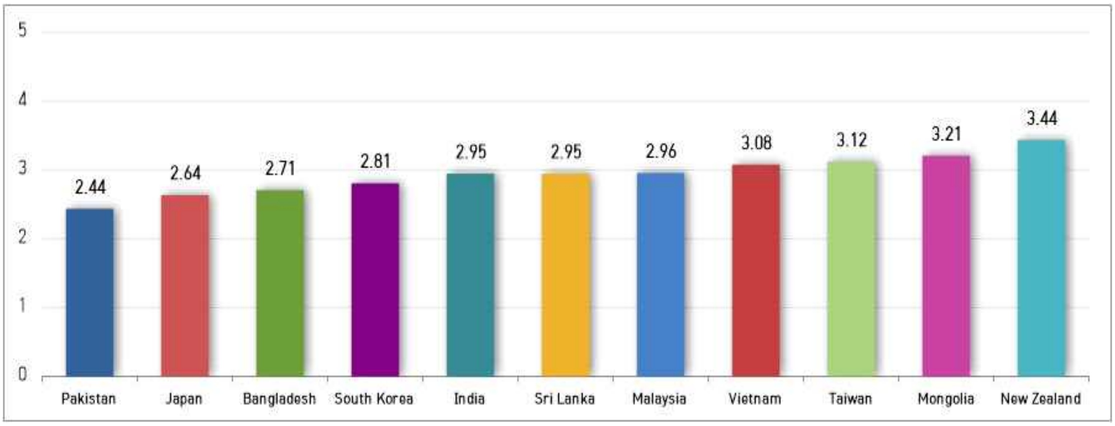


Figure 3.29 Women have the innate ability that men do not to care for the children. Country Average

The awareness on gender equality related to women having the innate ability to care for the children (see above figure) was the highest in Nepal (3.84), followed by New Zealand (3.44), Mongolia (3.21), Taiwan (3.12), Vietnam (3.08), and Malaysia (2.96) being higher than the APNN average (2.96). The countries that showed the score below the APNN average were Pakistan (2.44), Japan (2.64), Bangladesh (2.71), Korea (2.81), and India (2.95).

◦ **Gender equality 4.** The husband should have greater authority than the wife within the family.
The higher score, the higher Perception of Gender Equality (5-point scale). 3 points mean "Neutral."

The male scientists and engineers in 12 countries were asked how they agreed on "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife." Table 3.24 summarizes the results. The average score was higher than the mid-level (3.60)[22], meaning that the Perception of Gender Equality related to the authority of male in family was higher than "neutral."

The response results showed statistically significant differences among the occupation ($F = 8.680$, $p < .001$), the number of children ($F = 7.188$, $p < .001$), and the age ($F=4.520$, $p<.01$) of the respondent. The post-verification showed that the respondents in their 40's (3.84), those with one child (3.77), and the healthcare professionals (5.35) revealed statistically significantly higher average scores than the respondents who were 29 years or younger (3.49), those with three or more children (3.22), and other professionals (4.35), respectively. The respondents in their 40's showed the highest score on this question, followed by those in their 50's, 30's, and 29 years or younger, indicating that the older respondents tended to have the higher perception of gender equality.

[22] 1. Very agreeable, 2. Somewhat agreeable, 3. Neutral, 4. Somewhat disagreeable, and 5. Not agreeable at all.

Table 3.24 "The husband should have greater power and authority than the wife for the order and peace of the family."

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	3.60	1.278		
Age				
29 years or younger	3.49	1.230	4.520**	0.004
30 - 39	3.54	1.260		
40 - 49	3.84	1.257		
Over 50	3.69	1.418		
Marital status				
Single	3.54	1.239	1.618	0.199
Married	3.63	1.301		
Others	4.00	1.155		
Number of children				
1	3.77	1.309	7.118**	0.001
2	3.62	1.236		
3 or more	3.22	1.463		
Occupation				
Professor/Teacher	3.36	1.317	8.680***	0.000
Researcher	3.77	1.226		
Healthcare professional	4.35	1.022		
Engineer (company, R&D center, etc.)	3.53	1.338		
Others	3.62	1.146		
Double income status (married)				
Double income	3.66	1.217	0.839	0.433
Single income	3.56	1.446		
Others	4.00	0.816		

Note: ***p<.001, **p<.01, *p<.05

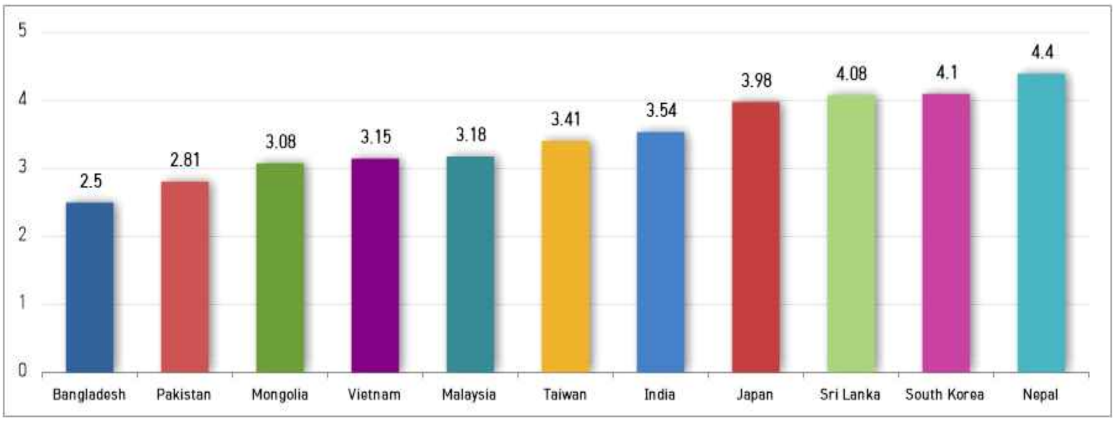


Figure 3.30 "The husband should have greater power and authority than the wife for the order and peace of the family." Country Average (Unit : Point)

The awareness on gender equality related to males having greater power and authority in the family (see above figure) was the highest in New Zealand (4.63), followed by Nepal (4.40), Korea (4.10), Sri Lanka (4.08), and Japan (3.98) being higher than the APNN average (3.60). The countries that showed the score below the APNN average were Bangladesh (2.50), Pakistan (2.81), Mongolia (3.08), Vietnam (3.15), Malaysia (3.18), and Taiwan (3.41).

◦ **Gender equality 5.** Gender equality will be achieved by equal opportunities ? The higher score, the higher Perception of Gender Equality (5-point scale). 3 points mean "Neutral."

The male scientists and engineers in 12 countries were asked how they agreed on "I believe gender equality will be fully achieved only if women are given equal opportunities as men." Table 3.25 shows the results. This question asked whether respondents believed that equal opportunity would lead to the equal outcome. However, resolving gender inequality is more complex than simply giving equal opportunity. The overall average was below the mid-level (2.15 points)[23], indicating that the perception on gender equality related to equality of result was lower than "neutral."

The response results showed statistically significant differences among the occupation ($F = 7.619$, $p < .000$) and the marital status ($F=4.687$, $p<.01$). The post-verification showed that the average scores of healthcare professionals (1.93) and engineers (2.00) were lower than the other occupations.

Although not statistically significant, the single respondents (2.28) showed higher score than the married respondents (2.09)and, the younger respondents tended to show higher scores.

Table 3.25 "If women are given equal opportunities as men, the consequences will also be equal."

(Unit: Point)

Type	Average	Standard Deviation	F	*p*
Total	2.15	1.122		
Age				
29 years or younger	2.20	1.109	2.519	0.057
30 - 39	2.21	1.117		
40 - 49	2.11	1.182		
Over 50	1.95	1.052		
Marital status				
Single	2.28	1.096	4.687**	0.009
Married	2.09	1.128		
Others	2.42	1.071		
Number of children				
1	2.03	1.214	0.455	0.634
2	2.02	1.034		
3 or more	2.13	1.113		
Occupation				
Professor/Teacher	2.18	1.108	7.619***	0.000
Researcher	2.16	1.091		
Healthcare professional	1.93	1.215		
Engineer (company, R&D center, etc.)	2.00	1.087		
Others	2.46	1.148		
Double income status (married)				
Double income	2.10	1.115	0.450	0.638
Single income	2.06	1.158		
Others	1.71	1.113		

Note: ***p<.001, **p<.01, *p<.05

[23] 1. Very agreeable, 2. Somewhat agreeable, 3. Neutral, 4. Somewhat disagreeable, and 5. Not agreeable at all.

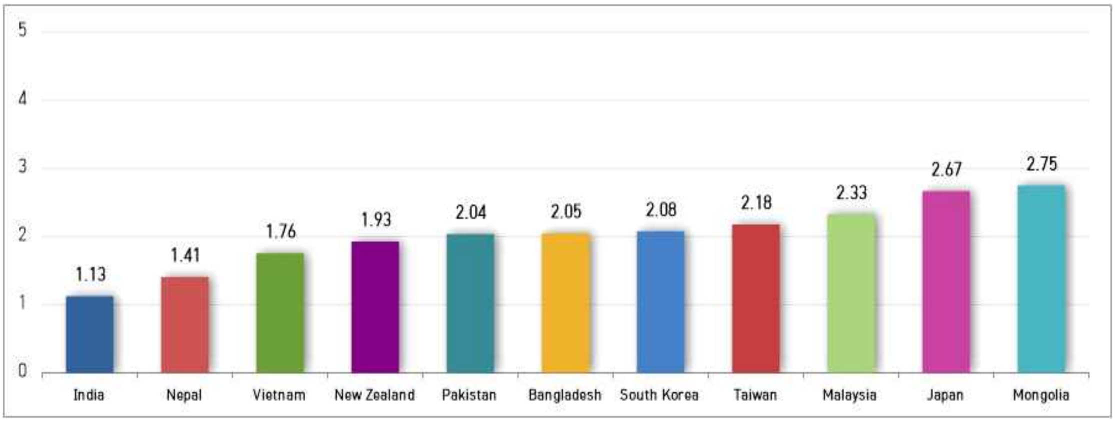


Figure 3.31 "If women are given equal opportunities as men, the consequences will also be equal." Country Average (Unit : Point)

The awareness on gender equality related to equal opportunity leading to the equal outcome (see above figure) was the highest in Sri Lanka (2.85), followed by Mongolia (2.75), Japan 2.65), Malaysia (2.33), and Taiwan (2.18). The countries that showed the score below the APNN average (2.15) were India (1.13), Nepal (1.41), Vietnam (1.76), New Zealand (1.93), Pakistan (2.04), Bangladesh (2.05), and Korea (2.08).

3.2.5. Comprehensive Results

This section discusses the analysis of the answers to each question according to the general profile (age, marital status, number of children, occupation, and double-income status) of the respondents in 12 APNN member countries. We also compared the average scores of the responses for each question by countries.

Pearson's correlation analysis was performed to evaluate the correlation of the respondents' answers for each category along with the general profiles of the respondents.

3.2.5.1. Correlation Analysis

The Pearson's correlation analysis was performed to check the correlation between the respondents' characteristics and the category of question. The following table 3.26 shows the result[24]. The age and marital status showed the positive (+) correlation, meaning that the older respondents were likely to be non-single[25]. The number of children and the perception of discrimination showed positive (+) correlation (r=.164, p.000), meaning that

[24] The correlation coefficients were mostly below 3 points, indicating the weak level. For the discussion here, we assumed that the coefficients larger than 0.1 point were correlated if it was statistically significant considering the offset of response results according to the diversity of 12 countries.

[25] Although the correlation between the age and occupation was statistically significant, we did not analyze it specifically since the occupation was in nominal scale (not the isometric or ratio scale). It was the same for the correlation between the marital status and the occupation.

the respondents with more children tended to have higher awareness of discrimination. The number of children and the male/female ratio showed negative (-) correlation (r=-.138, p.000), meaning that the respondents with more children tended to answer that there was higher ratio of men in their schools or works.

The categories that showed the positive (+) correlation included discrimination perception and indirect experience (r=.211, p.000), indirect experience and support policy (r=.187, p.000), discrimination and support policy (r=.168, p.000), and male/female ratio and indirect experience (r=.128, p.000).

In other words, the awareness of discrimination is directly proportional to the degree of indirect experience, meaning the higher the perception, the higher the indirect experience, or the higher the indirect experience level, the higher the perception of discrimination. Moreover, it indicates that the respondents with stronger indirect experience tended to agree more to the need of support policy and that the respondents with higher awareness of discrimination tended to agree more to the need for policy.

On the other hand, the categories that showed the negative (-) correlation included indirect experience and gender equality (r=-.289, p.000), gender equality and support policy (r=-.216, p.000), and male/female ratio and discrimination(r=-.124, p.000).

In other words, the respondents with a higher Perception of Gender Equality tended to have a lower level of indirect experience and tended to agree less to the need of support policy.

The results indicate that the countries that showed higher Perception of Gender Equality are less likely to implement the support policy. Likewise, the countries that showed a high score on male/female ratio may feel the less need for policy support.

Table 3.26 Result of Correlation Analysis

Subject		Age	Marital Status	Number of children	Occupation	Gender Ratio	Gender Barrier	Indirect Experience	Support Policy	Gender Equality
Age	Pearson Correlation	1								
	Significance Probability (Two-Sided)									
	N	1292								
Marital Status	Pearson Correlation	.592**								
	Significance Probability (Two-Sided)	0.000								
	N	1280	1282							
Number of children	Pearson Correlation	.155**	-0.070							
	Significance Probability (Two-Sided)	0.000	0.067							
	N	681	681	681						
Occupation	Pearson Correlation	-.267**	-.212**	.086*						
	Significance Probability (Two-Sided)	0.000	0.000	0.026						
	N	1287	1277	679	1289					
Male/Female Ratio	Pearson Correlation	-0.022	0.012	-.138**	-0.032					
	Significance Probability (Two-Sided)	0.449	0.675	0.000	0.258					
	N	1233	1226	669	1231	1235				
Gender Barrier	Pearson Correlation	-0.043	-0.014	.164**	0.033	-.124**				
	Significance Probability (Two-Sided)	0.126	0.615	0.000	0.232	0.000				
	N	1285	1275	677	1282	1230	1287			
Indirect Experience	Pearson Correlation	.076**	0.054	-.077*	-.063*	.128**	.211**			
	Significance Probability (Two-Sided)	0.006	0.052	0.044	0.025	0.000	0.000			
	N	1287	1277	679	1285	1232	1284	1289		
Policy Support	Pearson Correlation	-0.014	0.024	-0.041	-0.005	0.022	.168**	.187**		
	Significance Probability (Two-Sided)	0.614	0.388	0.281	0.872	0.439	0.000	0.000		
	N	1289	1279	680	1286	1233	1285	1287	1291	
Gender Equality	Pearson Correlation	0.043	0.012	-.083*	0.052	-0.030	-.088**	-.289**	-.216**	
	Significance Probability (Two-Sided)	0.124	0.677	0.030	0.062	0.286	0.002	0.000	0.000	
	N	1285	1279	681	1282	1230	1281	1283	1285	

3.2.5.2. Multiple Regression Analysis

We performed the multiple regression analysis to identify the independent variables that affected the response of male scientists and engineers to the questions related to the need of support policy, Perception of Gender Equality, and awareness of discrimination to overcome the gender barrier against women.

3.2.5.2.1. Predictor of Support Policy

We performed the multiple regression analysis to identify the independent variables that affect the view on support policy. The independent variables were the age, marital status, number of children, male/female ratio, discrimination, indirect experience, and gender equality while the dependent variable was the (level of agreeing to the need for) support policy.

The analysis showed that the independent variable that had the largest effect on the support policy was the (awareness of) gender equality (β=-0.213, p.000). Moreover, the (level of agreeing to the need for) support policy (β=0.123, p.001), age (β=-0.105, p.000), and indirect experience (β=0.102, p.000) showed some effect on the level of agreeing to the need of support policy.

In other words, the respondents with higher Perception of Gender Equality tended to agree less to the need of support policy. It can be concluded that the characteristics of the countries or environments of the respondents with higher Perception of Gender Equality may have affected the level of agreeing to the need of support policy. Moreover, the respondents with a higher score on discrimination and indirect experience and the younger respondents agreed more to the need of support policy. These four independent variables were significant in explaining the levels of respondents' agreeing to the need of support policy, and the total describing variation was 10.0% (R^2=.100, F=18.200, p.000). The effects of other independent variables such as the marital status, number of children, and male/female ratio were not statistically significant.

Table 3.27 Predictor Variables of Need of Support Policy: Result of Multiple Regression Analysis

Subject	Dependent Variable: Support Policy			
	B	*B*	*t*	*p*
(Constant)	3.935		14.752***	0.000
Gender Equality	-0.255	-0.213	-5.548***	0.000
Discrimination	0.162	0.123	3.294**	0.001
Age	-0.010	-0.105	-2.829**	0.005
Indirect Experience	0.158	0.102	2.614**	0.009
R^2	0.100			
F	18.200			
p	0.000			

3.2.5.2.2. Predictor of Gender Equality

The multiple regression analysis was performed on seven independent variables such as the age, marital status, number of children, male/female ratio, discrimination, indirect experience, and support policy that affected the Perception of Gender Equality. The analysis showed that indirect experience (β=-0.238, p.000) had the largest effect on the Perception of Gender Equality and the support policy (β=-0.212, p.000). The number of children (β=-0.097, p.01) also had some effect on the Perception of Gender Equality.

In other words, the respondents who had less indirect experience of gender barrier and who agreed less to the need of support policy tended to have the higher Perception of Gender Equality. Moreover, the respondents who had fewer children showed the higher Perception of Gender Equality.

These three independent variables were significant in explaining the levels of respondents' agreeing to the need of support policy, and the total describing variation was 11.9% (R^2=.119, F=30.736, p.000).

The effects of other independent variables such as the age, marital status, male/female ratio, and discrimination were not statistically significant.

Table 3.28 Predictor Variables of Gender Equality: Result of Multiple Stepwise Regression Analysis

Subject	Dependent Variable: Gender Equality			
	B	*B*	*t*	*p*
(Constant)	4.332		27.267***	0.000
Indirect Experience	-0.310	-0.238	-6.415***	0.000
Support Policy	-0.177	-0.212	-5.724***	0.000
Number of Children	-0.094	-0.097	-2.652**	0.008
R^2	0.119			
F	30.736***			
p	0.000			

3.2.5.2.3. Predictor of Perception of Discrimination

We performed the multiple regression analysis to identify the independent variables that affected the perception of discrimination. The independent variables were the age, marital status, number of children, male/female ratio, indirect experience, and gender equality while the dependent variable was the (level of agreeing to the existence of) discrimination.

The analysis showed that the independent variable that had the largest effect on the support policy was the male/female ratio (β=-0.189, p.000). It was followed by the number of children (β=-0.161, p.000), the indirect experience (β=-0.145, p.000), the support policy (β=-0.121, p.01), and the age (β=-0.082, p.05) with statistical significance.

In other words, the respondents who answered higher male/female ratio at school or work, those who had a higher degree of indirect experience of discrimination, and those who agreed more to the need for policy showed stronger awareness of discrimination.

Moreover, the respondents with more children and the younger respondents tended to be more aware of discrimination.

These five independent variables were significant in explaining the respondents' awareness levels of discrimination and the total describing variation was 10.1% (R^2=.101, F=14.841, p.000).

The effects of other independent variables such as the marital status and gender equality were not statistically significant.

Table 3.29 Predictor Variables of Awareness of Discrimination
: Result of Multiple Stepwise Regression Analysis

Subject	Dependent Variable: Gender Barrier			
	B	*B*	*t*	*p*
(Constant)	2.120		10.951***	0.000
Male/Female Ratio	-0.160	-0.189	-5.038***	0.000
Indirect Experience	0.172	0.145	3.818***	0.000
Number of Children	0.142	0.161	4.263***	0.000
Support Policy	0.092	0.121	3.194**	0.001
Age	-0.006	-0.082	-2.148*	0.032
R^2	0.101			
F	14.841			
p	0.000			

4. Analysis of Survey Results by Participating Nations

4. Analysis of Survey Results by Participating Nations

4.1. Nepal

4.1.1. General Profiles of Male Scientist and Engineer Respondents in Nepal

A total of 98 male scientists and engineers (7.6% of total respondents) answered the survey. Table 4.1.1 shows the age, marital status, number of children, and occupation of the male scientist and engineer respondents in Nepal.

Regarding the age, 44.3% were in their 30’s, 29.9% were 29 years or younger, 14.4% were in their 40’s, and 11.3% were 50 years or older. There were more married respondents at 65.3% than the single respondents at 34.7%. Of the respondents that had the children, 42.6% had one child, 40.4 had two children, and 17.0% had three or more children.

In the case of couples, 60.7% were double-income couples while 39.3% were single-income couples. Regarding the occupation, 79.6% were engineers, followed by 12.2% for other professions, 5.1% for researchers, 2.0% for teachers/professors and 1.0% for healthcare professionals.

Table 4.1.1 General Status Profile of Respondents in Nepal

(Unit: Person, %)

Composition	Frequency	%
Age		
29 years or younger	29	29.9
30 - 39	44	44.3
40 - 49	14	14.4
Over 50	11	11.3
Marital status		
Single	34	34.7
Married	64	65.3
Others (including divorced)	-	-
Number of Children		
1	20	42.6
2	19	40.4
3 or more	8	17.0
Occupation		
Professor/Teacher	2	2.0
Researcher	5	5.1
Healthcare professional	1	1.0
Engineer (company, R&D center, etc.)	78	79.6
Others	12	12.2
Double income status (married)		
Double income	37	60.7
Single income	24	39.3

4.1.2 Comparison of Answers by Male Scientists and Engineers in Nepal with Other APNN Member Countries

The questions in the survey are divided into five categories including “male/female ratio” in the major field of respondents, “perception of discrimination” against women in STEM, “indirect experience” of discrimination in STEM, “need of support policy” to resolve gender barriers in STEM, and perception of “gender equality.”

Average scores of the respondents from Nepal were compared with the average scores of the respondents from the other 11 APNN countries in each category as follows.

The average male/female ratio in the fields of male scientists and engineers was 1.60, and it was statistically significantly (t=-5.670, p.000) lower, meaning more there were more men than the average of the respondents from the other 11 countries which was 1.98. The average score for the perception of discrimination was 2.22 which was lower than the average score (2.55) from the other 11 countries at statistically significant level (t=-4.471, p.000). The average score for the indirect experience of discrimination was 1.95 which was also lower than the average score (2.08) of the other 11 countries at statistically significant level (t=-2.407, p.0018).

On the other hand, the average score of male scientists and engineers from Nepal agreeing to the need of support policy to overcome the gender barrier in STEM was 3.73 which was higher than “Neutral” and also higher than the average score of the other countries (3.49) at statistically significant level (t=2.458, p.05). Lastly, the average score for the Perception of Gender Equality was 3.28 which was higher than the average score of the other countries (2.89) at statistically significant level (t=6.219, p.000).

In summary, Nepal had more men, showed lower awareness and indirect experience of discrimination, agreed more to the need of support policy, and revealed higher perception of gender equality than the other 11 countries.

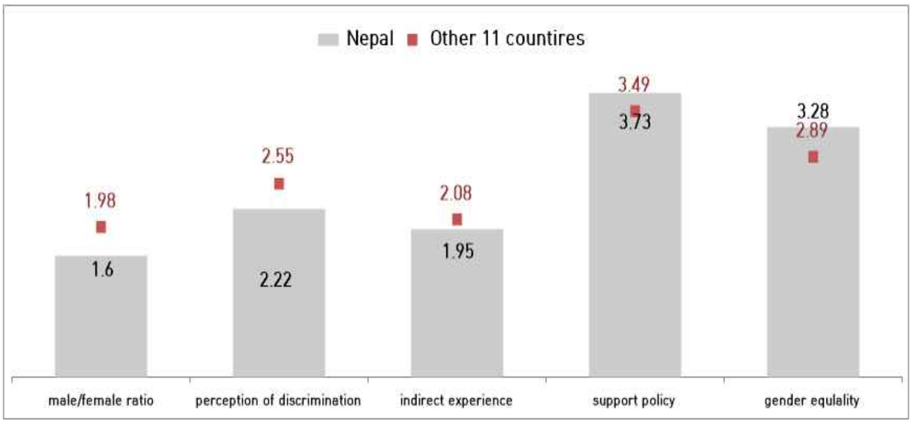


Figure 4.1.1 Comparison of Answer between Nepal and Other Countries: Aggregated (Unit: Point)

4.1.3. Comparison of Response by Male Scientists and Engineers in Nepal and Other APNN Countries to Each Question

◦ **Male/Female ratio**

: A lower score means relatively more men, and a higher score means relatively more women (5-point scale). 3 points mean "Neutral."

The average male/female ratio in the fields of respondents was 1.60, meaning there were relatively more men. The male/female ratio in STEM was the lowest scoring 1.34 in college and 1.77 at current work and manager or higher position, meaning that the ratio of women was slightly higher at work than when they were in college.

The figure was statistically significantly (t=-5.670, p.000) lower than 1.98 which was the average of the respondents from the other 11 countries. Nepal showed more men when the respondents were in college (t=-6.747, p.000), in graduate school (t=-5.4768, p.000), and in current work (t=-3.284, p.001) than other countries at the statistically significant level.

Table 4.1.2 Comparison of Answer to Other Countries : Mae/Female Ratio

(Unit: Point)

Type		Question	Nepal Average (n=98)	Average of Other Countries (n=1,196)	*t*	*(p)*
Male/Female Ratio (5-Point Scale)	1	The male/female ratio of my department during my university(college) education is (was)	1.34	1.94	-6.747***	0.000
	2	(If having taken graduate course) The male/female ratio of my department while at graduate school is (was)	1.48	2.03	-5.476***	0.000
	3	The male/female ratio of my current workplace is	1.77	2.07	-3.284**	0.001
	4	The male/female ratio at management level at my current workplace is	1.77	1.90	-1.088	0.277
	Sub Scale		1.60	1.98	-5.670***	0.000

◦ **Perception of Discrimination**

: The higher the score, the higher the perception of discrimination (5-point scale). 3 points mean "Neutral."

The average score of perception of discrimination in STEM was 2.22, which was below the mid-level. Of the five questions related to the Perception of Discrimination, "Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level." received the highest average score (2.76). "Girls and boys were equally encouraged to choose their majors in STEM during their education period." received the lowest average score (1.78).

The overall average of the answers to the questions related to perception of discrimination was 2.22 and lower than the overall average of 11 other APNN countries (2.55) at a statistically significant level (t=-4.471, p.000). The average scores of responses to all questions were relatively low.

A significant difference was observed between the responses, in the order of "It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications." (t=-3.846, p.000), followed by "Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues." (t=-3.680, p.000), "Girls and boys were equally encouraged to choose their majors in STEM during their education period." (t=-2.849, p.01), and "Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level." (t=-2.344, p.05)." Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists." scored relatively low although not statistically significant.

In other words, the discrimination as perceived by the male scientist and engineer respondents in Nepal was lower than the respondents from other countries.

Table 4.1.3 Comparison of Answer to Other Countries : Perception of Discrimination

(Unit: Point)

Type		Question	Nepal Average (n=98)	Average of Other Countries (n=1,196)	*t*	*(p)*
Perception of Discrimination (5-Point Scale)	1	Girls and boys were equally encouraged to choose their majors in STEM during their education period.	1.78	2.10	-2.849**	0.004
	2	It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.	2.54	3.01	-3.846***	0.000
	3	Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.	2.15	2.42	-2.344*	0.021
	4	Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.	2.76	2.92	-1.347	0.178
	5	Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues.	1.89	2.33	-3.680***	0.000
	Sub Scale		2.22	2.55	-4.471***	0.000

◦ **Indirect experience of discrimination**

: The higher score, the more experience of indirect discrimination (4-point scale)

The overall average of the response by the male scientist and engineers in Nepal on the indirect experience of discrimination was 1.95 points which was lower than the median value of 2.5 points in a 4-point scale and close to the level of "I have not seen or heard of it but am aware of it." The highest level of indirect experience was the discrimination related to "marriage, pregnancy, and childbirth" (2.90) while the lowest level of indirect experience was that related to "research fund and scholarship."

The overall average of responses to questions related to the level of indirect experience was lower than the overall average of other 11 countries (2.08), at a statistically significant level (t=-2.407, p.0018). More specifically, the average scores of the responses to the questions of discrimination related to "research fund and scholarship" (t=-6.513, p.000) and that to "project participation and leader" (t=-2.880, p.005) were lower than the average scores of other countries.

Table 4.1.4 Comparison of Answer to Other Countries : Indirect Experience

(Unit: Point)

Type		Question	Nepal Average (n=98)	Average of Other Countries (n=1,196)	*t*	*(p)*
Indirect Experience of Discrimination (4-Point Scale)	1	Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female.	1.31	1.71	-6.513***	0.000
	2	Woman in STEM is disadvantaged in participating or leading a research project because she is female.	1.47	1.69	-2.880**	0.005
	3	Woman in STEM being sexually harassed or treated unfairly	2.11	2.03	0.881	0.379
	4	Woman in STEM leaving work due to her marriage, pregnancy or childcare	2.90	2.89	0.046	0.963
	Sub Scale		1.95	2.08	-2.407*	0.018

◦ **Career Outlook and Need of Support Policy**

: A higher score means that the respondents agreed more on the need (5-point scale). 3 points mean "Neutral."

The male scientists and engineers had a very positive view on the career outlook of women in their fields as the average score was 4.63. The score was higher than the average 4.14 of 11 other countries at a statistically significant level (t=7.169, p.000), indicating that the respondents in Nepal had a more positive view than other 11 APNN member countries.

The average score of male scientists and engineers in Nepal answering to the question "It is crucial to have strong policy support to solve gender inequality in the STEM field." was 4.29, meaning that they generally agreed to it. It was higher than the average of other 11 countries (3.84) at the statistically significant level (t=5.295, p.000). In other words, the male scientists and engineers in Nepal agreed that there is need of policy to overcome the gender barrier, more than those in other countries.

The average score of male scientists and engineers in Nepal answering to the question "It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field." was 3.17, meaning that they agreed to it in the neutral level. The score was no different than the average of other 11 countries (3.13) at a statistically significant level.

Table 4.1.5 Comparison of Answer to Other Countries : Need of Support Policy

(Unit: Point)

Type		Question	Nepal Average (n=98)	Average of Other Countries (n=1,196)	*t*	*(p)*
Career Outlook	1	I believe things will turn out fine in the future career for women in STEM	4.63	4.14	7.169***	0.000
Need of Support Policy (5-Point Scale)	1	It is crucial to have strong policy support to solve gender inequality in the STEM field.	4.29	3.84	5.294***	0.000
	2	It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.	3.17	3.13	0.310	0.756
	Sub Scale		3.73	3.49	2.458*	0.014

◦ **Perception of gender equality**

: The higher the score, the higher the perception of gender equality (5-point scale). 3 points mean "Neutral."

Five questions were asked of male scientists and engineers in Nepal on their perception of gender equality in STEM. The overall average of responses to all questions was 3.28 points, being slightly higher than the mid-level.

The highest score was on to the statement "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife" (4.40). It was followed by "Primary breadwinners (who take care of financial obligations) of households should be men" (4.17) and "Women are born to have a way of caring children that men are not capable of in the same way" (3.84). The scores indicate that the respondents had more Perception of Gender Equality regarding the gender role in family.

On the other hand, the average scores on "In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves" (2.56) and "I believe gender equality will be fully achieved only if women are given equal opportunities as men" (1.44) were low. The scores indicate that the respondents had strong perception of conventional division of gender role and that equal opportunity would lead to equal outcome, meaning that the Perception of Gender Equality related to these questions was relatively low.

The overall average score of 3.28 was higher than the average score of 2.89 of other 11 countries at the statistically significant level (t=6.219, p.000). More specifically, the average scores on "Primary breadwinners (who take care of financial obligations) of households should be men" (t=8.958, p.000), "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife" (t=8.760, p.000), and "Women are born to have a way of caring children that men are not capable of in the same way" (t=7.055, p.000) were higher than other 11 countries at the statistically significant levels. The average scores indicate that the male scientists and engineers in Nepal had a higher Perception of Gender Equality related to gender role in family than those in other countries.

On the other hand, the average score on “I believe gender equality will be fully achieved only if women are given equal opportunities as men” was lower than the average score of 11 other countries at the statistically significant level (t=-9.043, p.000). It indicates that the male scientists and engineers in Nepal had lower Perception of Gender Equality related to equity than those in other countries.

Table 4.1.6Comparison of Answer to Other Countries : Perception of Gender Equality

(Unit: Point)

Type		Question	Nepal Average (n=98)	Average of Other Countries (n=1,196)	*t*	*(p)*
Perception of Gender Equality (5-Point Scale)	1	In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves.	2.56	2.62	-0.579	0.564
	2	Primary breadwinners(who take care of financial obligations) of households should be men.	4.17	3.20	8.958***	0.000
	3	Women are born to have a way of caring children that men are not capable of in the same way.	3.84	2.89	7.055***	0.000
	4	In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.	4.40	3.53	8.760***	0.000
	5	I believe gender equality will be fully achieved only if women are given equal opportunities as men.	1.41	2.22	-9.043***	0.000
	Sub Scale		3.28	2.89	6.219***	0.000

4.1.4. Comparison of Responses in Nepal with Other Countries

◦ **Male/Female ratio**

: A lower score means relatively more men, and a higher score means relatively more women (5-point scale). 3 points mean “Neutral.”

The average male/female ratio in the fields of male scientists and engineers was 1.60, meaning there were relatively more men. The differences according to the characteristics (age, marital status, number of children, occupation, and double income status (if married)) of the respondents in Nepal were evaluated by ANOVA (or t) analysis. Table 4.1.7 shows the results.

Table 4.1.7 Male/Female Ratio in Nepal: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	1.60			
Age				
29 years or younger	1.76	0.623	1.477	0.227
30 - 39	1.56	0.595		
40 - 49	1.36	0.478		
Over 50	1.64	0.595		
Marital status				
Single	1.77	0.634	1.861	0.066
Married	1.52	0.565		
Others (including divorced)	-	-		
Number of Children				
1	1.36	0.422	0.243	0.786
2	1.42	0.590		
3 or more	1.28	0.281		
Occupation				
Professor/Teacher	2.25	-	1.545	0.196
Researcher	1.95	0.622		
Healthcare professional	1.25	-		
Engineer (company, R&D center, etc.)	1.53	0.585		
Other	1.83	0.597		
Double income status (married)				
Double income	1.54	0.543	1.052	0.297
Single income	1.39	0.549		

Note: ***p<.001, **p<.01, *p<.05

The differences in the responses to the male/female ratios in the fields of respondents in Nepal according to the characteristics of the respondents were not statistically significant. Although the differences were not statistically significant, the average scores of the respondents in their 40's (1.36), the married respondents (1.52), and the healthcare professionals (1.25) were the lowest in each category of characteristics. On the other hand, the average scores of the respondents who were 29 years or younger (1.76) and the single respondents (1.77) were the lowest. These indicate that the younger and single respondent groups had the higher ratio of female scientists and engineers than other respondent groups[26].

[26] Teacher/professor and healthcare professional were excluded from the analysis since there was only one respondent in each group.

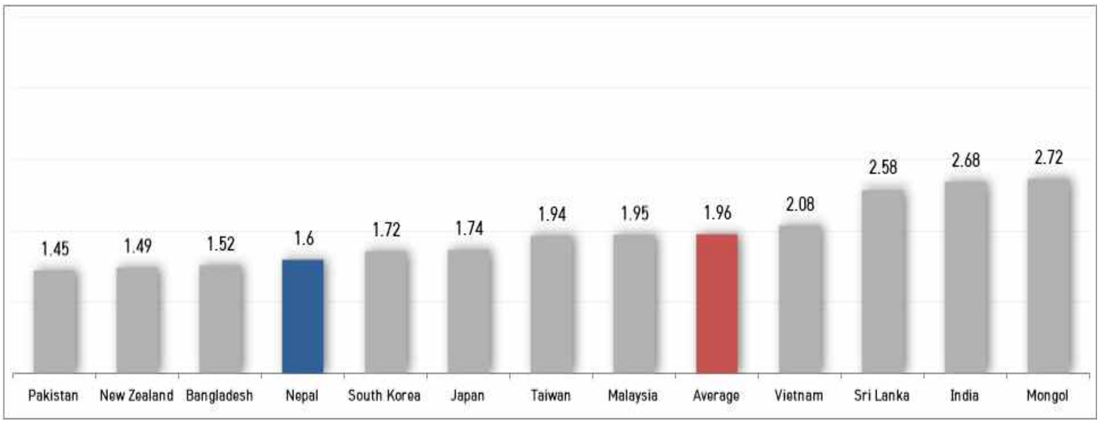


Figure 4.1.2 Averages of Nepal and Other Countries in Male/Female Ratio (Unit: Point)

As shown in the figure, the male/female ratio in the fields of the male scientists and engineers in Nepal was lower than the average of all countries (1.96), being the fourth lowest after Pakistan, New Zealand, and Bangladesh, meaning the ratio of men was fourth highest.

◦ **Perception of discrimination**

: The higher the score, the higher the awareness of discrimination (5-point scale). 3 points mean "Neutral."

Table 4.1.8 Perception of discrimination: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.22			
Age				
29 years or younger	2.24	0.599	0.188	0.904
30 - 39	2.26	0.699		
40 - 49	2.13	0.640		
Over 50	2.15	0.607		
Marital status				
Single	2.35	0.604	1.426	0.157
Married	2.16	0.656		
Number of Children				
1	2.02	0.463	1.507	0.233
2	2.01	0.568		
3 or more	2.38	0.618		
Occupation				
Professor/Teacher	1.20	0.283	2.193	0.076
Researcher	2.72	1.016		
Healthcare professional	2.00	-		
Engineer (company, R&D center, etc.)	2.23	0.622		
Other	2.15	0.483		
Double income status (married)				
Double income	2.24	0.680	1.898	0.063
Single income	1.93	0.540		

Note: ***p<.001, **p<.01, *p<.05

The average score of male scientists and engineers in Nepal to the perception of discrimination in STEM was lower than the mid-level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married)) of the respondents in Nepal were evaluated by d ANOVA (or t) analysis. Results are summarized in Table 4.1.8.

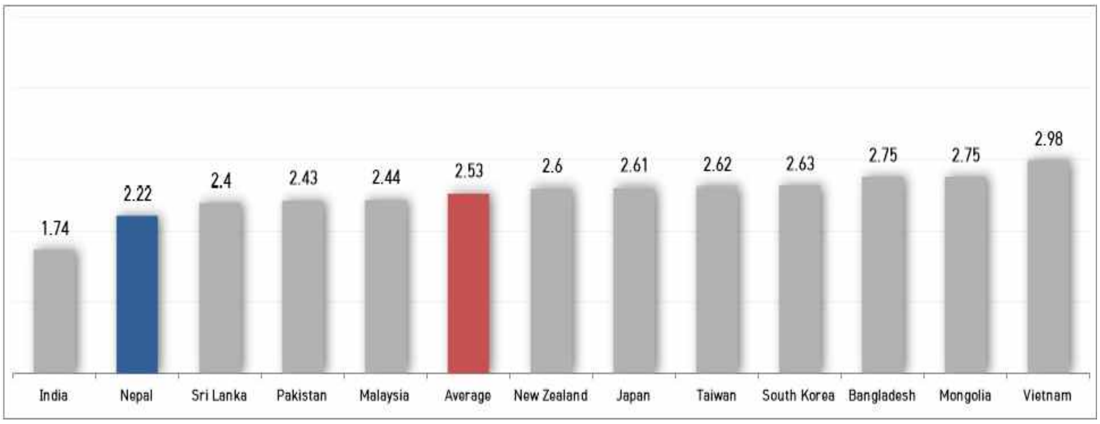


Figure 4.1.3 Averages of Nepal and Other Countries in Gender Barrier (Unit: Point)

The figure above shows the comparative average scores of by country. The awareness of male scientists and engineers in Nepal on discrimination was lower than the average of all countries (2.53), being the second lowest after India.

◦ **Indirect experience of discrimination**

: The higher the score, the more indirect experience of discrimination (4-point scale).

The average score of male scientists and engineers in Nepal on the indirect experience of discrimination against women in STEM was 1.95 which was close to “I have not seen or heard of it but am aware of it.” The differences according to the respondent’s profiles (age, marital status, number of children, occupation, and double income status (if married)) in Nepal were evaluated by ANOVA (or t) analysis. The results are summarized in Table 4.1.9.

The difference of responses according to the double-income status of the respondents in Nepal was statistically significant (t=2.861, p.006), and the double-income respondents (2.03) had higher indirect experience than the single-income respondents (1.70).

Although it was not statistically significant, the respondents over 50, married respondents, single-income respondents, and engineers had relatively low indirect experience of discrimination.

Table 4.1.9 Indirect Experience in Nepal: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	1.95			
Age				
29 years or younger	1.93	0.513	0.931	0.429
30 - 39	2.01	0.483		
40 - 49	1.89	0.626		
Over 50	1.73	0.395		
Marital status				
Single	2.01	0.540	0.958	0.341
Married	1.91	0.501		
Number of Children	-	-		
1				
2	1.79	0.482		
3 or more	1.84	0.528		
Occupation	1.84	0.516		
Professor/Teacher				
Researcher	2.25	0.000		
Healthcare professional	2.05	0.716		
Engineer (company, R&D center, etc.)	2.00	-		
Other	1.92	0.527		
Double income status (married)	2.00	0.413		
Double income			1.898	0.063
Single income	2.03	0.541		

Note: ***p<.001, **p<.01, *p<.05

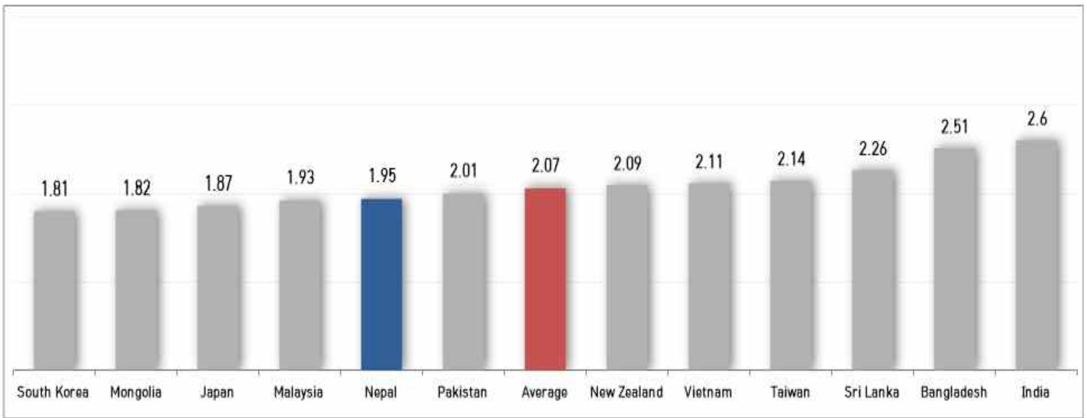


Figure 4.1.4 Averages of Nepal and Other Countries in Indirect Experience of Discrimination (Unit: Point)

The figure above shows the cross-country average scores on the indirect experience of discrimination in 12 countries. The indirect experience of discrimination by the male scientists and engineers in Nepal was lower than the average of all countries (2.07), being the fifth lowest after Korea, Mongolia, Japan, and Malaysia.

◦ **Need of support policy**

: A higher score means the respondents agreed more on the need (5-point scale). 3 points mean "Neutral."

The average score of male scientists and engineers in Nepal on the need of support policy to overcome the gender barrier in STEM was 3.73, being higher than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married)) of the respondents in Nepal were evaluated by ANOVA (or t) analysis. The differences were not statistically significant. Results are summarized in Table 4.1,10.

Although it was not statistically significant, the respondents over 50 (3.95) showed relatively high agreement to the need of support policy.

Table 4.1.10 Need of Support Policy in Nepal: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	3.73			
Age				
29 years or younger	3.72	0.714	0.465	0.707
30 - 39	3.70	0.741		
40 - 49	3.61	0.881		
Over 50	3.95	0.789		
Marital status				
Single	3.76	0.699	0.335	0.739
Married	3.71	0.786		
Others (including divorced)	-	-		
Number of Children				
1	3.58	0.674	0.552	0.580
2	3.82	0.901		
3 or more	3.56	0.729		
Occupation				
Professor/Teacher	4.75	0.354	1.809	0.134
Researcher	3.90	1.084		
Healthcare professional	3.50	-		
Engineer (company, R&D center, etc.)	3.65	0.703		
Others	4.04	0.865		
Double income status (married)				
Double income	3.69	0.794	0.108	0.915
Single income	3.67	0.803		

Note: ***p<.001, **p<.01, *p<.05

The figure below shows the cross country average scores on the need of support policy to overcome the gender barrier. Respondents in Nepal agreeing to the need of support policy was higher than the average of all countries (3.51), being the third highest after Vietnam and India.

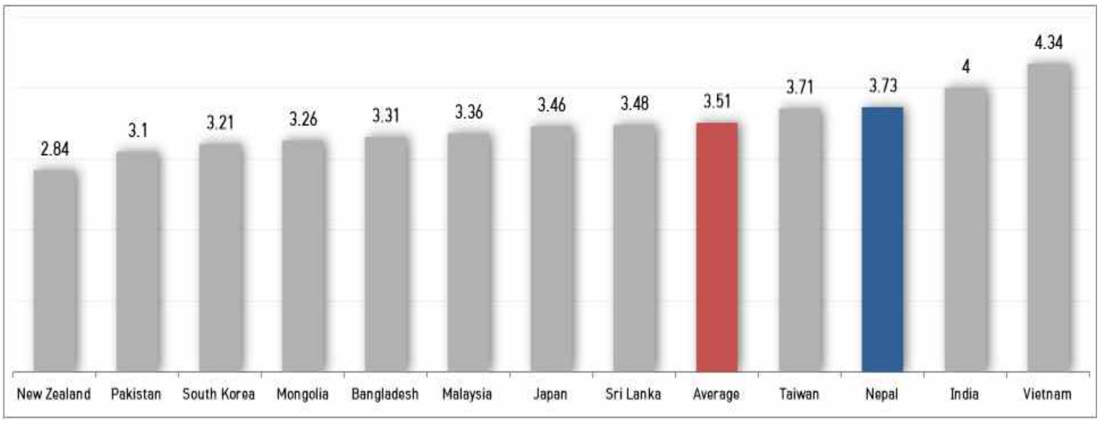


Figure 4.1.5 Averages of Nepal and Other Countries in Need of Support Policy (Unit: Point)

◦ **Perception of gender equality**

: The higher the score, the higher the perception of gender equality (5-point scale). 3 points mean "Neutral."

Table 4.1.11 Perception of Gender Equality in Nepal: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	3.28			
Age				
29 years or younger	3.16	0.538	0.741	0.530
30 - 39	3.33	0.663		
40 - 49	3.39	0.346		
Over 50	3.25	0.448		
Marital status				
Single	3.29	0.684	0.236	0.814
Married	3.27	0.498		
Others (including divorced)	-	-		
Number of Children				
1	3.33	0.417	0.045	0.956
2	3.35	0.345		
3 or more	3.30	0.321		
Occupation				
Professor/Teacher	3.40	0.849	0.854	0.495
Researcher	3.44	0.767		
Healthcare professional	2.40	-		
Engineer (company, R&D center, etc.)	3.26	0.558		
Others	3.38	0.515		
Double income status (married)				
Double income	3.26	0.594	-0.642	0.524
Single income	3.33	0.299		

Note: ***p<.001, **p<.01, *p<.05

The average score of male scientists and engineers in Nepal on the perception of gender equality was 3.28 which was slightly higher than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married)) of the respondents in Nepal were evaluated by ANOVA (or t) analysis. The differences were not statistically significant.

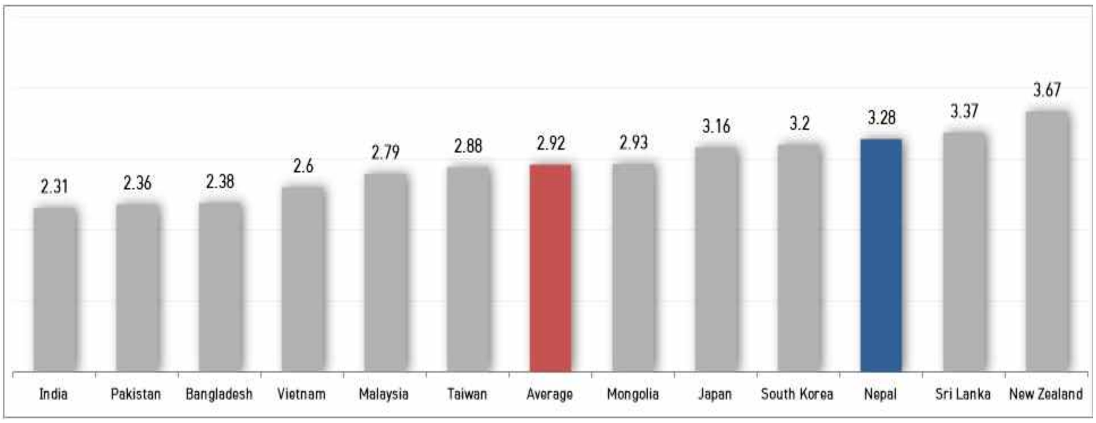


Figure 4.1.6 Averages of Nepal and Other Countries in Gender Equality (Unit: Point)

The above figure shows the cross-country average scores on the perception of gender equality. The level of the male scientists and engineers in Nepal agreeing to the need of support policy was higher than the average of all countries (2.92), being the third highest after New Zealand and Sri Lanka.

4.2. New Zealand

4.2.1. General Profiles of Male Respondents in New Zealand

A total of 54 male scientists and engineers (4.2% of total respondents) answered the survey. Table 4.2.1. shows the age, marital status, number of children, and occupation of the male scientist and engineer respondents in New Zealand.

Regarding the age, 37.0% were in their 50’s, 28.8% were in their 30’s, 24.1% were 29 years or younger and 11.1% were in their 40’s. There were more married respondents at 79.6% than the single respondents at 13.0%. 7.4% were in others married status including divorced.

Of the respondents that had the children (66% of total New Zealand respondents), 44.4% had two children, 30.6% had three or more children and 20.5% had two children. In the case of couples, 78.1% were double-income couples while 21.9% were single-income couples.

Regarding the occupation, 92.6% were engineers, followed by 3.7% were teachers/professors and other professions for each. There are not either researchers or healthcare professionals respondents who participate in this survey in New Zealand.

Table 4.2.1 General Profile of Respondents in New Zealand

(Unit: Person, %)

Composition	Frequency	%
Age		
29 years or younger	13	24.1
30 - 39	15	27.8
40 - 49	6	11.1
Over 50	20	37.0
Marital status		
Single	7	13.0
Married	43	79.6
Others (including divorced)	4	7.0
Number of Children		
1	9	25.0
2	16	44.0
3 or more	11	30.6
Occupation		
Professor/Teacher	2	3.7
Researcher	0	-
Healthcare professional	0	-
Engineer (company, R&D center, etc.)	50	92.6
Others	2	3.7
Double income status (married)		
Double income	25	78.1
Single income	7	21.9

4.2.2. Comparison of Answer by Male Scientists and Engineers in New Zealand with Other APNN Member Countries

The questions in the survey are divided into five categories including “male/female ratio” in the major field of respondents, “perception of discrimination” against women in STEM, “indirect experience” of discrimination in STEM, “need of support policy” to resolve gender barriers in STEM, and perception of “gender equality.”

Average scores of the respondents from New Zealand were compared with that from the other 11 APNN countries in each category as follows.

The average male/female ratio in the fields of male scientists and engineers was 1.49, and it was statistically significantly ($t=-6.531$, $p\leq.000$) lower, meaning there were more men than the average of the respondents from the other 11 countries which was 1.98. The average score for the perception of discrimination was 2.60 which was similarly higher than the average score (2.52) from the other 11 countries. The average score for the indirect experience of discrimination was 2.09 which was also similarly higher than the average score (2.52) of the other 11 countries.

On the other hand, the average score of male scientists and engineers from New Zealand agreeing to the need of support policy to overcome the gender barrier in STEM was 2.84 which was lower than “Neutral” and also lower than the average score of the other countries (3.54) at statistically significant level ($t=-5.395$, $p\leq.000$). Lastly, the average score for the Perception of Gender Equality was 3.67 which was higher than the average score of the other countries (2.89) at statistically significant level ($t=7.342$, $p\leq000$).

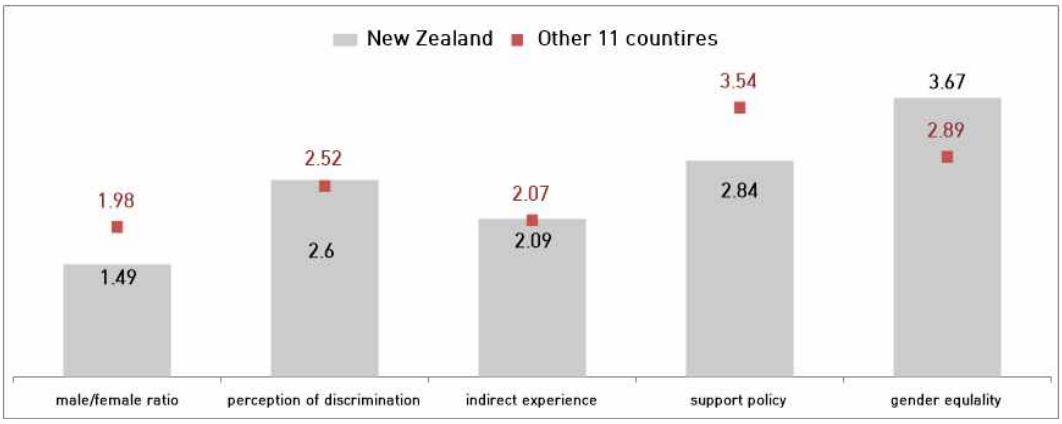


Figure 4.2.1 Comparisons of Answer between New Zealand and Other Countries (Unit: Point)

In summary, New Zealand had more men, showed higher perception of gender equality, revealed a similar indirect experience of discrimination, and agreed less to the need of support policy than other 11 APNN Member countries.

4.2.3. Comparison of Response by Male Scientists and Engineers in New Zealand and Other APNN Member Countries to Each Question

◦ **Male/Female ratio** (5-point scale, 3 points means Neutral)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of respondents was 1.49, meaning there were relatively more men. The male/female ratio in STEM was the lowest scoring 1.22 in college and 1.63 at current work, meaning that the ratio of women was slightly higher at work than when they were in college.

The figure was statistically significantly (t=-6.531, p≤.000) lower than 1.98 which was the average of the respondents from the other 11 countries. New Zealand showed more men when the respondents were in college (t=-8.332, p≤.000), manager or higher position in current work (t=-3.522, p≤.001), in current work (t=-3.381, p≤.001) and in graduate school (t=-2.654, p≤.01) than other countries at statistically significant level.

Table 4.2.2 Comparison of Answer to Other APNN Member Countries: Male/Female Ratio

(Unit: Point)

Type		Question	New Zealand Average (n=54)	Average of Other Countries (n=1,240)	*t*	*(p)*
male/female Ratio (5-Point Scale)	1	The male/female ratio of my department during my university(college) education is (was)	1.22	1.92	-8.332***	0.000
	2	(If having taken graduate course) The male/female ratio of my department while at graduate school is (was)	1.61	2.01	-2.654**	0.008
	3	The male/female ratio of my current workplace is	1.63	2.07	-3.381**	0.001
	4	The male/female ratio at management level at my current workplace is	1.50	1.91	-3.522**	0.001
	Sub Scale		1.49	1.98	-6.531***	0.000

◦ **Perception of Discrimination** (5-point scale, 3 points : “Neutral”)
The Higher score, The Higher Perception of Discrimination

The average score of perception of discrimination in STEM was 2.60, which was below the mid-level. Of the five questions related to the perception of gender barrier, “Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.” received the highest average score (2.89). “Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.” received the lowest average score (2.20).

The overall average of the answers to the questions related to perception of discrimination was 2.60 and similarly higher than the overall average of 11 other APNN countries (2.52). A significant difference was observed between the responses, in the order of "It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications." ($t=-4.999$, $p \leq .000$), followed by "Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues." ($t=2.582$, $p \leq .01$). The discrimination as perceived by the male scientists and engineer respondents in New Zealand was lower than the respondents from other countries for a job opportunity and work recompense at statistically significant.

However, "Girls and boys were equally encouraged to choose their majors in STEM during their education period." scored relatively high at statistically significant level ($t=4.297$ $p \leq .000$).

Table 4.2.3 Comparison of Answer to Other Countries: Perception of Discrimination

(Unit: Point)

Type		Question	New Zealand Average (n=54)	Average of Other Countries (n=1,240)	*t*	*(p)*
Perception of Discrimination (5-Point Scale)	1	Girls and boys were equally encouraged to choose their majors in STEM during their education period.	2.69	2.05	4.297***	0.000
	2	It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.	2.20	3.01	-4.999***	0.000
	3	Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.	2.52	2.39	0.829	0.407
	4	Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.	2.89	2.90	-0.096	0.924
	5	Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues.	2.69	2.28	2.582*	0.010
	Sub Scale		2.60	2.52	0.592	0.556

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The overall average of the response by the male scientist and engineers in New Zealand on the indirect experience of discrimination was 2.09 points which was lower than the median value of 2.5 points in a 4-point scale and close to the level of "I have not seen or heard of it but am aware of it."

The highest level of indirect experience was the discrimination related to “marriage, pregnancy, and childbirth” (3.41) while the lowest level of indirect experience was that related to “research fund and scholarship.” (1.37)

The overall average of responses to questions related to the level of indirect experience (2.09) was similarly higher than the overall average of other 11 countries (2.07).

More specifically, the average scores of the responses to the questions on discrimination related to “research fund and scholarship” (t=-4.295, $p \leq .000$) and that to “project participation and leader” (t=-2.022, $p \leq .048$) were lower than the average scores of other countries. However, the question related to “marriage, pregnancy, and childbirth” (3.41) was higher than the average score of other countries at a statistically significant level (t=3.727, $p \leq .000$).

Table 4.2.4 Comparison of Answer to Other Countries: Indirect Experience

(Unit: Point)

Type		Question	New Zealand Average (n=54)	Average of Other Countries (n=1,240)	*t*	*(p)*
Indirect Experience of discrimination (4-Point Scale)	1	Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female	1.37	1.70	-4.295***	0.000
	2	Woman in STEM is disadvantaged in participating or leading a research project because she is female.	1.48	1.68	-2.022*	0.048
	3	Woman in STEM being sexually harassed or treated unfairly	2.11	2.03	0.545	0.588
	4	Woman in STEM leaving work due to her marriage, pregnancy or child care	3.41	2.87	3.727***	0.000
		Sub Scale	2.09	2.07	0.281	0.779

◦ **Career Outlook and Need of Support Policy** (5-point scale, 3 points : “Neutral”) The Higher score means The Stronger agreement

The male scientists and engineers had a very positive view on the career outlook of women in their fields as the average score was 3.94. The score was lower than the average 4.19 of 11 other countries at a statistically significant level (t=-2.032, $p \leq .042$), indicating that the respondents in New Zealand had a less positive view than other 11 APNN member countries.

The average score of male scientists and engineers in New Zealand answering to the question “It is crucial to have strong policy support to solve gender inequality in the STEM field.” was 3.74, meaning that they slightly agreed to it. It was similarly lower than the average of other 11 countries (3.88). In other words, the male scientists and engineers in New Zealand agreed that there is need of policy to overcome the gender barrier, similarly less than those in other countries.

On the other side, the average score of male scientists and engineers in New Zealand answering to the question “It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field." was 1.94, meaning that they slightly disagreed and the score was lower than the average of other 11 countries (3.19) at statistically significant level (t=-7.253, p≤.000).

Table 4.2.5 Comparison of Answer to Other Countries: Career Outlook & Need of Support Policy

(Unit: Score)

Type		Question	New Zealand Average (n=54)	Average of Other Countries (n=1,240)	*t*	*(p)*
Career Outlook	1	I believe things will turn out fine in the future career for women in STEM	3.94	4.19	-2.032*	0.042
Need of Support Policy (5-Point Scale)	1	It is crucial to have strong policy support to solve gender inequality in the STEM field.	3.74	3.88	-0.798	0.428
	2	It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.	1.94	3.19	-7.253***	0.000
		Sub Scale	2.84	3.54	-5.395	0.000

◦ **Perception of Gender Equality** (5-point scale, 3 points : "Neutral")
The higher score, The Higher Perception of Gender equality

Five questions were asked of male scientists and engineers in New Zealand on their perception of gender equality in STEM. The overall average of responses to all questions was 3.28 points, being slightly higher than the mid-level.

The highest score was on the statement "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife" (4.63).

It was followed by "Primary breadwinners (who take care of financial obligations) of households should be men" (4.48), "In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves" (3.89), and "Women are born to have a way of caring children that men are not capable of in the same way" (3.44). The scores indicate that the respondents had more perception of gender equality regarding the gender role in a family.

On the other hand, the average scores on "I believe gender equality will be fully achieved only if women are given equal opportunities as men" (1.44) was the lowest. The scores indicate that the respondents had strong perception of conventional division of that equal opportunity would lead to an equal outcome, meaning that the perception of gender equality related to this question was relatively low.

The overall average score of New Zealand (3.67) was higher than the average score of other 11 countries (2.89) at a statistically significant level (t=6.219, p≤.000). More specifically, the average scores on "In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves" (t=9.261, p≤.000), "Primary breadwinners (who take care of financial obligations) of households should be men" (t=8.936, $p \leq .000$), "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife" (t=8.452, $p \leq .000$), and "Women are born to have a way of caring children that men are not capable of in the same way" (t=2.788, $p \leq .005$) were higher than other 11 countries at statistically significant levels. The average scores indicate that the male scientists and engineers in New Zealand had a higher perception of gender equality related to gender role in a family than those in other countries.

On the other hand, the average score on "I believe gender equality will be fully achieved only if women are given equal opportunities as men" (1.93) was lower than the average score of 11 other countries (2.16), which is not statistically significant. It indicates that the male scientists and engineers in New Zealand had slightly lower perception of gender equality related to equity.

Table 4.2.6 Comparison of Answer to Other Countries: Perception of Gender Equality

(Unit: Point)

Type		Question	New Zealand Average (n=54)	Average of Other Countries (n=1,240)	*t*	(p)
Perception of Gender Equality (5-point scale)	1	In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves	3.89	2.56	9.261***	0.000
	2	Primary breadwinners(who take care of financial obligations) of households should be men	4.48	3.22	8.936***	0.000
	3	Women are born to have a way of caring children that men are not capable of in the same way	3.44	2.94	2.788**	0.005
	4	In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.	4.63	3.55	8.452***	0.000
	5	I believe gender equality will be fully achieved only if women are given equal opportunities as men.	1.93	2.16	-1.282	0.205
		Sub Scale	3.67	2.89	7.342***	0.000

4.2.4. Comparison of Responses in New Zealand with Other Countries

◦ **Male/Female ratio** (5-point scale, 3 points : "Neutral")
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of male scientists and engineers was 1.49, meaning there were relatively more men. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in New Zealand were evaluated by ANOVA (or t) analysis. Table 4.2.7 shows the results.

Table 4.2.7 male/female ratio in New Zealand: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	p
Total	1.49			
Age				
29 years or younger	1.44	0.341	1.065	0.372
30 - 39	1.65	0.596		
40 - 49	1.63	0.685		
Over 50	1.36	0.490		
Marital status				
Single	1.50	0.382	1.095	0.342
Married	1.52	0.545		
Others (including divorced)	1.49	0.516		
Number of Children				
1	2.00	0.559	8.089**	0.001
2	1.58	0.590		
3 or more	1.11	0.172		
Occupation				
Professor/Teacher	1.13	0.177	0.749	0.478
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	1.50	0.519		
Other	1.75	0.707		
Double income status (married)				
Double income	1.49	0.430	-0.600	0.554
Single income	1.60	0.691		

Note: ***p<.001, **p<.01, *p<.05

The difference of responses according to the respondents' number of children in New Zealand was statistically significant (F=-8.089, p≤.001), and revealed the more children have the respondents, the male ratio had been relatively higher in their (academic or workplace) fields. The differences in the male/female ratios in New Zealand according to the other profiles of the respondents, however, were not statistically significant. Although the differences were not statistically significant, the average scores of the respondents in their 30's (1.65) and 40's (1.63), the married respondents (1.52), and the single income respondents (1.60) were the highest in each category[27].

As shown in the figure below, the male/female ratio in the fields of the male scientists and engineers in New Zealand was lower than the average of all countries (1.96), being the second lowest after Pakistan, meaning the ratio of men was the second highest.

[27] The comparison on the respondents occupation excluded from the analysis since most respondents (92.6%) were engineers (50 people out of 54).

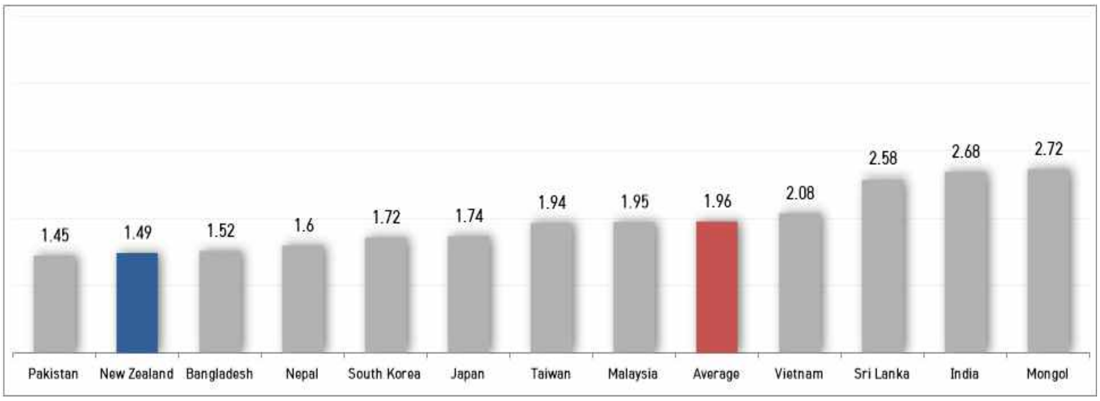


Figure 4.2.2 Average of New Zealand and Other Countries in male/female ratio (Unit: Point)

◦ **Perception of Discrimination** (5-point scale, 3 points : “Neutral”) The Higher score, The Higher Perception of Discrimination

The average score of male scientists and engineers in New Zealand to the perception of discrimination in STEM (2.60) was slightly lower than the mid-level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in New Zealand were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.2.8.

Table 4.2.8 Perception of Discrimination in New Zealand: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.60			
Age				
29 years or younger	2.62	1.069	2.043	0.120
30 - 39	2.41	0.765		
40 - 49	2.00	0.748		
Over 50	2.90	0.791		
Marital status				
Single	2.57	0.927	5.091*	0.010
Married	2.48	0.817		
Others (including divorced)	3.85	0.597		
Number of Children				
1	2.20	0.959	1.157	0.327
2	2.38	0.665		
3 or more	2.71	0.756		
Occupation				
Professor/Teacher	3.10	0.141	0.339	0.714
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	2.58	0.904		
Other	2.50	0.707		
Double income status (married)				
Double income	2.50	0.733	-0.130	0.897
Single income	2.53	0.933		

Note: ***p<.001, **p<.01, *p<.05

The difference of responses according to the respondents marital status was statistically significant (F=-5.091, p≤.01), and showed the average scores of the respondents in others (including divorced) marital status is relatively high.

The differences in the responses to the perception of discrimination of respondents in New Zealand, however, according to the other personal variable of the respondents were not statistically significant. Although the differences were not statistically significant, the average scores of the respondents in their age over 50 (2.90), respondents with 3 or more children (2.71) and professor/teacher respondents (3.10) were the highest in each category.

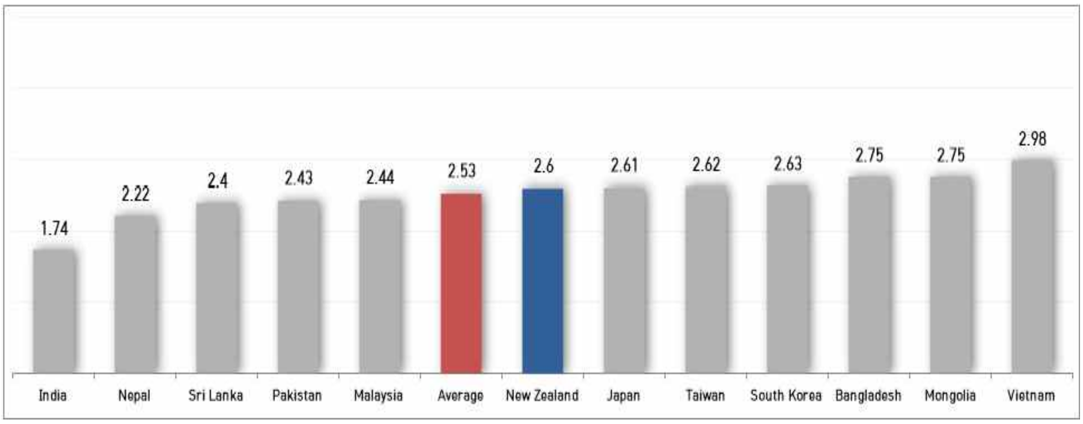


Figure 4.2.3 Averages of New Zealand and Other countries in Perception of Discrimination (Unit : Point)

The figure above shows the comparative average scores among different countries. The perception of male scientists and engineers in New Zealand on discrimination (2.60) was slightly higher than the average of all countries (2.53), being medium among 12 countries.

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The average score of male scientists and engineers in New Zealand on the indirect experience of discrimination against women in STEM was 2.09 which was close to “I have not seen or heard of it but am aware of it.” The differences according to the respondent’s profiles (age, marital status, number of children, occupation, and double income status (if married) in New Zealand were evaluated by ANOVA (or t) analysis. The results are summarized in Table 4.2.9.

The difference of responses according to the respondents marital status was statistically significant (F=3.729, p≤.05), and showed single respondents relatively have more indirect experiences of discrimination than other respondents in the category.

Table 4.2.9 Indirect Experience in New Zealand: Differences according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.09			
Age				
29 years or younger	2.27	0.330	2.045	0.119
30 - 39	2.05	0.635		
40 - 49	1.67	0.258		
Over 50	2.14	0.535		
Marital status				
Single	2.43	0.374	3.729*	0.031
Married	2.00	0.515		
Others (including divorced)	2.05	0.408		
Number of Children				
1	1.94	0.481	0.160	0.853
2	1.86	0.516		
3 or more	1.95	0.416		
Occupation				
Professor/Teacher	2.00	0.354	0.035	0.966
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	2.10	0.537		
Other	2.13	0.177		
Double income status (married)				
Double income	2.11	0.540	1.697	0.097
Single income	1.84	0.459		

Note: ***p<.001, **p<.01, *p<.05

The differences in the responses to the indirect experience of respondents in New Zealand, however, according to the other profiles of the respondents were not statistically significant. Although it was not statistically significant, the respondents in the age of 29 years or younger (2.27), and double-income respondents (2.11) had relatively high indirect experience of discrimination.

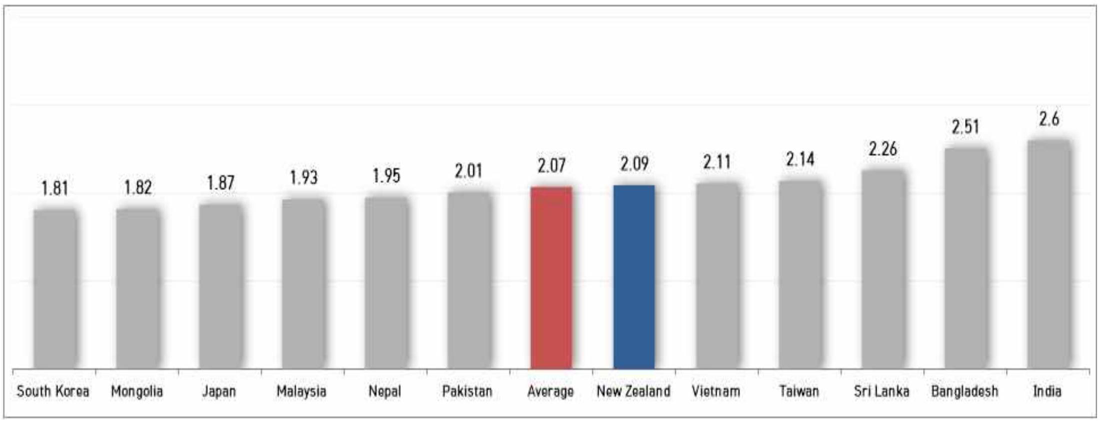


Figure 4.2.4 Averages of New Zealand and Other Countries in Indirect Experience (Unit : Point)

The figure above shows the cross-country average scores on the indirect experience of discrimination in 12 countries. The indirect experience of discrimination by the male scientists and engineers in New Zealand (2.09) was similarly higher than the average of all countries (2.07), being medium among 12 countries.

◦ **Need of Support Policy** (5-point scale, 3 points : "Neutral")
The Higher score means The Stronger agreement

The average score of male scientists and engineers in New Zealand on the need of support policy to overcome the gender barrier in STEM was 2.84, being lower than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in New Zealand were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.2.10.

Table 4.2.10 Need of Support Policy in New Zealand: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.84			
Age				
29 years or younger	3.08	1.205	0.513	0.675
30 - 39	2.70	0.922		
40 - 49	2.50	1.449		
Over 50	2.90	0.981		
Marital status				
Single	3.21	0.393	3.672*	0.032
Married	2.67	1.046		
Others (including divorced)	4.00	1.354		
Number of Children				
1	2.00	1.090	3.160	0.055
2	2.94	0.892		
3 or more	2.64	0.710		
Occupation				
Professor/Teacher	3.75	1.061	0.752	0.476
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	2.81	1.078		
Other	2.75	0.354		
Double income status (married)				
Double income	2.74	1.165	0.452	0.654
Single income	2.59	0.905		

Note: ***p<.001, **p<.01, *p<.05

The difference of responses according to the respondents marital status was statistically significant ($F=3.672$, $p \leq .05$), and showed the respondents in 'the Others (including divorced)' marital status relatively strongly agree than other respondents in the category. The differences in the responses to the need of support policy to resolve the gender barrier in New Zealand, however, according to the other profiles of the respondents were not statistically significant. Although the differences were not statistically significant, the average scores of the respondents in their age 29 years or younger (3.08), and the respondents with 2 or more children (2.74) showed relatively high agreement to the need of support policy.

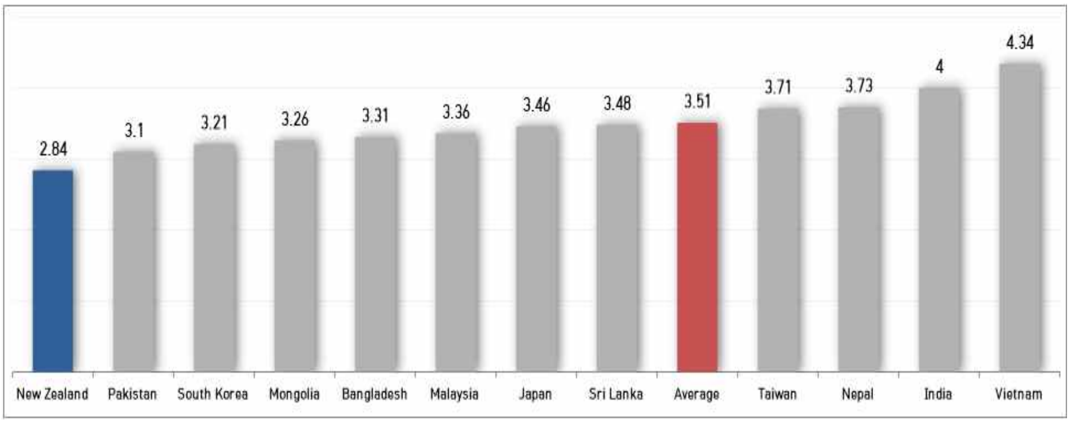


Figure 4.2.5 Averages of New Zealand and Other Countries in Need of Support Policy (Unit: Point)

The above figure shows the cross-country average scores on the need of support policy to overcome the gender barrier. Respondents in New Zealand agreeing to the need of support policy was lower than the average of all countries (3.51), being the lowest among 12 countries.

◦ **Perception of Gender Equality** (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Gender Equality

The average score of male scientists and engineers in New Zealand on the perception of gender equality was 3.67 which was slightly higher than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in New Zealand were evaluated by ANOVA (or t) analysis. The differences were not statistically significant. Although the differences were not statistically significant, the average scores of the respondents in their 40's (4.33), single respondents (3.89), and double-income respondents (3.69) showed a relatively high perception of gender equality.

Table 4.2.11 Perception of Gender Equality in New Zealand: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	3.67			
Age				
29 years or younger	3.71	0.494	2.771	0.051
30 - 39	3.55	0.715		
40 - 49	4.33	0.484		
Over 50	3.55	0.642		
Marital status				
Single	3.89	0.460	0.644	0.529
Married	3.62	0.686		
Others (including divorced)	3.85	0.473		
Number of Children				
1	3.29	1.082	1.259	0.297
2	3.73	0.505		
3 or more	3.71	0.561		
Occupation				
Professor/Teacher	4.60	0.283	2.221	0.119
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	3.64	0.634		
Other	3.60	0.849		
Double income status (married)				
Double income	3.69	0.638	0.777	0.442
Single income	3.52	0.778		

Note: ***p<.001, **p<.01, *p<.05

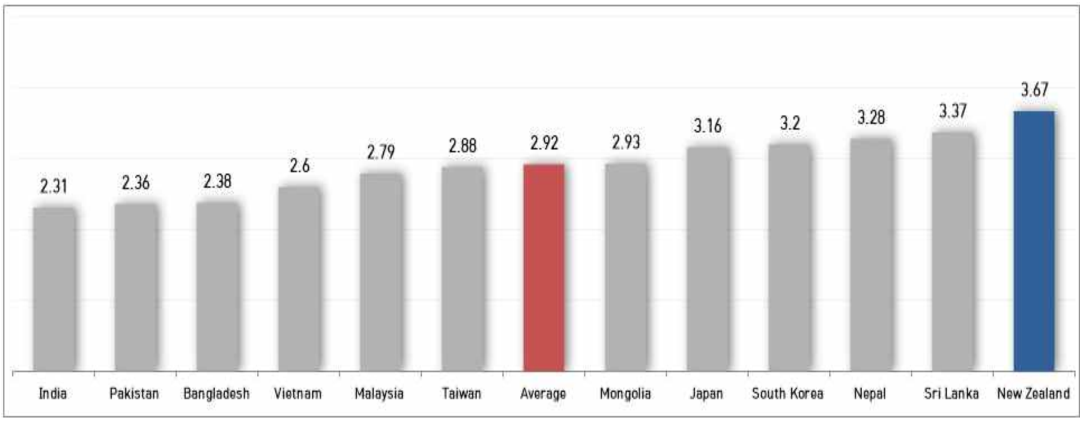


Figure 4.2.6 Averages of New Zealand and Other Countries in the Perception of Gender Equality (Unit: Point)

The figure above shows the cross-country average scores on the perception of gender equality. The perception of male scientists and engineers in New Zealand on gender equality (3.67) was higher than the average of all countries (2.92), being the highest among 12 APNN member countries.

4.3. Malaysia

4.3.1. General Profiles of Male Respondents in Malaysia

A total of 55 male scientists and engineers (4.3% of total respondents) answered the survey. Table 4.3.1. shows the age, marital status, number of children, and occupation of the male scientist and engineer respondents in Malaysia.

Regarding the age, 34.5% were in their 40's, 32.7% were in their 30's, 23.6% were 29 years or younger and 9.1% were in their 50 years or older. There were more married respondents at 54.5% than the single respondents at 45.5%. Of the respondents that had children (56.4% of total Malaysia respondents), 51.6% had 3 or more children, 35.56% had 2 children and 12.9% had 1 child. In the case of couples, 70.0% were double-income couples while 30.5% were single-income couples.

Regarding the occupation, 56.4% were engineers, followed by 21.8% were teachers/professors and other professions for each. There are not either researchers or healthcare professionals respondents who participate in this survey in Malaysia.

Table 4.3.1 General Profile of Respondents in Malaysia

(Unit: Person, %)

Composition	Frequency	%
Age		
29 years or younger	13	23.6
30 - 39	18	32.7
40 - 49	19	34.5
Over 50	5	9.1
Marital status		
Single	25	45.5
Married	30	54.5
Others (including divorced)	-	-
Number of Children		
1	4	12.9
2	11	35.5
3 or more	16	51.6
Occupation		
Professor/Teacher	12	21.8
Researcher	-	-
Healthcare professional	-	-
Engineer (company, R&D center, etc.)	31	56.4
Other	12	21.8
Double income status (married)		
Double income	21	70.0
Single income	9	30.0

4.3.2. Comparison of Answer by Male Scientists and Engineers in Malaysia with Other APNN Member Countries

The questions in the survey are divided into five categories including “male/female ratio” in the major field of respondents, “perception of discrimination” against women in STEM, “indirect experience” of discrimination in STEM, “need of support policy” to resolve gender barriers in STEM, and perception of “gender equality.”

Average scores of the respondents from Malaysia were compared with that from the other 11 APNN countries in each category as follows.

The average male/female ratio in the fields of male scientists and engineers was 1.95, and it was similar to that of the respondents from the other 11 countries which was 1.96.

The average score for the perception of discrimination was 2.44 which was similarly lower than the average score (2.53) from the other 11 countries. The average score for the indirect experience of discrimination was 1.93 which was also slightly lower than the average score (2.08) of the other 11 countries.

On the other hand, the average score of male scientists and engineers from Malaysia agreeing to the need of support policy to overcome the gender barrier in STEM was 3.36 which was slightly higher than “Neutral” but somewhat lower than the average score of the other countries (3.51) without statistical significance. Lastly, the average score for the awareness of gender equality was 2.79 which was slightly lower than the average score of the other countries (2.93).

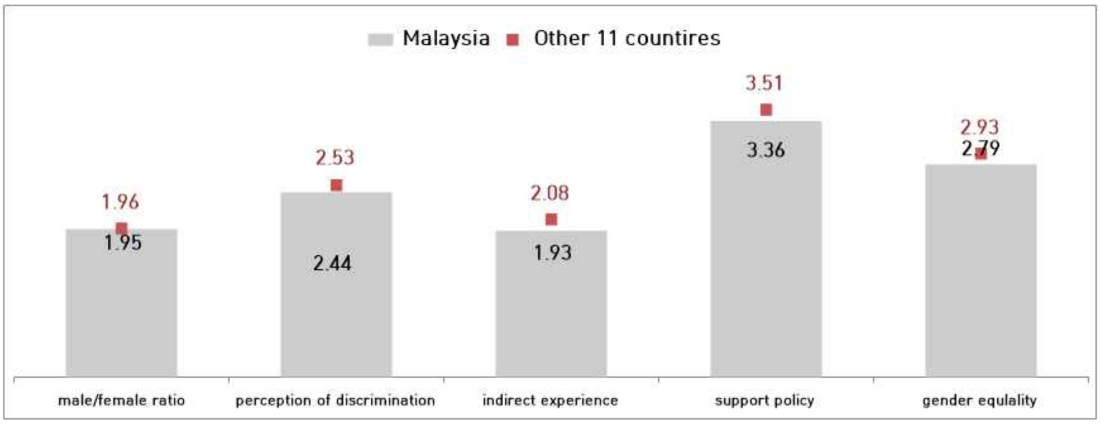


Figure 4.3.1 Comparisons of Answer between Malaysia and Other Countries (Unit: Point)

In summary, the averages scores form Malaysia were in the similar level to those from other 11 countries within a slightly lower point for all 5 categories.

4.3.3. Comparison of Response by Male Scientists and Engineers in Malaysia and Other APNN Member Countries to Each Question

◦ **Male/Female ratio** (5-point scale, 3 points means Neutral)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of respondents was 1.95, meaning there were relatively more men. The male/female ratio in STEM was the lowest scoring 1.73 in college and 2.20 at current work, meaning that the ratio of women was slightly higher at work than when they were in college.

The figure (1.95) was similar to that of 11 countries (1.96). Malaysia showed more men during all questioned period (from college to current work). The average scores of Malaysia for college and in graduate school were slightly lower (0.1 ~ 0.2 score point) than other APNN 11 countries, whereas slightly higher for current work and manager or higher position in current work at the same scale.

Table 4.3.2 Comparison of Answer to Other APNN Member Countries: Male/Female Ratio

(Unit: Point)

Type		Question	Malaysia Average (n=55)	Average of Other Countries (n=1,239)	*t*	*(p)*
male/female Ratio (5-Point Scale)	1	The male/female ration of my department during my university(college) education	1.73	1.90	-1.128	0.259
	2	The male/female ratio of my department while at graduate school	1.82	2.00	-1.204	0.229
	3	The male/female ratio of my current workplace	2.20	2.04	1.028	0.304
	4	The male/female ration at management level at my current workplace	2.04	1.88	0.997	0.319
	Sub Scale		1.95	1.96	-0.099	0.921

◦ **Perception of Discrimination** (5-point scale, 3 points means Neutral)
The Higher score, The Higher Perception of Discrimination

The average score of perception of discrimination in STEM was 2.44, which was below the mid-level. Of the five questions related to the perception of gender barrier, “Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.” received the highest average score (2.80). “Girls and boys were equally encouraged to choose their majors in STEM during their education period.” received the lowest average score (1.73).

The overall average of the answers to the questions related to perception of discrimination was 2.44 and similarly lower than the overall average of 11 other APNN countries (2.53). A significant difference was observed from the responses "Girls and boys were equally encouraged to choose their majors in STEM during their education period." ($t=-3.201$, $p \leq .01$) get a relatively lower score, while "Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level." ($t=2.159$, $p \leq .05$) received a higher score than those from other 11 countries.

The discrimination as perceived by the male scientists and engineer respondents in Malaysia was generally little lower than the respondents from other countries. The figure shows the perception of discrimination in STEM is significantly lower during educational period but higher for equal work distribution and work appraisal in Malaysia.

Table 4.3.3 Comparison of Answer to Other Countries: Perception of Discrimination

(Unit: Point)

Type		Question	Malaysia Average (n=55)	Average of Other Countries (n=1,239)	*t*	*(p)*
Perception of Discrimination (5-Point Scale)	1	Girls and boys were equally encouraged to choose their majors in STEM during their education period.	1.73	2.09	-3.201**	0.002
	2	It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.	2.71	2.99	-1.726	0.085
	3	Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.	2.36	2.40	-0.292	0.771
	4	Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.	2.80	2.91	-0.691	0.490
	5	Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues	2.62	2.28	2.159*	0.031
		Sub Scale	2.44	2.53	-0.903	0.367

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The overall average of the response by the male scientist and engineers in Malaysia on the indirect experience of discrimination was 1.93 points which was lower than the median value of 2.5 points in a 4-point scale and close to the level of "I have not seen or heard of it but am aware of it."

The highest level of indirect experience was the discrimination related to "marriage, pregnancy, and childbirth" (2.71) while the lowest level of indirect experience was that related to “research fund and scholarship.”(1.58)

The overall average of responses to questions related to the level of indirect experience (1.93) was similarly higher than the overall average of other 11 countries (2.08). More specifically, the average scores of the responses to the questions of discrimination related to “Woman in STEM being sexually harassed or treated unfairly” ($t=-2.120$, $p \leq .034$) was lower than the average scores of other countries.

Table 4.3.4 Comparison of Answer to Other Countries: Indirect Experience

(Unit: Point)

Type		Question	Malaysia Average (n=55)	Average of Other Countries (n=1,239)	*t*	*(p)*
Indirect Experience of discrimination (4-Point Scale)	1	Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female	1.58	1.69	-0.871	0.384
	2	Woman in STEM is disadvantaged in participating or leading a research project because she is female.	1.64	1.67	-0.306	0.760
	3	Woman in STEM being sexually harassed or treated unfairly	1.78	2.05	-2.120*	0.034
	4	Woman in STEM leaving work due to her marriage, pregnancy or child care	2.71	2.90	-1.342	0.180
		Sub Scale	1.93	2.08	-1.710	0.087

◦ **Career Outlook and Need of Support Policy** (5-point scale, 3 points : “Neutral”) The Higher score means The Stronger agreement

The male scientists and engineers had a very positive view on the career outlook of women in their fields as the average score was 4.15. The score was similar to the average 4.18 of 11 other countries indicating that the respondents in Malaysia equally had a positive view as other 11 APNN member countries.

Table 4.3.5 Comparison of Answer to Other Countries: Career Outlook & Need of Support Policy

(Unit: Score)

Type		Question	Malaysia Average (n=55)	Average of Other Countries (n=1,239)	*t*	*(p)*
Career Outlook	1	I believe things will turn out fine in the future career for women in STEM	4.15	4.18	-0.285	0.776
Need of Support Policy (5-Point Scale)	1	It is crucial to have strong policy support to solve gender inequality in the STEM field.	3.78	3.88	-0.710	0.478
	2	It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.	2.95	3.14	-1.146	0.252
		Sub Scale	3.36	3.51	-1.163	0.245

The average score of male scientists and engineers in Malaysia answering to the question “It is crucial to have strong policy support to solve gender inequality in the STEM field.” was 3.78, meaning that they slightly agreed to it. It was similarly lower than the average of other 11 countries (3.88). In other words, the male scientists and engineers in Malaysia agreed that there is need of policy to overcome the gender barrier, similarly less than other 11 countries. on average.

The average score of male scientists and engineers in Malaysia answering to the question “It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.” was 2.95 meaning that they neither disagree nor agree. And the score was also slightly lower than the average of other 11 countries (3.14).

◦ **Perception of Gender Equality** (5-point scale, 3 points : “Neutral”)
The higher score, The Higher Perception of Gender equality

Five questions were asked of male scientists and engineers in Malaysia on their perception of gender equality in STEM. The overall average of responses to all questions was 2.79 points, being lower than mid-level.

Table 4.3.6 Comparison of Answer to Other Countries: Perception of Gender Equality

(Unit: Point)

Type		Question	Malaysia Average (n=55)	Average of Other Countries (n=1,239)	*t*	*(p)*
Perception of Gender Equality (5-point scale)	1	In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves	2.58	2.62	-0.267	0.791
	2	Primary breadwinners (who take care of financial obligations) of households should be men	2.89	3.29	-2.254*	0.024
	3	Women are born to have a way of caring children that men are not capable of in the same way	2.96	2.96	0.001	0.999
	4	In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.	3.18	3.62	-2.479*	0.013
	5	I believe gender equality will be fully achieved only if women are given equal opportunities as men.	2.33	2.15	1.172	0.242
	Sub Scale		2.79	2.93	-1.277	0.202

The highest score was on to the statement “In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife” (3.18).

It was followed by “Women are born to have a way of caring children that men are not capable of in the same way” (2.96), “Primary breadwinners (who take care of financial obligations) of households should be men” (2.89), and “In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves” (2.58). The scores indicate that the respondents had more perception of gender equality regarding the gender role in family.

On the other hand, the average scores on “I believe gender equality will be fully achieved only if women are given equal opportunities as men” (2.33) was the lowest. The scores indicate that the respondents had strong perception of conventional division of that equal opportunity would lead to an equal outcome, meaning that the perception of gender equality related to this question was relatively low.

The overall average score of Malaysia (2.79) was slightly lower than the average score of other 11 countries (2.93). More specifically, the average scores on “In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife” ($t=-2.479$, $p \leq .05$), and “Primary breadwinners (who take care of financial obligations) of households should be men” ($t=-2.254$, $p \leq .05$) were lower than other 11 countries at statistically significant levels. The average scores indicate that the male scientists and engineers in Malaysia had a somewhat lower perception of gender equality related to gender role in family than those in other countries.

4.3.4. Comparison of Responses in Malaysia with Other Countries

◦ **Male/Female ratio** (5-point scale, 3 points : “Neutral”)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of male scientists and engineers was 1.95, meaning there were relatively more men. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Malaysia were evaluated by ANOVA (or t) analysis. Table 4.3.7 shows the results.

The difference of responses according to the occupation in Malaysia was statistically significant ($F=4.280$, $p \leq .019$), and revealed there are more men in the field of engineers than that of other occupations. Although other differences were not statistically significant, the average scores of the respondents in their 30’s (2.19) and the respondents with 3 or more children (2.08), and the single income respondents (2.11) were the highest in each category.

Table 4.3.7 male/female ratio in Malaysia: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	1.95			
Age				
29 years or younger	2.10	1.134	1.446	0.240
30 - 39	2.19	0.949		
40 - 49	1.63	0.669		
Over 50	1.85	0.285		
Marital status				
Single	1.92	0.901	-0.193	0.848
Married	1.97	0.890		
Others (including divorced)	-	-		
Number of Children				
1	1.50	0.540	0.763	0.476
2	1.98	0.938		
3 or more	2.08	0.815		
Occupation				
Professor/Teacher	2.15	0.950	4.280*	0.019
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	1.67	0.669		
Other	2.46	1.091		
Double income status (married)				
Double income	1.90	0.910	-0.575	0.570
Single income	2.11	0.876		

Note: ***p<.001, **p<.01, *p<.05

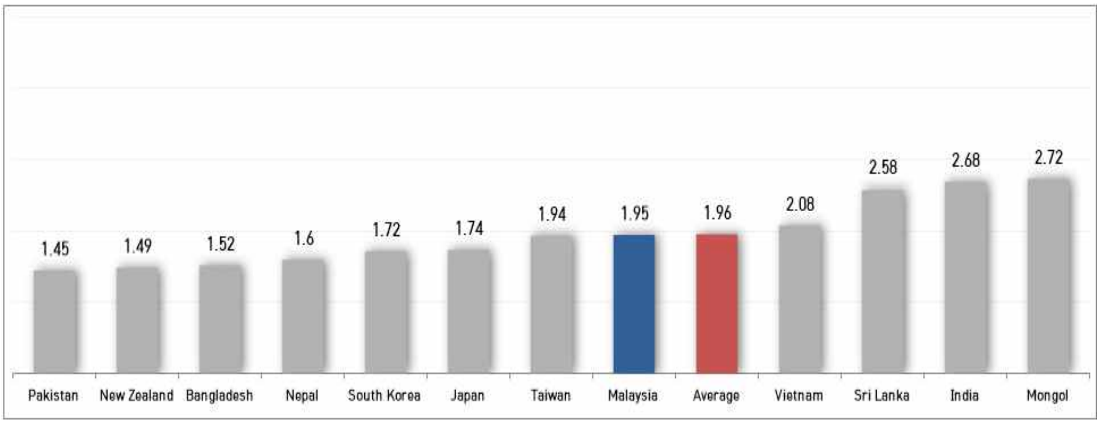


Figure 4.3.2 Average of Malaysia and Other Countries in male/female ratio (Unit: Point)

As shown in the figure, the male/female ratio in the fields of the male scientists and engineers in Malaysia (1.95) was similar to the average of all countries (1.96), being the mid-level.

◦ **Perception of Discrimination** (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Discrimination

The average score of male scientists and engineers in Malaysia to the perception of discrimination in STEM (2.44) was lower than the mid-level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Malaysia were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.3.8.

Although other differences of the average scores of the respondents by their personal variable were not statistically significant, the average scores of the respondents in their age over 50 (2.88) was relatively higher in the category.

Table 4.3.8 Perception of Discrimination in Malaysia: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.44			
Age				
29 years or younger	2.48	0.710	0.955	0.421
30 - 39	2.38	0.682		
40 - 49	2.37	0.586		
Over 50	2.88	0.303		
Marital status				
Single	2.40	0.653	-0.463	0.645
Married	2.48	0.625		
Others (including divorced)	-	-		
Number of Children				
1	2.20	0.432	0.355	0.704
2	2.55	0.839		
3 or more	2.44	0.646		
Occupation				
Professor/Teacher	2.50	0.663	0.061	0.941
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	2.43	0.693		
Other	2.42	0.463		
Double income status (married)				
Double income	2.45	0.547	-0.427	0.672
Single income	2.56	0.811		

Note: ***p<.001, **p<.01, *p<.05

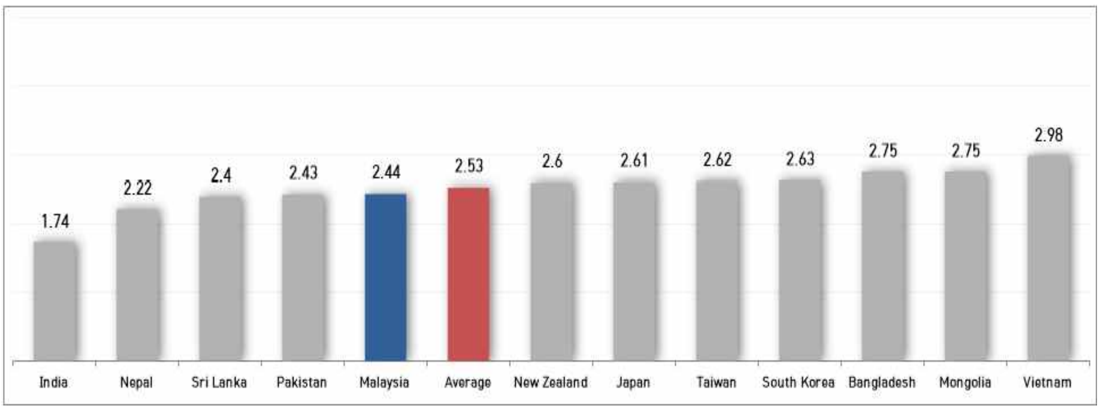


Figure 4.3.3 Averages of Malaysia and Other countries in Perception of Discrimination (Unit : Point)

The figure above shows the comparative average scores among different countries. The perception of male scientists and engineers in Malaysia on discrimination (2.44) was lower than the average of all countries (2.53), being medium among 12 countries.

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The average score of male scientists and engineers in Malaysia on the indirect experience of discrimination against women in STEM was 1.93 which was close to "I have not seen or heard of it but am aware of it." The differences according to the respondent's profiles (age, marital status, number of children, occupation, and double income status (if married) in Malaysia were evaluated by ANOVA (or t) analysis. The results are summarized in Table 4.3.9.

Although the differences of the average scores of the respondents by their personal variable were not statistically significant, the average scores of the respondents in their 40's (2.16), married, those who have 3 or more children and double-income respondents were relatively high in each category.

Table 4.3.9 Indirect Experience in Malaysia: Differences according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	1.93			
Age				
29 years or younger	1.79	0.660	2.290	0.089
30 - 39	1.72	0.392		
40 - 49	2.16	0.693		
Over 50	2.15	0.285		
Marital status				
Single	1.81	0.527	-1.369	0.177
Married	2.03	0.638		
Others (including divorced)	-	-		
Number of Children				
1	1.88	0.661	1.533	0.234
2	1.70	0.688		
3 or more	2.11	0.508		
Occupation				
Professor/Teacher	1.96	0.673	0.056	0.946
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	1.90	0.543		
Other	1.96	0.689		
Double income status (married)				
Double income	2.06	0.642	0.447	0.659
Single income	1.94	0.659		

Note: ***p<.001, **p<.01, *p<.0

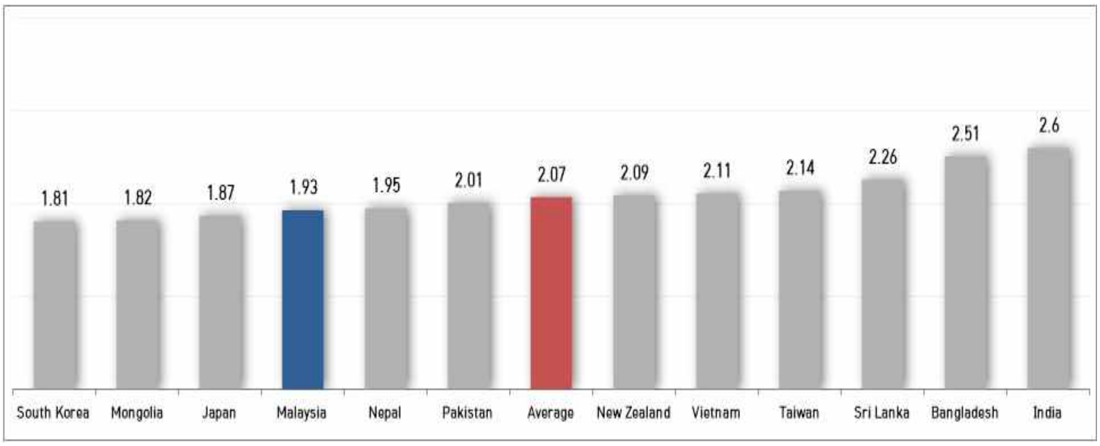


Figure 4.3.4 Averages of Malaysia and Other Countries in Indirect Experience (Unit : Point)

The figure above shows the cross-country average scores on the indirect experience of discrimination in 12 countries. The indirect experience of discrimination by the male scientists and engineers in Malaysia (1.93) was lower than the average of all countries (2.07), being the fourth lowest after South Korea, Mongolia and Japan.

◦ **Need of Support Policy** (5-point scale, 3 points : "Neutral")
The Higher score means The Stronger agreement

The average score of male scientists and engineers in Malaysia on the need of support policy to overcome the gender barrier in STEM was 3.36, being slightly higher than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Malaysia were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.3.10.

Although the differences were not statistically significant, the average scores of the respondents in their age 29 years or younger (3.65), the respondents with 1 child (3.75), and single income respondent (3.56)s showed relatively high agreement to the need of support policy.

Table 4.3.10 Need of Support Policy in Malaysia: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	p
Total	3.36			
Age			0.865	0.465
29 years or younger	3.65	0.718		
30 - 39	3.11	1.106		
40 - 49	3.37	0.910		
Over 50	3.50	1.000		
Marital status			0.116	0.908
Single	3.38	0.950		
Married	3.35	0.957		
Others (including divorced)	-	-		
Number of Children			0.488	0.619
1	3.75	0.866		
2	3.23	0.984		
3 or more	3.50	1.000		
Occupation			0.791	0.459
Professor/Teacher	3.25	0.866		
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	3.29	1.071		
Other	3.67	0.615		
Double income status (married)			-0.764	0.451
Double income	3.26	0.889		
Single income	3.56	1.130		

Note: ***p<.001, **p<.01, *p<.05

The below figure shows the cross-country average scores on the need of support policy to overcome the gender barrier. Respondents in Malaysia agreeing to the need of support policy (3.36) was similarly lower than the average of all countries (3.51), being the mid-level among 12 countries.

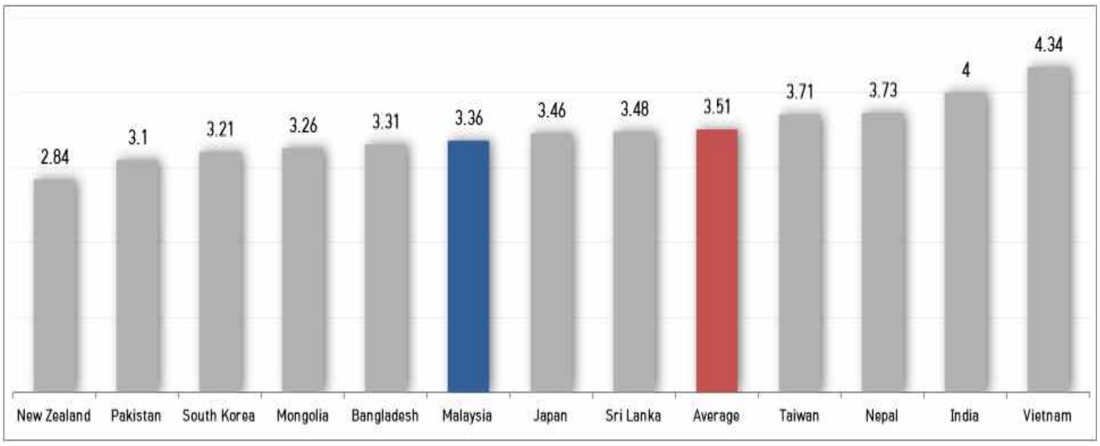


Figure 4.3.5 Averages of Malaysia and Other Countries in Need of Support Policy (Unit: Point)

◦ **Perception of Gender Equality** (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Gender Equality

The average score of male scientists and engineers in Malaysia on the perception of gender equality was 2.79 which was lower than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Malaysia were evaluated by ANOVA (or t) analysis.

Although the differences of the average scores of the respondents by their personal variable were not statistically significant, the average scores of the respondents in their 30's (2.96), single (2.90), and respondents in other occupation (3.02) were showed relatively higher in each category.

Table 4.3.11 Perception of Gender Equality in Malaysia: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.79			
Age				
29 years or younger	2.78	0.781	1.058	0.375
30 - 39	2.96	0.701		
40 - 49	2.78	0.808		
Over 50	2.24	1.099		
Marital status				
Single	2.90	0.744	0.976	0.333
Married	2.69	0.838		
Others (including divorced)	-	-		
Number of Children				
1	2.85	0.661	1.964	0.159
2	3.09	0.756		
3 or more	2.49	0.826		
Occupation				
Professor/Teacher	2.57	0.906	0.956	0.391
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	2.79	0.737		
Other	3.02	0.838		
Double income status (married)				
Double income	2.70	0.852	0.112	0.912
Single income	2.67	0.854		

Note: ***p<.001, **p<.01, *p<.05

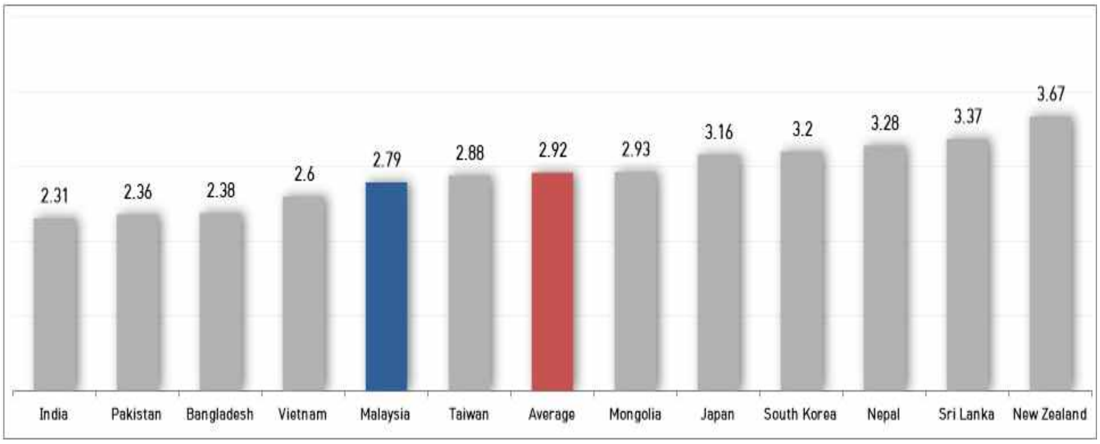


Figure 4.3.6 Averages of Malaysia and Other Countries in the Perception of Gender Equality (Unit: Point)

The figure above shows the cross-country average scores on the perception of gender equality. The perception of male scientists and engineers in Malaysia on gender equality (2.79) was lower than the average of all countries (2.92), being the fifth lowest after India, Pakistan, Bangladesh, and Vietnam.

4.4. Mongolia

4.4.1. General Profiles of Male Respondents in Mongolia

A total of 106 male scientists and engineers (8.2% of total respondents) answered the survey. Table 4.4.1. shows the age, marital status, number of children, and occupation of the male scientist and engineer respondents in Mongolia.

Regarding the age, 47.2% were 29 years or younger, 34.9% were in their 30's, 12.3% were in their 40's, and 5.7% were in their 50 years or older. There were more married respondents at 65.1% than the single respondents at 28.3%. Of the respondents that had the children(63.2% of total Mongolia respondents), 41.8% had 2 children, 31.3% had 1 child, and 26.9% had 3 or more children. In the case of couples, 72.5% were double-income couples while 27.5% were single-income couples. Regarding the occupation, 72.6% were engineers, followed by 17.0% were teachers/professors, 7.5% were in other professions, 1.9% were researchers, and 1.9% were healthcare professionals respondents who participate in this survey in Mongolia.

Table 4.4.1 General Profile of Respondents in Mongolia

(Unit: Person, %)

Composition	Frequency	%
Age		
29 years or younger	50	47.2
30 - 39	37	34.9
40 - 49	13	12.3
Over 50	6	5.7
Marital status		
Single	30	28.3
Married	69	65.1
Others (including divorced)	7	6.6
Number of Children		
1	21	31.3
2	28	41.8
3 or more	18	26.9
Occupation		
Professor/Teacher	18	17.0
Researcher	2	1.9
Healthcare professional	1	0.9
Engineer (company, R&D center, etc.)	77	72.6
Other	8	7.5
Double income status (married)		
Double income	50	72.5
Single income	19	27.5

4.4.2. Comparison of Answer by Male Scientists and Engineers in Mongolia with Other APNN Member Countries

The questions in the survey are divided into five categories including "male/female ratio" in the major field of respondents, "perception of discrimination" against women in STEM, "indirect experience" of discrimination in STEM, "need of support policy" to resolve gender barriers in STEM, and perception of "gender equality."

Average scores of the respondents from Mongolia were compared with that from the other 11 APNN countries in each category as follows.

The average male/female ratio in the fields of male scientists and engineers was 2.72, and it was higher than that of the respondents from the other 11 countries which was 1.89.

The average score for the perception of discrimination was 2.75 which was higher than the average score (2.51) from the other 11 countries. The average score for the indirect experience of discrimination was 1.82 which was also slightly lower than the average score (2.09) of the other 11 countries.

On the other hand, the average score of male scientists and engineers from Mongolia agreeing to the need of support policy to overcome the gender barrier in STEM was 3.26 which was slightly higher than "Neutral" but somewhat lower than the average score of the other countries (3.53) without statistical significance. Lastly, the average score for the Perception of Gender Equality was 2.93 which was similar to the average score of the other countries (2.92).

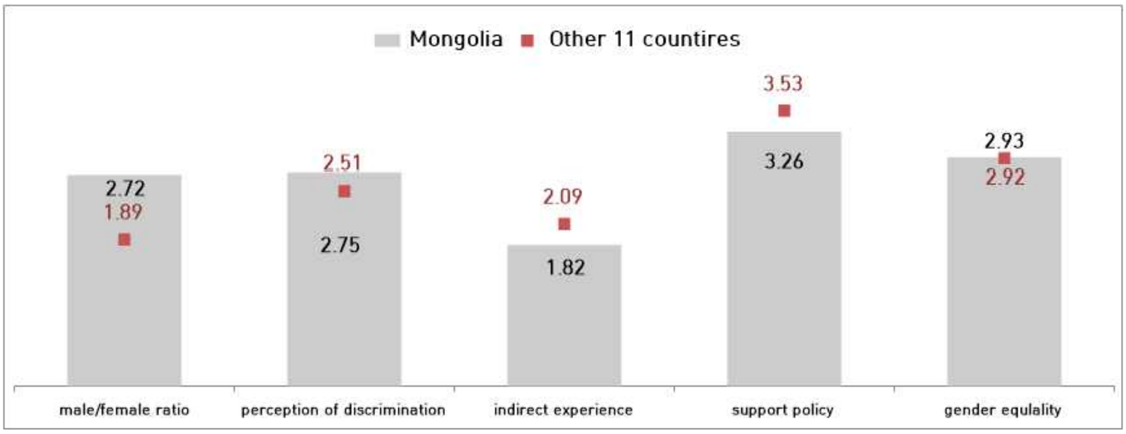


Figure 4.4.1 Comparisons of Answer between Mongolia and Other Countries (Unit: Point)

Male/Female Ratio, Perception of Discrimination, Indirect Experience of Discrimination, Need of Support Policy, Perception of Gender Equality, Mongolia, Other countries.

In summary, Mongolia had more men but relatively fewer men than other 11 countries, showed similar perception of gender equality, revealed lower indirect experience of discrimination, and agreed less to the need of support policy than other 11 APNN Member countries.

4.4.3. Comparison of Response by Male Scientists and Engineers in Mongolia and Other APNN Member Countries to Each Question

◦ **Male/Female ratio** (5-point scale, 3 points means Neutral)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of respondents was 2.72, meaning there were relatively more men but the ratio was close to balance. The male/female ratio in STEM was the lowest scoring 2.35 in college and highest (2.83) in graduate school. This figure was lowered at current work (2.69) but was arrived at balanced level in management level at current work.

The figure was statistically significantly (t=9.9917, p≤.000) higher than 1.89 which was the average of the respondents from the other 11 countries. Mongolia showed more women in the management level of respondents current work (t=9.898, p≤.000), followed by in graduate school (t=8.733, p≤.000), in current work (t=5.327, p≤.000), and in college (t=3.736, p≤.000) than other countries at statistically significant level.

Table 4.4.2 Comparison of Answer to Other APNN Member Countries : Male/Female Ratio

(Unit: Point)

Type		Question	Mongolia Average (n=106)	Average of Other Countries (n=1,188)	*t*	*(p)*
male/female Ratio (5-Point Scale)	1	The male/female ration of my department during my university(college) education	2.35	1.85	3.736***	0.000
	2	The male/female ratio of my department while at graduate school	2.83	1.91	8.733***	0.000
	3	The male/female ratio of my current workplace	2.69	1.99	5.327***	0.000
	4	The male/female ration at management level at my current workplace	3.00	1.79	9.898***	0.000
	Sub Scale		2.72	1.89	9.917***	0.000

◦ **Perception of Discrimination** (5-point scale, 3 points means Neutral)
The Higher score, The Higher Perception of Discrimination

The average score of perception of discrimination in STEM was 2.75, which was below the mid-level. Of the five questions related to the perception of gender barrier, “It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.” received the highest average score (3.56). “Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues.” (2.30) and “Girls and boys were equally encouraged to choose their majors in STEM during their education period.” (2.32) received the lowest average score.

The overall average of the answers to the questions related to perception of discrimination was 2.75 and higher than the overall average of 11 other APNN countries (2.51) at a statistically significant(t=5.011, p≤.000). Specifically, significant differences were observed for the responses “It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.”(t=6.996, p≤.000), “Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.” (t=3.287, p≤.001), “Girls and boys were equally encouraged to choose their majors in STEM during their education period.” (t=3.105, p ≤.01) get a relatively higher score, than those from other 11 countries.

The figures show the perception of discrimination in STEM is significantly higher from entering the professional life to equal work distribution and work appraisal in Mongolia than in other 11 countries on average.

Table 4.4.3 Comparison of Answer to Other Countries : Perception of Discrimination

(Unit: Point)

Type		Question	Mongolia Average (n=106)	Average of Other Countries (n=1,188)	*t*	*(p)*
Perception of Discrimination (5-Point Scale)	1	Girls and boys were equally encouraged to choose their majors in STEM during their education period.	2.32	2.05	3.105	0.002
	2	It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.	3.56	2.92	6.996***	0.000
	3	Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.	2.67	2.37	3.287**	0.001
	4	Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.	2.92	2.90	0.246	0.806
	5	Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues	2.30	2.29	0.100	0.920
	Sub Scale		2.75	2.51	5.011***	0.000

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The overall average of the response by the male scientist and engineers in Mongolia on the indirect experience of discrimination was 1.82 points which was lower than the median value of 2.5 points in a 4-point scale and close to the level of “I have not seen or heard of it but am aware of it.”

The highest level of indirect experience was the discrimination related to “marriage, pregnancy, and childbirth” (2.12) while the lowest level of indirect experience was that related to “research fund and scholarship.”(1.68)

The overall average of responses to questions related to the level of indirect experience (1.82) was lower than the overall average of other 11 countries (2.09) at statistically significant (t=-4.231, p≤.000). More specifically, the average scores of the responses to the questions of discrimination related to “Woman in STEM leaving work due to her marriage, pregnancy or child care” (t=-8.156, p≤.000), “Woman in STEM being sexually harassed or treated unfairly” (t=-4.019, p≤.000) were lower than the average scores of other countries at statistically significant.

Table 4.4.4 Comparison of Answer to Other Countries : Indirect Experience

(Unit: Point)

Type		Question	Mongolia Average (n=106)	Average of Other Countries (n=1,188)	*t*	*(p)*
Indirect Experience of discrimination (4-Point Scale)	1	Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female	1.68	1.68	-0.030	0.976
	2	Woman in STEM is disadvantaged in participating or leading a research project because she is female.	1.79	1.66	1.580	0.114
	3	Woman in STEM being sexually harassed or treated unfairly	1.70	2.06	-4.019***	0.000
	4	Woman in STEM leaving work due to her marriage, pregnancy or child care	2.12	2.96	-8.156***	0.000
	Sub Scale		1.82	2.09	-4.231***	0.000

◦ **Career Outlook and Need of Support Policy** (5-point scale, 3 points : “Neutral”) The Higher score means The Stronger agreement

The male scientists and engineers had a somewhat positive view on the career outlook of women in their fields as the average score was 3.74. But this score was lower than the average of other 11 countries (4.44) at statistically significant (t=-5.565, p≤.000) indication that the respondents in Mongolia had less positive view than other 11 APNN member countries.

The average score of male scientists and engineers in Mongolia answering to the question “It is crucial to have strong policy support to solve gender inequality in the STEM field.” was 3.44, meaning that their opinion is close to ‘neutral’ It was lower than the average of other 11 countries (3.92) at a statistically significant (t=-4.627, p ≤.000). In other words, the male scientists and engineers in Mongolia agreed that there is need of policy to overcome the gender barrier, less than other 11 countries on average.

The average score of male scientists and engineers in Mongolia answering to the question “It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.” was 3.08 meaning that they neither disagree nor agree. And the score was slightly lower than the average of other 11 countries (3.14).

Table 4.4.5 Comparison of Answer to Other Countries : Career Outlook & Need of Support Policy

(Unit: Score)

Type		Question	Mongolia Average (n=106)	Average of Other Countries (n=1,188)	*t*	*(p)*
Career Outlook	1	I believe things will turn out fine in the future career for women in STEM	3.74	4.22	-5.565***	0.000
Need of Support Policy (5-Point Scale)	1	It is crucial to have strong policy support to solve gender inequality in the STEM field.	3.44	3.92	-4.627***	0.000
	2	It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.	3.08	3.14	-0.668	0.505
		Sub Scale	3.26	3.53	-3.308	0.001

◦ **Perception of Gender Equality** (5-point scale, 3 points : "Neutral")
The higher score, The Higher Perception of Gender equality

Five questions were asked of male scientists and engineers in Mongolia on their perception of gender equality in STEM. The overall average of responses to all questions was 2.93 points, being close to the mid-level.

The highest score was on to the statement "Women are born to have a way of caring children that men are not capable of in the same way" (3.21).

It was followed by "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife" (3.08), "Primary breadwinners (who take care of financial obligations) of households should be men" (2.96), "In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves" (2.68). The scores indicate that the respondents had more perception of gender equality regarding the gender role in family.

On the other hand, the average scores on "I believe gender equality will be fully achieved only if women are given equal opportunities as men" (2.75) was the slightly lower than other scores in the category.

The overall average score of Mongolia (2.93) was similar to the average score of other 11 countries (2.92). More specifically, the average scores on "I believe gender equality will be fully achieved only if women are given equal opportunities as men."(t=6.938, $p \leq .000$), and "Women are born to have a way of caring children that men are not capable of in the same way" (t=2.501, $p \leq .014$) were higher than other 11 countries at statistically significant levels.

However, the average score on "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife" (t=-5.709, $p \leq .000$), and "Primary breadwinners (who take care of financial obligations) of households should be men" (t=-3.300, $p \leq .001$) were lower at statistically significant.

Table 4.4.6 Comparison of Answer to Other Countries : Perception of Gender Equality

(Unit: Point)

Type		Question	Mongolia Average (n=106)	Average of Other Countries (n=1,188)	*t*	*(p)*
Perception of Gender Equality (5-point scale)	1	In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves	2.68	2.61	0.640	0.523
	2	Primary breadwinners (who take care of financial obligations) of households should be men	2.96	3.30	-3.300**	0.001
	3	Women are born to have a way of caring children that men are not capable of in the same way	3.21	2.94	2.501*	0.014
	4	In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.	3.08	3.65	-5.709***	0.000
	5	I believe gender equality will be fully achieved only if women are given equal opportunities as men.	2.75	2.10	6.938***	0.000
		Sub Scale	2.93	2.92	0.223	0.824

4.4.4. Comparison of Responses in Mongolia with Other Countries

◦ **Male/Female ratio** (5-point scale, 3 points : "Neutral")
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of male scientists and engineers was 1.95, meaning there were relatively more men. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Mongolia were evaluated by ANOVA (or t) analysis. Table 4.4.7 shows the results.

The difference of responses according to the child number (F=3.970, p≤.05) and income status (t=-2.613, p≤.05) in Mongolia was statistically significant and revealed there are more men in the field of respondents having 3 or more children (3.02) than of respondents having 1 child (2.69). Although other differences were not statistically significant, the average scores of the respondents in their 30's (2.19), married and researcher respondents were the highest in each category.

Table 4.4.7 male/female ratio in Mongolia: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.72			
Age				
29 years or younger	2.72	0.714	0.429	0.733
30 - 39	2.80	0.872		
40 - 49	2.58	0.793		
Over 50	2.50	0.592		
Marital status				
Single	3.01	0.606	0.904	0.408
Married	2.92	0.586		
Others (including divorced)	2.69	0.527		
Number of Children				
1	3.02	0.778	3.970*	0.024
2	2.82	0.707		
3 or more	2.38	0.708		
Occupation				
Professor/Teacher	2.92	0.659	2.036	0.095
Researcher	3.88	1.591		
Healthcare professional	2.00			
Engineer (company, R&D center, etc.)	2.63	0.751		
Other	2.88	0.845		
Double income status (married)				
Double income	2.62	0.801	-2.613*	0.011
Single income	3.14	0.567		

Note: ***p<.001, **p<.01, *p<.05

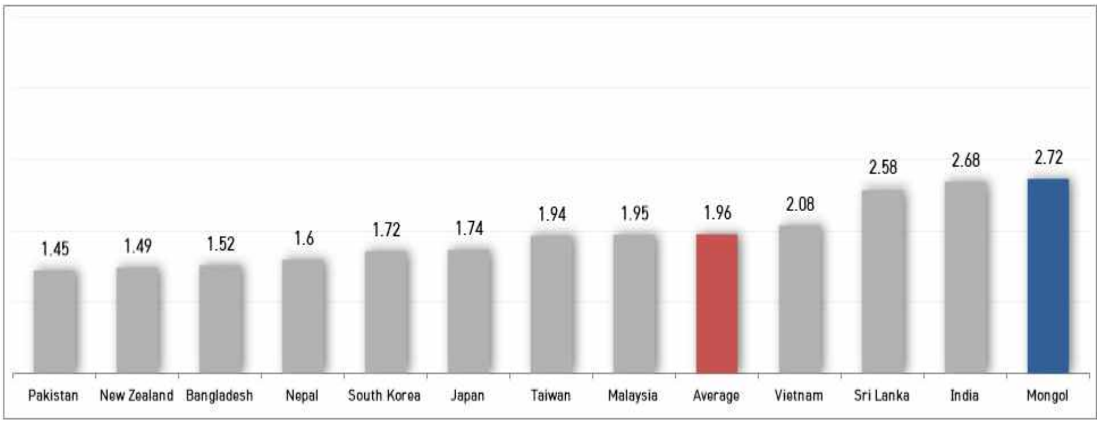


Figure 4.4.2 Average of Mongolia and Other Countries in male/female ratio (Unit: Point)

As shown in the figure, the male/female ratio in the fields of the male scientists and engineers in Mongolia (2.72) was similar to the average of all countries (1.96), being the highest level among APNN 12 countries and was closed to the balanced.

◦ **Perception of Discrimination** (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Discrimination

The average score of male scientists and engineers in Mongolia to the perception of discrimination in STEM (2.75) was lower than the mid-level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Mongolia were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.4.8.

The difference of response according to the respondents' income status ($t=2.100$, $p \leq .05$) in Mongolia was statistically significant, and revealed the perception of discrimination of double income respondents is relatively higher than that of single income respondents.

Although other differences of the average scores of the respondents by their personal variable were not statistically significant, the average scores of the respondents in 30's (2.82), single (as marital status, 3.01), and respondents in other occupation were relatively high in each category.

Table 4.4.8 Perception of Discrimination in Mongolia: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.75			
Age				
29 years or younger	2.75	0.365	0.924	0.432
30 - 39	2.83	0.526		
40 - 49	2.65	0.524		
Over 50	2.57	0.625		
Marital status				
Single	3.01	0.606	0.904	0.408
Married	2.92	0.586		
Others (including divorced)	2.69	0.527		
Number of Children				
1	2.69	0.403	0.144	0.866
2	2.76	0.533		
3 or more	2.72	0.583		
Occupation				
Professor/Teacher	2.63	0.481	0.690	0.600
Researcher	2.70	0.141		
Healthcare professional	2.40	-		
Engineer (company, R&D center, etc.)	2.77	0.468		
Other	2.90	0.400		
Double income status (married)				
Double income	2.82	0.479	2.100*	0.040
Single income	2.56	0.445		

Note: ***p<.001, **p<.01, *p<.05

The figure below shows the comparative average scores among different countries. The perception of male scientists and engineers in Mongolia on discrimination (2.75) was higher than the average of all countries (2.53), being the second highest after Vietnam among 12 countries.

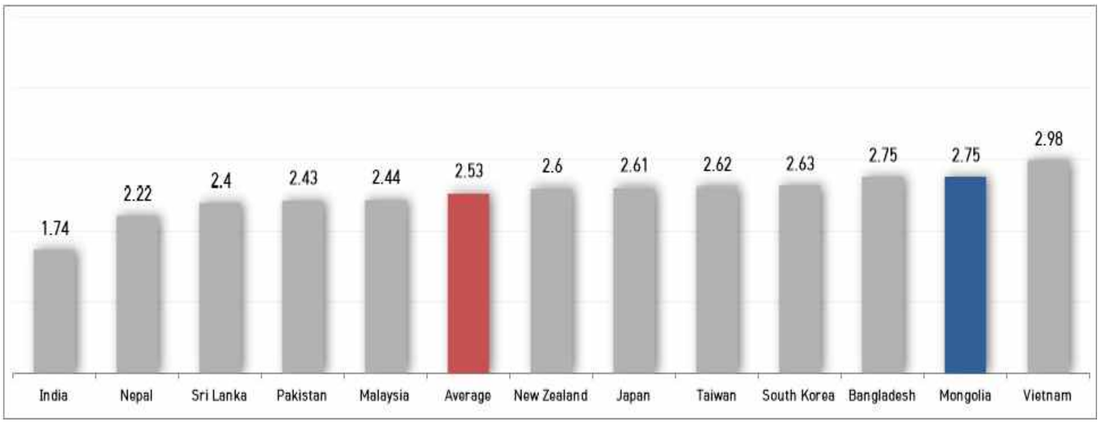


Figure 4.4.3 Averages of Mongolia and Other countries in Perception of Discrimination (Unit : Point)

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The average score of male scientists and engineers in Mongolia on the indirect experience of discrimination against women in STEM was 1.82 which was close to “I have not seen or heard of it but am aware of it.”

Table 4.4.9 Indirect Experience in Mongolia: Differences according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	1.82			
Age				
29 years or younger	1.80	0.564	0.207	0.891
30 - 39	1.87	0.634		
40 - 49	1.85	0.573		
Over 50	1.71	0.431		
Marital status				
Single	1.84	0.606	0.904	0.408
Married	1.79	0.586		
Others (including divorced)	1.80	0.527		
Number of Children				
1	1.88	0.610	0.164	0.849
2	1.83	0.628		
3 or more	1.93	0.468		
Occupation				
Professor/Teacher	2.01	0.639	0.923	0.454
Researcher	2.00	0.354		
Healthcare professional	1.25			
Engineer (company, R&D center, etc.)	1.78	0.569		
Other	1.88	0.567		
Double income status (married)				
Double income	1.89	0.617	0.179	0.858
Single income	1.86	0.614		

Note: ***p<.001, **p<.01, *p<.05

The differences according to the respondent's profiles (age, marital status, number of children, occupation, and double income status (if married) in Mongolia were evaluated by ANOVA (or t) analysis. The results are summarized in Table 4.4.9.

The standard deviation of the average scores of the respondents by the personal variable was in similar level.

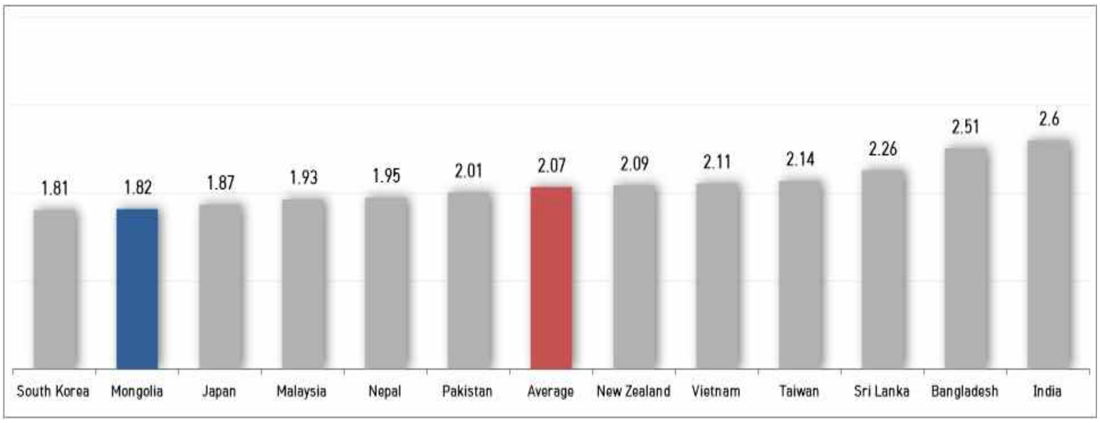


Figure 4.4.4 Averages of Mongolia and Other Countries in Indirect Experience (Unit : Point)

The figure above shows the cross-country average scores on the indirect experience of discrimination in 12 countries. The indirect experience of discrimination by the male scientists and engineers in Mongolia (1.82) was lower than the average of all countries (2.07), being the second lowest after South Korea

◦ **Need of Support Policy** (5-point scale, 3 points : "Neutral")
The Higher score means The Stronger agreement

The average score of male scientists and engineers in Mongolia on the need of support policy to overcome the gender barrier in STEM was 3.26, being slightly higher than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Mongolia were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.4.10.

Although the differences were not statistically significant, the average scores of the respondents in their age 29 years or younger (3.36), single respondents (as marital status, 3.01), engineers (3.34) and double income respondents (3.37) showed relatively high agreement to the need of support policy.

Table 4.4.10 Need of Support Policy in Mongolia: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	3.26			
Age				
29 years or younger	3.36	0.700	0.617	0.606
30 - 39	3.14	0.925		
40 - 49	3.19	0.751		
Over 50	3.33	0.753		
Marital status				
Single	3.01	0.606	0.904	0.408
Married	2.92	0.586		
Others (including divorced)	2.69	0.527		
Number of Children				
1	3.21	0.751	0.111	0.895
2	3.32	0.884		
3 or more	3.25	0.752		
Occupation				
Professor/Teacher	3.14	0.589	1.152	0.336
Researcher	2.50	2.121		
Healthcare professional	3.00	-		
Engineer (company, R&D center, etc.)	3.34	0.816		
Other	2.94	0.496		
Double income status (married)				
Double income	3.37	0.813	1.950	0.055
Single income	2.95	0.780		

Note: ***p<.001, **p<.01, *p<.05

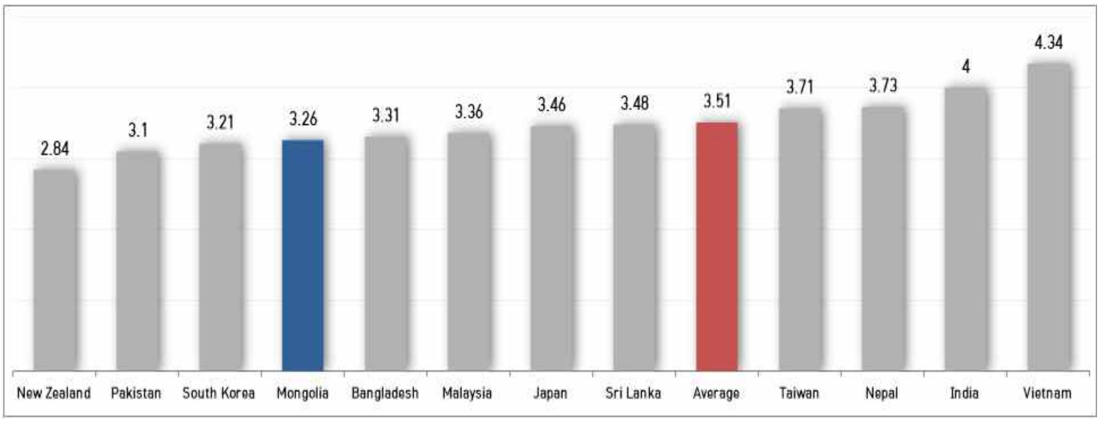


Figure 4.4.5 Averages of Mongolia and Other Countries in Need of Support Policy (Unit: Point)

The above figure shows the cross-country average scores on the need of support policy to overcome the gender barrier. Respondents in Mongolia agreeing to the need of support policy (3.26) was lower than the average of all countries (3.51), being the fourth lowest after New Zealand, Pakistan, and South Korea.

◦ **Perception of Gender Equality** (5-point scale, 3 points : “Neutral”)
The Higher score, The Higher Perception of Gender Equality

The average score of male scientists and engineers in Mongolia on the perception of gender equality was 2.93 which was lower than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Mongolia were evaluated by ANOVA (or t) analysis.

Although the differences of the average scores of the respondents by their personal variable were not statistically significant, the average scores of the respondents in their 30’s (3.04), single (3.01), and single income respondents (3.03) were shown a relatively high perception of gender equality in each category.

Table 4.4.11 Perception of Gender Equality in Mongolia: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.93			
Age			1.670	0.178
29 years or younger	2.95	0.604		
30 - 39	3.04	0.521		
40 - 49	2.72	0.597		
Over 50	2.60	0.727		
Marital status			0.904	0.408
Single	3.01	0.606		
Married	2.92	0.586		
Others (including divorced)	2.69	0.527		
Number of Children			0.041	0.960
1	2.95	0.596		
2	2.94	0.596		
3 or more	2.90	0.537		
Occupation			0.670	0.614
Professor/Teacher	2.74	0.393		
Researcher	2.90	0.141		
Healthcare professional	2.60			
Engineer (company, R&D center, etc.)	2.98	0.648		
Other	2.95	0.334		
Double income status (married)			-0.933	0.354
Double income	2.88	0.595		
Single income	3.03	0.563		

Note: ***p<.001, **p<.01, *p<.05

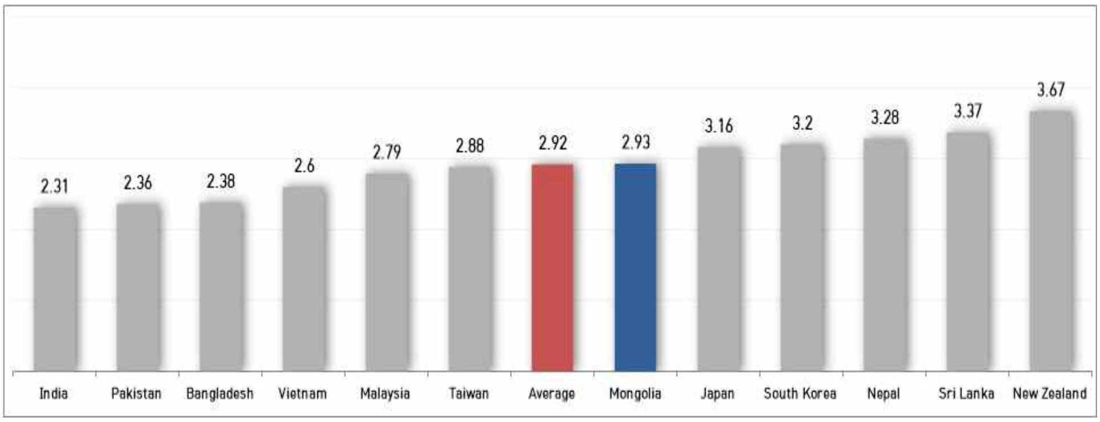


Figure 4.4.6 Averages of Mongolia and Other Countries in the Perception of Gender Equality (Unit: Point)

The figure above shows the cross-country average scores on the perception of gender equality. The perception of male scientists and engineers in Mongolia on gender equality (2.93) was lower than the average of all countries (2.92), being the mid-level among 12 countries.

4.5. Bangladesh

4.5.1. General Profiles of Male Respondents in Bangladesh

A total of 100 male scientists and engineers (7.7% of total respondents) answered the survey. Table 4.5.1. shows the age, marital status, number of children, and occupation of the male scientist and engineer respondents in Bangladesh.

Regarding the age, 77.0% were 29 years or younger, 20.0% were in their 30’s, 2.0% were in their 40’s, and 1.0% were in their 50 years or older. Bangladesh respondents are relatively young than other countries. There were more single respondents at 64.0% than married respondents at 35.5%. Of the respondents that had the children (21% of total Bangladesh respondents), 42.9% had 2 children and 28.6% had 1 child or 3 or more children each. In case of couples, 55.1% were single-income couples while 44.1% were double-income couples.

Regarding the occupation, 46.0% were engineers, followed by 28.0% were researchers, 13.0% were teachers/professors, 11.0% were in other professions, and 2.0% were healthcare professionals respondents.

Table 4.5.1 General Profile of Respondents in Bangladesh

(Unit: Person, %)

Composition	Frequency	%
Age		
29 years or younger	77	77.0
30 - 39	20	20.0
40 - 49	2	2.0
Over 50	1	1.0
Marital status		
Single	64	64.0
Married	35	35.0
Others (including divorced)	1	1.0
Number of Children		
1	6	28.6
2	9	42.9
3 or more	6	28.6
Occupation		
Professor/Teacher	13	13.0
Researcher	28	28.0
Healthcare professional	2	2.0
Engineer (company, R&D center, etc.)	46	46.0
Other	11	11.0
Double income status (married)		
Double income	15	44.1
Single income	19	55.9

4.5.2. Comparison of Answer by Male Scientists and Engineers in Bangladesh with Other APNN Member Countries

The questions in the survey are divided into five categories including “male/female ratio” in the major field of respondents, “perception of discrimination” against women in STEM, “indirect experience” of discrimination in STEM, “need of support policy” to resolve gender barriers in STEM, and perception of “gender equality.” Average scores of the respondents from Bangladesh were compared with that from the other 11 APNN countries in each category as follows.

The average score of male/female ratio in the fields of male scientists and engineers was 1.52, and it was lower than that from other 11 countries (1.96) at a statistically significant. ($t=-6.067$, $p \leq .000$), indicating more male ratio than other countries. The average score for the perception of discrimination was 2.75 which was slightly higher than the average score (2.51) from the other 11 countries. The average score for the indirect experience of discrimination was 2.51 which was also higher than the average score (2.03) of the other 11 countries at a statistically significant ($t=7.414$, $p \leq .000$).

On the other hand, the average score of male scientists and engineers from Bangladesh agreeing to the need of support policy to overcome the gender barrier in STEM was 3.31 which was slightly higher than “Neutral” but somewhat lower than the average score of the other countries (3.52) without statistical significance. Lastly, the average score for the awareness of gender equality was 2.38 which was lower than the average score of the other countries (2.97) at statistical significance ($t=-7.246$, $p \leq .000$).

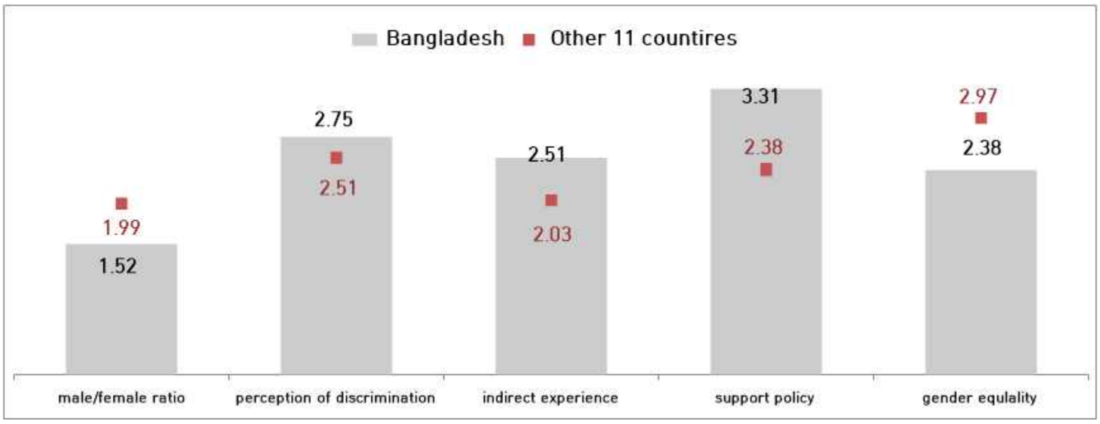


Figure 4.5.1 Comparisons of Answer between Bangladesh and Other Countries (Unit: Point)

In summary, the averages scores from Bangladesh showed more men in STEM, less agreement to support policy, slightly lower perception of discrimination and of gender equality than other countries.

4.5.3. Comparison of Response by Male Scientists and Engineers in Bangladesh and Other APNN Member Countries to Each Question

◦ **Male/Female ratio** (5-point scale, 3 points means Neutral)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of respondents was 1.52, meaning there were more men. The male/female ratio in STEM was the lowest scoring 1.40 for management level at the current workplace but highest in graduate school, meaning that the ratio of women was lower at work than that during their education period.

The figure (1.52) was lower than that of 11 countries (1.99) at a statistically significant (t=-6.067, $p \leq .000$). Bangladesh showed more men during all questioned period (from college to current work and after). The average scores of Bangladesh at current work (t=-6.713, $p \leq .000$), at management level at current work (t=-5.956, $p \leq .000$), at college (t=-3.448, $p \leq .001$), and at graduate school (t=-3.013, $p \leq .01$) were slightly lower (0.1 ~ 0.2 score point) than other APNN 11 countries, whereas slightly higher for current work and manager or higher position in current work at the same scale. In summary, there were more men in STEM in Bangladesh than other 11 countries for all period from college to the management level at current work.

Table 4.5.2 Comparison of Answer to Other APNN Member Countries : Male/Female Ratio

(Unit: Point)

Type		Question	Bangladesh Average (n=100)	Average of Other Countries (n=1,194)	*t*	*(p)*
male/female Ratio (5-Point Scale)	1	The male/female ration of my department during my university(college) education	1.57	1.92	-3.448**	0.001
	2	The male/female ratio of my department while at graduate school	1.68	2.01	-3.013**	0.003
	3	The male/female ratio of my current workplace	1.44	2.10	-6.713***	0.000
	4	The male/female ration at management level at my current workplace	1.40	1.93	-5.956***	0.000
		Sub Scale	1.52	1.99	-6.067***	0.000

◦ **Perception of Discrimination** (5-point scale, 3 points means Neutral)
The Higher score, The Higher Perception of Discrimination

The average score of perception of discrimination in STEM was 2.75, which was below the mid-level. Of the five questions related to the perception of gender barrier, “It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.” received the highest average score (3.27). “Girls and boys were equally encouraged to choose their majors in STEM during their education period." (1.99) received the lowest average score.

The overall average of the answers to the questions related to perception of discrimination was 2.75 and higher than the overall average of 11 other APNN countries (2.51) at a statistically significant (t=3.278, $p \leq .001$). Specifically, significant differences were observed for the responses "Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues" (t=2.988, $p \leq .01$), "It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications." (t=2.630, $p \leq .001$), and "Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level." (t=2.682, $p \leq .001$) get relatively higher score, than those from other 11 countries.

The figures show the perception of discrimination of male scientists and engineers in STEM of Bangladesh is significantly higher from entering the professional life to equal work distribution, payment and work appraisal in Bangladesh than in other 11 countries on average.

Table 4.5.3 Comparison of Answer to Other Countries : Perception of Discrimination

(Unit: Point)

Type		Question	Bangladesh Average (n=100)	Average of Other Countries (n=1,194)	*t*	*(p)*
Perception of Discrimination (5-Point Scale)	1	Girls and boys were equally encouraged to choose their majors in STEM during their education period.	1.99	2.08	-0.713	0.477
	2	It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.	3.27	2.95	2.630**	0.009
	3	Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.	2.68	2.37	2.682**	0.007
	4	Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.	3.10	2.89	1.649	0.102
	5	Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues	2.70	2.26	2.988**	0.003
		Sub Scale	2.75	2.51	3.278***	0.001

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The overall average of the response by the male scientist and engineers in Bangladesh on the indirect experience of discrimination was 2.51 points which was close to the median value of 2.5 points in a 4-point scale, meaning "I have not seen or heard of it but am aware of it.”

The highest level of indirect experience was the discrimination related to “marriage, pregnancy, and childbirth” (3.15) while the lowest level of indirect experience was that related to “participating or leading a research project” (2.11).

The overall average of responses to questions related to the level of indirect experience (2.51) was higher than the overall average of other 11 countries (2.03) at statistically significant ($t=7.414$, $p \leq .000$).

More specifically, the average scores of the responses to the questions of indirect experience related to “Woman in STEM are disadvantaged in receiving research funds or scholarships because she is female” ($t=6.523$, $p \leq .000$), “Woman in STEM is disadvantaged in participating or leading a research project because she is female.” ($t=4.716$, $p \leq .000$), “Woman in STEM being sexually harassed or treated unfairly” ($t=4.345$, $p \leq .000$), and “Woman in STEM leaving work due to her marriage, pregnancy or child care” ($t=2.953$, $p \leq .000$) were higher in order than the average scores of other countries at statistically significant.

Table 4.5.4 Comparison of Answer to Other Countries: Indirect Experience

(Unit: Point)

Type		Question	Bangladesh Average (n=100)	Average of Other Countries (n=1,194)	*t*	*(p)*
Indirect Experience of discrimination (4-Point Scale)	1	Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female	2.33	1.63	6.523***	0.000
	2	Woman in STEM is disadvantaged in participating or leading a research project because she is female.	2.11	1.63	4.716***	0.000
	3	Woman in STEM being sexually harassed or treated unfairly	2.46	2.00	4.345***	0.000
	4	Woman in STEM leaving work due to her marriage, pregnancy or child care	3.15	2.87	2.953**	0.004
	Sub Scale		2.51	2.03	7.414***	0.000

◦ **Career Outlook and Need of Support Policy** (5-point scale, 3 points : “Neutral”) The Higher score means The Stronger agreement

The male scientists and engineers had a very positive view on the career outlook of women in their fields as the average score was 4.38. The score was significantly higher ($t=2.442$, $p \leq .000$) than the average of 11 other countries (4.16) indicating that the respondents in Bangladesh had more positive view to other 11 APNN member countries.

The average score of male scientists and engineers in Bangladesh answering to the question “It is crucial to have strong policy support to solve gender inequality in the STEM field.” was 3.82, meaning that they slightly agreed to it. It was similar to the average of other 11 countries (3.88). In other words, the male scientists and engineers in Bangladesh agreed that there is need of policy to overcome the gender barrier on a similar level with other 11 countries.

The average score of male scientists and engineers in Bangladesh answering to the question “It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.” was 2.75 meaning that they neither disagree nor agree. And the score was lower than the average (3.16) of other 11 countries at a statistically significant (t=-2.626, $p \leq .05$).

Table 4.5.5 Comparison of Answer to Other Countries : Career Outlook & Need of Support Policy

(Unit: Score)

Type		Question	Bangladesh Average (n=100)	Average of Other Countries (n=1,194)	*t*	*(p)*
Career Outlook	1	I believe things will turn out fine in the future career for women in STEM	4.38	4.16	2.442*	0.015
Need of Support Policy (5-Point Scale)	1	It is crucial to have strong policy support to solve gender inequality in the STEM field.	3.82	3.88	-0.584	0.559
	2	It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.	2.79	3.16	-2.626*	0.010
	Sub Scale		3.31	3.52	-2.254	0.024

◦ **Perception of Gender Equality** (5-point scale, 3 points : “Neutral”)
The higher score, The Higher Perception of Gender equality

Five questions were asked of male scientists and engineers in Bangladesh on their perception of gender equality in STEM. The overall average of responses to all questions was 2.38 points, being lower than the mid-level.

The highest score was on to the statement “Women are born to have a way of caring children that men are not capable of in the same way” (2.71).

It was followed by “In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife” (2.50), “Primary breadwinners (who take care of financial obligations) of households should be men” (2.35), and “In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves” (2.29). The scores indicate that the respondents had more perception of gender equality regarding the gender role in family.

On the other hand, the average scores on “I believe gender equality will be fully achieved only if women are given equal opportunities as men” (2.05) were the lowest. The scores indicate that the respondents had strong perception of conventional division of that equal opportunity would lead to equal outcome, meaning that the perception of gender equality related to this question was relatively low.

The overall average score of Bangladesh (2.38) was lower than the average score of other 11 countries (2.97) at a statistically significant level (t=-7.246, p≤.000). More specifically, the average scores on "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife" (t=-9.135, p ≤.000), "Primary breadwinners (who take care of financial obligations) of households should be men" (t=-8.396, p≤.000), 'In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves' (t=-2.779, p≤.01) and 'Women are born to have a way of caring children that men are not capable of in the same way' (t=-1.978, p≤.05) were lower than other 11 countries at statistically significant levels. The average scores indicate that the male scientists and engineers in Bangladesh had a lower perception of gender equality related to gender role in family than those in other countries.

Table 4.5.6 Comparison of Answer to Other Countries : Perception of Gender Equality

(Unit: Point)

Type		Question	Bangladesh Average (n=100)	Average of Other Countries (n=1,194)	*t*	*(p)*
Perception of Gender Equality (5-point scale)	1	In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves	2.29	2.65	-2.779**	0.006
	2	Primary breadwinners (who take care of financial obligations) of households should be men	2.35	3.35	-8.396***	0.000
	3	Women are born to have a way of caring children that men are not capable of in the same way	2.71	2.98	-1.978*	0.048
	4	In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.	2.50	3.69	-9.135***	0.000
	5	I believe gender equality will be fully achieved only if women are given equal opportunities as men.	2.05	2.16	-0.944	0.346
		Sub Scale	2.38	2.97	-7.246***	0.000

4.5.4. Comparison of Responses in Bangladesh with Other Countries

◦ **Male/Female ratio** (5-point scale, 3 points : "Neutral")
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of male scientists and engineers was 1.52, meaning there were relatively more men. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Bangladesh were evaluated by ANOVA (or t) analysis. Table 4.5.7 shows the results.

Although the differences due to the personal variables were not statistically significant, the average scores of the respondents in their 40's (1.00), having 1 children (1.21), engineers (1.32) and single income (1.37) were the lowest in each category meaning more male scientists and engineers in their fields.

Table 4.5.7 male/female ratio in Bangladesh: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	1.52			
Age				
29 years or younger	1.56	0.776	0.683	0.564
30 - 39	1.38	0.553		
40 - 49	1.00	0.000		
Over 50	1.50			
Marital status				
Single	1.47	0.615	1.352	0.264
Married	1.25	0.714		
Others (including divorced)	1.50			
Number of Children				
1	1.21	0.292	0.212	0.811
2	1.36	0.453		
3 or more	1.33	0.585		
Occupation				
Professor/Teacher	1.58	0.724	2.638*	0.039
Researcher	1.62	0.644		
Healthcare professional	2.38	0.884		
Engineer (company, R&D center, etc.)	1.32	0.685		
Other	1.91	0.903		
Double income status (married)				
Double income	1.63	0.706	0.998	0.326
Single income	1.37	0.814		

Note: ***p<.001, **p<.01, *p<.05

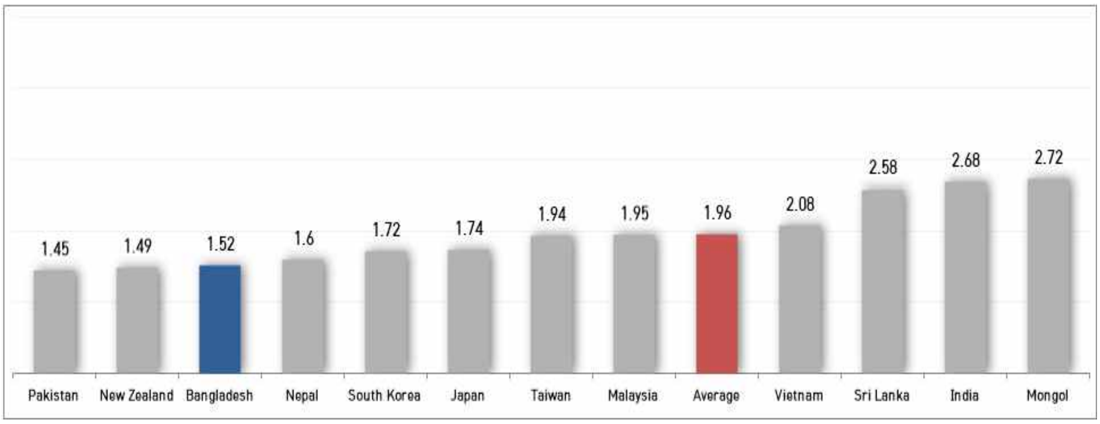


Figure 4.5.2 Average of Bangladesh and Other Countries in male/female ratio (Unit: Point)

As shown in the figure, the male/female ratio in the fields of the male scientists and engineers in Bangladesh (1.52) was lower than the average of all countries (1.96), being the third lowest level after Pakistan, and New Zealand among APNN 12 countries.

◦ **Perception of Discrimination** (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Discrimination

The average score of male scientists and engineers in Bangladesh to the perception of discrimination in STEM (2.75) was lower than the mid-level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Bangladesh were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.5.8.

Although the differences of the average scores of the respondents by their personal variable were not statistically significant, the average scores of the respondents in 30's (2.97), engineers (2.94), and single income respondents (2.91) were relatively high in each category

Table 4.5.8 Perception of Discrimination in Bangladesh: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.75			
Age				
29 years or younger	2.69	0.685	2.738*	0.048
30 - 39	2.97	0.396		
40 - 49	3.50	0.141		
Over 50	1.80			
Marital status				
Single	2.44	0.615	1.352	0.264
Married	2.25	0.714		
Others (including divorced)	3.00	-		
Number of Children				
1	2.93	0.501	0.374	0.693
2	2.71	0.701		
3 or more	2.97	0.625		
Occupation				
Professor/Teacher	2.66	0.574	2.312+	0.063
Researcher	2.60	0.697		
Healthcare professional	2.10	0.990		
Engineer (company, R&D center, etc.)	2.94	0.597		
Other	2.53	0.628		
Double income status (married)				
Double income	2.53	0.640	-1.758+	0.088
Single income	2.91	0.590		

Note: ***p<.001, **p<.01, *p<.05

The figure below shows the comparative average scores among different countries. The perception of male scientists and engineers in Bangladesh on discrimination (2.75) was higher than the average of all countries (2.53), being the second highest with Mongolia after Vietnam among 12 countries.

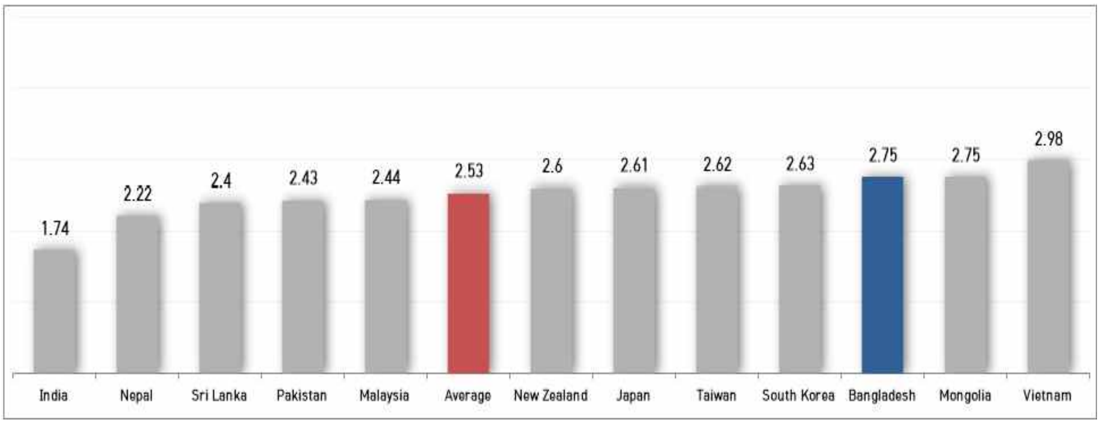


Figure 4.5.3 Averages of Bangladesh and Other countries in Perception of Discrimination (Unit : Point)

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The average score of male scientists and engineers in Bangladesh on the indirect experience of discrimination against women in STEM was 2.51 which was close to “I have not seen or heard of it but am aware of it.”

Table 4.5.9 Indirect Experience in Bangladesh: Differences according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.51			
Age				
29 years or younger	2.49	0.621	0.261	0.853
30 - 39	2.59	0.650		
40 - 49	2.75	1.414		
Over 50	2.25			
Marital status				
Single	2.44	0.615	1.352	0.264
Married	2.25	0.714		
Others (including divorced)	3.00			
Number of Children				
1	2.50	1.037	0.250	0.781
2	2.72	0.605		
3 or more	2.46	0.749		
Occupation				
Professor/Teacher	2.56	0.410	0.420	0.794
Researcher	2.54	0.593		
Healthcare professional	2.75	1.061		
Engineer (company, R&D center, etc.)	2.52	0.708		
Other	2.30	0.611		
Double income status (married)				
Double income	2.42	0.724	-0.505	0.617
Single income	2.54	0.689		

Note: ***p<.001, **p<.01, *p<.05

The differences according to the respondent's profiles (age, marital status, number of children, occupation, and double income status (if married) in Bangladesh were evaluated by ANOVA (or t) analysis. The results are summarized in Table 4.5.9.

The standard deviation of the average scores of the respondents by the personal variable was in similar level.

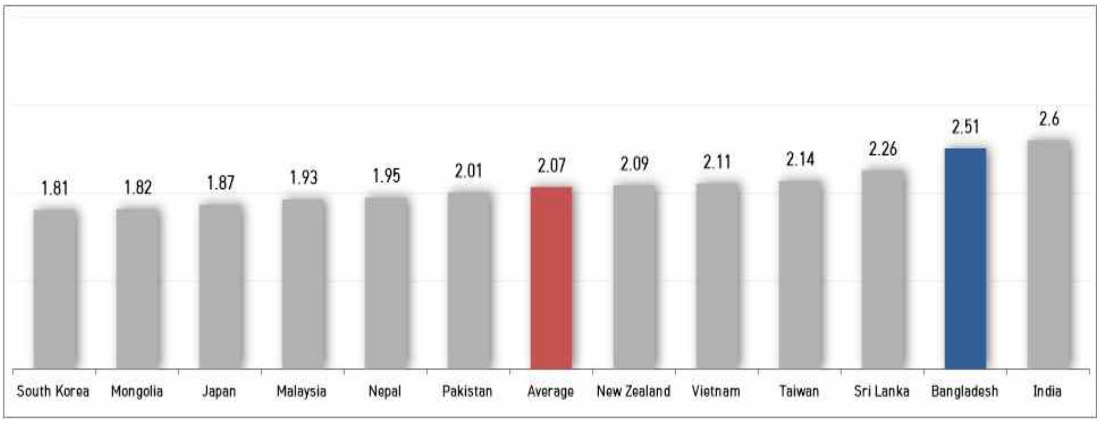


Figure 4.5.4 Averages of Bangladesh and Other Countries in Indirect Experience (Unit : Point)

The figure above shows the cross-country average scores on the indirect experience of discrimination in 12 countries. The indirect experience of discrimination by the male scientists and engineers in Bangladesh (2.51) was lower than the average of all countries (2.07), being the second highest after India.

◦ **Need of Support Policy** (5-point scale, 3 points : "Neutral")
The Higher score means The Stronger agreement

The average score of male scientists and engineers in Bangladesh on the need of support policy to overcome the gender barrier in STEM was 3.31, being slightly higher than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Bangladesh were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.5.10.

The standard deviation of the average scores of the respondents by the personal variable was in similar level.

Table 4.5.10 Need of Support Policy in Bangladesh: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	3.31			
Age				
29 years or younger	3.27	1.053	0.488	0.691
30 - 39	3.50	0.811		
40 - 49	3.00	1.414		
Over 50	4.00			
Marital status				
Single	2.44	0.615	1.352	0.264
Married	2.25	0.714		
Others (including divorced)	3.00	-		
Number of Children				
1	3.08	1.021	1.638	0.222
2	3.83	0.750		
3 or more	3.67	0.606		
Occupation				
Professor/Teacher	3.31	1.032	2.436+	0.053
Researcher	3.23	0.967		
Healthcare professional	2.25	1.768		
Engineer (company, R&D center, etc.)	3.56	0.990		
Other	2.68	0.845		
Double income status (married)				
Double income	3.00	1.086	-2.203*	0.035
Single income	3.76	0.933		

Note: ***p<.001, **p<.01, *p<.05

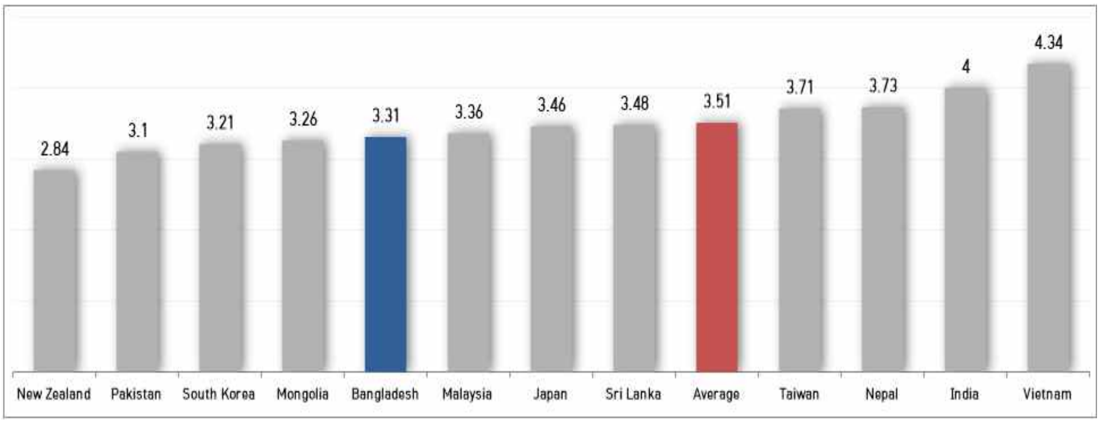


Figure 4.5.5 Averages of Bangladesh and Other Countries in Need of Support Policy (Unit: Point)

The above figure shows the cross-country average scores on the need of support policy to overcome the gender barrier. Respondents in Bangladesh agreeing to the need of support policy (3.31) was lower than the average of all countries (3.51), being the fifth lowest after New Zealand, Pakistan, South Korea and Mongolia.

◦ **Perception of Gender Equality** (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Gender Equality

The average score of male scientists and engineers in Bangladesh on the perception of gender equality was 2.38 which was lower than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Bangladesh were evaluated by ANOVA (or t) analysis.

Although the differences of the average scores of the respondents by their personal variable were not statistically significant, the average scores of the respondents in the age of less than 29 years (2.46), having more than 3 children (2.23), and double income respondents (2.33) were relatively high, meaning more perception of gender equality in each category.

Table 4.5.11 Perception of Gender Equality in Bangladesh: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.38			
Age				
29 years or younger	2.46	0.660	1.821	0.149
30 - 39	2.11	0.560		
40 - 49	2.40	1.131		
Over 50	1.80			
Marital status				
Single	2.44	0.615	1.352	0.264
Married	2.25	0.714		
Others (including divorced)	3.00			
Number of Children				
1	2.17	0.942	0.096	0.909
2	2.07	0.574		
3 or more	2.23	0.742		
Occupation				
Professor/Teacher	2.57	0.626	2.289	0.066
Researcher	2.49	0.467		
Healthcare professional	2.70	0.424		
Engineer (company, R&D center, etc.)	2.18	0.761		
Other	2.68	0.454		
Double income status (married)				
Double income	2.33	0.670	0.577	0.568
Single income	2.19	0.759		

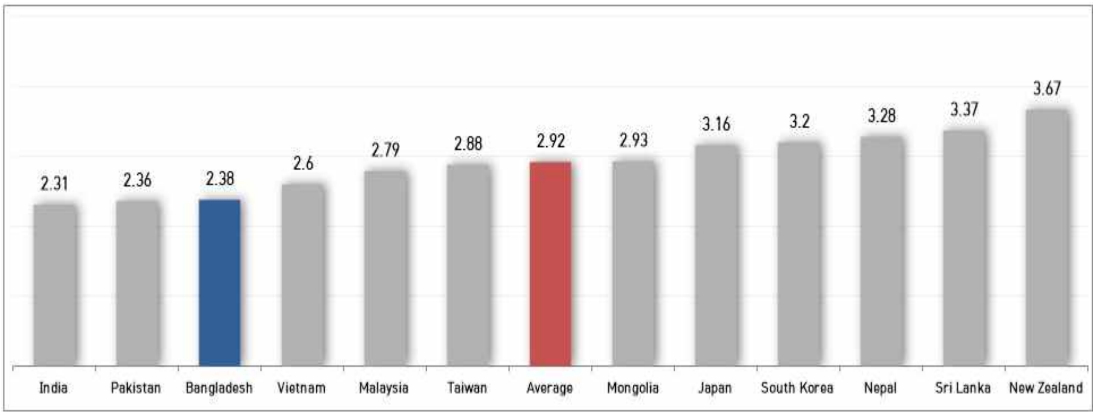


Figure 4.5.6 Averages of Bangladesh and Other Countries in the Perception of Gender Equality (Unit: Point)

The figure above shows the cross-country average scores on the perception of gender equality. The perception of male scientists and engineers in Bangladesh on gender equality (2.38) was lower than the average of all countries (2.92), being the third lowest level after India, and Pakistan among 12 countries.

4.6. Vietnam

4.6.1. General Profiles of Male Respondents in Vietnam

A total of 104 male scientists and engineers (8.0% of total respondents) answered the survey. Table 4.6.1. shows the age, marital status, number of children, and occupation of the male scientist and engineer respondents in Vietnam.

Regarding the age, 76.9% were in their 30's, 11.5% were in their 40's and 29 years or less for each, and there was no respondent in the age of 50 or older. There were more married respondents at 87.0% than the single respondents at 13.0%. Of the respondents that had the children (83.0% of total Vietnam respondents), 73.9% had 2 children, 17.0% had 1 child, and 9.1% had 3 or more children. In the case of couples, all the respondents Vietnam were double-income couples (100%). Regarding occupation, 52.9% were teachers/professors, followed by 32.7% were engineers, 14.4% were in other professions in Vietnam.

Table 4.6.1 General Profile of Respondents in Vietnam

(Unit: Person, %)

Composition	Frequency	%
Age		
29 years or younger	12	11.5
30 - 39	80	76.9
40 - 49	12	11.5
Over 50	-	-
Marital status		
Single	13	13.0
Married	87	87.0
Others (including divorced)	-	-
Number of Children		
1	15	17.0
2	65	73.9
3 or more	8	9.1
Occupation		
Professor/Teacher	55	52.9
Researcher	-	-
Healthcare professional	-	-
Engineer (company, R&D center, etc.)	34	32.7
Other	15	14.4
Double income status (married)		
Double income	87	100.0
Single income	-	-

4.6.2. Comparison of Answer by Male Scientists and Engineers in Vietnam with Other APNN Member Countries

The questions in the survey are divided into five categories including "male/female ratio" in the major field of respondents, "perception of discrimination" against women in STEM, "indirect experience" of discrimination in STEM, "need of support policy" to resolve gender barriers in STEM, and perception of "gender equality."

Average scores of the respondents from Vietnam were compared with that from the other 11 APNN countries in each category as follows. The average male/female ratio in the fields of male scientists and engineers was 2.08, and it was higher than that of the respondents from the other 11 countries which was 1.95. The average score for the perception of discrimination was 2.98 which was higher than the average score (2.49) from the other 11 countries at statistically significant ($t=11.700$, $p\leq.000$). The average score for the indirect experience of discrimination was 2.11 which was similarly higher than the average score (2.07) of the other 11 countries. The average score of male scientists and engineers from Vietnam agreeing to the need of support policy to overcome the gender barrier in STEM was 4.34 which was not only higher than "Neutral" but also than the average score of the other countries (3.43) at statistical significance ($t=12.126$, $p\leq.000$). On the other hand, the average score for the perception of gender equality was 2.60 which was lower than the average score of the other countries (2.95) at a statistically significant ($t=-4.357$, $p\leq.000$).

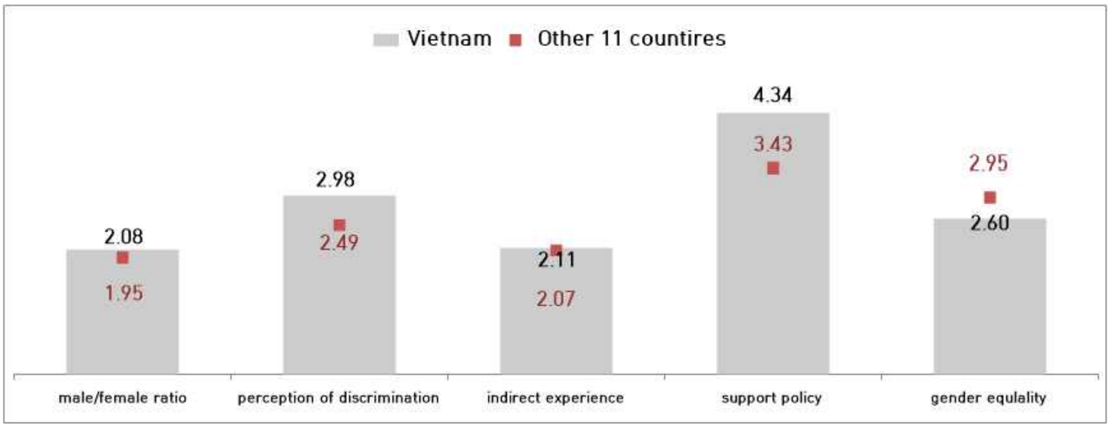


Figure 4.6.1 Comparisons of Answer between Vietnam and Other Countries (Unit: Point)

In summary, Vietnam had more men but slightly fewer men than other 11 countries, showed higher perception of gender equality, revealed higher indirect experience of discrimination, and agreed more to the need of support policy than other 11 APNN member countries.

4.6.3. Comparison of Response by Male Scientists and Engineers in Vietnam and Other APNN Member Countries to Each Question

◦ **Male/Female ratio** (5-point scale, 3 points means Neutral)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of respondents was 2.08, meaning there were relatively more men than women in STEM. The male/female ratio at STEM was the lowest scoring 1.91 in college and highest scoring 2.18 in graduate school. The average male/female ratio at current work and at management level in workplace (2.09 for each) are slightly higher than that at college but slightly lower than that in graduate school.

The figure (2.08) was similar to that of 11 countries (1.95). Vietnam showed more men during all questioned period but slightly more women than other 11 countries on average (from college to current work).

Table 4.6.2 Comparison of Answer to Other APNN Member Countries: Male/Female Ratio

(Unit: Point)

Type		Question	Vietnam Average (n=104)	Average of Other Countries (n=1,190)	*t*	*(p)*
male/female Ratio (5-Point Scale)	1	The male/female ration of my department during my university(college) education	1.91	1.89	0.177	0.860
	2	The male/female ratio of my department while at graduate school	2.18	1.97	1.861	0.063
	3	The male/female ratio of my current workplace	2.09	2.04	0.372	0.710
	4	The male/female ration at management level at my current workplace	2.09	1.87	1.883	0.060
	Sub Scale		2.08	1.95	1.169	0.245

◦ **Perception of Discrimination** (5-point scale, 3 points means Neutral)
The Higher score, The Higher Perception of Discrimination

The average score of perception of discrimination in STEM was 2.98, which was slightly below the mid-level. Of the five questions related to the perception of gender barrier, “Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.” received the highest average score (3.34). “Girls and boys were equally encouraged to choose their majors in STEM during their education period.” (2.43) received the lowest average score.

The overall average of the answers to the questions related to perception of discrimination was 2.98 and higher than the overall average of 11 other APNN countries (2.49) at a statistically significant (t=11.700, p≤.000).

All detail responses from Vietnam have statistically significant differences to those from other 11 countries on average. The highest difference score was “Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.” (t=7.807, p≤.000), followed by “Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.” (t=5.225, p≤.000), “Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues” (t=3.846, p ≤.000), “Girls and boys were equally encouraged to choose their majors in STEM during their education period.” (t=3.570, p≤.000), and “It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.” (t=3.476, p≤.001).

The figures show the perception of discrimination of Vietnam men engineers and scientists in STEM is significantly higher from than that of other 11 countries on average.

Table 4.6.3 Comparison of Answer to Other Countries : Perception of Discrimination

(Unit: Point)

Type		Question	Vietnam Average (n=104)	Average of Other Countries (n=1,190)	*t*	*(p)*
Perception of Discrimination (5-Point Scale)	1	Girls and boys were equally encouraged to choose their majors in STEM during their education period.	2.43	2.04	3.570***	0.000
	2	It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.	3.36	2.94	3.476**	0.001
	3	Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.	3.20	2.33	7.807***	0.000
	4	Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.	3.34	2.87	5.225***	0.000
	5	Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues	2.62	2.27	3.846***	0.000
		Sub Scale	2.98	2.49	11.700	0.000

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The overall average of the response by the male scientist and engineers in Vietnam on the indirect experience of discrimination was 2.11 points which was lower than the median value of 2.5 points in a 4-point scale and close to the level of “I have not seen or heard of it but am aware of it.”

The indirect experience was the discrimination related to 'participating or leading a research project' got the highest average score(2.44), while the discrimination related to 'sexually harassed or treated unfairly' got the lowest score (1.80).

The overall average of responses to questions related to the level of indirect experience (2.11) was slightly higher than the overall average of other 11 countries (2.07) but the scores for each response in the category tend to be different from that of other countries on average.

More specifically, the average scores of the responses to the questions of discrimination related to "Woman in STEM is disadvantaged in participating or leading a research project because she is female." ($t=10.248$, $p \leq .000$), "Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female." ($t=4.523$, $p \leq .000$) were higher, while "Woman in STEM leaving work due to her marriage, pregnancy or child care." ($t=-7.936$, $p \leq .000$), and "Woman in STEM being sexually harassed or treated unfairly"($t=-2.787$, $p \leq .01$) were lower than that of other 11 countries at statistically significant level.

Table 4.6.4 Comparison of Answer to Other Countries : Indirect Experience

(Unit: Point)

Type		Question	Vietnam Average (n=104)	Average of Other Countries (n=1,190)	*t*	*(p)*
Indirect Experience of discrimination (4-Point Scale)	1	Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female	2.05	1.65	4.523***	0.000
	2	Woman in STEM is disadvantaged in participating or leading a research project because she is female.	2.44	1.60	10.248***	0.000
	3	Woman in STEM being sexually harassed or treated unfairly	1.80	2.06	-2.787**	0.005
	4	Woman in STEM leaving work due to her marriage, pregnancy or child care	2.13	2.96	-7.936***	0.000
	Sub Scale		2.11	2.07	0.516	0.607

◦ **Career Outlook and Need of Support Policy** (5-point scale, 3 points : "Neutral") The Higher score means The Stronger agreement

The male scientists and engineers had a somewhat positive view on the career outlook of women in their fields as the average score was 4.38, significantly higher ($t=2.433$, $p \leq .05$) than the average of other 11 countries (4.16) meaning the respondents in Vietnam had more positive view than other 11 APNN member countries.

The average score of male scientists and engineers in Vietnam answering to the question "It is crucial to have strong policy support to solve gender inequality in the STEM field." was 4.27, meaning that their opinion is positive to the support policy to overcome the discrimination It was higher than the average of other 11 countries (3.84) at a statistically significant (t=5.003, p≤.000).

Moreover, the average score of male scientists and engineers in Vietnam answering to the question “It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.” was 4.40, meaning that their opinion is positive to the affirmative support policy to overcome the discrimination. This average score is the highest among 11 countries (3.43) having statistical significance (t=15.340, p≤.05) on average.

Table 4.6.5 Comparison of Answer to Other Countries : Career Outlook & Need of Support Policy

(Unit: Score)

Type		Question	Vietnam Average (n=104)	Average of Other Countries (n=1,190)	*t*	*(p)*
Career Outlook	1	I believe things will turn out fine in the future career for women in STEM	4.38	4.16	2.433*	0.015
Need of Support Policy (5-Point Scale)	1	It is crucial to have strong policy support to solve gender inequality in the STEM field.	4.27	3.84	5.003***	0.000
	2	It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.	4.40	3.02	15.340***	0.000
		Sub Scale	4.34	3.43	12.126***	0.000

◦ **Perception of Gender Equality** (5-point scale, 3 points : “Neutral”)
The higher score, The Higher Perception of Gender equality

Five questions were asked of male scientists and engineers in Vietnam on their perception of gender equality in STEM. The overall average of responses to all questions was 2.60 points, lower than mid-level.

The highest score was on to the statement “In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife” (3.15). It was followed by “Women are born to have a way of caring children that men are not capable of in the same way” (3.08), “Primary breadwinners (who take care of financial obligations) of households should be men” (2.81). The scores indicate that the respondents had more perception of gender equality regarding the gender role in family.

On the other hand, the average scores on “In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves” (2.21), and on “I believe gender equality will be fully achieved only if women are given equal opportunities as men” (1.76) were lower than other scores in the category.

The overall average score of Vietnam (2.60) was lower than the average score of other 11 countries (2.95) at statistically significant level (t=-4.357, p≤.000), meaning lower perception of gender equality than other countries on average.

Table 4.6.6 Comparison of Answer to Other Countries : Perception of Gender Equality

(Unit: Point)

Type		Question	Vietnam Average (n=104)	Average of Other Countries (n=1,190)	*t*	*(p)*
Perception of Gender Equality (5-point scale)	1	In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves	2.21	2.65	-3.905***	0.000
	2	Primary breadwinners (who take care of financial obligations) of households should be men	2.81	3.31	-4.424***	0.000
	3	Women are born to have a way of caring children that men are not capable of in the same way	3.08	2.95	0.929	0.353
	4	In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.	3.15	3.64	-4.290***	0.000
	5	I believe gender equality will be fully achieved only if women are given equal opportunities as men.	1.76	2.19	-4.341***	0.000
		Sub Scale	2.60	2.95	-4.357***	0.000

More specifically, the average scores on “Primary breadwinners (who take care of financial obligations) of households should be men” ($t=-4.424$, $p \leq .000$), “I believe gender equality will be fully achieved only if women are given equal opportunities as men.” ($t=-4.341$, $p \leq .000$), “In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife” ($t=-4.290$, $p \leq .000$), and “In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves” ($t=-3.905$, $p \leq .000$) were lower at statistically significant levels in order. The average scores indicate that the male scientists and engineers in Vietnam had a lower perception of gender equality related to gender role in family than those in other countries.

However, The average score on “Primary breadwinners (who take care of financial obligations) of households should be men” was slightly higher than other countries.

4.6.4. Comparison of Responses in Vietnam with Other Countries

◦ **Male/Female ratio** (5-point scale, 3 points : “Neutral”)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of male scientists and engineers was 2.08, meaning there were relatively more men. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Vietnam were evaluated by ANOVA (or t) analysis. Table 4.6.7

shows the results.

The difference of responses according to the marital status (t=5.874, p≤.006) in Vietnam was statistically significant, and revealed there are more men in the field of single respondents (3.21) than of married respondents (1.77).

Table 4.6.7 male/female ratio in Vietnam: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.08			
Age			1.918	0.152
29 years or younger	2.13	0.199		
30 - 39	2.16	1.225		
40 - 49	1.50	0.238		
Over 50	-	-		
Marital status			5.874***	0.000
Single	3.21	1.513		
Married	1.77	0.670		
Others (including divorced)				
Number of Children			1.850	0.164
1	1.70	0.569		
2	1.84	0.700		
3 or more	1.38	0.401		
Occupation			0.074	0.929
Professor/Teacher	2.06	1.269		
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	2.13	1.010		
Other	2.00	0.340		
Double income status (married)			-	-
Double income	1.77	0.670		
Single income	-	-		

Note: ***p<.001, **p<.01, *p<.05

Although other differences were not statistically significant, the average scores of the respondents in the age less than 39 is lower more 0.5p than in the age over 40. These differences make us know the male/female ratio is changing along with the generation.

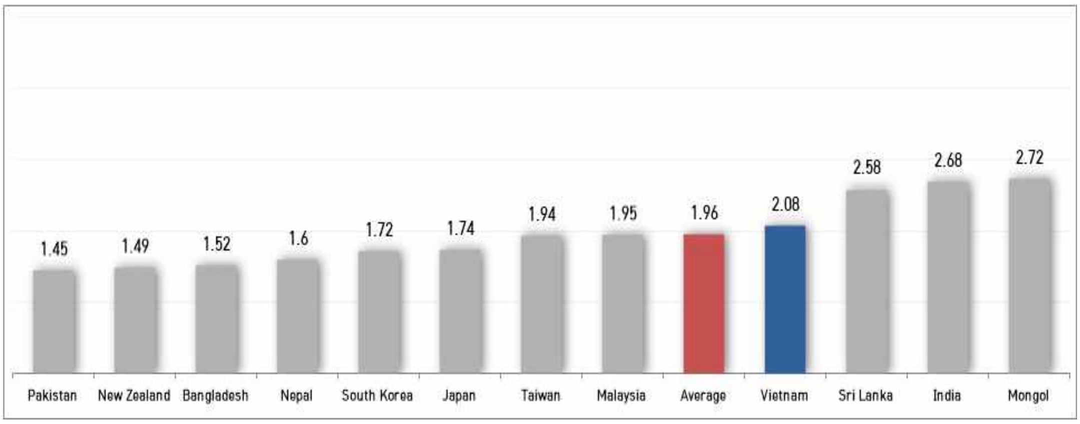


Figure 4.6.2 Average of Vietnam and Other Countries in male/female ratio (Unit: Point)

As shown in the figure, the male/female ratio in the fields of the male scientists and engineers in Vietnam (2.08) was similar to the average of all countries (1.96).

◦ **Perception of Discrimination** (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Discrimination

The average score of male scientists and engineers in Vietnam to the perception of discrimination in STEM (2.98) was lower than the mid-level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Vietnam were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.6.8.

The standard deviations of the average scores by the personal variable of the respondents did not show statistical significances.

Table 4.6.8 Perception of Discrimination in Vietnam: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.98			
Age				
29 years or younger	3.12	0.199	1.757	0.178
30 - 39	2.95	0.409		
40 - 49	3.10	0.181		
Over 50				
Marital status				
Single	3.12	0.252	1.469	0.145
Married	2.96	0.393		
Others (including divorced)	-	-		
Number of Children				
1	2.92	0.376	0.182	0.834
2	2.96	0.412		
3 or more	3.03	0.151		
Occupation				
Professor/Teacher	2.94	0.234	1.073	0.346
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	3.01	0.373		
Other	3.09	0.676		
Double income status (married)				
Double income	85	2.96	-	-
Single income	-	-		

Note: ***p<.001, **p<.01, *p<.05

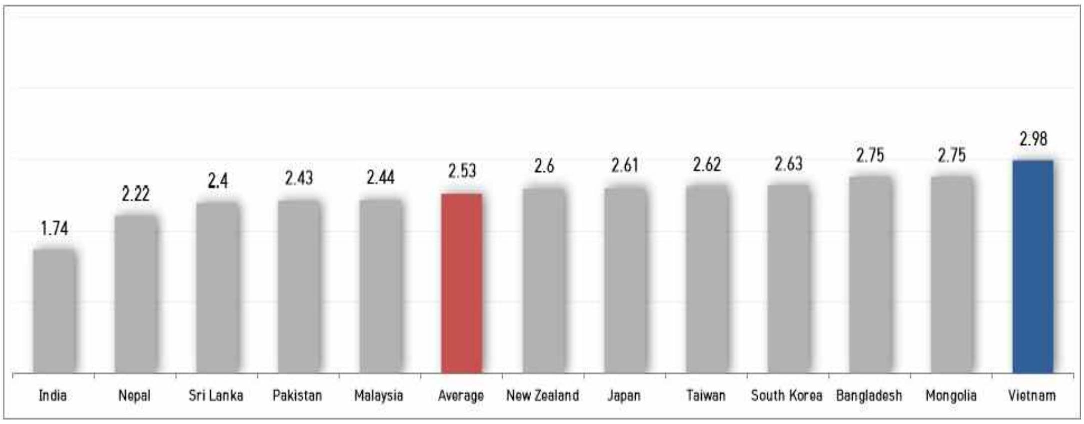


Figure 4.6.3 Averages of Vietnam and Other Countries in Perception of Discrimination (Unit: Point)

The figure above shows the comparative average scores among different countries. The perception of male scientists and engineers in Vietnam on discrimination (2.98) was higher than the average of all countries (2.53), being the highest among 12 APNN member countries.

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The average score of male scientists and engineers in Vietnam on the indirect experience of discrimination against women in STEM was 2.11 which was close to “I have not seen or heard of it but am aware of it.” The differences according to the respondent’s profiles (age, marital status, number of children, occupation, and double income status (if married) in Vietnam were evaluated by ANOVA (or t) analysis. The results are summarized in Table 4.6.9.

The difference of responses according to the marital status ($t=4.070$, $p \leq .001$) in Vietnam was statistically significant, and revealed the single respondents (2.90) had more indirect experiences of discrimination than married (1.91).

Although other differences were not statistically significant, the average scores of the respondents having fewer children, teacher/professor respondents were higher than others in each category, indicate having more indirect experience of gender discrimination in STEM.

Table 4.6.9 Indirect Experience in Vietnam: Differences according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.11			
Age				
29 years or younger	1.50	0.489	4.589*	0.012
30 - 39	2.20	0.776		
40 - 49	2.10	0.711		
Over 50	-	-		
Marital status				
Single	2.90	0.857	4.070**	0.001
Married	1.91	0.567		
Others (including divorced)	-	-		
Number of Children				
1	2.07	0.486	2.395	0.097
2	1.93	0.599		
3 or more	1.53	0.388		
Occupation				
Professor/Teacher	2.21	0.798	1.220	0.299
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	1.95	0.823		
Other	2.08	0.440		
Double income status (married)				
Double income	1.91	0.567	-	-
Single income	-	-		

Note: ***p<.001, **p<.01, *p<.05

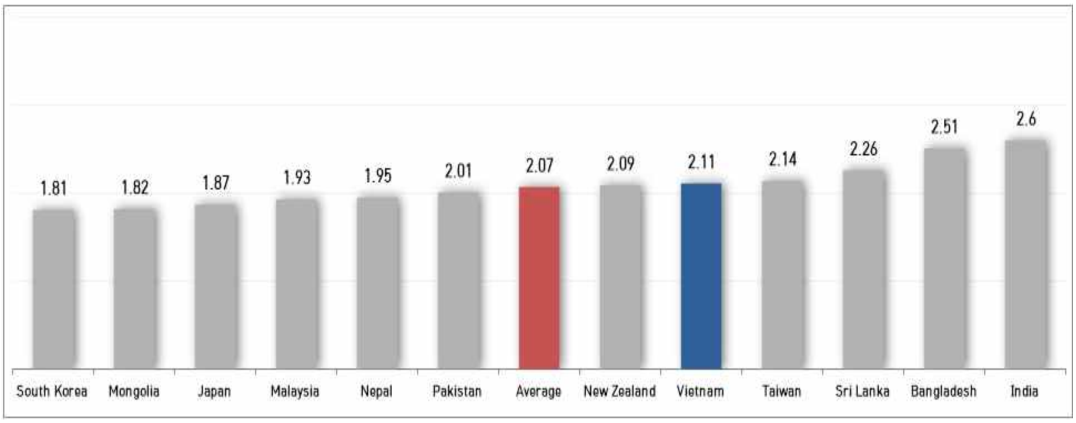


Figure 4.6.4 Averages of Vietnam and Other Countries in Indirect Experience (Unit : Point)

The figure above shows the cross-country average scores on the indirect experience of discrimination in 12 countries. The indirect experience of discrimination by the male scientists and engineers in Vietnam (2.11) was similarly higher than the average of all countries (2.07), being the mid-level among 12 countries.

◦ **Need of Support Policy** (5-point scale, 3 points : “Neutral”)
The Higher score means The Stronger agreement

The average score of male scientists and engineers in Vietnam on the need of support policy to overcome the gender barrier in STEM was 4.34, being higher than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Vietnam were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.6.10.

The differences of responses according to the age (t=4.425, $p \leq .05$), and occupation (t=4.543, $p \leq .05$) in Vietnam were statistically significant, and revealed the respondents in the age of less than 29 years (4.75) agree more to support policy than the respondents in their 40’s (3.92). Due to the occupation, the teacher/professor (4.15) respondents agree less than the engineer (4.56).

Although differences were not statistically significant, the average scores of the respondents having more children and single respondents were higher than others in each category, indicate agree more to the support policy to overcome gender inequality in STEM.

Table 4.6.10 Need of Support Policy in Vietnam: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	4.34			
Age			4.425*	0.014
29 years or younger	4.75	0.261		
30 - 39	4.34	0.741		
40 - 49	3.92	0.557		
Over 50				
Marital status			1.678+	0.097
Single	4.62	0.650		
Married	4.26	0.711		
Others (including divorced)	-	-		
Number of Children			1.770	0.177
1	3.97	0.611		
2	4.32	0.710		
3 or more	4.44	0.776		
Occupation			4.543*	0.013
Professor/Teacher	4.15	0.815		
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	4.56	0.473		
Other	4.53	0.550		
Double income status (married)			-	-
Double income	4.26	0.711		
Single income	-	-		

Note: ***p<.001, **p<.01, *p<.05

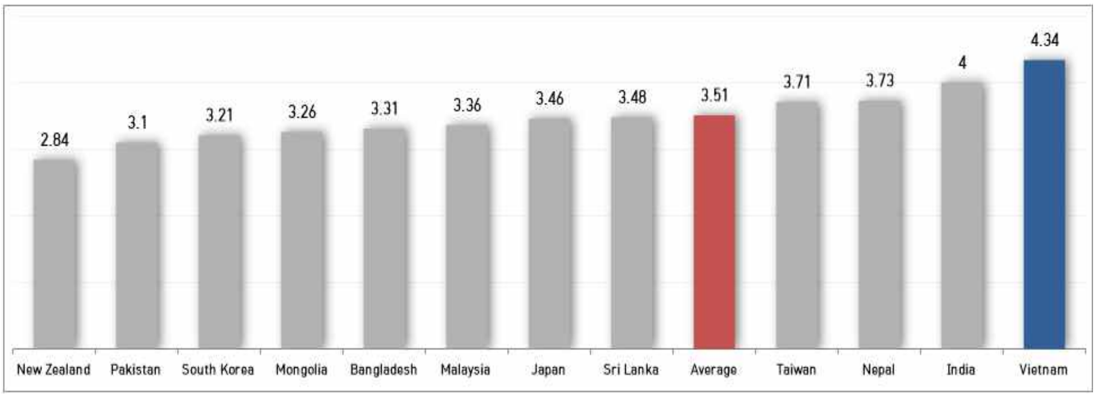


Figure 4.6.5 Averages of Vietnam and Other Countries in Need of Support Policy (Unit: Point)

The above figure shows the cross-country average scores on the need of support policy to overcome the gender barrier. Respondents in Vietnam agreeing to the need of support policy (4.34) was higher than the average of all countries (3.51), being the highest among 12 APNN member countries.

◦ **Perception of Gender Equality** (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Gender Equality

The average score of male scientists and engineers in Vietnam on the perception of gender equality was 2.60 which was lower than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Vietnam were evaluated by ANOVA (or t) analysis.

The differences of responses according to the children number ($t=6.087$, $p \leq .01$), the age ($t=6.073$, $p \leq .01$), the marital status ($t=-4.771$, $p \leq .000$) and the occupation ($t=4.322$, $p \leq .05$) in Vietnam were statistically significant. It revealed the respondents having fewer children, married and engineers showed stronger perception of gender equality while the respondents in their 30's, single and teacher/professor did less.

Table 4.6.11 Perception of Gender Equality in Vietnam: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	p
Total	2.60			
Age				
29 years or younger	3.05	0.258	6.073**	0.003
30 - 39	2.46	0.661		
40 - 49	3.08	1.376		
Over 50	-	-		
Marital status				
Single	1.82	0.580	-4.771***	0.000
Married	2.78	0.692		
Others (including divorced)	-	-		
Number of Children				
1	3.12	0.770	6.087**	0.003
2	2.78	0.651		
3 or more	2.13	0.301		
Occupation				
Professor/Teacher	2.41	0.875	4.322*	0.016
Researcher	-	-		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	2.90	0.602		
Other	2.61	0.573		
Double income status (married)				
Double income	2.78	0.692	-	-
Single income	-	-		

Note: ***p<.001, **p<.01, *p<.05

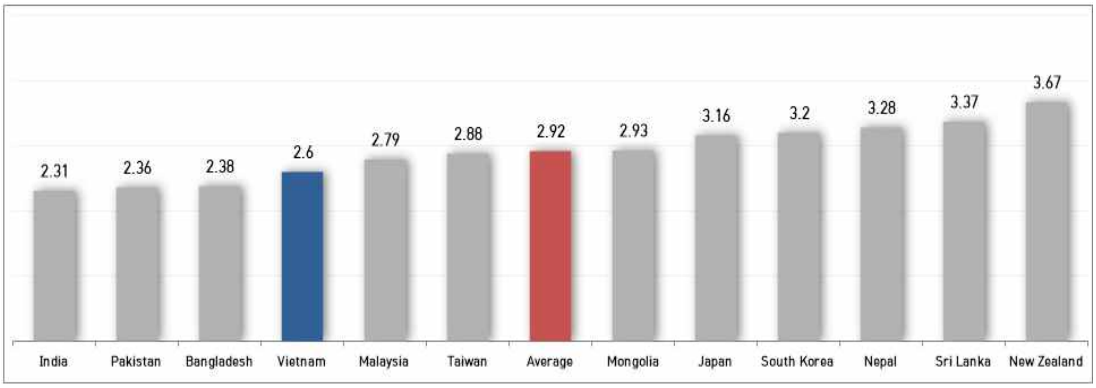


Figure 4.6.6 Averages of Vietnam and Other Countries in the Perception of Gender Equality (Unit: Point)

The figure above shows the cross-country average scores on the perception of gender equality. The perception of male scientists and engineers in Vietnam on gender equality (2.60) was lower than the average of all countries (2.92), being the fourth lowest level after India, Pakistan and Bangladesh.

4.7. Sri Lanka

4.7.1. General Profiles of Male Respondents in Sri Lanka

A total of 107 male scientists and engineers (8.3% of total respondents) answered the survey. Table 4.3.1. shows the age, marital status, number of children, and occupation of the male scientist and engineer respondents in Sri Lanka.

Regarding the age, 30.8% were in their 30’s, 32.7% 28.0% were 29 years or younger, 23.4% were in their 40’s, and 17.8% were in their 50 years or older. There were more married respondents at 64.2% than the single respondents at 32.1%. Of the respondents that had the children (64.5% of total Sri Lanka respondents), 46.4% had 2 children, 37.7% had 1 child and 15.9% had 3 or more children. In the case of couples, 69.4% were double-income couples while 30.6% were single-income couples.

Regarding the occupation, 40.2% were other professions, followed by 28.0% were engineers, 12.1% were teachers/professors, 11.2% were researchers and 8.4% were healthcare professionals in Sri Lanka.

Table 4.7.1 General Profile of Respondents in Sri Lanka

(Unit: Person, %)

Composition	Frequency	%
Age		
29 years or younger	30	28.0
30 - 39	33	30.8
40 - 49	25	23.4
Over 50	19	17.8
Marital status		
Single	34	32.1
Married	68	64.2
Others (including divorced)	4	3.8
Number of Children		
1	26	37.7
2	32	46.4
3 or more	11	15.9
Occupation		
Professor/Teacher	13	12.1
Researcher	12	11.2
Healthcare professional	9	8.4
Engineer (company, R&D center, etc.)	30	28.0
Other	43	40.2
Double income status (married)		
Double income	43	69.4
Single income	19	30.6

4.7.2. Comparison of Answer by Male Scientists and Engineers in Sri Lanka with Other APNN Member Countries

The questions in the survey are divided into five categories including "male/female ratio" in the major field of respondents, "perception of discrimination" against women in STEM, "indirect experience" of discrimination in STEM, "need of support policy" to resolve gender barriers in STEM, and perception of "gender equality."

Average scores of the respondents from Sri Lanka were compared with that from the other 11 APNN countries in each category as follows.

The average male/female ratio in the fields of male scientists and engineers was 2.58, and it was higher than that of the respondents from the other 11 countries which was 1.91 at a statistically significant level ($t=6.258$, $p \leq .000$).

The average score for the perception of discrimination was 2.40 which was similarly lower than the average score (2.54) from the other 11 countries. The average score for the indirect experience of discrimination was 2.26 which was higher than the average score (2.05) of the other 11 countries at a statistically significant level ($t=3.282$, $p \leq .001$).

On the other hand, the average score of male scientists and engineers from Sri Lanka agreeing to the need of support policy to overcome the gender barrier in STEM was 3.48 which was slightly higher than "Neutral" but similarly lower than the average score of the other countries (3.51) without statistical significance. Lastly, the average score for the Perception of Gender Equality was 3.37 which was significantly higher than ($t=6.264$, $p \leq .000$) the average score of the other countries (2.88).

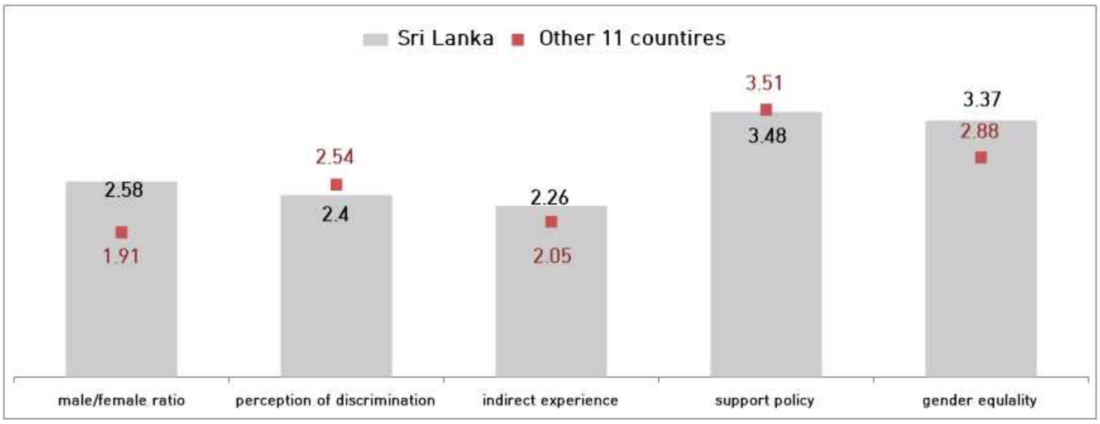


Figure 4.7.1 Comparisons of Answer between Sri Lanka and Other Countries (Unit: Point)

In summary, in Sri Lanka, there were more female scientists and engineers compared to other 11 APNN member countries on average. The average score of the perception of gender discrimination is slightly lower while the need of support policy, indirect experience of gender discrimination and perception of gender equality were higher than other countries on average.

4.7.3. Comparison of Response by Male Scientists and Engineers in Sri Lanka and Other APNN Member Countries to Each Question

◦ **Male/Female ratio** (5-point scale, 3 points means Neutral)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of respondents was 2.58, meaning there were relatively more men. The male/female ratio in STEM was the lowest scoring 2.44 in college and 2.79 at current work, meaning that the ratio of women was slightly higher at work than when they were in college.

The figure (2.58) was significantly higher (t=6.598, p≤.000) than that of 11 countries (1.91). The differences are followed by "at current work" (t=6.598, p≤.000), "manager of higher position in current work" (t=5.539, p≤.000), at graduate school (t=4.886, p ≤.000), and at college (t=4.613, p≤.000) in order.

Table 4.7.2 Comparison of Answer to Other APNN Member Countries : Male/Female Ratio

(Unit: Point)

Type		Question	Sri Lanka Average (n=107)	Average of Other Countries (n=1,187)	*t*	*(p)*
male/female Ratio (5-Point Scale)	1	The male/female ration of my department during my university(college) education	2.44	1.85	4.613***	0.000
	2	The male/female ratio of my department while at graduate school	2.65	1.93	4.886***	0.000
	3	The male/female ratio of my current workplace	2.79	1.98	6.598***	0.000
	4	The male/female ration at management level at my current workplace	2.53	1.83	5.539***	0.000
	Sub Scale		2.58	1.91	6.258***	0.000

◦ **Perception of Discrimination** (5-point scale, 3 points means Neutral)
The Higher score, The Higher Perception of Discrimination

The average score of perception of discrimination in STEM was 2.40, which was below the mid-level. Of the five questions related to the perception of gender barrier, "It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications." (2.73) received the highest average score. "Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues” (1.98) received the lowest average score.

The overall average of the answers to the questions related to perception of discrimination was 2.40 and similarly lower than the overall average of 11 other APNN countries (2.54) at a statistically significant level ($t=-1.960$, $p \leq .05$). A significant difference was observed for the responses “Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.” ($t=2.252$, $p \leq .05$) get a relatively higher score, while other 4 average scores were relatively lower. The differences of average scores were followed by “Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues” ($t=-3.577$, $p \leq .000$), “It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.” ($t=-2.1806$, $p \leq .05$), and “Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.” ($t=-2.042$, $p \leq .05$) in order.

Table 4.7.3 Comparison of Answer to Other Countries : Perception of Discrimination

(Unit: Point)

Type		Question	Sri Lanka Average (n=107)	Average of Other Countries (n=1,187)	*t*	*(p)*
Perception of Discrimination (5-Point Scale)	1	Girls and boys were equally encouraged to choose their majors in STEM during their education period.	2.00	2.08	-0.729	0.466
	2	It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.	2.73	3.00	-2.180*	0.031
	3	Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.	2.63	2.38	2.252*	0.025
	4	Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.	2.66	2.92	-2.042*	0.043
	5	Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues	1.98	2.32	-3.577***	0.000
	Sub Scale		2.40	2.54	-1.960*	0.050

The discrimination as perceived by the male scientists and engineer respondents in Sri Lanka was generally lower than the respondents from other countries. The figure shows the perception of discrimination in STEM is significantly lower during the educational period but higher for equal work distribution and work appraisal in Sri Lanka.

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The overall average of the response by the male scientist and engineers in Sri Lanka on the indirect experience of discrimination was 2.26 points which was lower than the median value of 2.5 points in a 4-point scale and close to the level of “I have not seen or heard of it but am aware of it.”

The highest level of indirect experience was the discrimination related to “marriage, pregnancy, and childbirth” (3.31), while the lowest level of indirect experience was that related to “research fund and scholarship.” (1.65).

The overall average of responses to questions related to the level of indirect experience (2.26) was similarly higher than the overall average of other 11 countries (2.05). More specifically, the average scores of the responses to the questions of discrimination related to “marriage, pregnancy, and childbirth” ($t=5.550$, $p \leq .000$), “Woman in STEM being sexually harassed or treated unfairly” ($t=3.954$, $p \leq .000$) was higher than the average scores of other countries at statistically significant level.

Table 4.7.4 Comparison of Answer to Other Countries : Indirect Experience

(Unit: Point)

Type		Question	Sri Lanka Average (n=107)	Average of Other Countries (n=1,187)	*t*	*(p)*
Indirect Experience of discrimination (4-Point Scale)	1	Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female	1.65	1.68	-0.341	0.733
	2	Woman in STEM is disadvantaged in participating or leading a research project because she is female.	1.71	1.67	0.522	0.602
	3	Woman in STEM being sexually harassed or treated unfairly	2.36	2.01	3.954***	0.000
	4	Woman in STEM leaving work due to her marriage, pregnancy or child care	3.31	2.86	5.550***	0.000
	Sub Scale		2.26	2.05	3.282**	0.001

◦ **Career Outlook and Need of Support Policy** (5-point scale, 3 points : “Neutral”) The Higher score means The Stronger agreement

The male scientists and engineers had a very positive view on the career outlook of women in their fields as the average score was 4.15. The score was similar to the average 4.18 of 11 other countries indicating that the respondents in Sri Lanka equally had a positive view to other 11 APNN member countries.

The average score of male scientists and engineers in Sri Lanka answering to the question “It is crucial to have strong policy support to solve gender inequality in the STEM field.” was 3.94, meaning that they slightly agreed to it. It was similarly higher than the average of other 11 countries (3.87). In other words, the male scientists and engineers in Sri Lanka agreed similarly that there is need of policy to overcome the gender barrier to other 11 countries on average.

The average score of male scientists and engineers in Sri Lanka answering to the question “It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.” was 3.01 meaning that they neither disagree nor agree. And the score was also slightly lower than the average of other 11 countries (3.15).

Table 4.7.5 Comparison of Answer to Other Countries : Career Outlook & Need of Support Policy

(Unit: Score)

Type		Question	Sri Lanka Average (n=107)	Average of Other Countries (n=1,187)	*t*	*(p)*
Career Outlook	1	I believe things will turn out fine in the future career for women in STEM	4.15	4.18	-0.355	0.723
Need of Support Policy (5-Point Scale)	1	It is crucial to have strong policy support to solve gender inequality in the STEM field.	3.94	3.87	0.713	0.476
	2	It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.	3.01	3.15	-1.084	0.278
	Sub Scale		3.48	3.51	-0.351	0.726

◦ **Perception of Gender Equality** (5-point scale, 3 points : “Neutral”)
The higher score, The Higher Perception of Gender equality

Five questions were asked of male scientists and engineers in Sri Lanka on their perception of gender equality in STEM. The overall average of responses to all questions was 3.37 points, being higher than mid-level. And this difference had statistical significance (t=6.264, $p \leq .000$).

The highest score was on to the statement “In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife” (4.08), “Primary breadwinners (who take care of financial obligations) of households should be men” (3.85), “In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves (3.11).

Except, the average score of “Women are born to have a way of caring children that men are not capable of in the same way” which was slightly lower than other countries, all other average scores for perception of gender equality were significantly higher than other 11 countries.

Compare to the other 11 countries, the average scores on “believe gender equality will be fully achieved only if women are given equal opportunities as men.” (t=6.824, $p \leq .000$) have the highest difference, followed by “Primary breadwinners (who take care of financial obligations) of households should be men” (t=5.580, $p \leq .000$), “In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife” (t=4.759, $p \leq .000$), and “In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves” (t=4.366, $p \leq .000$) were higher than other 11 countries at statistically significant levels. The average scores indicate that the male scientists and engineers in Sri Lanka had higher perception of gender equality related to gender role in family and gender equity than those in other countries on average.

Table 4.7.6 Comparison of Answer to Other Countries : Perception of Gender Equality

(Unit: Point)

Type		Question	Sri Lanka Average (n=107)	Average of Other Countries (n=1,187)	*t*	*(p)*
Perception of Gender Equality (5-point scale)	1	In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves	3.11	2.57	4.366***	0.000
	2	Primary breadwinners (who take care of financial obligations) of households should be men	3.85	3.22	5.580***	0.000
	3	Women are born to have a way of caring children that men are not capable of in the same way	2.95	2.96	-0.085	0.932
	4	In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.	4.08	3.56	4.759***	0.000
	5	I believe gender equality will be fully achieved only if women are given equal opportunities as men.	2.85	2.09	6.824***	0.000
		Sub Scale	3.37	2.88	6.264***	0.000

4.7.4. Comparison of Responses in Sri Lanka with Other Countries

◦ **Male/Female ratio** (5-point scale, 3 points : "Neutral")
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of male scientists and engineers was 2.58, meaning there were relatively more men. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Sri Lanka were evaluated by ANOVA (or t) analysis. Table 4.7.7 shows the results.

The difference of responses according to the occupation in Sri Lanka was statistically significant ($t=8.818$, $p \leq .000$), and revealed there are more men in the field of teacher/professor (1.80) than that of other occupations. Although other differences were not statistically significant, the average scores of the respondents in their 50's (2.16), married, having more children, and the double income respondents were lower in each category meaning more male scientists and engineers in their field.

Table 4.7.7 male/female ratio in Sri Lanka: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.58			
Age				
29 years or younger	2.91	0.906	2.111	0.105
30 - 39	2.48	1.075		
40 - 49	2.75	0.944		
Over 50	2.16	0.870		
Marital status				
Single	2.77	0.950	2.342	0.102
Married	2.45	0.983		
Others (including divorced)	3.38	1.090		
Number of Children				
1	2.72	1.103	0.628	0.537
2	2.49	0.932		
3 or more	2.30	1.123		
Occupation				
Professor/Teacher	1.80	0.926	8.818***	0.000
Researcher	3.07	0.956		
Healthcare professional	3.06	0.427		
Engineer (company, R&D center, etc.)	2.03	0.724		
Other	3.03	0.910		
Double income status (married)				
Double income	2.38	1.043	-1.587	0.119
Single income	2.84	0.851		

Note: ***p<.001, **p<.01, *p<.05

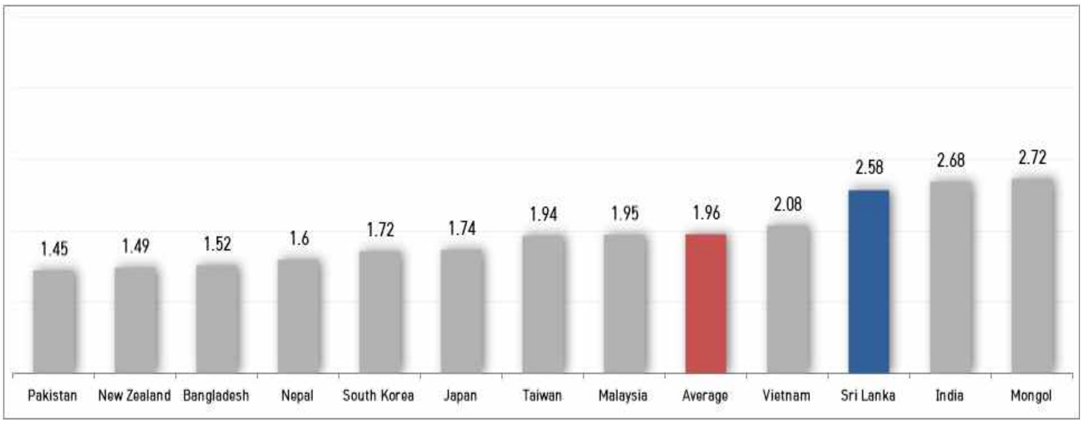


Figure 4.7.2 Average of Sri Lanka and Other Countries in male/female ratio (Unit: Point)

As shown in the figure, the male/female ratio in the fields of the male scientists and engineers in Sri Lanka (2.58) was higher than the total average, being the third highest among 12 APNN member countries.

◦ **Perception of Discrimination** (5-point scale, 3 points : “Neutral”)
The Higher score, The Higher Perception of Discrimination

The average score of male scientists and engineers in Sri Lanka to the perception of discrimination in STEM (2.40) was lower than the mid-level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Sri Lanka were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.7.8.

The difference of responses according to the occupation in Sri Lanka was statistically significant level (t=3.934, p≤.01), and revealed weaker perception for health care professional and researcher than other occupations. Although differences were not statistically significant, the average scores of the respondents in the age 29 years or younger (2.22) having fewer children, and single income respondents were relatively lower in each category.

Table 4.7.8 Perception of Discrimination in Sri Lanka: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.40			
Age				
29 years or younger	2.22	0.725	0.998	0.397
30 - 39	2.48	0.583		
40 - 49	2.45	0.762		
Over 50	2.48	0.627		
Marital status				
Single	2.35	0.773	0.532	0.589
Married	2.45	0.622		
Others (including divorced)	2.15	0.854		
Number of Children				
1	2.36	0.733	0.531	0.590
2	2.48	0.611		
3 or more	2.60	0.693		
Occupation				
Professor/Teacher	2.72	0.641	3.934**	0.005
Researcher	2.08	0.549		
Healthcare professional	1.78	0.595		
Engineer (company, R&D center, etc.)	2.51	0.545		
Other	2.45	0.729		
Double income status (married)				
Double income	2.47	0.571	0.368	0.714
Single income	2.41	0.753		

Note: ***p<.001, **p<.01, *p<.05

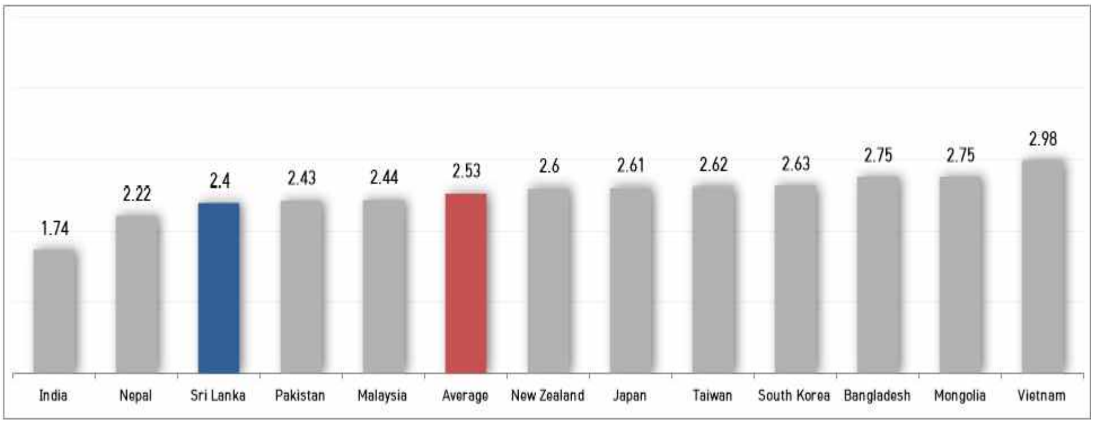


Figure 4.7.3 Averages of Sri Lanka and Other countries in Perception of Discrimination (Unit : Point)

The figure above shows the comparative average scores among different countries. The perception of male scientists and engineers in Sri Lanka on discrimination (2.40) was lower than the average of all countries (2.53), being the third lowest after India, and Nepal among 12 countries.

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The average score of male scientists and engineers in Sri Lanka on the indirect experience of discrimination against women in STEM was 2.26 which was close to “I have not seen or heard of it but am aware of it.” The differences according to the respondent’s profiles (age, marital status, number of children, occupation, and double income status (if married) in Sri Lanka were evaluated by ANOVA (or t) analysis. The results are summarized in Table 4.7.9.

Although differences were not statistically significant, the average scores of the respondents in the age 30’s (2.42), single (2.38), and engineer (2.49) were relatively higher in each category.

Table 4.7.9 Indirect Experience in Sri Lanka: Differences according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.26			
Age				
29 years or younger	2.18	0.605	1.527	0.212
30 - 39	2.42	0.601		
40 - 49	2.27	0.732		
Over 50	2.08	0.409		
Marital status				
Single	2.38	0.705	1.028	0.361
Married	2.20	0.561		
Others (including divorced)	2.31	0.688		
Number of Children				
1	2.27	0.682	0.802	0.453
2	2.13	0.516		
3 or more	2.36	0.626		
Occupation				
Professor/Teacher	2.13	0.428	1.852	0.125
Researcher	2.06	0.339		
Healthcare professional	2.06	0.481		
Engineer (company, R&D center, etc.)	2.49	0.786		
Other	2.23	0.573		
Double income status (married)				
Double income	2.16	0.517	-0.696	0.489
Single income	2.26	0.537		

Note: ***p<.001, **p<.01, *p<.05

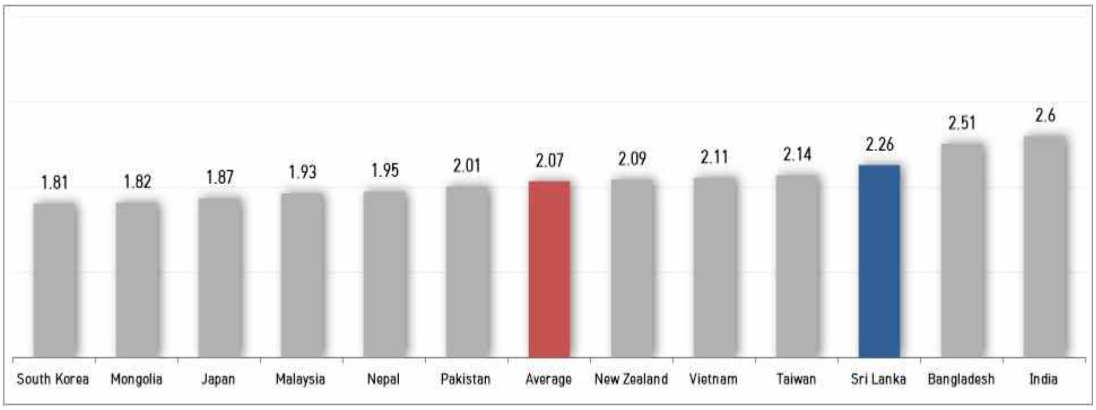


Figure 4.7.4 Averages of Sri Lanka and Other Countries in Indirect Experience (Unit : Point)

The figure above shows the cross-country average scores on the indirect experience of discrimination in 12 countries. The indirect experience of discrimination by the male scientists and engineers in Sri Lanka (2.26) was higher than the average of all countries (2.07), being the third highest after India and Bangladesh.

◦ **Need of Support Policy** (5-point scale, 3 points : "Neutral")
The Higher score means The Stronger agreement

The average score of male scientists and engineers in Sri Lanka on the need of support policy to overcome the gender barrier in STEM was 3.48, being slightly higher than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Sri Lanka were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.7.10.

The difference of responses according to the age in Sri Lanka was statistically significant level ($t=3.656$, $p \leq .05$), and revealed more agreement at the age of 29 years or younger. Although differences were not statistically significant, the average scores of the respondents not married and at healthcare professional and researcher, and single income were relatively higher in each category.

Table 4.7.10 Need of Support Policy in Sri Lanka: Difference according to Personal Variable

(Unit: Point

Type	Average	Standard Deviation	F/T	*p*
Total	3.48			
Age				
29 years or younger	3.93	0.828	3.656*	0.015
30 - 39	3.24	0.953		
40 - 49	3.26	1.012		
Over 50	3.45	0.864		
Marital status				
Single	3.66	0.885	1.570	0.213
Married	3.35	0.989		
Others (including divorced)	3.88	0.750		
Number of Children				
1	3.69	1.021	3.338*	0.042
2	3.23	0.833		
3 or more	2.86	1.120		
Occupation				
Professor/Teacher	3.42	0.572	1.612	0.177
Researcher	3.75	1.055		
Healthcare professional	4.00	0.661		
Engineer (company, R&D center, etc.)	3.20	0.934		
Other	3.50	1.041		
Double income status (married)				
Double income	3.21	0.959	-1.661	0.102
Single income	3.66	1.028		

Note: ***p<.001, **p<.01, *p<.05

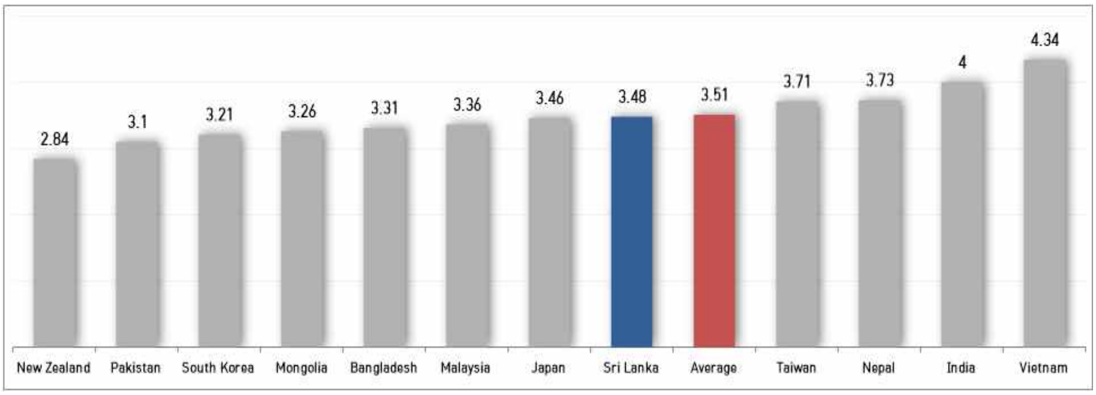


Figure 4.7.5 Averages of Sri Lanka and Other Countries in Need of Support Policy (Unit: Point)

The figure above shows the cross-country average scores on the need of support policy to overcome the gender barrier. Respondents in Sri Lanka agreeing to the need of support policy (3.48) was similarly higher than the average of all countries (3.51), being mid-level among 12 countries.

◦ Perception of Gender Equality (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Gender Equality

The average score of male scientists and engineers in Sri Lanka on the perception of gender equality was 3.37 which was higher than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Sri Lanka were evaluated by ANOVA (or t) analysis.

The difference of responses according to children number in Sri Lanka was statistically significant ($t=4.604$, $p\leq.05$), and revealed stronger perception of gender equality for the respondent having fewer children.

Although the differences of the average scores of the respondents by their personal variable were not statistically significant, the average scores of the respondents younger, not married and single income were showed relatively higher in each category.

Table 4.7.11 Perception of Gender Equality in Sri Lanka: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	3.37			
Age				
29 years or younger	3.50	0.729	1.961	0.124
30 - 39	3.49	0.543		
40 - 49	3.26	0.668		
Over 50	3.09	0.812		
Marital status				
Single	3.49	0.702	1.800	0.170
Married	3.29	0.675		
Others (including divorced)	3.80	0.673		
Number of Children				
1	3.65	0.694	4.604*	0.013
2	3.16	0.692		
3 or more	3.11	0.450		
Occupation				
Professor/Teacher	3.12	0.507	2.204	0.074
Researcher	3.68	0.755		
Healthcare professional	3.76	0.467		
Engineer (company, R&D center, etc.)	3.22	0.788		
Other	3.38	0.637		
Double income status (married)				
Double income	3.19	0.687	-1.465	0.148
Single income	3.46	0.647		

Note: ***p<.001, **p<.01, *p<.05

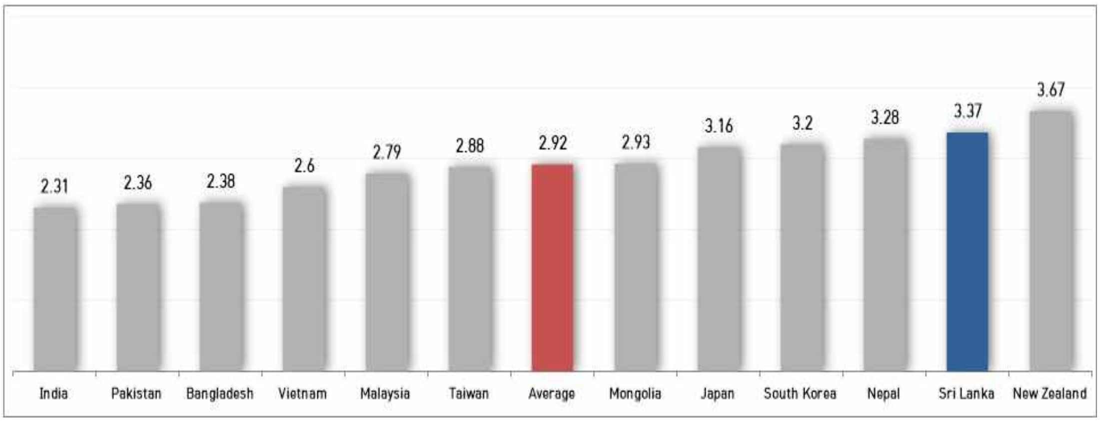


Figure 4.7.6 Averages of Sri Lanka and Other Countries in the Perception of Gender Equality (Unit: Point)

The figure above shows the cross-country average scores on the perception of gender equality. The perception of male scientists and engineers in Sri Lanka on gender equality (3.37) was higher than the average of all countries (2.92), being the second highest after New Zealand.

4.8. India

4.8.1. General Profiles of Male Respondents in India

A total of 103 male scientists and engineers (8.0% of total respondents) answered the survey. Table 4.8.1. shows the age, marital status, number of children, and occupation of the male scientist and engineer respondents in India.

Regarding the age, 39.8% were in their 40's, 22.3% were in their 30's and 50 years or older each, and 15.5%were 29 years or younger. There were more married respondents at 86.4% than single respondents at 13.6%. Of the respondents that had children (80.6% of total India respondents), 60.2% had 1 child, 28.9% had 2 children, and 10.8% had 3 or more children. In case of couples, 64.0% were single-income couples while 36.0% were double-income couples.

Regarding the occupation, 33.3% were teachers/professors, 25.5% were engineers and researchers each, 10.8% were in other professions and 4.9% were healthcare professional.

Table 4.8.1 General Profile of Respondents in India

(Unit: Person, %)

Composition	Frequency	%
Age		
29 years or younger	16	15.5
30 - 39	23	22.3
40 - 49	41	39.8
Over 50	23	22.3
Marital status		
Single	14	13.6
Married	89	86.4
Others (including divorced)		
Number of Children		
1	50	60.2
2	24	28.9
3 or more	9	10.8
Occupation		
Professor/Teacher	34	33.3
Researcher	26	25.5
Healthcare professional	5	4.9
Engineer (company, R&D center, etc.)	27	25.5
Other	11	10.8
Double income status (married)		
Double income	32	36.0
Single income	57	64.0

4.8.2. Comparison of Answer by Male Scientists and Engineers in India with Other APNN Member Countries

The questions in the survey are divided into five categories including "male/female ratio" in the major field of respondents, "perception of discrimination" against women in STEM, "indirect experience" of discrimination in STEM, "need of support policy" to resolve gender barriers in STEM, and perception of "gender equality." Average scores of the respondents from India were compared with that from the other 11 APNN countries in each category as follows.

The average score of male/female ratio in the fields of male scientists and engineers was 2.68, and it was higher than that from other 11 countries (1.89) at a statistically significant ($t=17.369$, $p \leq .000$), indicating more female ratio than other countries. The average score for the perception of discrimination was 1.74 which was significantly lower ($t=-17.832$, $p \leq .000$) than the average score from the other 11 countries (2.60).

On the other hand the average score for the indirect experience of discrimination was 2.60 was significantly higher ($t=18.129$, $p \leq .000$) than the average score (2.02) of the other 11 countries. The average score of male scientists and engineers from India agreeing to the need of support policy to overcome the gender barrier in STEM was 4.00 which was significantly higher ($t=5.591$, $p \leq .000$) than the average score of the other countries (3.46).

Lastly, the average score for the Perception of Gender Equality was 2.31 which was lower than the average score of the other countries (2.97) at a statistically significant ($t=-8.422$, $p \leq .000$).

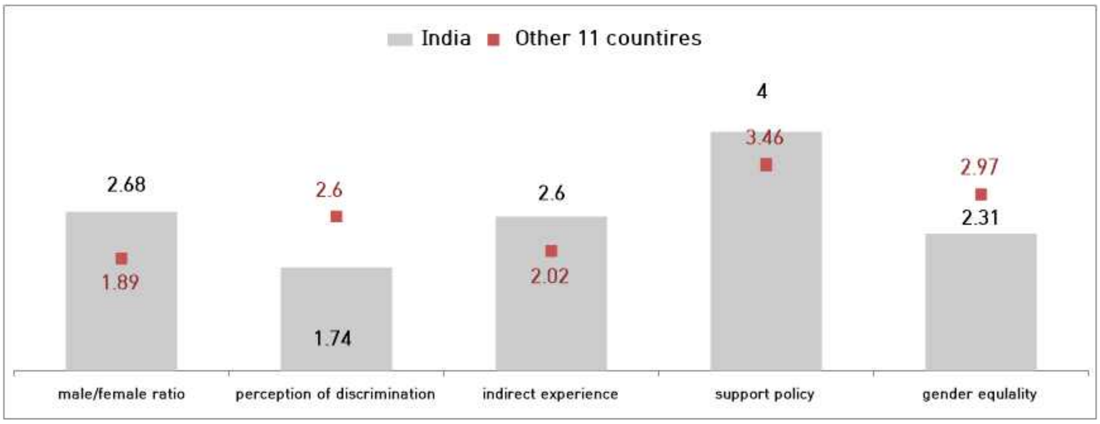


Figure 4.8.1 Comparisons of Answer between India and Other Countries (Unit: Point)

In summary, the averages scores form India showed more men in STEM but relatively more women than from other 11 countries, less perception of gender discrimination and of gender equality but more indirect experiences of discrimination and more agreement to the support policy to overcome the gender discriminations than other countries.

4.8.3. Comparison of Response by Male Scientists and Engineers in India and Other APNN Member Countries to Each Question

◦ **Male/Female ratio** (5-point scale, 3 points means Neutral)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of respondents was 2.68, meaning there were relatively more men. The male/female ratio in STEM was the lowest scoring 2.46 in graduate school and highest scoring 2.46 at current work.

The figure was statistically significantly ($t=17.369$, $p \leq .000$) higher than 1.89 which was the average of the respondents from the other 11 countries. India showed more women during university(college) ($t=10.560$, $p \leq .000$), followed by at current work ($t=7.753$, $p \leq .000$), in the management level of respondents current work ($t=7.021$, $p \leq .000$), and during graduate school ($t=5.992$, $p \leq .000$) than other countries at statistically significant levels.

Table 4.8.2 Comparison of Answer to Other APNN Member Countries : Male/Female Ratio

(Unit: Point)

Type		Question	India Average (n=103)	Average of Other Countries (n=1,191)	*t*	*(p)*
male/female Ratio (5-Point Scale)	1	The male/female ration of my department during my university(college) education	2.82	1.81	10.560***	0.000
	2	The male/female ratio of my department while at graduate school	2.46	1.95	5.992***	0.000
	3	The male/female ratio of my current workplace	2.85	1.98	7.753***	0.000
	4	The male/female ration at management level at my current workplace	2.61	1.83	7.021***	0.000
	Sub Scale		2.68	1.89	17.369***	0.000

◦ **Perception of Discrimination** (5-point scale, 3 points means Neutral)
The Higher score, The Higher Perception of Discrimination

The average score of perception of discrimination in STEM was 1.74, which was below the mid-level. Of the five questions related to the perception of gender barrier, “It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.” received the highest average score (2.60). “Girls and boys were equally encouraged to choose their majors in STEM during their education period.” (1.20) received the lowest average score.

The overall average of the answers to the questions related to perception of discrimination was 1.74 lower than the overall average of 11 other APNN countries

(2.60) at a statistically significant level. “Girls and boys were equally encouraged to choose their majors in STEM during their education period."(t=-17.832, p≤.000). Specifically, significant differences were observed for the responses “Girls and boys were equally encouraged to choose their majors in STEM during their education period.” (t=-12.612, p≤.000), “Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues” (t=-11.591, p≤.000), “It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.” (t=-6.897, p≤.05), and “Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.” (t=-3.322, p≤.001) get relatively higher score, than those from other 11 countries.

The figures show the perception of discrimination of male scientists and engineers in STEM of India is significantly lower from entering the professional life to equal work distribution, payment and work appraisal in India than in other 11 countries on average.

Table 4.8.3 Comparison of Answer to Other Countries : Perception of Discrimination

(Unit: Point)

Type		Question	India Average (n=103)	Average of Other Countries (n=1,191)	*t*	*(p)*
Perception of Discrimination (5-Point Scale)	1	Girls and boys were equally encouraged to choose their majors in STEM during their education period.	1.20	2.15	-12.612***	0.000
	2	It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.	2.60	3.01	-3.322**	0.001
	3	Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.	1.25	2.50	-19.714***	0.000
	4	Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.	2.26	2.96	-6.897***	0.000
	5	Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues	1.40	2.37	-11.591***	0.000
	Sub Scale		1.74	2.60	-17.832***	0.000

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The overall average of the response by the male scientist and engineers in India on the indirect experience of discrimination was 2.60 points which was close to the median value of 2.5 points in a 4-point scale, meaning “I have not seen or heard of it but am aware of it.”

The highest level of indirect experience was the discrimination related to “marriage, pregnancy, and childbirth” (3.89) while the lowest level of indirect experience was that related to “participating or leading a research project”(1.23).

The overall average of responses to questions related to the level of indirect experience was higher than the overall average of other 11 countries (2.02) at statistically significant (t=18.129, p≤.000).

More specifically, the average scores of the responses to the questions of indirect experience related to “Woman in STEM leaving work due to her marriage, pregnancy or child care”(t=22.155, p≤.000), “Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female” (t=17.487, p≤.000), and “Woman in STEM being sexually harassed or treated unfairly” (t=8.649, p≤.000) were higher in order than the average scores of other countries at statistically significant. But the average response of “Woman in STEM is disadvantaged in participating or leading a research project because she is female.” got lower score at a statistically significant level (t=-8.169, p≤.000) than other 11 countries.

Table 4.8.4 Comparison of Answer to Other Countries : Indirect Experience

(Unit: Point)

Type		Question	India Average (n=103)	Average of Other Countries (n=1,191)	*t*	*(p)*
Indirect Experience of discrimination (4-Point Scale)	1	Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female	2.73	1.59	17.487***	0.000
	2	Woman in STEM is disadvantaged in participating or leading a research project because she is female.	1.23	1.71	-8.169***	0.000
	3	Woman in STEM being sexually harassed or treated unfairly	2.54	1.99	8.649***	0.000
	4	Woman in STEM leaving work due to her marriage, pregnancy or child care	3.89	2.81	22.155***	0.000
	Sub Scale		2.60	2.02	18.129***	0.000

◦ **Career Outlook and Need of Support Policy** (5-point scale, 3 points : “Neutral”) The Higher score means The Stronger agreement

The male scientists and engineers had a very positive view on the career outlook of women in their fields as the average score was 4.88. The score was significantly higher (t=13.259, p≤.000) than the average of 11 other countries (4.12) indicating that the respondents in India had a more positive view to other 11 APNN member countries.

The average score of male scientists and engineers in India answering to the question “It is crucial to have strong policy support to solve gender inequality in the STEM field.” was 4.85, meaning that they strongly agreed to it. It was higher than the average score of other 11 countries (3.79) at a statistically significant level (t=16.478, p≤.000). In other words, the male scientists and engineers in India strongly agreed to the policy to overcome the gender barrier

However, the average score of male scientists and engineers in India answering to the question “It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.” was 3.14 meaning that they neither disagree nor agree. The score was similar to the average (3.14) of other 11 countries.

Table 4.8.5 Comparison of Answer to Other Countries : Career Outlook & Need of Support Policy

(Unit: Score)

Type		Question	India Average (n=103)	Average of Other Countries (n=1,191)	t	*(p)*
Career Outlook	1	I believe things will turn out fine in the future career for women in STEM	4.88	4.12	13.259***	0.000
Need of Support Policy (5-Point Scale)	1	It is crucial to have strong policy support to solve gender inequality in the STEM field.	4.85	3.79	16.478***	0.000
	2	It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.	3.14	3.14	0.003	0.998
	Sub Scale		4.00	3.46	5.591***	0.000

◦ **Perception of Gender Equality** (5-point scale, 3 points : “Neutral”)
The higher score, The Higher Perception of Gender equality

Five questions were asked of male scientists and engineers in India on their perception of gender equality in STEM. The overall average of responses to all questions was 2.31 points, being lower than the mid-level.

The highest score was on to the statement “In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife” (3.54). It was followed by “Women are born to have a way of caring children that men are not capable of in the same way” (2.95), and “Primary breadwinners (who take care of financial obligations) of households should be men” (2.75). The scores indicate that the respondents had more perception of gender equality regarding the gender role in family.

On the other hand, the average scores on “In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves” (1.19), and “I believe gender equality will be fully achieved only if women are given equal opportunities as men” (1.13) were much lower than other average score, indicating that the respondents had strong perception of conventional division of gender role. And strongly believe that the equal opportunity would lead to equal outcome.

The overall average score of India (2.31) was lower than the average score of other 11 countries (2.97) at a statistically significant level ($t=-8.422$ $p \leq .000$). More specifically, the average scores on “In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves”(t=-21.064, p≤.000), “I believe gender equality will be fully achieved only if women are given equal opportunities as men” (t=-18.969, p≤.000), “Primary breadwinners (who take care of financial obligations) of households should be men” (t=-4.355, p≤.000) were lower than other 11 countries at statistically significant levels. And the average scores of the rest two statements were also lower than other 11 countries.

Table 4.8.6 Comparison of Answer to Other Countries : Perception of Gender Equality

(Unit: Point)

Type		Question	India Average (n=103)	Average of Other Countries (n=1,191)	*t*	*(p)*
Perception of Gender Equality (5-point scale)	1	In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves	1.19	2.74	-21.064***	0.000
	2	Primary breadwinners (who take care of financial obligations) of households should be men	2.75	3.32	-4.355***	0.000
	3	Women are born to have a way of caring children that men are not capable of in the same way	2.95	2.96	-0.098	0.922
	4	In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.	3.54	3.60	-0.383	0.702
	5	believe gender equality will be fully achieved only if women are given equal opportunities as men.	1.13	2.24	-18.969***	0.000
	Sub Scale		2.31	2.97	-8.422***	0.000

4.8.4. Comparison of Responses in India with Other Countries

◦ **Male/Female ratio** (5-point scale, 3 points : “Neutral”)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of male scientists and engineers was 1.52, meaning there were relatively more men. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in India were evaluated by ANOVA (or t) analysis. Table 4.8.7 shows the results.

The difference of responses according to the age (t=4.880, p≤.000) and occupation (t=8.818, p≤.000) of the respondents in India were statistically significant. It showed there were more men in the field of respondents in their 40’s than in their 30’s, and more men in the field of healthcare professional respondents.

Table 4.8.7 male/female ratio in India: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.68			
Age				
29 years or younger	2.53	0.407	4.880**	0.003
30 - 39	2.50	0.477		
40 - 49	2.82	0.291		
Over 50	2.74	0.324		
Marital status				
Single	4.29	0.521	-0.036	0.972
Married	4.29	0.639		
Others (including divorced)	-	-		
Number of Children				
1	2.69	0.364	2.210	0.116
2	2.86	0.276		
3 or more	2.75	0.395		
Occupation				
Professor/Teacher	2.74	0.420	4.054**	0.004
Researcher	2.83	0.243		
Healthcare professional	2.25	0.468		
Engineer (company, R&D center, etc.)	2.54	0.422		
Other	2.73	0.175		
Double income status (married)				
Double income	2.74	0.424	0.488	0.627
Single income	2.70	0.345		

Note: ***p<.001, **p<.01, *p<.05

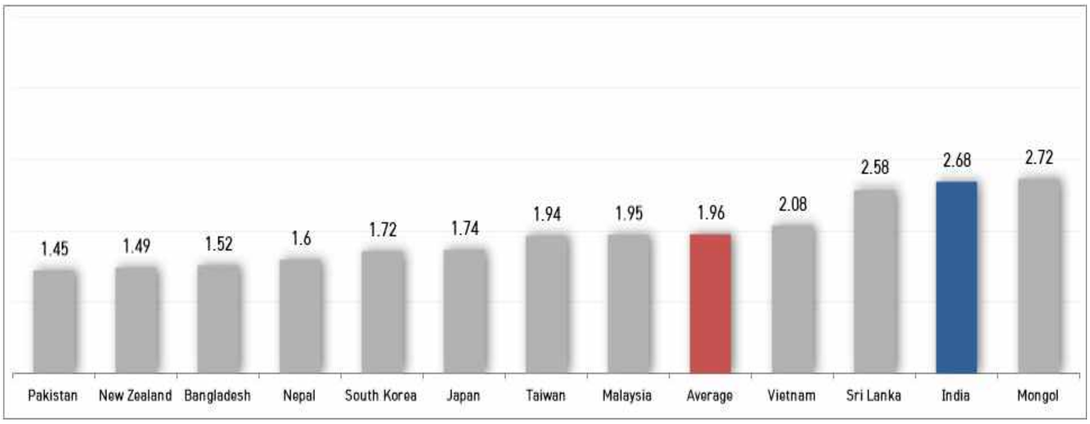


Figure 4.8.2 Average of India and Other Countries in male/female ratio (Unit: Point)

As shown in the figure, the male/female ratio in the fields of the male scientists and engineers in India (2.68) was higher than the average of all countries (1.96), being the second highest level after Mongolia.

◦ **Perception of Discrimination** (5-point scale, 3 points : “Neutral”)
The Higher score, The Higher Perception of Discrimination

The average score of male scientists and engineers in India to the perception of discrimination in STEM (1.74) was lower than the mid-level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in India were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.8.8.

Although the differences of the average scores of the respondents by their personal variable were not statistically significant, the average scores of the younger respondents than that of older, of single respondent than that of married were relatively high in each category.

Table 4.8.8 Perception of Discrimination in India: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	1.74			
Age				
29 years or younger	1.91	0.598	1.380	0.253
30 - 39	1.80	0.594		
40 - 49	1.67	0.359		
Over 50	1.70	0.189		
Marital status				
Single	4.18	0.775	0.870	0.386
Married	3.97	0.859		
Others (including divorced)	-	-		
Number of Children				
1	1.75	0.453	0.315	0.731
2	1.69	0.396		
3 or more	1.64	0.194		
Occupation				
Professor/Teacher	1.72	0.400	1.807	0.134
Researcher	1.73	0.466		
Healthcare professional	1.64	0.167		
Engineer (company, R&D center, etc.)	1.91	0.528		
Other	1.51	0.259		
Double income status (married)				
Double income	1.70	0.366	0.045	0.833
Single income	1.69	0.414		

Note: ***p<.001, **p<.01, *p<.05

The figure below shows the comparative average scores among different countries. The perception of male scientists and engineers in India on discrimination (1.74) was higher than the average of all countries (2.53), being the lowest among 12 countries.

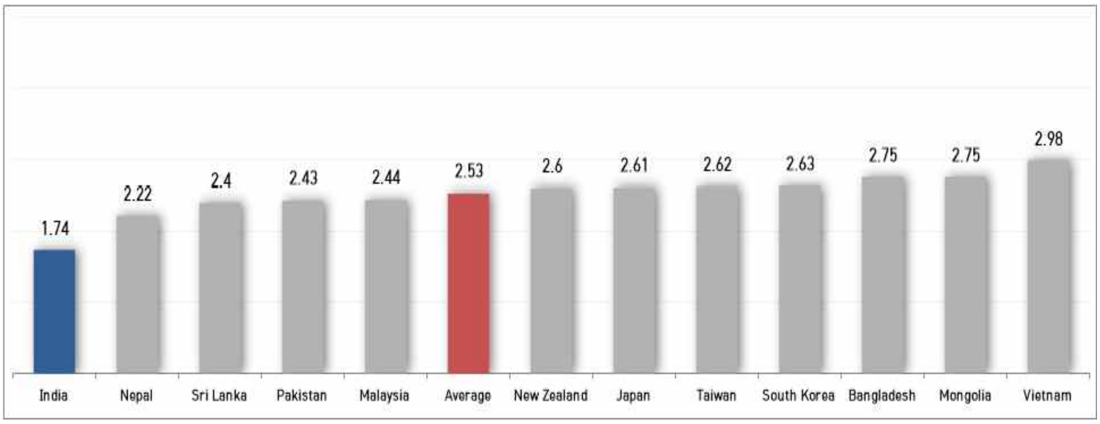


Figure 4.8.3 Averages of India and Other countries in Perception of Discrimination (Unit : Point)

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The average score of male scientists and engineers in India on the indirect experience of discrimination against women in STEM was 2.60 which was close to “I have not seen or heard of it but am aware of it.”

Table 4.8.9 Indirect Experience in India: Differences according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.60			
Age				
29 years or younger	2.41	0.315	3.948*	0.011
30 - 39	2.61	0.344		
40 - 49	2.63	0.195		
Over 50	2.67	0.162		
Marital status				
Single	2.67	0.521	-0.036	0.972
Married	2.36	0.639		
Others (including divorced)	-	-		
Number of Children				
1	2.66	0.252	1.011	0.368
2	2.58	0.217		
3 or more	2.69	0.208		
Occupation				
Professor/Teacher	2.57	0.225	0.804	0.526
Researcher	2.59	0.244		
Healthcare professional	2.70	0.209		
Engineer (company, R&D center, etc.)	2.58	0.344		
Other	2.70	0.218		
Double income status (married)				
Double income	2.56	0.229	-2.140*	0.035
Single income	2.67	0.224		

Note: ***p<.001, **p<.01, *p<.05

The differences according the respondent's profiles (age, marital status, number of children, occupation, and double income status (if married) in India were evaluated by ANOVA (or t) analysis. The results are summarized in Table 4.8.9.

The difference of responses according to the age ($t=3.948$, $p \leq .05$) and income status ($t=-2.140$, $p \leq .05$) of the respondents in India were statistically significant. The average scores was higher for the older than for the younger, as well as for single-income respondents than for double-income respondents. Although the difference of the average score was not statistically significant, the score for healthcare professional and for other profession were relatively high in each category.

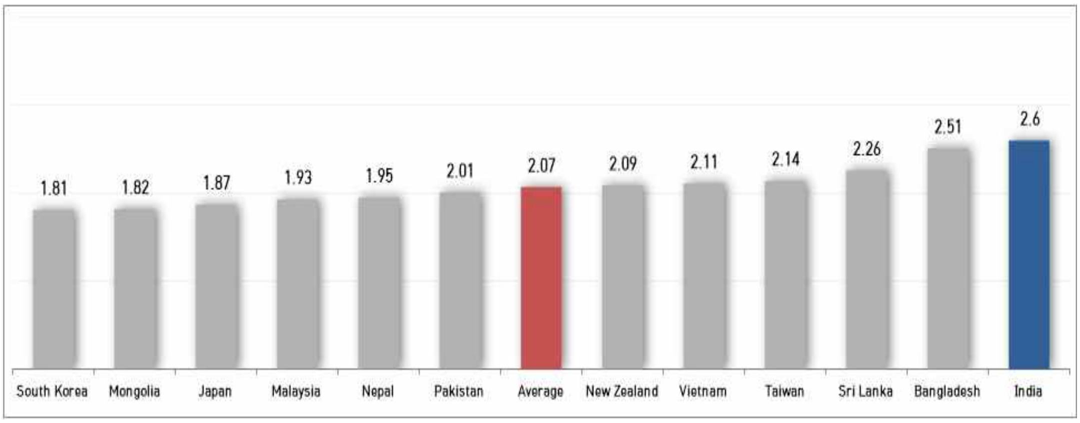


Figure 4.8.4 Averages of India and Other Countries in Indirect Experience (Unit : Point)

The figure above shows the cross-country average scores on the indirect experience of discrimination in 12 countries. The indirect experience of discrimination by the male scientists and engineers in India (2.60) was lower than the average of all countries (2.07), being the highest among 12 APNN member countries.

◦ **Need of Support Policy** (5-point scale, 3 points : "Neutral")
The Higher score means The Stronger agreement

The average score of male scientists and engineers in India on the need of support policy to overcome the gender barrier in STEM was 4.00, being higher than the neutral level more 1 point score. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in India were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.8.10.

The standard deviation of the average scores of the respondents by the personal variable was in similar level.

Table 4.8.10 Need of Support Policy in India: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	4.00			
Age				
29 years or younger	4.16	0.851	1.618	0.190
30 - 39	4.26	0.767		
40 - 49	3.82	0.879		
Over 50	3.93	0.830		
Marital status				
Single	4.18	0.775	0.870	0.386
Married	3.97	0.859		
Others (including divorced)	-	-		
Number of Children				
1	4.00	0.875	0.373	0.690
2	3.85	0.814		
3 or more	4.11	0.858		
Occupation				
Professor/Teacher	4.10	0.796	1.748	0.146
Researcher	3.71	0.940		
Healthcare professional	4.60	0.548		
Engineer (company, R&D center, etc.)	4.10	0.800		
Other	3.82	0.902		
Double income status (married)				
Double income	4.05	0.865	0.661	0.510
Single income	3.92	0.860		

Note: ***p<.001, **p<.01, *p<.05

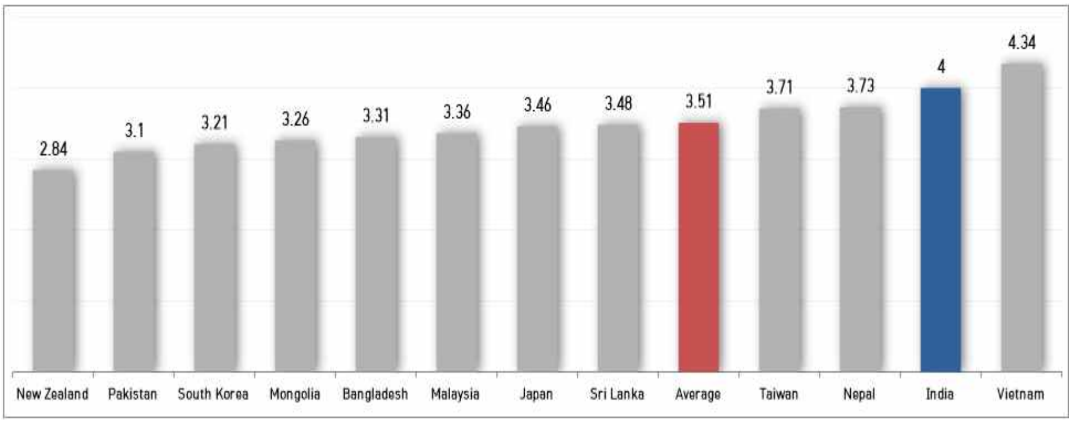


Figure 4.8.5 Averages of India and Other Countries in Need of Support Policy (Unit: Point)

The above figure shows the cross-country average scores on the need of support policy to overcome the gender barrier. Respondents in India agreeing to the need of support policy (4.00) was higher than the average of all countries (3.51), being the second highest after Vietnam.

◦ **Perception of Gender Equality** (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Gender Equality

The average score of male scientists and engineers in India on the perception of gender equality was 2.31 which was lower than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in India were evaluated by ANOVA (or t) analysis.

Although the differences of the average scores of the respondents by their personal variable were not statistically significant, the average scores of the respondents in the age of less than 29 years (2.46), researcher respondents (2.47) were relatively high, meaning more perception of gender equality in each category.

Table 4.8.11 Perception of Gender Equality in India: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.31			
Age				
29 years or younger	2.46	0.822	0.494	0.687
30 - 39	2.23	0.723		
40 - 49	2.35	0.694		
Over 50	2.22	0.690		
Marital status				
Single	2.47	0.521	-0.036	0.972
Married	2.23	0.639		
Others (including divorced)	-	-		
Number of Children				
1	2.26	0.693	0.413	0.663
2	2.31	0.659		
3 or more	2.07	0.714		
Occupation				
Professor/Teacher	2.21	0.634	0.499	0.736
Researcher	2.47	0.800		
Healthcare professional	2.20	0.490		
Engineer (company, R&D center, etc.)	2.30	0.772		
Other	2.31	0.766		
Double income status (married)				
Double income	2.25	0.581	-0.269	0.789
Single income	2.29	0.720		

Note: ***p<.001, **p<.01, *p<.05

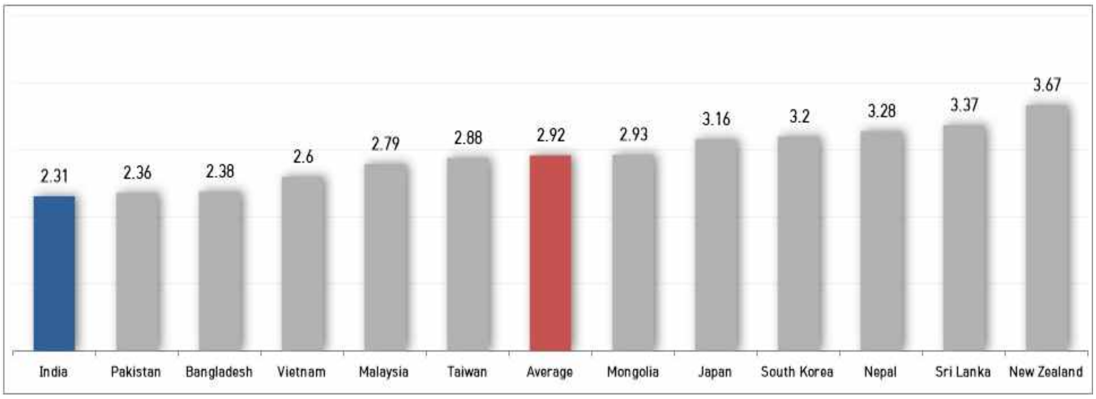


Figure 4.8.6 Averages of India and Other Countries in the Perception of Gender Equality (Unit: Point)

The figure above shows the cross-country average scores on the perception of gender equality. The perception of male scientists and engineers in India on gender equality (2.31) was lower than the average of all countries (2.92), being the lowest level among 12 countries.

4.9. Japan

4.9.1. General Profiles of Male Respondents in Japan

A total of 224 male scientists and engineers (17.3% of total respondents) answered and Japan is the most participated country in this survey. Table 4.9.1. shows the age, marital status, number of children, and occupation of the male scientist and engineer respondents in Japan.

Regarding the age, 46.0% were in the age of 29 or less, 2.1% were in their 30’s, 16.1% were in their 40’s and 13.8% were in the age of 50 or older. There were more single respondents at 50.9% than the married respondents at 46.0%. Of the respondents that had the children (21.5% of total Japan respondents), 70.8% had 1 child, 25.0% had 2 children, and 4.2% had 3 or more children. In the case of couples, 62.7% work together (double income), 37.3% work alone (single income). Regarding occupation, 44.2% were in other professions, followed by 27.7% were teachers/professors, 20.5% were researchers, 4.0% were engineers, and 3.6% were in healthcare profession.

Table 4.9.1 General Profile of Respondents in Japan

(Unit: Person, %)

Composition	Frequency	%
Age		
29 years or younger	103	46.0
30 - 39	54	24.1
40 - 49	36	16.1
Over 50	31	13.8
Marital status		
Single	114	50.9
Married	103	46.0
Others (including divorced)	1	0.4
Number of Children		
1	34	70.8
2	12	25.0
3 or more	2	4.2
Occupation		
Professor/Teacher	62	27.7
Researcher	46	20.5
Healthcare professional	8	3.6
Engineer (company, R&D center, etc.)	9	4.0
Other	99	44.2
Double income status (married)		
Double income	64	62.7
Single income	38	37.3

4.9.2. Comparison of Answer by Male Scientists and Engineers in Japan with Other APNN Member Countries

The questions in the survey are divided into five categories including “male/female ratio” in the major field of respondents, “perception of discrimination” against women in STEM, “indirect experience” of discrimination in STEM, “need of support policy” to resolve gender barriers in STEM, and perception of “gender equality.”

Average scores of the respondents from Japan were compared with that from the other 11 APNN countries in each category as follows. The average male/female ratio in the fields of male scientists and engineers was 1.74, and it was lower than that of the respondents from the other 11 countries which was 2.00 at a statistically significant level ($t=-5.086$, $p\leq.000$).

The average score for the perception of discrimination was 2.61 and for the need of support policy, 3.46 were somewhat lower than the average score from the other 11 countries. While the average score for the indirect experience of discrimination was 1.87 which was significantly lower ($t=-6.112$, $p\leq.000$) than the average score (2.87) of the other 11 countries. On the other hand, the average score for the Perception of Gender Equality was 3.16 which was higher than the average score of the other countries (2.87) at a statistically significant ($t=6.172$, $p\leq.000$).

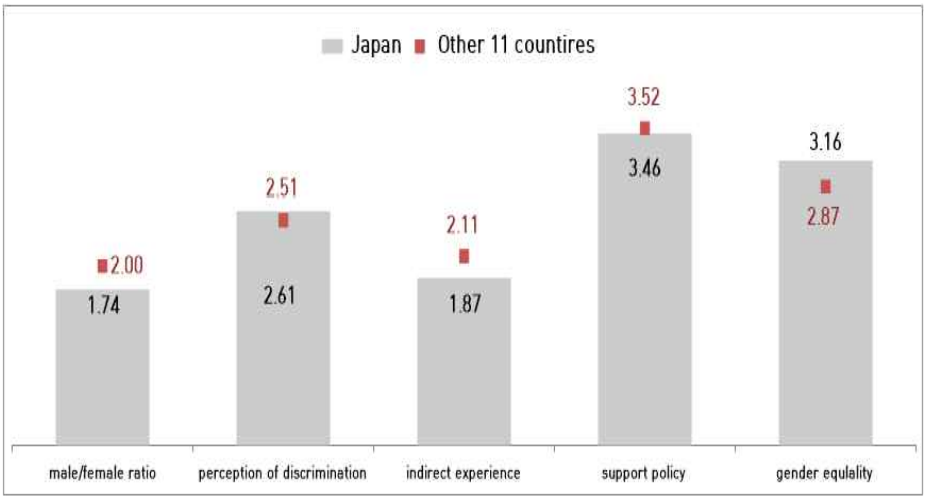


Figure 4.9.1 Comparisons of Answer between Japan and Other Countries (Unit: Point)

In summary, Japan had more men in STEM and higher male ratio than other 11 countries. The average scores showed slightly lower perception of gender discrimination, lower indirect experience of discrimination, and lower agreement to the need of support policy. However, they showed higher perception of gender equality than other 11 APNN Member countries on average.

4.9.3. Comparison of Response by Male Scientists and Engineers in Japan and Other APNN Member Countries to Each Question

◦ **Male/Female ratio** (5-point scale, 3 points means Neutral)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of respondents was 1.74, meaning there were more men than women in STEM. The male/female ratio in STEM was the lowest scoring 1.42 at management level at current workplace and the highest scoring 1.90 at graduate school.

The figure (1.74) was lower than that of 11 countries (2.00) at a statistically significant level (t=-5.086, $p \leq .000$). Japan showed more men during all questioned period than other 11 countries on average (from college to current work).

Table 4.9.2 Comparison of Answer to Other APNN Member Countries : Male/Female Ratio

(Unit: Point)

Type		Question	Japan Average (n=224)	Average of Other Countries (n=1,070)	*t*	*(p)*
male/female Ratio (5-Point Scale)	1	The male/female ration of my department during my university(college) education	1.78	1.92	-1.922	0.055
	2	The male/female ratio of my department while at graduate school	1.90	2.01	-1.573	0.117
	3	The male/female ratio of my current workplace	1.77	2.10	-4.652***	0.000
	4	The male/female ration at management level at my current workplace	1.42	1.98	-8.714***	0.000
		Sub Scale	1.74	2.00	-5.086***	0.000

◦ **Perception of Discrimination** (5-point scale, 3 points means Neutral)
The Higher score, The Higher Perception of Discrimination

The average score of perception of discrimination in STEM was 2.61, which was below the mid-level and slightly higher than other 11 countries. Of the five questions related to the perception of gender barrier, "Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists." received the highest average score (3.07). "Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level." (2.27) received the lowest average score.

Almost detail responses from Japan have statistically significant differences to those from other 11 countries on average. The highest difference score was "Girls and boys were equally encouraged to choose their majors in STEM during their education period." ($t=3.763$, $p \leq .000$), "Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists." ($t=2.684$, $p \leq .01$), "Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues" ($t=1.980$, $p \leq .05$) were higher, while "Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level." ($t=-2.112$, $p \leq .05$) was lower at a statistically significant level.

Table 4.9.3 Comparison of Answer to Other Countries : Perception of Discrimination

(Unit: Point)

Type		Question	Japan Average (n=224)	Average of Other Countries (n=1,070)	*t*	*(p)*
Perception of Discrimination (5-Point Scale)	1	Girls and boys were equally encouraged to choose their majors in STEM during their education period.	2.32	2.02	3.763***	0.000
	2	It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.	2.96	2.98	-0.260	0.795
	3	Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.	2.27	2.42	-2.112*	0.035
	4	Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.	3.07	2.87	2.684**	0.008
	5	Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues	2.42	2.27	1.980*	0.049
	Sub Scale		2.61	2.51	2.036	0.042

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The overall average of the response by the male scientist and engineers in Japan on the indirect experience of discrimination was 1.87 points which was lower than the median value of 2.5 points in a 4-point scale and close to the level of "I have not seen or heard of it but am aware of it."

The indirect experience was the discrimination related to 'marriage, pregnancy or child care' (2.76) got the highest average score, while the discrimination related to 'receiving research funds or scholarships' got the lowest score (1.32).

The overall average of responses to questions related to the level of indirect experience (1.87) was lower than the overall average of other 11 countries (2.11) at a statistically significant level ($t=-6.112$, $p \leq .000$).

More specifically, the average scores of the responses to the questions of discrimination related to "Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female." (t=-9.552, p≤.000), followed by "Woman in STEM is disadvantaged in participating or leading a research project because she is female." (t=-4.559, p≤.000), "Woman in STEM being sexually harassed or treated unfairly" (t=-2.528, p≤.05) and "Woman in STEM leaving work due to her marriage, pregnancy or child care." (t=-2.068, p≤.05) were lower. All the average scores from Japan related to indirect discrimination were lower than that from other countries at statistically significant levels.

Table 4.9.4 Comparison of Answer to Other Countries : Indirect Experience

(Unit: Point)

Type		Question	Japan Average (n=224)	Average of Other Countries (n=1,070)	*t*	*(p)*
Indirect Experience of discrimination (4-Point Scale)	1	Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female	1.32	1.76	-9.552***	0.000
	2	Woman in STEM is disadvantaged in participating or leading a research project because she is female.	1.48	1.71	-4.559***	0.000
	3	Woman in STEM being sexually harassed or treated unfairly	1.91	2.06	-2.528*	0.012
	4	Woman in STEM leaving work due to her marriage, pregnancy or child care	2.76	2.92	-2.068*	0.039
		Sub Scale	1.87	2.11	-6.112***	0.000

◦ **Career Outlook and Need of Support Policy** (5-point scale, 3 points : "Neutral") The Higher score means The Stronger agreement

The male scientists and engineers had a somewhat positive view on the career outlook of women in their fields as the average score was 4.02, but significantly lower (t=-3.162, p≤.05) than the average of other 11 countries (4.21) meaning the respondents in Japan had less positive view than other 11 APNN member countries.

The average score of male scientists and engineers in Japan answering to the question "It is crucial to have strong policy support to solve gender inequality in the STEM field." was 3.55, meaning that their opinion is positive to the support policy to overcome the discrimination It was lower than the average of other 11 countries (3.79) at a statistically significant (t=-5.394, p≤.000).

However, the average score of male scientists and engineers in Japan answering to the question "It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field." was 3.36, meaning that their opinion is not negative to the affirmative support policy to overcome the discrimination. This average score is the higher than other 11 countries (3.09) having statistical significance (t=3.902, p≤.000) on average.

Table 4.9.5 Comparison of Answer to Other Countries : Career Outlook & Need of Support Policy

(Unit: Score)

Type		Question	Japan Average (n=224)	Average of Other Countries (n=1,070)	*t*	*(p)*
Career Outlook	1	I believe things will turn out fine in the future career for women in STEM	4.02	4.21	-3.162**	0.002
Need of Support Policy (5-Point Scale)	1	It is crucial to have strong policy support to solve gender inequality in the STEM field.	3.55	3.95	-5.394***	0.000
	2	It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.	3.36	3.09	3.902***	0.000
		Sub Scale	3.46	3.52	-0.993	0.322

◦ **Perception of Gender Equality** (5-point scale, 3 points : "Neutral")
The higher score, The Higher Perception of Gender equality

Five questions were asked of male scientists and engineers in Japan on their perception of gender equality in STEM. The overall average of responses to all questions was 3.16 points, close to mid-level.

The highest score was on to the statement "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife" (3.98). It was followed by "Primary breadwinners (who take care of financial obligations) of households should be men" (3.69), "In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves" (2.81), "I believe gender equality will be fully achieved only if women are given equal opportunities as men" (2.67), and "Women are born to have a way of caring children that men are not capable of in the same way" (2.64). The overall average of responses to all questions was higher than other 11 countries at a statistically significant level ($t=6.172$ $p \leq .000$) meaning stronger perception of gender equality than other countries on average.

More specifically, the average scores on "I believe gender equality will be fully achieved only if women are given equal opportunities as men" ($t=7.656$, $p \leq .000$) have the highest difference to other countries. It is followed by "Primary breadwinners (who take care of financial obligations) of households should be men" ($t=6.184$, $p \leq .000$), "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife" ($t=6.024$, $p \leq .000$), "In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves" ($t=2.727$, $p \leq .01$).

However, the average score on "Women are born to have a way of caring children that men are not capable of in the same way" ($t=-4.366$, $p \leq .000$) was significantly lower than other countries. The response from Japan showed lower indirect experience of gender discrimination but higher perception of gender equality.

Table 4.9.6 Comparison of Answer to Other Countries : Perception of Gender Equality

(Unit: Point)

Type		Question	Japan Average (n=224)	Average of Other Countries (n=1,070)	*t*	*(p)*
Perception of Gender Equality (5-point scale)	1	In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves	2.81	2.58	2.727**	0.007
	2	Primary breadwinners (who take care of financial obligations) of households should be men	3.69	3.19	6.184***	0.000
	3	Women are born to have a way of caring children that men are not capable of in the same way	2.64	3.03	-4.366***	0.000
	4	In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.	3.98	3.52	6.024***	0.000
	5	I believe gender equality will be fully achieved only if women are given equal opportunities as men.	2.67	2.05	7.656***	0.000
	Sub Scale		3.16	2.87	6.172***	0.000

4.9.4. Comparison of Responses in Japan with Other Countries

◦ **Male/Female ratio** (5-point scale, 3 points : "Neutral")
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of male scientists and engineers was 1.74, meaning there were relatively more men. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Japan were evaluated by ANOVA (or t) analysis. Table 4.9.7 shows the results.

The difference of responses according to the occupation ($t=4.107$, $p \leq .01$) of respondents in Japan was statistically significant, and revealed there are relatively more women in the field of healthcare professional (2.38)[28].

[28] We did not read here the statistical difference due to the children number, because there was only 1 respondent having more 3 children.

Table 4.9.7 male/female ratio in Japan: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	1.74			
Age				
29 years or younger	1.71	0.615	0.570	0.636
30 - 39	1.79	0.618		
40 - 49	1.66	0.528		
Over 50	1.81	0.686		
Marital status				
Single	3.63	0.664	1.155	0.317
Married	3.66	0.712		
Others (including divorced)	4.67	-		
Number of Children				
1	1.94	0.657	3.264*	0.047
2	1.60	0.458		
3 or more	1.00	0.000		
Occupation				
Professor/Teacher	1.66	0.508	4.107**	0.003
Researcher	1.91	0.637		
Healthcare professional	2.38	0.997		
Engineer (company, R&D center, etc.)	1.33	0.280		
Other	1.70	0.619		
Double income status (married)				
Double income	1.78	0.556	0.883	0.379
Single income	1.67	0.640		

Note: ***p<.001, **p<.01, *p<.05

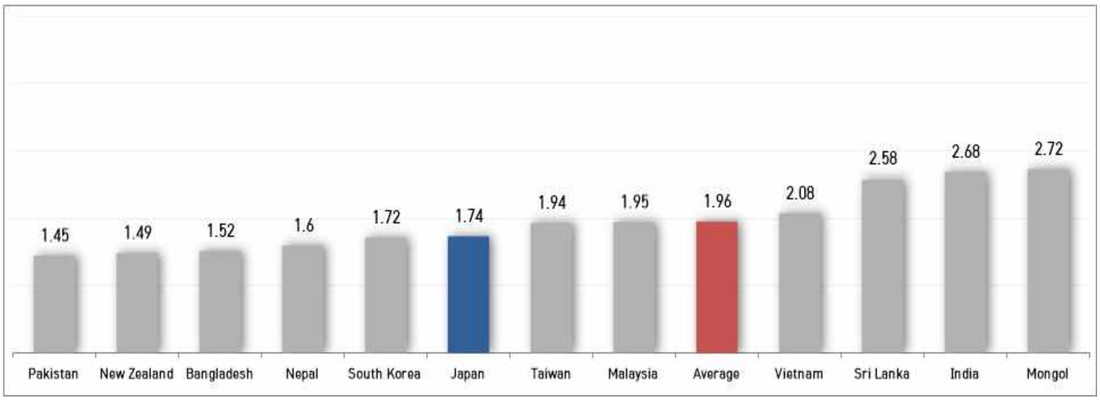


Figure 4.9.2 Average of Japan and Other Countries in male/female ratio (Unit: Point)

As shown in the figure, the male/female ratio in the fields of the male scientists and engineers in Japan (1.74) was lower than the average of all countries (1.96) and sixth lower after Pakistan, New Zealand, Bangladesh, Nepal and South Korea.

◦ **Perception of Discrimination** (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Discrimination

The average score of male scientists and engineers in Japan to the perception of discrimination in STEM (2.61) was lower than the mid-level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Japan were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.9.8.

Table 4.9.8 Perception of Discrimination in Japan: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.61			
Age				
29 years or younger	2.65	0.579	0.839	0.474
30 - 39	2.49	0.644		
40 - 49	2.64	0.625		
Over 50	2.63	0.594		
Marital status				
Single	3.43	0.787	1.010	0.366
Married	3.49	0.805		
Others (including divorced)	4.50	-		
Number of Children				
1	2.67	0.700	0.673	0.515
2	2.55	0.795		
3 or more	2.10	0.141		
Occupation				
Professor/Teacher	2.61	0.651	0.793	0.531
Researcher	2.52	0.560		
Healthcare professional	2.43	0.439		
Engineer (company, R&D center, etc.)	2.49	0.756		
Other	2.68	0.591		
Double income status (married)				
Double income	2.52	0.687	-1.336	0.185
Single income	2.69	0.571		

Note: ***p<.001, **p<.01, *p<.05

The standard deviations of the average scores by the personal variable did not show statistically significances, the average score of the respondents in their 30’s, in double income were relatively higher than other in each category.

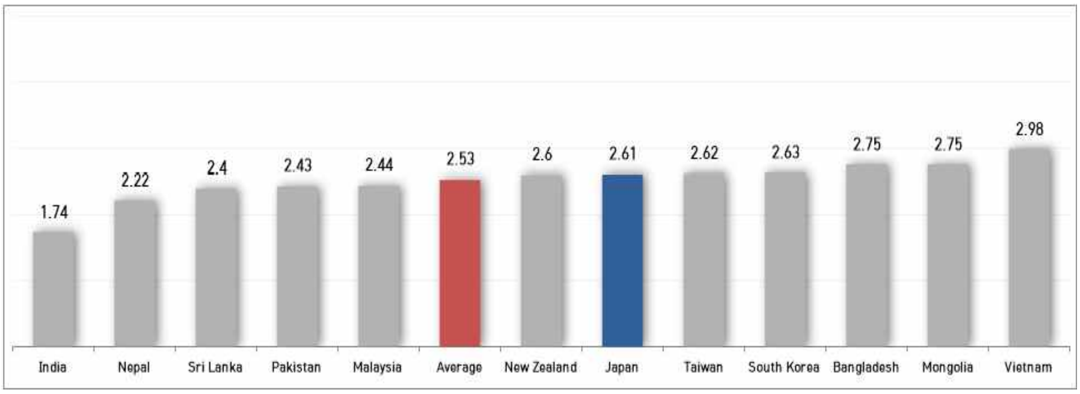


Figure 4.9.3 Averages of Japan and Other Countries in Perception of Discrimination (Unit: Point)

The figure above shows the comparative average scores among different countries. The perception of male scientists and engineers in Japan on discrimination (2.61) was similarly higher than the average of all countries (2.53), being mid-level among 12 APNN member countries.

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The average score of male scientists and engineers in Japan on the indirect experience of discrimination against women in STEM was 1.87 which was close to “I have not seen or heard of it but am aware of it.” The differences according to the respondent’s profiles (age, marital status, number of children, occupation, and double income status (if married) in Japan were evaluated by ANOVA (or t) analysis. The results are summarized in Table 4.9.9.

The difference of responses according to the age (F=4.626, p≤.01), and of the occupation (F=2.976, p≤.05) of respondents in Japan were statistically significant, meaning relatively more indirect discrimination on gender discrimination for older and for engineers than other respondents in each category.

Table 4.9.9 Indirect Experience in Japan: Differences according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	1.87			
Age				
29 years or younger	1.74	0.528	4.626**	0.004
30 - 39	1.90	0.496		
40 - 49	2.03	0.540		
Over 50	2.04	0.418		
Marital status				
Single	3.63	0.664	1.155	0.317
Married	3.66	0.712		
Others (including divorced)	4.67	-		
Number of Children				
1	2.12	0.545	0.175	0.840
2	2.09	0.692		
3 or more	1.88	0.177		
Occupation				
Professor/Teacher	1.88	0.445	2.976*	0.020
Researcher	1.98	0.502		
Healthcare professional	2.00	0.408		
Engineer (company, R&D center, etc.)	2.25	0.661		
Other	1.76	0.554		
Double income status (married)				
Double income	2.00	0.523	-0.470	0.639
Single income	2.05	0.500		

Note: ***p<.001, **p<.01, *p<.05

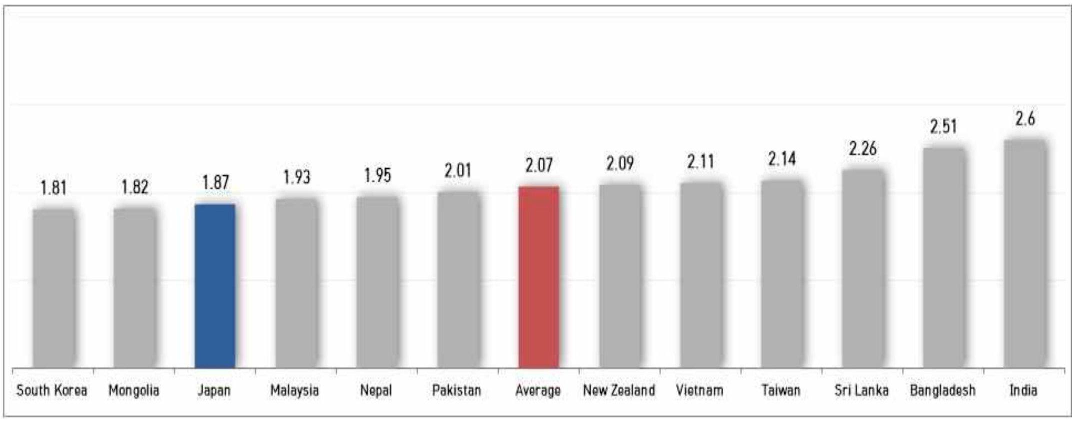


Figure 4.9.4 Averages of Japan and Other Countries in Indirect Experience (Unit : Point)

The figure above shows the cross-country average scores on the indirect experience of discrimination in 12 countries. The indirect experience of discrimination by the male scientists and engineers in Japan (1.87) was lower than the average of all countries (2.07), being the third lowest after South Korea and Mongol among 12 countries.

◦ **Need of Support Policy** (5-point scale, 3 points : "Neutral")
The Higher score means The Stronger agreement

The average score of male scientists and engineers in Japan on the need of support policy to overcome the gender barrier in STEM was 3.46, being slightly higher than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Japan were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.9.10.

The difference of responses according to the age ($F=5.016$, $p \leq .01$) in Japan was statistically significant, and revealed the respondents in their 30's (3.14) agree less to support policy than other ages.

Table 4.9.10 Need of Support Policy in Japan: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	3.46			
Age				
29 years or younger	3.48	0.710	5.016**	0.002
30 - 39	3.14	0.860		
40 - 49	3.69	0.710		
Over 50	3.67	0.844		
Marital status				
Single	3.43	0.787	1.010	0.366
Married	3.49	0.805		
Others (including divorced)	4.50	-		
Number of Children				
1	3.65	0.784	0.527	0.594
2	3.86	1.051		
3 or more	3.25	1.061		
Occupation				
Professor/Teacher	3.50	0.754	1.420	0.228
Researcher	3.27	0.929		
Healthcare professional	3.36	0.627		
Engineer (company, R&D center, etc.)	3.89	1.024		
Other	3.48	0.716		
Double income status (married)				
Double income	3.48	0.840	0.068	0.946
Single income	3.47	0.745		

Note: ***p<.001, **p<.01, *p<.05

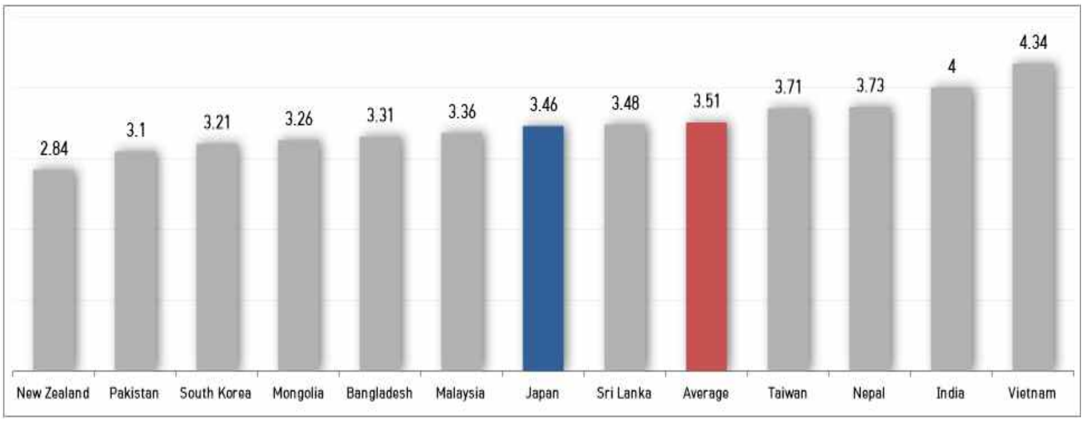


Figure 4.9.5 Averages of Japan and Other Countries in Need of Support Policy (Unit: Point)

The above figure shows the cross-country average scores on the need of support policy to overcome the gender barrier. Respondents in Japan agreeing to the need of support policy (3.46) was similarly lower than the average of all countries (3.51), being mid-level among 12 APNN member countries.

◦ **Perception of Gender Equality** (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Gender Equality

The average score of male scientists and engineers in Japan on the perception of gender equality was 3.16 which was slightly higher than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Japan were evaluated by ANOVA (or t) analysis.

The difference of responses according to the age (F=5.995, p≤.01), and the occupation (F=4.122, p≤.01) in Japan were statistically significant. It revealed the respondents in their 30's and working as teacher/professor showed lower perception of gender equality than other respondents in each category.

Table 4.9.11 Perception of Gender Equality in Japan: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	3.16			
Age				
29 years or younger	2.99	0.554	5.995**	0.001
30 - 39	3.22	0.522		
40 - 49	3.34	0.632		
Over 50	3.38	0.578		
Marital status				
Single	3.63	0.664	1.155	0.317
Married	3.66	0.712		
Others (including divorced)	4.67	-		
Number of Children				
1	3.19	0.569	0.194	0.824
2	3.28	0.663		
3 or more	3.40	0.283		
Occupation				
Professor/Teacher	3.30	0.556	4.122**	0.003
Researcher	3.23	0.489		
Healthcare professional	3.43	0.454		
Engineer (company, R&D center, etc.)	3.18	0.628		
Other	2.98	0.567		
Double income status (married)				
Double income	3.39	0.616	2.508*	0.014
Single income	3.09	0.519		

Note: ***p<.001, **p<.01, *p<.05

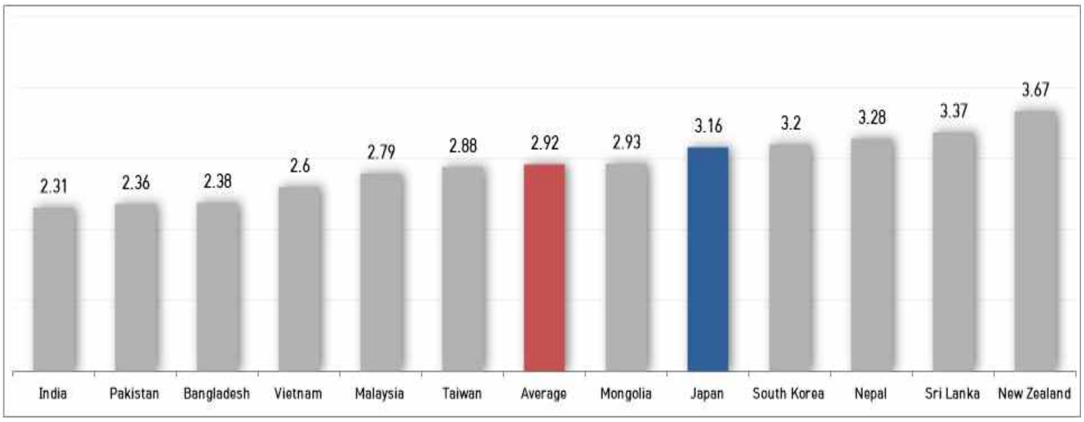


Figure 4.9.6 Averages of Japan and Other Countries in the Perception of Gender Equality (Unit: Point)

The figure above shows the cross-country average scores on the perception of gender equality. The perception of male scientists and engineers in Japan on gender equality (3.16) was higher than the average of all countries (2.92), being the fifth highest level after New Zealand, Sri Lanka, Nepal and South Korea.

4.10. Taiwan

4.10.1. General Profiles of Male Respondents in Taiwan

A total of 114 male scientists and engineers (8.8% of total respondents) answered the survey. Table 4.10.1. shows the age, marital status, number of children, and occupation of the male scientist and engineer respondents in Taiwan.

Regarding the age, 31.6% were in their 30's, 24.6% were in the age of over 50 years, 23.7% were, in the age of 29 years or younger, and 20.2% were in their 40's. There were more married respondents at 60.5% than the single respondents at 38.6%. Of the respondents that had the children (60.5% of total Taiwan respondents), 68.1% had 2 children, 18.1% had 1 child, and 13.1% had 3 or more children. In the case of couples, there were more a double-income couple at 76.8% than single-income couple at 23.2%. Regarding occupation, 26.3% were in other occupation, followed by 21.9% were engineers, 19.3% were teachers/professors, 18.4% were researchers, and 14.0% were healthcare professional.

Table 4.10.1 General Profile of Respondents in Taiwan

(Unit: Person, %)

Composition	Frequency	%
Age		
29 years or younger	27	23.7
30 - 39	36	31.6
40 - 49	23	20.2
Over 50	28	24.6
Marital status		
Single	44	38.6
Married	69	60.5
Others (including divorced)	1	0.9
Number of Children		
1	13	18.8
2	47	68.1
3 or more	9	13.1
Occupation		
Professor/Teacher	22	19.3
Researcher	21	18.4
Healthcare professional	16	14.0
Engineer (company, R&D center, etc.)	25	21.9
Other	30	26.3
Double income status (married)		
Double income	53	76.8
Single income	16	23.2

4.10.2. Comparison of Answer by Male Scientists and Engineers in Taiwan with Other APNN Member Countries

The questions in the survey are divided into five categories including "male/female ratio" in the major field of respondents, "perception of discrimination" against women in STEM, "indirect experience" of discrimination in STEM, "need of support policy" to resolve gender barriers in STEM, and perception of "gender equality."

Average scores of the respondents from Taiwan were compared with that from the other 11 APNN countries in each category as follows.

The average male/female ratio in the fields of male scientists and engineers was 1.94, and it was similar to that of the respondents from the other 11 countries which was 1.96. The average score for the perception of discrimination (2.62) and for the indirect experience of discrimination (2.14) were slightly higher than other 11 countries, and the average score for the support policy (3.71) was higher than the average score of the other countries (3.49) at a statistically significant ($t=2.493$, $p \leq .05$). On the other hand, the average score for the Perception of Gender Equality (2.88) was slightly lower than other 11 countries.

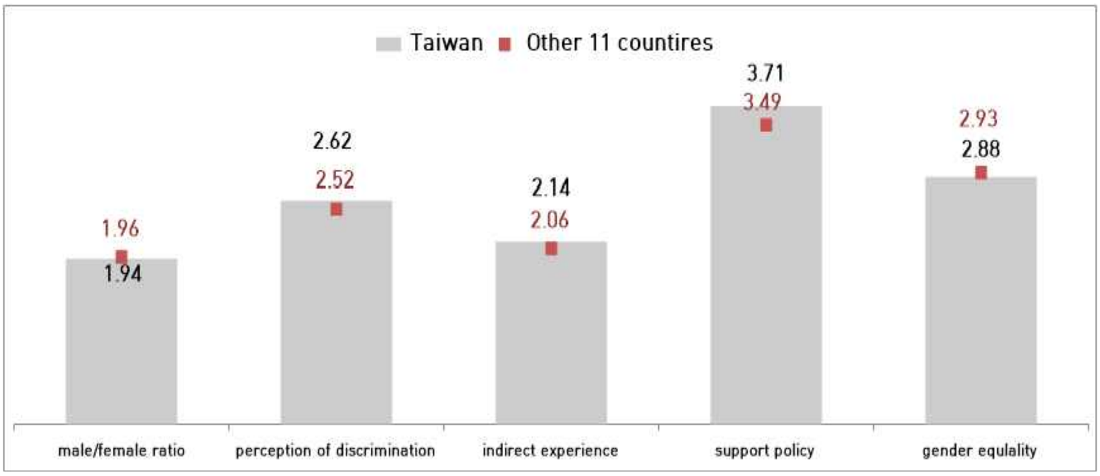


Figure 4.10.1 Comparisons of Answer between Taiwan and Other Countries (Unit: Point)

In summary, Taiwan had slightly more men, showed similarly higher perception of gender equality, revealed slightly more indirect experience of discrimination, and agreed more to the need of support policy but slightly lower perception of gender equality than other 11 APNN Member countries.

4.10.3. Comparison of Response by Male Scientists and Engineers in Taiwan and Other APNN Member Countries to Each Question

◦ **Male/Female ratio** (5-point scale, 3 points means Neutral)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of respondents was 1.94, meaning there were relatively more men than women in STEM. The male/female ratio at STEM was the lowest scoring 1.73 in college and highest scoring 2.21 at current work.

The figure (1.94) was similar to that of 11 countries (1.96). Taiwan showed slightly more men engineers and scientists than other countries, slightly more women scientists and engineers than other 11 countries on average.

Table 4.10.2 Comparison of Answer to Other APNN Member Countries : Male/Female Ratio

(Unit: Point)

Type		Question	Taiwan Average (n=114)	Average of Other Countries (n=1,180)	*t*	*(p)*
male/female Ratio (5-Point Scale)	1	The male/female ration of my department during my university(college) education	1.73	1.91	-1.658	0.098
	2	The male/female ratio of my department while at graduate school	1.88	2.00	-1.160	0.246
	3	The male/female ratio of my current workplace	2.21	2.03	1.623	0.105
	4	The male/female ration at management level at my current workplace	1.95	1.89	0.571	0.568
		Sub Scale	1.94	1.96	-0.208	0.836

◦ **Perception of Discrimination** (5-point scale, 3 points means Neutral)
The Higher score, The Higher Perception of Discrimination

The average score of perception of discrimination in STEM was 2.62, which was below the mid-level. Of the five questions related to the perception of gender barrier, “It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.” received the highest average score (3.15), while “Girls and boys were equally encouraged to choose their majors in STEM during their education period.” (1.80) got the lowest average score.

The overall average of the answers to the questions related to perception of discrimination was 2.62 and slightly higher than the overall average of 11 other APNN countries (2.52).

The average score from Taiwan for the statement “Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues” received higher score (2.78) than from other 11 countries at a statistically significant level (t=4.194, p≤.000), while "Girls and boys were equally encouraged to choose their majors in STEM during their education period." (t=-2.857, p≤.01) received lower score with statistical significance.

Although other differences were not statistically significant, the average scores from Taiwan for "It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications." (3.15), and for "Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists." (3.00) were higher than from other 11 countries. However, the average scores for "Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level." (2.35) got lower score than from other 11 countries on average.

Table 4.10.3 Comparison of Answer to Other Countries : Perception of Discrimination

(Unit: Point)

Type		Question	Taiwan Average (n=114)	Average of Other Countries (n=1,180)	*t*	*(p)*
Perception of Discrimination (5-Point Scale)	1	Girls and boys were equally encouraged to choose their majors in STEM during their education period.	1.80	2.10	-2.857	0.004
	2	It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.	3.15	2.96	1.664	0.096
	3	Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.	2.35	2.40	-0.540	0.590
	4	Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.	3.00	2.89	0.953	0.341
	5	Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues	2.78	2.25	4.194***	0.000
	Sub Scale		2.62	2.52	1.358	0.177

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The overall average of the response by the male scientist and engineers in Taiwan on the indirect experience of discrimination was 2.14 points which was lower than the median value of 2.5 points in a 4-point scale and close to the level of "I have not seen or heard of it but am aware of it."

The indirect experience was the discrimination related to 'marriage, pregnancy or child care' got the highest average score (2.68), while the discrimination related to 'research funds or scholarships' got the lowest score (1.87).

The overall average of responses to questions related to the level of indirect experience (2.14) was slightly higher than the overall average of other 11 countries (2.06). More specifically, the average scores of the responses to the questions of discrimination related to "Woman in STEM is disadvantaged in participating or leading a research project because she is female." (t=3.026, $p \leq .01$), "Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female." (t=2.517, $p \leq .05$) were higher, while "Woman in STEM leaving work due to her marriage, pregnancy or child care." (t=-2.593, $p \leq .01$) was lower than that of other 11 countries at statistically significant level.

Table 4.10.4 Comparison of Answer to Other Countries : Indirect Experience

(Unit: Point)

Type		Question	Taiwan Average (n=114)	Average of Other Countries (n=1,180)	*t*	*(p)*
Indirect Experience of discrimination (4-Point Scale)	1	Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female	1.87	1.66	2.517*	0.013
	2	Woman in STEM is disadvantaged in participating or leading a research project because she is female.	1.89	1.65	3.026**	0.003
	3	Woman in STEM being sexually harassed or treated unfairly	2.11	2.03	0.870	0.384
	4	Woman in STEM leaving work due to her marriage, pregnancy or child care	2.68	2.91	-2.593**	0.010
		Sub Scale	2.14	2.06	1.229	0.219

◦ **Career Outlook and Need of Support Policy** (5-point scale, 3 points : "Neutral") The Higher score means The Stronger agreement

The male scientists and engineers had a somewhat positive view on the career outlook of women in their fields as the average score was 4.21, slightly higher than the average of other 11 countries (4.17) meaning the respondents in Taiwan had similarly positive view than other 11 APNN member countries.

The average score of male scientists and engineers in Taiwan answering to the question "It is crucial to have strong policy support to solve gender inequality in the STEM field." was 3.86, meaning that their opinion is close to positive to the support policy to overcome the discrimination. It was similar to the average of other 11 countries (3.88).

However, the average score of male scientists and engineers in Taiwan answering to the question "It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field." was 3.57, which was higher than in other 11 countries at statistically significant level (t=4.548, $p \leq .000$) meaning that their opinion is close to somewhat positive to the affirmative support policy to overcome the discrimination, but slightly less agreement than support policy to solve gender inequality.

Table 4.10.5 Comparison of Answer to Other Countries : Career Outlook & Need of Support Policy

(Unit: Score)

Type		Question	Taiwan Average (n=114)	Average of Other Countries (n=1,180)	*t*	*(p)*
Career Outlook	1	I believe things will turn out fine in the future career for women in STEM	4.21	4.17	0.423	0.673
Need of Support Policy (5-Point Scale)	1	It is crucial to have strong policy support to solve gender inequality in the STEM field.	3.86	3.88	-0.214	0.831
	2	It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.	3.57	3.09	4.548***	0.000
	Sub Scale		3.71	3.49	2.493*	0.013

◦ **Perception of Gender Equality** (5-point scale, 3 points : "Neutral")
The higher score, The Higher Perception of Gender equality

Five questions were asked of male scientists and engineers in Taiwan on their perception of gender equality in STEM. The overall average of responses to all questions was 2.88 points, lower than mid-level.

The highest score was on to the statement "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife" (3.41). It was followed by "Women are born to have a way of caring children that men are not capable of in the same way" (3.12), "Primary breadwinners (who take care of financial obligations) of households should be men" (3.02), "In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves" (2.67), and on "I believe gender equality will be fully achieved only if women are given equal opportunities as men" (2.18) were lower than other scores in the category. The scores indicate that the respondents had more perception of gender equality regarding the gender role in family.

The overall average score of Taiwan (2.88) was slightly lower than the average score of other 11 countries (2.93)

More specifically, the average scores on "Primary breadwinners (who take care of financial obligations) of households should be men" $t=-2.353$, $p \leq .05$) were lower at statistically significant level. Although other differences were not statistically significant, the average scores on "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife." was lower, while "Women are born to have a way of caring children that men are not capable of in the same way" was higher than other 11 countries.

Table 4.10.6 Comparison of Answer to Other Countries : Perception of Gender Equality

(Unit: Point)

Type		Question	Taiwan Average (n=114)	Average of Other Countries (n=1,180)	*t*	*(p)*
Perception of Gender Equality (5-point scale)	1	In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves	2.67	2.61	0.443	0.658
	2	Primary breadwinners (who take care of financial obligations) of households should be men	3.02	3.30	-2.353	0.020
	3	Women are born to have a way of caring children that men are not capable of in the same way	3.12	2.95	1.372	0.170
	4	In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.	3.41	3.62	-1.635	0.102
	5	I believe gender equality will be fully achieved only if women are given equal opportunities as men.	2.18	2.15	0.303	0.762
	Sub Scale		2.88	2.93	-0.579	0.563

4.10.4. Comparison of Responses in Taiwan with Other Countries

◦ **Male/Female ratio** (5-point scale, 3 points : “Neutral”)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of male scientists and engineers was 1.94, meaning there were relatively more men. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Taiwan were evaluated by ANOVA (or t) analysis. Table 4.10.7 shows the results.

The difference of responses according to the occupation of respondents ($t=7.678$, $p \leq .000$) in Taiwan was statistically significant, and revealed there are more men in the field of engineers (1.55) and respondents in other professions (1.58) than of married respondents.

Table 4.10.7 male/female ratio in Taiwan: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	1.94			
Age				
29 years or younger	2.06	1.041	1.023	0.386
30 - 39	1.94	0.782		
40 - 49	2.09	0.796		
Over 50	1.71	0.824		
Marital status				
Single	3.98	0.701	1.105	0.335
Married	3.81	0.687		
Others (including divorced)	4.33	-		
Number of Children				
1	1.75	0.750	0.160	0.852
2	1.80	0.812		
3 or more	1.94	0.899		
Occupation				
Professor/Teacher	2.07	0.897	7.678***	0.000
Researcher	2.21	1.007		
Healthcare professional	2.69	0.834		
Engineer (company, R&D center, etc.)	1.55	0.559		
Other	1.58	0.603		
Double income status (married)				
Double income	1.82	0.751	0.342	0.734
Single income	1.75	0.632		

Note: ***p<.001, **p<.01, *p<.05

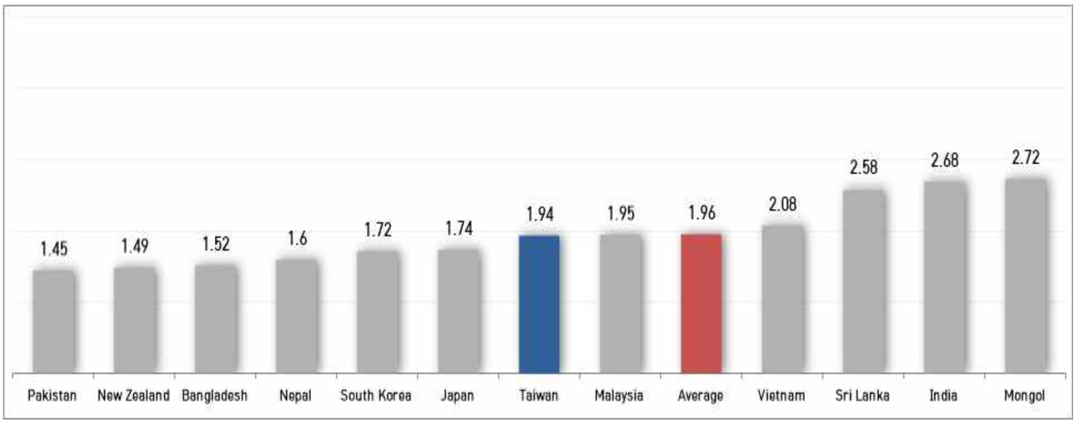


Figure 4.10.2 Average of Taiwan and Other Countries in male/female ratio (Unit: Point)

As shown in the figure, the male/female ratio in the fields of the male scientists and engineers in Taiwan (1.94) was similar to the average of all countries (1.96).

◦ **Perception of Discrimination** (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Discrimination

The average score of male scientists and engineers in Taiwan to the perception of discrimination in STEM (1.94) was much lower than the mid-level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Taiwan were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.10.8.

Although the standard deviations of the average scores by the personal variable of the respondents did not show statistical significances, the average scores of the respondents over 50 years, married, having fewer children, single income and engineers were lower than that of other respondents in each category.

Table 4.10.8 Perception of Discrimination in Taiwan: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.62			
Age				
29 years or younger	2.67	0.713	0.353	0.787
30 - 39	2.64	0.744		
40 - 49	2.65	0.644		
Over 50	2.49	0.816		
Marital status				
Single	3.82	0.883	0.623	0.538
Married	3.64	0.818		
Others (including divorced)	4.00	-		
Number of Children				
1	2.45	0.758	0.708	0.496
2	2.71	0.745		
3 or more	2.69	0.530		
Occupation				
Professor/Teacher	2.60	0.748	0.734	0.571
Researcher	2.58	0.761		
Healthcare professional	2.38	0.737		
Engineer (company, R&D center, etc.)	2.77	0.716		
Other	2.65	0.716		
Double income status (married)				
Double income	2.62	0.660	-0.584	0.561
Single income	2.74	0.869		

Note: ***p<.001, **p<.01, *p<.05

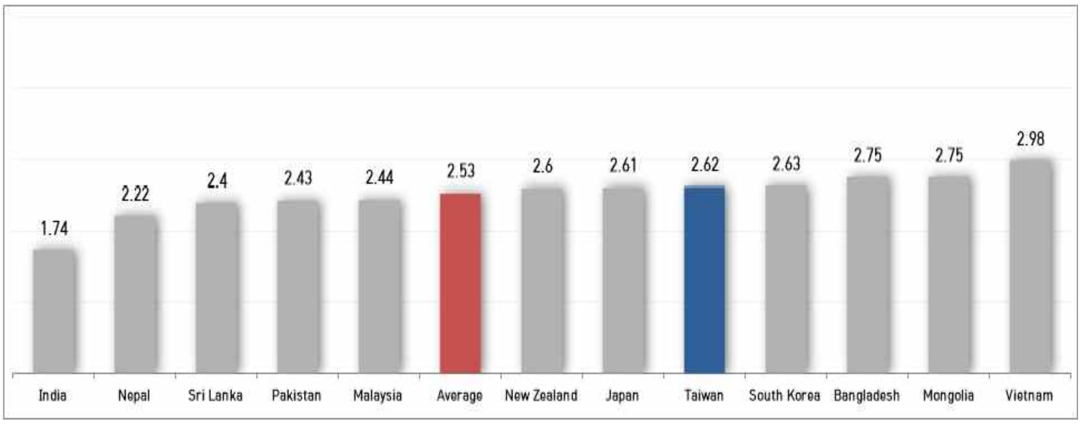


Figure 4.10.3 Averages of Taiwan and Other Countries in Perception of Discrimination (Unit: Point)

The figure above shows the comparative average scores among different countries. The perception of male scientists and engineers in Taiwan on discrimination (2.62) was slightly higher than the average of all countries (2.53), being mid-level among 12 APNN member countries.

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The average score of male scientists and engineers in Taiwan on the indirect experience of discrimination against women in STEM was 2.14 which was close to "I have not seen or heard of it but am aware of it." The differences according to the respondent's profiles (age, marital status, number of children, occupation, and double income status (if married) in Taiwan were evaluated by ANOVA (or t) analysis. The results are summarized in Table 4.10.9.

The difference of responses according to the age of respondents (($F=3.021$, $p \leq .01$) in Taiwan were statistically significant, and revealed the respondents in their 40's (2.40) had more indirect experiences of discrimination.

Table 4.10.9 Indirect Experience in Taiwan: Differences according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.14			
Age				
29 years or younger	2.15	0.648	3.021*	0.033
30 - 39	2.06	0.763		
40 - 49	2.48	0.569		
Over 50	1.96	0.553		
Marital status				
Single	3.98	0.701	1.105	0.335
Married	3.81	0.687		
Others (including divorced)	4.33	-		
Number of Children				
1	2.27	0.732	0.328	0.722
2	2.16	0.525		
3 or more	2.06	0.873		
Occupation				
Professor/Teacher	2.27	0.794	1.502	0.207
Researcher	2.02	0.806		
Healthcare professional	1.89	0.483		
Engineer (company, R&D center, etc.)	2.07	0.580		
Other	2.31	0.590		
Double income status (married)				
Double income	2.23	0.631	1.535	0.129
Single income	1.95	0.647		

Note: ***p<.001, **p<.01, *p<.05

Although other differences were not statistically significant, the average scores of the respondents married, having fewer children, single income and healthcare professional were lower than others in each category, indicate having less indirect experience of gender discrimination in STEM.

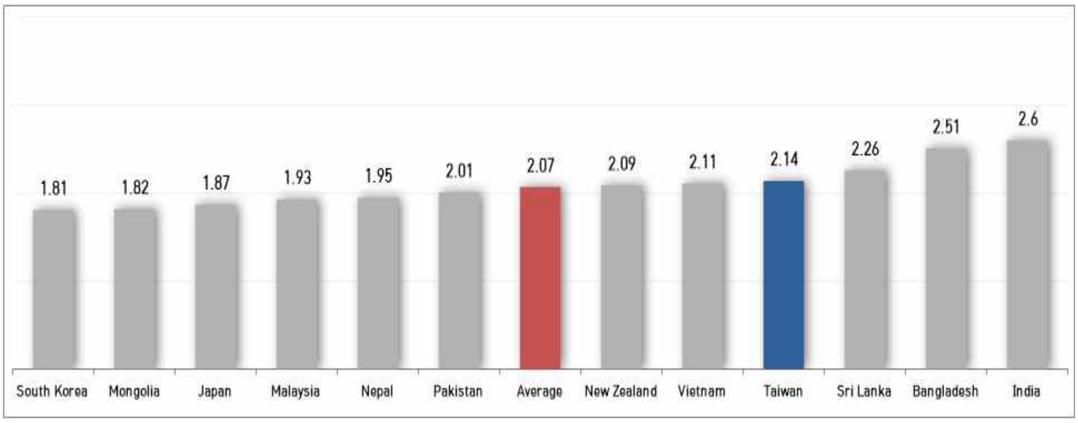


Figure 4.10.4 Averages of Taiwan and Other Countries in Indirect Experience (Unit : Point)

The figure above shows the cross-country average scores on the indirect experience of discrimination in 12 countries. The indirect experience of discrimination by the male scientists and engineers in Taiwan (2.14) was slightly higher than the average of all countries (2.07), being the fourth highest after India, Bangladesh and Sri Lanka.

◦ **Need of Support Policy** (5-point scale, 3 points : "Neutral")
The Higher score means The Stronger agreement

The average score of male scientists and engineers in Taiwan on the need of support policy to overcome the gender barrier in STEM was 3.71, being higher than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Taiwan were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.10.10.

Although the standard deviations of the average scores by the personal variable of the respondents did not show statistical significances, the average scores of the respondents below 40 years old, not married, having fewer children, and single income were higher than that of other respondents in each category.

Table 4.10.10 Need of Support Policy in Taiwan: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	3.71			
Age				
29 years or younger	3.96	0.820	2.577+	0.057
30 - 39	3.86	0.807		
40 - 49	3.50	0.707		
Over 50	3.46	0.932		
Marital status				
Single	3.82	0.883	0.623	0.538
Married	3.64	0.818		
Others (including divorced)	4.00	-		
Number of Children				
1	3.85	0.899	0.339	0.714
2	3.63	0.811		
3 or more	3.72	1.064		
Occupation				
Professor/Teacher	3.82	0.795	1.499	0.207
Researcher	3.33	1.076		
Healthcare professional	3.66	0.397		
Engineer (company, R&D center, etc.)	3.82	0.865		
Other	3.85	0.811		
Double income status (married)				
Double income	3.74	0.788	1.703+	0.093
Single income	3.34	0.870		

Note: ***p<.001, **p<.01, *p<.05

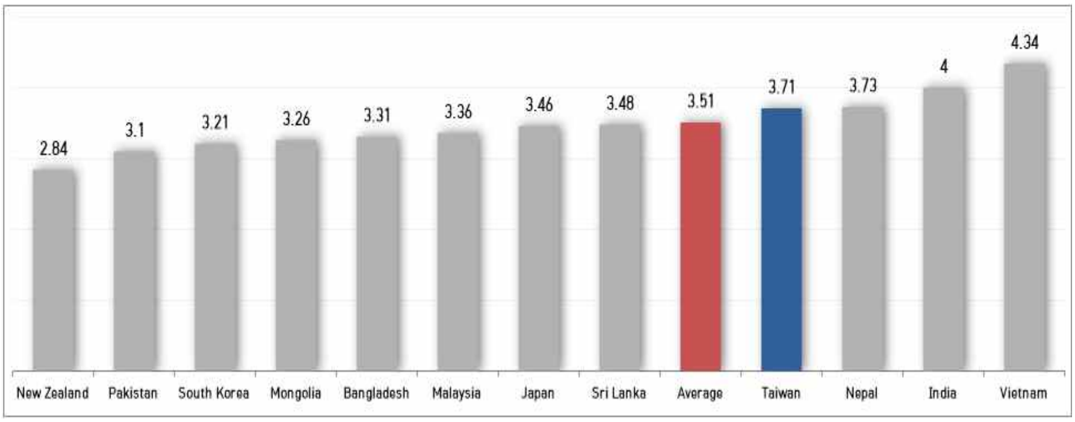


Figure 4.10.5 Averages of Taiwan and Other Countries in Need of Support Policy (Unit: Point)

The above figure shows the cross-country average scores on the need of support policy to overcome the gender barrier. Respondents in Taiwan agreeing to the need of support policy (3.71) was higher than the average of all countries (3.51), being the fourth highest after Vietnam, India and Nepal.

◦ **Perception of Gender Equality** (5-point scale, 3 points : “Neutral”)
The Higher score, The Higher Perception of Gender Equality

The average score of male scientists and engineers in Taiwan on the perception of gender equality was 2.88 which was slightly lower than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Taiwan were evaluated by ANOVA (or t) analysis.

Although differences by personal variables of respondents were not statistically significant, the average scores in the age of 29 years or younger, married, and in other occupations were lower than others in each category, indicate lower perception of gender equality than others.

Table 4.10.11 Perception of Gender Equality in Taiwan: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.88			
Age				
29 years or younger	2.67	1.074	0.871	0.459
30 - 39	2.89	0.874		
40 - 49	3.06	0.740		
Over 50	2.92	0.793		
Marital status				
Single	3.98	0.701	1.105	0.335
Married	3.81	0.687		
Others (including divorced)	4.33	-		
Number of Children				
1	2.78	0.933	0.042	0.958
2	2.78	0.721		
3 or more	2.87	1.204		
Occupation				
Professor/Teacher	2.95	0.844	1.294	0.277
Researcher	2.74	0.893		
Healthcare professional	3.25	0.798		
Engineer (company, R&D center, etc.)	2.94	0.741		
Other	2.68	1.021		
Double income status (married)				
Double income	2.95	0.796	0.157	0.876
Single income	2.91	0.700		

Note: $^{***}p<.001$, $^{**}p<.01$, $^{*}p<.05$

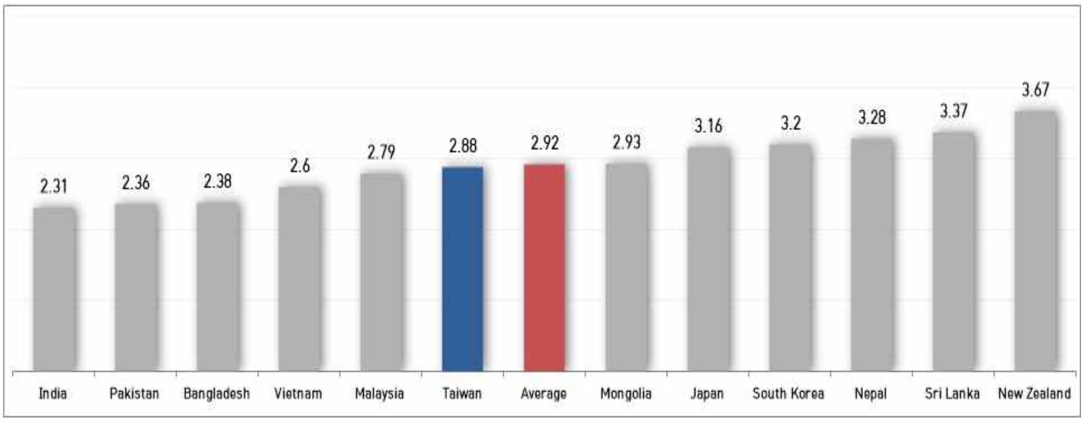


Figure 4.10.6 Averages of Taiwan and Other Countries in the Perception of Gender Equality (Unit: Point)

The figure above shows the cross-country average scores on the perception of gender equality. The perception of male scientists and engineers in Taiwan on gender equality (2.88) was similarly lower than the average of all countries (2.92), being mid-level among 12 APNN countries.

4.11. Pakistan

4.11.1. General Profiles of Male Respondents in Pakistan

A total of 96 male scientists and engineers (7.4% of total respondents) answered the survey. Table 4.8.1. shows the age, marital status, number of children, and occupation of the male scientist and engineer respondents in Pakistan.

Regarding the age, 44.8% were 29 years or younger, 35.4% were in their 30's, 14.6% were in their 50 years or older, and 5.2% were in their 40's. There were more married respondents at 57.3% than single respondents at 40.6%. Of the respondents that had children (44.8% of total Pakistan respondents), 39.6% had 3 or more children, 30.2% had 1 child or 2 children each. In case of couples, 52.7% were single-income couples while 47.3% were double-income couples.

Regarding the occupation, 52.1% were engineers, followed by 18.8% were teachers/professors, 18.8 were healthcare professional, 10.4% were researchers, and 4.2% were in other professions.

Table 4.11.1 General Profile of Respondents in Pakistan

(Unit: Person, %)

Composition	Frequency	%
Age		
29 years or younger	43	44.8
30 - 39	34	35.4
40 - 49	5	5.2
Over 50	14	14.6
Marital status		
Single	39	40.6
Married	55	57.3
Others (including divorced)	1	1.0
Number of Children		
1	13	30.2
2	13	30.2
3 or more	17	39.6
Occupation		
Professor/Teacher	18	18.8
Researcher	10	10.4
Healthcare professional	14	14.6
Engineer (company, R&D center, etc.)	50	52.1
Other	4	4.2
Double income status (married)		
Double income	26	47.3
Single income	29	52.7

4.11.2. Comparison of Answer by Male Scientists and Engineers in Pakistan with Other APNN Member Countries

The questions in the survey are divided into five categories including “male/female ratio” in the major field of respondents, “perception of discrimination” against women in STEM, “indirect experience” of discrimination in STEM, “need of support policy” to resolve gender barriers in STEM, and perception of “gender equality.” Average scores of the respondents from Pakistan were compared with that from the other 11 APNN countries in each category as follows.

The average score of male/female ratio in the fields of male scientists and engineers was 1.45, and it was lower than that from other 11 countries (2.00) at a statistically significant. ($t=-8.064$, $p \leq .000$), indicating more male ratio than other countries. The average score for the perception of discrimination was 2.43 which was slightly lower than the average score (2.54) from the other 11 countries. The average score for the indirect experience of discrimination was 2.01 which was also lower than the average score (2.07) of the other 11 countries. The average score of male scientists and engineers from Pakistan agreeing to the need of support policy to overcome the gender barrier in STEM was 3.10 which was close to “Neutral” but significantly lower ($t=-4.933$, $p \leq .000$) than the average score of the other countries (3.54). Lastly, the average score for the Perception of Gender Equality was 2.36 which was lower than the average score of the other countries (2.97) at a statistically significant ($t=-7.398$, $p \leq .000$).

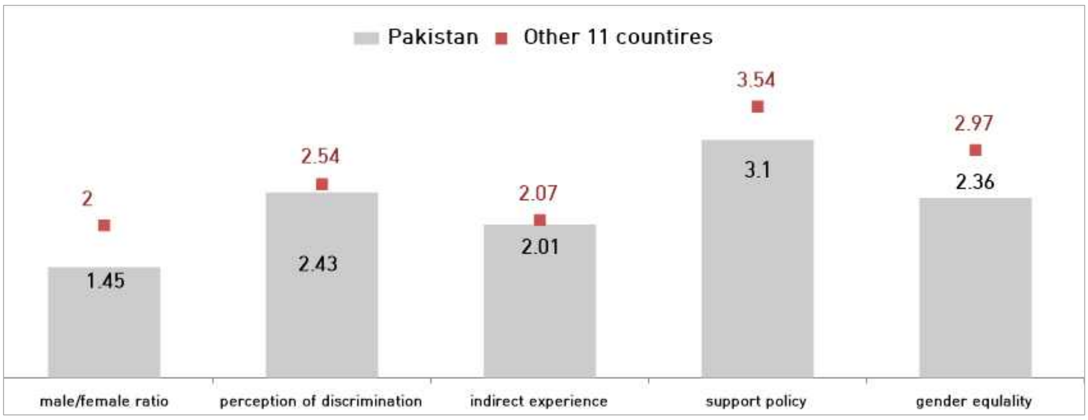


Figure 4.11.1 Comparisons of Answer between Pakistan and Other Countries (Unit: Point)

In summary, the averages scores from Pakistan showed more men in STEM, less agreement to support policy, lower perception of discrimination, less indirect experience and lower perception of gender equality than other countries.

4.11.3. Comparison of Response by Male Scientists and Engineers in Pakistan and Other APNN Member Countries to Each Question

◦ **Male/Female ratio** (5-point scale, 3 points means Neutral)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of respondents was 1.45, meaning there were more men. The male/female ratio in STEM was the lowest scoring 1.18 for management level at current workplace but highest during university 1.69, meaning that the ratio of women was lower at work than that during their education period.

The figure (1.45) was lower than that of 11 countries (2.00) at a statistically significant (t=-8.064, $p \leq .000$). Pakistan showed more men during all questioned period (from college to current work and after). The average scores of Pakistan at management level at current work (t=-10.677, $p \leq .000$), at current work (t=-9.233, $p \leq .000$), and in graduate school (t=-3.758, $p \leq .000$) were lower than that of other 11 countries at statistically significant level. There were also more men during university than other 11 APNN countries without statistically significant difference. In summary, there were more men in STEM in Pakistan than other 11 countries for all period from college to the management level at current work.

Table 4.11.2 Comparison of Answer to Other APNN Member Countries: Male/Female Ratio

(Unit: Point)

Type		Question	Pakistan Average (n=96)	Average of Other Countries (n=1,198)	*t*	*(p)*
male/female Ratio (5-Point Scale)	1	The male/female ration of my department during my university(college) education	1.69	1.91	-1.802	0.072
	2	The male/female ratio of my department while at graduate school	1.59	2.02	-3.758***	0.000
	3	The male/female ratio of my current workplace	1.39	2.10	-9.233***	0.000
	4	The male/female ration at management level at my current workplace	1.18	1.95	-10.677***	0.000
	Sub Scale		1.45	2.00	-8.064***	0.000

◦ **Perception of Discrimination** (5-point scale, 3 points means Neutral)
The Higher score, The Higher Perception of Discrimination

The average score of perception of discrimination in STEM was 2.43, which was below the mid-level. Of the five questions related to the perception of gender barrier, “Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.” received the highest average score (2.98). “Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues” (1.90) received the lowest average score.

The overall average of the answers to the questions related to perception of discrimination was 2.43 lower than the overall average of 11 other APNN countries (2.54). Specifically, significant differences were observed for the responses “Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues” ($t=-3.566$, $p \leq .000$), scoring lower than other 11 countries. Besides “Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists” which get higher average score than other 11 countries, the responses from Pakistan about perception of gender discrimination were lower score than other 11 countries on average.

Table 4.11.3 Comparison of Answer to Other Countries: Perception of Discrimination

(Unit: Point)

Type		Question	Pakistan Average (n=96)	Average of Other Countries (n=1,198)	*t*	*(p)*
Perception of Discrimination (5-Point Scale)	1	Girls and boys were equally encouraged to choose their majors in STEM during their education period.	1.98	2.08	-0.884	0.377
	2	It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.	2.97	2.98	-0.049	0.961
	3	Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.	2.33	2.40	-0.568	0.571
	4	Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.	2.98	2.90	0.681	0.496
	5	Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues	1.90	2.33	-3.566***	0.000
	Sub Scale		2.43	2.54	-1.442	0.150

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The overall average of the response by the male scientist and engineers in Pakistan on the indirect experience of discrimination was 2.01 points which was close to the median value of 2.5 points in a 4-point scale, meaning “I have not seen or heard of it but am aware of it.”

The highest level of indirect experience was the discrimination related to “marriage, pregnancy, and childbirth” (3.25) while the lowest level of indirect experience was that related to “participating or leading a research project” (1.48).

The overall average of responses to questions related to the level of indirect experience was lower than the overall average of other 11 countries (2.01).

More specifically, the average scores of the responses to the questions of indirect experience related to "Woman in STEM leaving work due to her marriage, pregnancy or child care"(t=3.506, p≤.000) was higher in order than the average scores of other countries at statistically significant. But the average response of "Woman in STEM being sexually harassed or treated unfairly" (t=-3.570, p≤.000), and "Woman in STEM is disadvantaged in participating or leading a research project because she is female." (t=-2.538, p≤.05) got lower score at a statistically significant level than other 11 countries.

Table 4.11.4 Comparison of Answer to Other Countries : Indirect Experience

(Unit: Point)

Type		Question	Pakistan Average (n=96)	Average of Other Countries (n=1,198)	*t*	*(p)*
Indirect Experience of discrimination (4-Point Scale)	1	Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female	1.48	1.70	-2.538*	0.013
	2	Woman in STEM is disadvantaged in participating or leading a research project because she is female.	1.59	1.68	-0.932	0.351
	3	Woman in STEM being sexually harassed or treated unfairly	1.72	2.06	-3.570***	0.000
	4	Woman in STEM leaving work due to her marriage, pregnancy or child care	3.25	2.86	3.506***	0.000
		Sub Scale	2.01	2.07	-0.950	0.342

◦ **Career Outlook and Need of Support Policy** (5-point scale, 3 points : "Neutral") The Higher score means The Stronger agreement

The male scientists and engineers had a very positive view on the career outlook of women in their fields as the average score was 4.13. The score was similar to the average of 11 other countries (4.18).

The average score of male scientists and engineers in Pakistan answering to the question "It is crucial to have strong policy support to solve gender inequality in the STEM field." was 4.01, meaning that they agreed to it. It was higher than the average score of other 11 countries (3.87).

However, the average score of male scientists and engineers in Pakistan answering to the question "It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field." was 2.19 meaning that they somewhat disagree to these policies. This score was lower than the average (3.54) of other 11 countries at a statistically significant level (t=-7.794, p≤.000).

Table 4.11.5 Comparison of Answer to Other Countries : Career Outlook & Need of Support Policy

(Unit: Score)

Type		Question	Pakistan Average (n=96)	Average of Other Countries (n=1,198)	*t*	*(p)*
Career Outlook	1	I believe things will turn out fine in the future career for women in STEM	4.13	4.18	-0.605	0.546
Need of Support Policy (5-Point Scale)	1	It is crucial to have strong policy support to solve gender inequality in the STEM field.	4.01	3.87	1.333	0.183
	2	It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.	2.19	3.21	-7.794***	0.000
		Sub Scale	3.10	3.54	-4.933	0.000

◦ **Perception of Gender Equality** (5-point scale, 3 points : "Neutral")
The higher score, The Higher Perception of Gender equality

Five questions were asked of male scientists and engineers in Pakistan on their perception of gender equality in STEM. The overall average of responses to all questions was 2.36 points, being lower than the mid-level.

The highest score was on to the statement "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife" (2.81). It was followed by "Women are born to have a way of caring children that men are not capable of in the same way" (2.44), In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves" (2.30), "Primary breadwinners (who take care of financial obligations) of households should be men" (2.22) and "I believe gender equality will be fully achieved only if women are given equal opportunities as men" (2.04). The scores indicate that the respondents had more perception of gender equality regarding the gender role in family.

The overall average score of Pakistan (2.31) was lower than the average score of other 11 countries (2.97) at a statistically significant level ($t=-7.398$ $p \leq .000$). More specifically, the average scores on "Primary breadwinners (who take care of financial obligations) of households should be men" ($t=-8.602$, $p \leq .000$), "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife" ($t=-5.372$, $p \leq .000$), "Women are born to have a way of caring children that men are not capable of in the same way"($t=-4.151$, $p \leq .000$), and "In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves"($t=-2.795$, $p \leq .01$) were lower than other 11 countries at statistically significant levels.

And the average score of the statement of "I believe gender equality will be fully achieved only if women are given equal opportunities as men" was also lower than other 11 countries.

Table 4.11.6 Comparison of Answer to Other Countries : Perception of Gender Equality

(Unit: Point)

Type		Question	Pakistan Average (n=96)	Average of Other Countries (n=1,198)	*t*	*(p)*
Perception of Gender Equality (5-point scale)	1	In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves	2.30	2.64	-2.795**	0.006
	2	Primary breadwinners (who take care of financial obligations) of households should be men	2.22	3.36	-8.602***	0.000
	3	Women are born to have a way of caring children that men are not capable of in the same way	2.44	3.01	-4.151***	0.000
	4	In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.	2.81	3.66	-5.372***	0.000
	5	I believe gender equality will be fully achieved only if women are given equal opportunities as men.	2.04	2.16	-1.106	0.271
		Sub Scale	2.36	2.97	-7.398***	0.000

4.11.4. Comparison of Responses in Pakistan with Other Countries

◦ **Male/Female ratio** (5-point scale, 3 points : “Neutral”)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of male scientists and engineers was 1.45, meaning there were relatively more men. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Pakistan were evaluated by ANOVA (or t) analysis. Table 4.11.7 shows the results.

The difference of responses according to the age ($F=4.504$, $p \leq .01$), occupation ($F=19.523$, $p \leq .000$), and the income status ($t=2.096$, $p \leq .05$) of the respondents in Pakistan were statistically significant. It showed there were more men in the field of older respondents, more men in the field of single-income respondents than double-income respondents, but fewer men in the field of healthcare professional respondents.

Although no statistical significances, the average scores of single respondents and of having more children respondents were lower in each category.

Table 4.11.7 male/female ratio in Pakistan: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	1.45			
Age				
29 years or younger	1.49	0.630	4.504**	0.006
30 - 39	1.64	0.619		
40 - 49	1.15	0.224		
Over 50	1.02	0.067		
Marital status				
Single	3.40	0.783	0.147	0.864
Married	3.47	0.621		
Others (including divorced)	3.67	-		
Number of Children				
1	1.62	0.808	2.031	0.145
2	1.46	0.548		
3 or more	1.18	0.457		
Occupation				
Professor/Teacher	1.43	0.624	19.523***	0.000
Researcher	1.47	0.579		
Healthcare professional	2.27	0.398		
Engineer (company, R&D center, etc.)	1.16	0.292		
Other	2.13	0.777		
Double income status (married)				
Double income	1.64	0.711	2.096*	0.042
Single income	1.28	0.493		

Note: ***p<.001, **p<.01, *p<.05

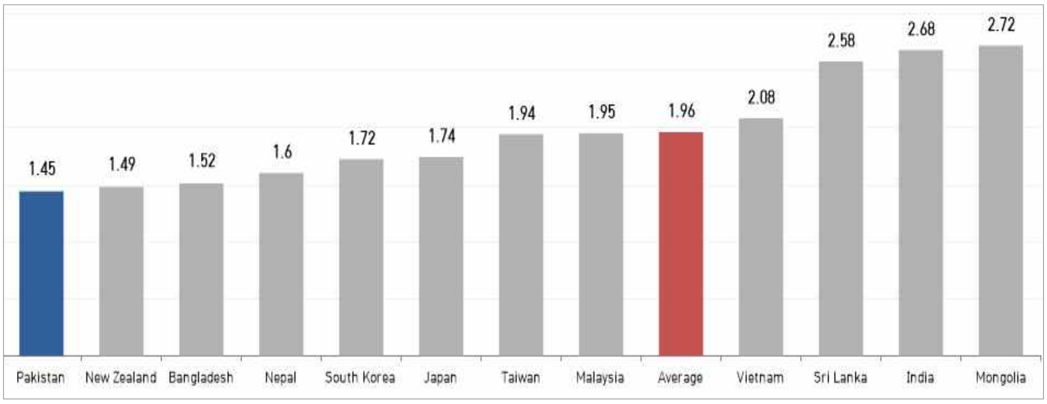


Figure 4.11.2 Average of Pakistan and Other Countries in male/female ratio (Unit: Point)

As shown in the figure, the male/female ratio in the fields of the male scientists and engineers in Pakistan (1.45) was lower than the average of all countries (1.96), being the lowest among 12 APNN countries.

◦ **Perception of Discrimination** (5-point scale, 3 points : “Neutral”)
The Higher score, The Higher Perception of Discrimination

The average score of male scientists and engineers in Pakistan to the perception of discrimination in STEM (2.43) was lower than the mid-level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Pakistan were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.11.8.

The differences of responses according to the age (F=10.899, $p \leq .01$) and child number (F=3.701, $p \leq .05$) of the respondents in Pakistan were statistically significant. The average score of older respondents was higher than the youngers as well as of having more children than of having fewer children respondents. Although differences were not statistically significant, the average scores of married, double-income and researcher respondents were relatively high in each category.

Table 4.11.8 Perception of Discrimination in Pakistan: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.43			
Age				
29 years or younger	2.10	0.693	10.899***	0.000
30 - 39	2.44	0.745		
40 - 49	2.92	0.610		
Over 50	3.29	0.539		
Marital status				
Single	2.97	0.937	0.771	0.466
Married	3.19	0.755		
Others (including divorced)	3.00	-		
Number of Children				
1	2.34	0.512	3.701*	0.034
2	2.68	1.112		
3 or more	3.10	0.532		
Occupation				
Professor/Teacher	2.39	0.966	1.047	0.388
Researcher	2.82	0.607		
Healthcare professional	2.56	0.295		
Engineer (company, R&D center, etc.)	2.36	0.855		
Other	2.05	0.661		
Double income status (married)				
Double income	2.73	0.858	0.481	0.633
Single income	2.63	0.701		

Note: ***p<.001, **p<.01, *p<.05

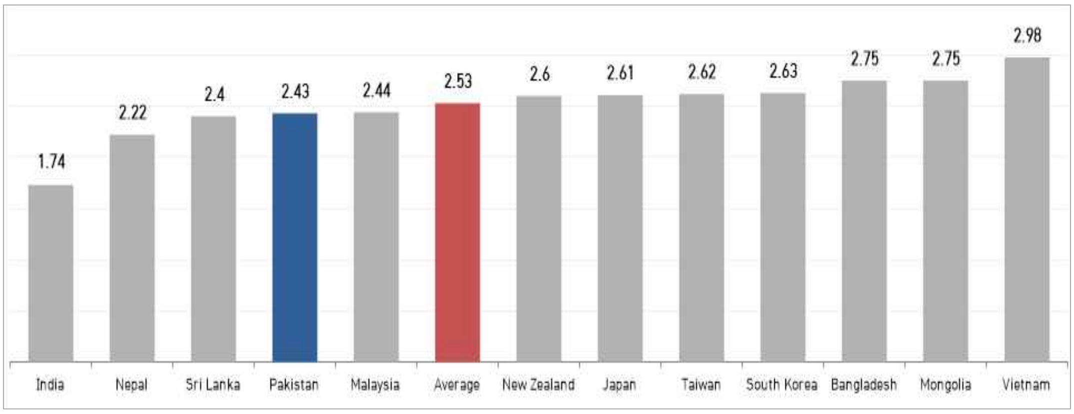


Figure 4.11.3 Averages of Pakistan and Other countries in Perception of Discrimination (Unit : Point)

The figure above shows the comparative average scores among different countries. The perception of male scientists and engineers in Pakistan on gender discrimination (2.43) was lower than the average of all countries (2.53), being the fourth lowest level after India, Nepal, and Sri Lanka.

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The average score of male scientists and engineers in Pakistan on the indirect experience of discrimination against women in STEM was 2.01 which was close to "I have not seen or heard of it but am aware of it." The differences according to the respondent's profiles (age, marital status, number of children, occupation, and double income status (if married) in Pakistan were evaluated by ANOVA (or t) analysis. The results are summarized in Table 4.11.9.

The differences of responses according to the age ($F=3.948$, $p \leq .05$) and occupation ($F=-2.140$, $p \leq .05$) of the respondents in Pakistan were statistically significant. The average scores was lower for the respondents at the age 29 years or less and for engineers respondents in the category. Although the difference of the average score was not statistically significant, the average score of single respondents, of the respondents having 1 child were relatively low in each category.

Table 4.11.9 Indirect Experience in Pakistan: Differences according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.01			
Age				
29 years or younger	1.78	0.608	3.740*	0.014
30 - 39	2.18	0.661		
40 - 49	2.15	0.518		
Over 50	2.25	0.528		
Marital status				
Single	3.40	0.783	0.147	0.864
Married	3.47	0.621		
Others (including divorced)	3.67	-		
Number of Children				
1	1.98	0.360	0.886	0.420
2	2.29	0.683		
3 or more	2.15	0.650		
Occupation				
Professor/Teacher	2.01	0.572	5.735***	0.000
Researcher	2.15	0.580		
Healthcare professional	2.64	0.516		
Engineer (company, R&D center, etc.)	1.81	0.616		
Other	1.94	0.375		
Double income status (married)				
Double income	2.36	0.697	2.148*	0.038
Single income	2.02	0.422		

Note: ***p<.001, **p<.01, *p<.05

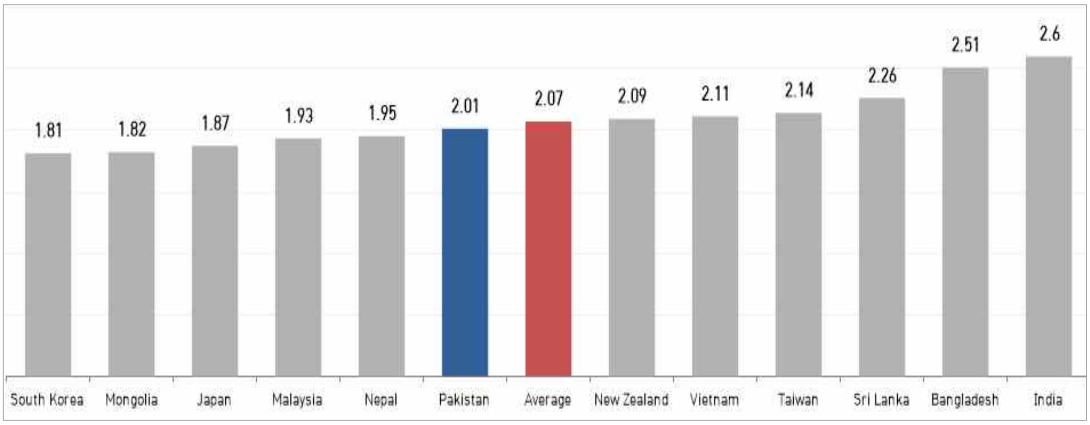


Figure 4.11.4 Averages of Pakistan and Other Countries in Indirect Experience (Unit : Point)

The figure above shows the cross-country average scores on the indirect experience of discrimination in 12 countries. The indirect experience of discrimination by the male scientists and engineers in Pakistan (2.01) was slightly lower than the average of all countries (2.07), being mid-level among 12 APNN member countries.

◦ **Need of Support Policy** (5-point scale, 3 points : “Neutral”)
The Higher score means The Stronger agreement

The average score of male scientists and engineers in Pakistan on the need of support policy to overcome the gender barrier in STEM was 3.10, being close to neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Pakistan were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.11.10.

Although the differences of the average scores of the respondents by their personal variable were not statistically significant, the average scores of the younger respondents than that of older, of single respondent than that of married and of double-income respondents than of single-income respondents were relatively low in each category.

Table 4.11.10 Need of Support Policy in Pakistan: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	3.10			
Age				
29 years or younger	2.96	0.907	0.727	0.538
30 - 39	3.18	0.834		
40 - 49	3.20	0.758		
Over 50	3.29	0.545		
Marital status				
Single	2.97	0.937	0.771	0.466
Married	3.19	0.755		
Others (including divorced)	3.00	-		
Number of Children				
1	3.12	0.893	0.674	0.515
2	3.00	0.677		
3 or more	3.29	0.532		
Occupation				
Professor/Teacher	3.03	0.737	0.493	0.741
Researcher	3.00	1.027		
Healthcare professional	3.04	0.134		
Engineer (company, R&D center, etc.)	3.12	0.904		
Other	3.63	1.250		
Double income status (married)				
Double income	3.10	0.583	-0.899	0.373
Single income	3.28	0.882		

Note: ***p<.001, **p<.01, *p<.05

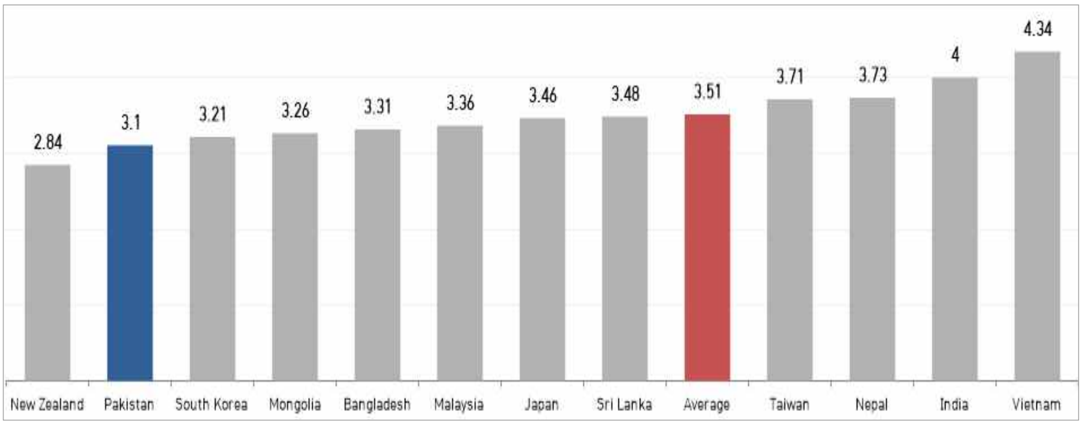


Figure 4.11.5 Averages of Pakistan and Other Countries in Need of Support Policy (Unit: Point)

The above figure shows the cross-country average scores on the need of support policy to overcome the gender barrier. Respondents in Pakistan agreeing to the need of support policy (3.10) was lower than the average of all countries (3.51), being the second lowest after New Zealand.

◦ **Perception of Gender Equality** (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Gender Equality

The average score of male scientists and engineers in Pakistan on the perception of gender equality was 2.36 which was lower than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in Pakistan were evaluated by ANOVA (or t) analysis.

The difference of responses according to the age was statistically significant but rejected through post verification. Although the differences of the average scores of the respondents by their personal variable were not statistically significant, the average scores of the respondents having more children, researcher, and single-income were relatively low, meaning lower perception of gender equality in each category.

Table 4.11.11 Perception of Gender Equality in Pakistan: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.36			
Age				
29 years or younger	2.55	0.638	5.288**	0.002
30 - 39	2.43	0.827		
40 - 49	1.80	0.566		
Over 50	1.81	0.447		
Marital status				
Single	3.40	0.783	0.147	0.864
Married	3.47	0.621		
Others (including divorced)	3.67	-		
Number of Children				
1	2.51	0.972	2.230	0.121
2	2.17	0.770		
3 or more	1.92	0.534		
Occupation				
Professor/Teacher	2.47	0.860	0.611	0.656
Researcher	2.18	0.485		
Healthcare professional	2.46	0.287		
Engineer (company, R&D center, etc.)	2.37	0.828		
Other	1.95	0.342		
Double income status (married)				
Double income	2.32	0.731	1.436	0.157
Single income	2.04	0.683		

Note: ***p<.001, **p<.01, *p<.05

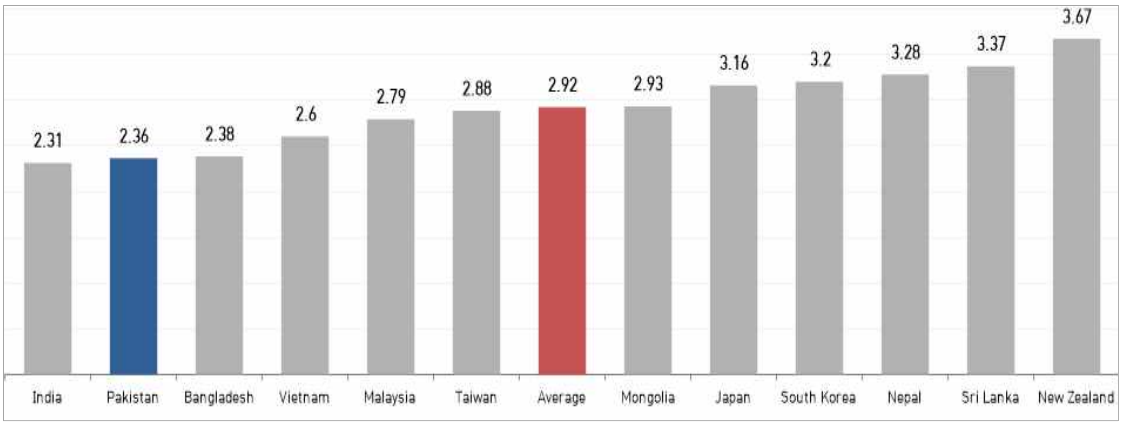


Figure 4.11.6 Averages of Pakistan and Other Countries in the Perception of Gender Equality (Unit: Point)

The figure above shows the cross-country average scores on the perception of gender equality. The perception of male scientists and engineers in Pakistan on gender equality (2.36) was lower than the average of all countries (2.92), being the second lowest level after India among 12 countries.

4.12. South Korea

4.12.1. General Profiles of Male Respondents in South Korea

A total of 133 male scientists and engineers (10.3% of total respondents) answered the survey. Table 4.12.1. shows the age, marital status, number of children, and occupation of the male scientist and engineer respondents in South Korea.

Regarding the age, 42.1% were in their 40's, 36.8% were in their 30's, 14.3% were at 29 years old or younger, and 6.8% were in their 50 years or older.

There were more married respondents at 74.4% than single respondents at 25.6%. Of the respondents that had children (59.4% of total South Korea respondents), 63.3% had 2 children, 27.8% had 1 child, and 8.9% had 3 or more. In case of couples, 52.1% were double-income couples while 47.9% were single-income couples.

Regarding the occupation, 84.2% were researchers, followed by 9.0% were in other professions, 3.8% were teachers/professors, and 3.0% were engineers. There were no respondents work as healthcare professional from South Korea.

Table 4.12.1 General Profile of Respondents in South Korea

(Unit: Person, %)

Composition	Frequency	%
Age		
29 years or younger	19	14.3
30 - 39	49	36.8
40 - 49	56	42.1
Over 50	9	6.8
Marital status		
Single	34	25.6
Married	99	74.4
Others (including divorced)	-	-
Number of Children		
1	22	27.8
2	50	63.3
3 or more	7	8.9
Occupation		
Professor/Teacher	5	3.8
Researcher	112	84.2
Healthcare professional	-	-
Engineer (company, R&D center, etc.)	4	3.0
Other	12	9.0
Double income status (married)		
Double income	50	52.1
Single income	46	47.9

4.12.2. Comparison of Answer by Male Scientists and Engineers in South Korea with Other APNN Member Countries

The questions in the survey are divided into five categories including "male/female ratio" in the major field of respondents, "perception of discrimination" against women in STEM, "indirect experience" of discrimination in STEM, "need of support policy" to resolve gender barriers in STEM, and perception of "gender equality." Average scores of the respondents from South Korea were compared with that from the other 11 APNN countries in each category as follows.

The average score of male/female ratio in the fields of male scientists and engineers was 1.72, and it was lower than that from other 11 countries (1.99) at a statistically significant. ($t=-4.150$, $p \leq .000$), indicating more male ratio than other countries. The average score for the perception of discrimination was 2.63 which was slightly higher than the average score (2.52) from the other 11 countries. The average score for the indirect experience of discrimination was 1.81 which was significantly lower ($t=-5.674$, $p \leq .000$) than the average score (2.10) of the other 11 countries. The average score of male scientists and engineers from South Korea agreeing to the need of support policy to overcome the gender barrier in STEM was 3.21 which was close to "Neutral" but significantly lower ($t=-3.834$, $p \leq .000$) than the average score of the other countries (3.54). Lastly, the average score for the Perception of Gender Equality was 3.20 which was higher than the average score of the other countries (2.89) at a statistically significant ($t=5.261$, $p \leq .000$).

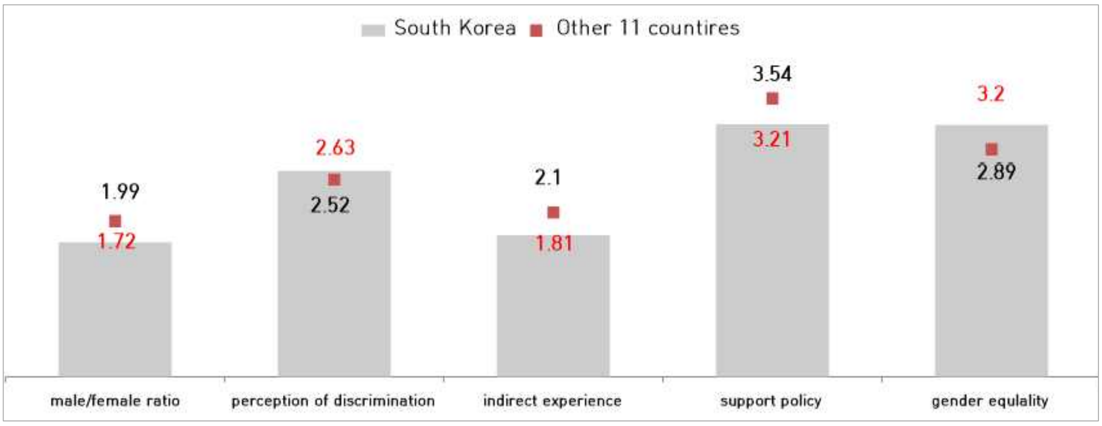


Figure 4.12.1 Comparisons of Answer between South Korea and Other Countries (Unit: Point)

In summary, the averages scores from South Korea showed more men in STEM, less agreement to support policy, lower perception of discrimination, less indirect experience but higher perception of gender equality than other countries.

4.12.3. Comparison of Response by Male Scientists and Engineers in South Korea and Other APNN Member Countries to Each Question

◦ **Male/Female ratio** (5-point scale, 3 points means Neutral)
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of respondents was 1.72, meaning there were more men. The male/female ratio in STEM was the lowest scoring 1.55 for management level at the current workplace but highest scoring 1.84 at the current workplace. There were more men at graduate school than at university (college) during education period, and more men at management level at workplace in South Korea.

The figure (1.72) was lower than that of 11 countries (2.99) at a statistically significant (t=-4.150, p≤.000). South Korea showed more men during all questioned period (from college to current work and after).

The average scores of ‘management level at current work’ (t=-5.367, p≤.000), ‘in graduate school’ (t=-4.779, p≤.000) and ‘at current work’ (t=-2.565, p≤.000) were lower than that of other 11 countries at statistically significant levels. There were more men also during university than other 11 APNN countries without statistically significant difference. In summary, there were more men in STEM in South Korean than other 11 countries for all period from college to the management level at current work.

Table 4.12.2 Comparison of Answer to Other Countries : male/female ratio

(Unit: Point)

Type		Question	S. Korea Average (n=133)	Average of Other Countries (n=1,161)	*t*	*(p)*
male/female Ratio (5-Point Scale)	1	The male/female ration of my department during my university(college) education	1.83	1.90	-0.651	0.515
	2	The male/female ratio of my department while at graduate school	1.66	2.03	-4.779***	0.000
	3	The male/female ratio of my current workplace	1.84	2.07	-2.565*	0.011
	4	The male/female ration at management level at my current workplace	1.55	1.93	-5.367***	0.000
		Sub Scale	1.72	1.99	-4.150***	0.000

◦ **Perception of Discrimination** (5-point scale, 3 points means Neutral)
The Higher score, The Higher Perception of Discrimination

The average score of perception of discrimination in STEM was 2.63, which was below the mid-level. Of the five questions related to the perception of gender barrier, “It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.” received the highest average score (3.11). “Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues” (2.35) received the lowest average score.

The overall average of the answers to the questions related to perception of discrimination was 2.63 slightly higher than the overall average of 11 other APNN countries (2.52). Specifically, significant differences were observed for the responses “Girls and boys were equally encouraged to choose their majors in STEM during their education period.” (t=3.614, p≤.000), scoring higher than other 11 countries. Besides, “It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.”, “Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues” (2.50), “Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues” (2.35) get slightly higher average score than other 11 countries the responses.

Table 4.12.3 Comparison of Answer to Other Countries : Perception of Discrimination

(Unit: Point)

Type		Question	S. Korea Average (n=133)	Average of Other Countries (n=1,161)	*t*	*(p)*
Perception of Discrimination (5-Point Scale)	1	Girls and boys were equally encouraged to choose their majors in STEM during their education period.	2.39	2.04	3.614***	0.000
	2	It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.	3.11	2.96	1.354	0.176
	3	Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.	2.50	2.38	1.182	0.237
	4	Being promoted or becoming a tenured professor or a principal investigator is more difficult for female scientists than for male scientists.	2.83	2.91	-0.819	0.413
	5	Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues	2.35	2.29	0.558	0.577
	Sub Scale		2.63	2.52	1.858	0.063

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The overall average of the response by the male scientist and engineers in South Korea on the indirect experience of discrimination was 1.81 points which was close to the median value of 2.5 points in a 4-point scale, meaning “I have not seen or heard of it but am aware of it.”

The highest level of indirect experience was the discrimination related to “marriage, pregnancy, and childbirth” (2.80) while the lowest level of indirect experience was that related to “receiving funding or scholarships” (1.17).

The overall average of responses to questions related to the level of indirect experience was significantly lower (t=-5.674, p≤.000) than the overall average of other

11 countries (2.10).

More specifically, the average scores of the responses to the questions of indirect experience related to “Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female”(t=-12.332, p≤.000), and “Woman in STEM is disadvantaged in participating or leading a research project because she is female.”(t=-5.330, p≤.000) were lower in order than the average scores of other countries at statistically significant. And the average response of “Woman in STEM being sexually harassed or treated unfairly”, and “Woman in STEM is disadvantaged in participating or leading a research project because she is female.” got slightly lower score without statistical significances than other 11 countries.

Table 4.12.4 Comparison of Answer to Other Countries : Indirect Experience

(Unit: Point)

Type		Question	S. Korea Average (n=133)	Average of Other Countries (n=1,161)	*t*	*(p)*
Indirect Experience of discrimination (4-Point Scale)	1	Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female	1.17	1.74	-12.332***	0.000
	2	Woman in STEM is disadvantaged in participating or leading a research project because she is female.	1.36	1.71	-5.330***	0.000
	3	Woman in STEM being sexually harassed or treated unfairly	1.91	2.05	-1.682	0.093
	4	Woman in STEM leaving work due to her marriage, pregnancy or child care	2.80	2.90	-1.039	0.299
	Sub Scale		1.81	2.10	-5.674***	0.000

◦ **Career Outlook and Need of Support Policy** (5-point scale, 3 points : “Neutral”)
The Higher score means The Stronger agreement

The male scientists and engineers had a very positive view on the career outlook of women in their fields as the average score was 3.75. The score was lower than the average of 11 other countries (4.21) at a statistically significant level (t=-6.091, p≤.000).

The average score of male scientists and engineers in South Korea answering to the question “It is crucial to have strong policy support to solve gender inequality in the STEM field.” was 3.41, meaning that they agreed to it. It was lower than the average score of other 11 countries (3.93) at a statistically significant level (t=-5.626, p≤.000).

Lastly, the average score of male scientists and engineers in South Korea answering to the question “It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.” was 3.02 meaning that they neither agree, nor disagree to these policies. This score was lower than the average (3.15) of other 11 countries.

Table 4.12.5 Comparison of Answer to Other Countries : Career Outlook & Need of Support Policy

(Unit: Score)

Type		Question	S. Korea Average (n=133)	Average of Other Countries (n=1,161)	*t*	*(p)*
Career Outlook	1	I believe things will turn out fine in the future career for women in STEM	3.75	4.23	-6.091**	0.000
Need of Support Policy (5-Point Scale)	1	It is crucial to have strong policy support to solve gender inequality in the STEM field.	3.41	3.93	-5.626***	0.000
	2	It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.	3.02	3.15	-1.325	0.187
	Sub Scale		3.21	3.54	-3.834***	0.000

◦ **Perception of Gender Equality** (5-point scale, 3 points : "Neutral")
The higher score, The Higher Perception of Gender equality

Five questions were asked of male scientists and engineers in South Korea on their perception of gender equality in STEM. The overall average of responses to all questions was 3.20 points, being mid-level.

The highest score was on to the statement "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife" (4.10). It was followed by "Primary breadwinners (who take care of financial obligations) of households should be men" (3.79), "In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves" (3.25), "Women are born to have a way of caring children that men are not capable of in the same way" (2.81), and "I believe gender equality will be fully achieved only if women are given equal opportunities as men" (2.08). The scores indicate that the respondents had more perception of gender equality regarding the gender role in family.

The overall average score of South Korea (3.20) was higher than the average score of other 11 countries (2.89) at a statistically significant level ($t=5.261$ $p \leq .000$).

More specifically, the average scores on "In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife" ($t=6.680$, $p \leq .000$), "In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves" ($t=6.327$, $p \leq .01$), and "Primary breadwinners (who take care of financial obligations) of households should be men" ($t=5.952$, $p \leq .000$) were higher than other 11 countries at statistically significant levels.

But the average scores on "Women are born to have a way of caring children that men are not capable of in the same way", and "I believe gender equality will be fully achieved only if women are given equal opportunities as men." received relatively lower than other 11 countries, means relatively lower perception on gender equality.

Table 4.12.6 Comparison of Answer to Other Countries : Perception of Gender Equality

(Unit: Point)

Type		Question	S. Korea Average (n=133)	Average of Other Countries (n=1,161)	*t*	*(p)*
Perception of Gender Equality (5-point scale)	1	In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves	3.25	2.55	6.327***	0.000
	2	Primary breadwinners (who take care of financial obligations) of households should be men	3.79	3.21	5.952***	0.000
	3	Women are born to have a way of caring children that men are not capable of in the same way	2.81	2.98	-1.421	0.156
	4	In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.	4.10	3.54	6.680***	0.000
	5	I believe gender equality will be fully achieved only if women are given equal opportunities as men.	2.08	2.16	-1.064	0.289
	Sub Scale		3.20	2.89	5.261***	0.000

4.12.4. Comparison of Responses in South Korea with Other Countries

◦ **Male/Female ratio** (5-point scale, 3 points : "Neutral")
Lower score means relatively More men
Higher score means relatively More women

The average male/female ratio in the fields of male scientists and engineers was 1.72, meaning there were relatively more men. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in South Korea were evaluated by ANOVA (or t) analysis. Table 4.12.7 shows the results.

Although the differences of the average scores due to the personal variable did not have statistical significances, there were more men in the field of older respondents, and double-income respondent than single-income respondents in the category.

Table 4.12.7 male/female ratio in South Korea: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	1.72			
Age				
29 years or younger	2.00	0.707	1.983	0.120
30 - 39	1.77	0.698		
40 - 49	1.59	0.611		
Over 50	1.69	0.610		
Marital status				
Single	3.09	0.597	0.226	0.822
Married	3.07	0.493		
Others (including divorced)	-	-		
Number of Children				
1	1.51	0.670	0.745	0.478
2	1.63	0.611		
3 or more	1.36	0.497		
Occupation				
Professor/Teacher	1.60	0.627	1.392	0.248
Researcher	1.71	0.672		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	1.31	0.375		
Other	2.02	0.635		
Double income status (married)				
Double income	1.57	0.589	-1.022	0.310
Single income	1.70	0.664		

Note: ***p<.001, **p<.01, *p<.05

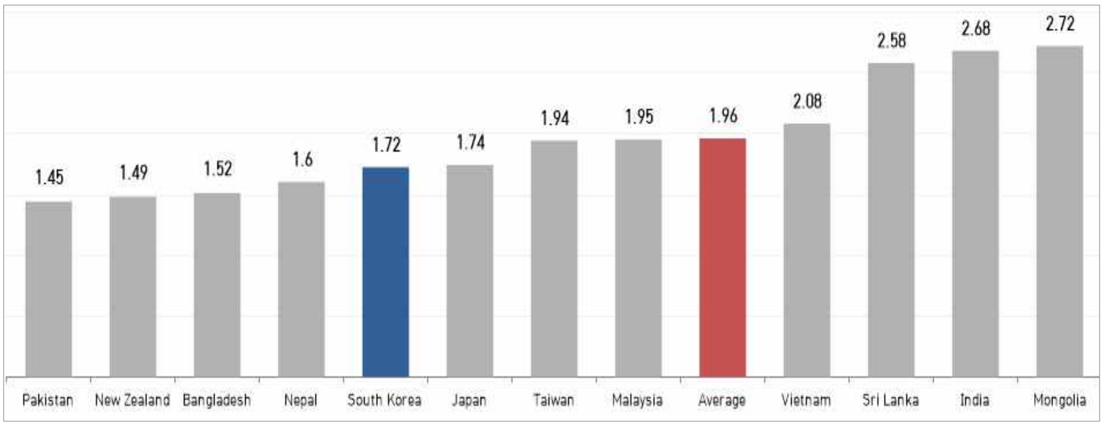


Figure 4.12.2 Average of South Korea and Other Countries in male/female ratio (Unit: Point)

As shown in the figure, the male/female ratio in the fields of the male scientists and engineers in South Korea (1.72) was lower than the average of all countries (1.96), being the fifth lowest after Pakistan, New Zealand, Bangladesh and Nepal.

◦ **Perception of Discrimination** (5-point scale, 3 points : “Neutral”)
The Higher score, The Higher Perception of Discrimination

The average score of male scientists and engineers in South Korea to the perception of discrimination in STEM (2.63) was lower than the mid-level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in South Korea were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.12.8.

The difference of responses according to income status ($t=2.207$, $p \leq .05$) of the respondents from South Korea was statistically significant. The average score of double-income respondents was higher than that of single-income respondents. Although differences were not statistically significant, the average scores of 40’s, married, and respondents having fewer children were relatively low in each category.

Table 4.12.8 Perception of Discrimination in South Korea: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	2.63			
Age				
29 years or younger	2.86	0.817	1.966	0.122
30 - 39	2.61	0.723		
40 - 49	2.51	0.747		
Over 50	3.04	0.823		
Marital status				
Single	2.74	0.764	0.945	0.346
Married	2.60	0.762		
Others (including divorced)	-	-		
Number of Children				
1	2.48	0.681	0.588	0.558
2	2.66	0.794		
3 or more	2.80	1.026		
Occupation				
Professor/Teacher	2.88	0.522	1.917	0.130
Researcher	2.57	0.771		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	2.95	0.929		
Other	3.05	0.579		
Double income status (married)				
Double income	2.75	0.656	2.207*	0.030
Single income	2.41	0.827		

Note: ***$p<.001$, **$p<.01$, *$p<.05$

The figure below shows the comparative average scores among different countries. The perception of male scientists and engineers in South Korea on gender discrimination (2.63) was slightly higher than the average of all countries (2.53), being the fourth highest level after Vietnam, Mongol, and Bangladesh.

Figure 4.12.3 Averages of South Korea and Other countries in Perception of Discrimination (Unit : Point)

◦ **Indirect experience of Discrimination** (4-point scale)
The Higher score means The More indirect experience of discrimination

The average score of male scientists and engineers in South Korea on the indirect experience of discrimination against women in STEM was 1.81 which was close to “ I have not seen or heard of it but am aware of it.”

Table 4.12.9 Indirect Experience in South Korea: Differences according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	1.81			
Age				
29 years or younger	1.78	0.608	3.740*	0.014
30 - 39	2.18	0.661		
40 - 49	2.15	0.518		
Over 50	2.25	0.528		
Marital status				
Single	3.40	0.783	0.147	0.864
Married	3.47	0.621		
Others (including divorced)	3.67	-		
Number of Children				
1	1.98	0.360	0.886	0.420
2	2.29	0.683		
3 or more	2.15	0.650		
Occupation				
Professor/Teacher	2.01	0.572	5.735***	0.000
Researcher	2.15	0.580		
Healthcare professional	2.64	0.516		
Engineer (company, R&D center, etc.)	1.81	0.616		
Other	1.94	0.375		
Double income status (married)				
Double income	2.36	0.697	2.148*	0.038
Single income	2.02	0.422		

Note: ***p<.001, **p<.01, *p<.05

The differences according to the respondent's profiles (age, marital status, number of children, occupation, and double income status (if married) in South Korea were evaluated by ANOVA (or t) analysis. The results are summarized in Table 4.12.9.

Although the differences of the average scores due to the personal variable did not have statistical significances, the average scores of the older respondents, of the respondents having fewer children, and double-income respondents were higher than other respondents in each category.

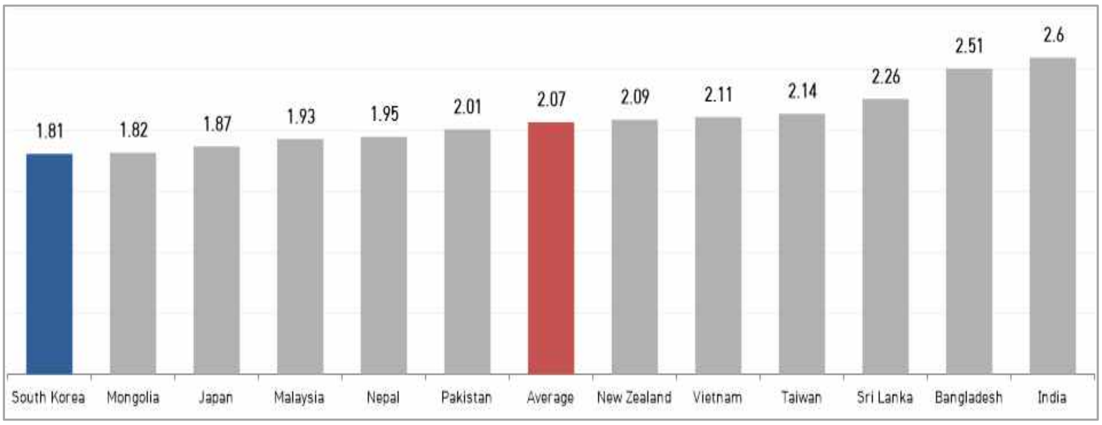


Figure 4.12.4 Averages of South Korea and Other Countries in Indirect Experience (Unit : Point)

The figure shows the cross-country average scores on the indirect experience of discrimination in 12 countries. The indirect experience of discrimination by the male scientists and engineers in South Korea (1.81) was lower than the average of all countries (2.07), being the lowest among 12 APNN member countries.

◦ **Need of Support Policy** (5-point scale, 3 points : "Neutral")
The Higher score means The Stronger agreement

The average score of male scientists and engineers in South Korea on the need of support policy to overcome the gender barrier in STEM was 3.21, being close to neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in South Korea were evaluated by ANOVA (or t) analysis. Results are summarized in Table 4.12.10.

Although the differences of the average scores of the respondents did not have statistical significances, the average score of the respondents more 50 years old was higher than other respondents in the category.

Table 4.12.10 Need of Support Policy in South Korea: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	3.21			
Age				
29 years or younger	3.11	1.150	0.884	0.452
30 - 39	3.30	0.935		
40 - 49	3.12	0.934		
Over 50	3.61	1.024		
Marital status				
Single	2.74	0.764	0.945	0.346
Married	2.60	0.762		
Others (including divorced)	-	-		
Number of Children				
1	3.23	1.120	0.068	0.934
2	3.21	0.964		
3 or more	3.36	0.556		
Occupation				
Professor/Teacher	3.50	0.707	0.156	0.926
Researcher	3.21	0.985		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	3.25	1.443		
Other	3.17	0.862		
Double income status (married)				
Double income	3.22	0.964	0.440	0.661
Single income	3.13	1.030		

Note: ***p<.001, **p<.01, *p<.05

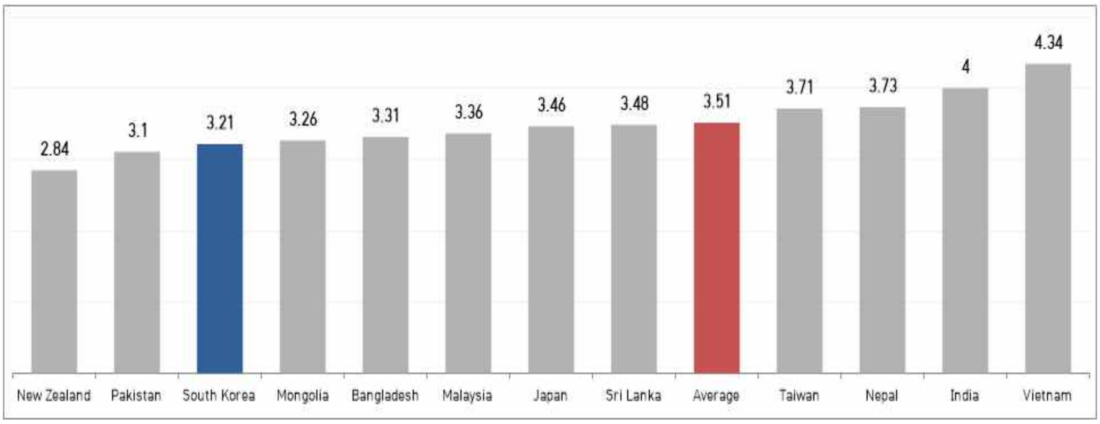


Figure 4.12.5 Averages of South Korea and Other Countries in Need of Support Policy (Unit: Point)

The figure shows the cross-country average scores on the need of support policy to overcome the gender barrier. Respondents in South Korea agreeing to the need of support policy (3.21) was lower than the average of all countries (3.51), being the third lowest after New Zealand and Pakistan.

◦ **Perception of Gender Equality** (5-point scale, 3 points : "Neutral")
The Higher score, The Higher Perception of Gender Equality

The average score of male scientists and engineers in South Korea on the perception of gender equality was 3.20 which was slightly higher than the neutral level. The differences according to the profiles (age, marital status, number of children, occupation, and double income status (if married) of the respondents in South Korea were evaluated by ANOVA (or t) analysis.

Table 4.12.11 Perception of Gender Equality in South Korea: Difference according to Personal Variable

(Unit: Point)

Type	Average	Standard Deviation	F/T	*p*
Total	3.20			
Age				
29 years or younger	3.31	0.559	0.469	0.704
30 - 39	3.24	0.707		
40 - 49	3.16	0.628		
Over 50	3.04	0.467		
Marital status				
Single	3.09	0.597	0.226	0.822
Married	3.07	0.493		
Others (including divorced)	-	-		
Number of Children				
1	3.25	0.532	1.998	0.143
2	3.09	0.621		
3 or more	3.54	0.629		
Occupation				
Professor/Teacher	3.28	0.576	0.113	0.953
Researcher	3.21	0.660		
Healthcare professional	-	-		
Engineer (company, R&D center, etc.)	3.15	0.900		
Other	3.12	0.356		
Double income status (married)				
Double income	3.11	0.569	-0.713	0.478
Single income	3.20	0.641		

Note: ***p<.001, **p<.01, *p<.05

Although the differences of the average scores of the respondents did not have statistical significances, the average score of the older was higher than the younger. And the average score of the respondents having 3 or more children was relatively high, meaning had relatively higher perception of gender equality than other respondents in the category.

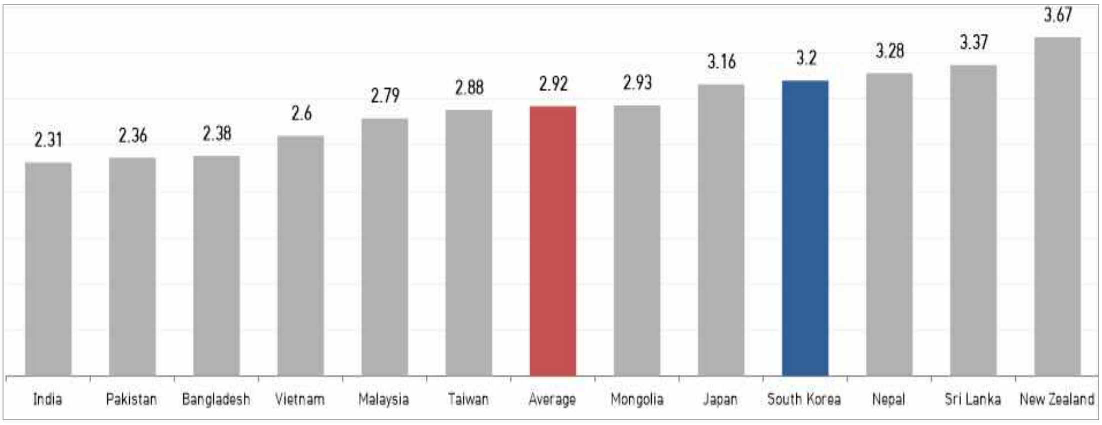


Figure 4.12.6 Averages of South Korea and Other Countries in the Perception of Gender Equality (Unit: Point)

The figure above shows the cross-country average scores on the perception of gender equality. The perception of male scientists and engineers in South Korea on gender equality (3.20) was higher than the average of all countries (2.92), being the fourth highest level after New Zealand, Sri Lanka, and Nepal.

5. For Conclusion and Suggestions: 2017 MAPWiST

5. For Conclusion and Suggestions: 2017 MAPWiST

This document has reviewed the result of the survey of male scientists and engineers in 12 APNN countries conducted by KWSE in 2017.

The survey results, as well as the size and characteristics of male scientists and engineers, were diverse. It cannot be concluded that the results of this survey accurately reflect the scientists and engineers in each country or the reality of culture or gender barrier in each country. Nevertheless, this survey process will surely provide a good opportunity to understand the common characteristics of male scientists and engineers who have participated in and provided opinions to this survey and how they differed from country to country although they had similar research, occupation, age, and family status.

Most of all, we hope that this attempt to share our study with male scientists and engineers in 2017 goes beyond the gender barriers and is another extension or beginning of the cooperation of APNN member countries for science and technology for sustainable development. In closing the report, we substitute the conclusion and policy suggestion with the summary of the policy forum of female scientists and engineers of APNN member countries held in Plaza Hotel in Seoul on September 2, 2017. The keynote speeches by Prof. Kong-Ju-bock Lee of Ewha Womans University, Gender & Leadership CEO Yanghee Kim, and the EU representative Caroline Belan-Menagier accurately explained the reason and purpose of this report. These keynote speeches precisely reflected the will of female scientist and engineers who pursue science and technology-gender-innovation and sustainability. They were followed by the main discussion of current status in Nepal, Taiwan, Mongolia, and Japan. The attendees discussed the meaning and characteristics of gender barrier as the female scientist and engineers in each country understood and reaffirmed the will for innovation and sustainable development by overcoming the gender barrier. We conclude this report by summarizing the discussion at the policy forum of female scientists and engineers of in the Asia Pacific region in 2017.

5.1. 2017 MAPWiST (Meeting of Asia & Pacific Women in Science & Technology)

2017 MAPWiST was the last session of BIEN (The International Conference of Women Scientists and Engineers conference on BT, IT, ET and NT) 2017 held in Seoul under the theme of "Shaping the Future." The international policy forum was geared towards the discussion on the present conditions and predictions of science and technology-nation-woman in each country and Asia-Pacific based on the national and global policy issues.

2017 MAPWiST was the extension of 2014 MAPWiST held by APNN (Asia and Pacific Nation Network, a regional network of INWES (The International Network of Women Engineers & Scientists)) in Seoul as the international conference.

The forum was chaired by Prof. Jung Sun Kim of Dongseo University who has planned and managed all MAPWiST meetings and included the panel discussion by the representatives from Nepal, Taiwan, Mongolia, Japan, and Korea. The discussion focused on the current status of female scientists and engineers in Asian-Pacific countries and gender issues in science and engineering.

This MAPWiST included the keynote lectures and invited lectures centered on gender equality survey and policy development research in science and engineering that have been carried out by KWSE for four years since 2014. This project by KWSE is the outcome of realizing the need for Asian-Pacific version of "SHE FIGURES" published by the EU every three years since 2003. Its objective is to draw a map of gendered innovation and development in science and engineering by tracking and collecting the reality of female scientists and engineers in the Asia-Pacific region according to time and space taking into account the geographical and historical differences between the inter-continental regions in addition to the European and Western societies.

Dr. Caroline Belan Menagier, who has led the "gendered innovation" project of the EU for the past 10 years, gave a special lecture in support of the objective.

"Balanced Development of Human Resources in STEM for the Future of AI"

Prof. Kong-Ju-bock Lee opened the MAPWiST session with a video presentation showing that the "Fourth Industrial Revolution" was not just an issue but the reality close to our daily living through time and space, personal relationship, technology, and human life. It reflected her expertise as the physicist and researcher of policy for female scientists and engineers.

Prof. Lee explained that the change brought by the Fourth Industrial Revolution was not just the recent issue but the outcome of the gradual changes and developments of science and technology. In other words, the science and technology have already become part of our daily living and changed the meaning of space. Prof. Lee's explanation of the meaning of time was relative enough to understand Einstein's explanation inversely in reality. The science and technology that "change everything" extends the universality of life through speed and mobility and differentiate the past and the future at a faster rate. They are developed rapidly and closer to our lives with the necessity of "future form" to predict the paradigm that is different from convention.

Prof. Lee used the Human Development Index (HDI), Gender Inequality Index (GII), and Gender Gap Index (GGI) to explain that the science and technology by humans exceeded the speed of human lives and the speed of acceptance of diversity. Therefore, she argued that there was the need for more appropriate resolution than the issues of equality and equity in the past and present. Prof. Lee concluded her lecture with the need to expand and extend the role of female scientist and engineers as the keyword in solving the gender and human inequalities through science and technology.

"Gender barriers perceived and experienced by women scientists and engineers among APNN member countries"

Dr. Yanghee Kim, CEO of Gender & Leadership, gave the first invited lecture. Dr. Kim pointed out that "the science and technology" and "woman" can be two key words in solving two main challenges for humans - sustainable development and overcoming of poverty. She, however, criticized that they are not the practical issues for policy makers who were the decision-makers in the international society as well as in each country.

Dr. Kim's lecture focused on the discussion of the results of the survey of status of female scientists and engineers in APNN member countries which were part of the KWSE project in its fourth year to demonstrate the importance of data as the reliable basis for realistic policy formation.

The survey reflected the perceptions of female scientists and engineers of 13 APNN member countries based on the review of HDI, GII, GGI, Economic Activity Participation Rate of OECD member countries, and the status of female scientists and engineers by UNESCO. The 13 APNN member countries were Nepal, New Zealand, Malaysia, Mongolia, Bangladesh, Vietnam, Sri Lanka, India, Japan, Taiwan, Pakistan, Australia, and Korea.

The purpose of the survey was to study typical gender roles; discrimination in employment, wage, and promotion; inequalities in work-family balance and housework sharing; institutional and customary barriers centered on sexual harassment or other unfair practices; conscious and unconscious discrimination; and obstacles to gender equality.

Dr. Kim explained that the survey of 1,379 male scientists and engineers in 12 APNN countries except for Australia in 2016 showed that the female students were still less encouraged to have the career in STEM and it led to women to have relatively difficulties of finding jobs in the fields. The difficulties of women in STEM continued as they became professionals after school as the survey showed that it was more difficult for female scientists and engineers to have regular jobs or become project managers than males. The difficulties of female scientists and engineers increased due to work-family balancing and burden of housework. Moreover, women experienced gender harassment as well as inequalities in scholarship and degree acquisition. Although stereotypes of gender roles showed various characteristics by country and age, characteristics that are perceived by the roles and occupations of men and women as symbolized by reason and emotion still remained.

As the result of the survey and policy studies, Dr. Kim pointed out the need for "Broad and continuous implementation of investigation and research for gender barriers and policy support," Collection of statistics related to female scientists and engineers in STEM," "Expansion of excellent support projects and collection of policy information in each country," "Establishment of indicators for improvement and development that can symbolize SHE FIGURE of APNN," and "Establishment of mid and long term plan for supporting the development of women in STEM." She also argued for the need for the efforts and cooperation of APNN countries for them.

"Making full use of human potential: how structural change is being promoted"

Dr. Caroline Belan-Menagier is in charge of the EU's international relations project at Confederal University Leonardo da Vinci located in Poitiers, France. She worked as the French representative to the Helsinki Group on gender in Research & Innovation for the gendered innovation in the EU as the gender expert at the French Ministry of Higher Education and Research in 2009 - 2015.

Dr. Belan-Menagier reviewed the key work by the team of Kong-Ju-bock Lee, Prof. Jung Sun Kim, and Dr. Yanghee Kim for KWSE's "SHE FIGURE" Asia Pacific version project and presented the outcomes, limitations, and current challenge of Gendered Innovations in Science and Engineering in the EU which began the program almost 20 years earlier.

The gendered innovation program for scientific and engineering research and innovation in the EU began with the Framework Program (FP) 5 (2002 - 2006) in 1998 and was detailed by the Helsinki Group the following year. It led to the Lisbon Strategy n 2000, the recommendation for gender mainstreaming strategy of main stream policy in 2002, the research by the EU Commission and Member States in 2005 to establish of the goal of 25% female ratio in public sector of research and technology, the implementation of gender mainstreaming in science and technology through the integration of gender-sensitivity in mainstream policies in 2007, and the policy proposal for family-friendly job and research environment in 2008. They were followed by Horizon 2020 (a 7-year action plan with the budget of nearly EUR 80 billion with three key objectives of "Gender balance in decision-making and research teams at all levels," "Gender dimension in research," and "Gender balance in innovative contents") announced in 2013 and the EU resolution in 2015 for gender equality in research and innovation through continuous and new paradigm. The EU has been publishing She Figures every three years since 2003. It reviews the current situations of European woman scientists through horizontal separation, vertical separation, and job opportunities.

Dr. Belan-Menagier, however, pointed out in the lecture that the quantitative increase did not necessarily lead to qualitative improvement even quality in Europe and that the increase in numbers did not result in rapid improvement, so the firm gender barriers have remained the most difficult challenge. She added that the challenge for overcoming the gender barrier move beyond increasing the ratio of women and building the system to change the "knowledge" itself.

Discussion of female scientist and engineer representatives of APNN member countries

Prof. Lee lectured on the role of female scientists and engineers for the future and the need for overcoming gender barriers in science and engineering. Dr. Kim presented the current status of female scientists and engineers and gender barriers in the Asia Pacific countries and the outcome and limitation of overcoming gender barriers through the funding and mainstream policies of the government and international organizations for the past 20 years. Their speeches vividly relayed the challenges ahead in all countries participating in the session.

Following the panel discussion, the attendees discussed the current outcomes and challenges of female scientists and engineers in each country based on diversity of the countries. They agreed on the need for collection of data for each country to overcome the firm gender barriers especially in the countries where the Confucian tradition remained strong, continuous international interchange and networking in the APNN region as well as the national and regional cooperations and the drive for international support.

The panel speakers' discussion showed the differences in the timing of enactment of the law on gender equality as well as the pace and extent of women's representation in countries like Mongolia, Nepal, Taiwan, and Japan. Nevertheless, they all agreed on the importance of the effect of the cooperation and interactions among the female scientists and engineers on individuals and communities. Regardless of nationality, the female scientists and engineers were equally sensitive to the fact that the gender issue was used just to give more opportunities to women or for the passive policy of mobilizing women as part of the solution of national or global crises.

2017 MAPWiST provided the opportunity for the female scientists and engineers in the Asia-Pacific region to express their desire for new policies and practices through strong networking. The passion continued through debates and opinions into late hours. This event confirmed that the policies supporting female scientists and engineers must evolve into new paradigm for gender policy in science and technology and they must continue their passion and cooperation for the goal.

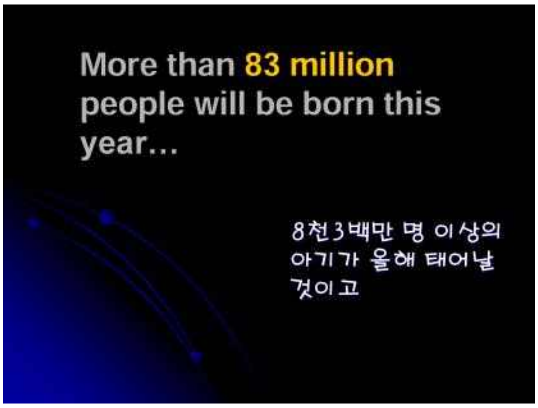
6. Appendix

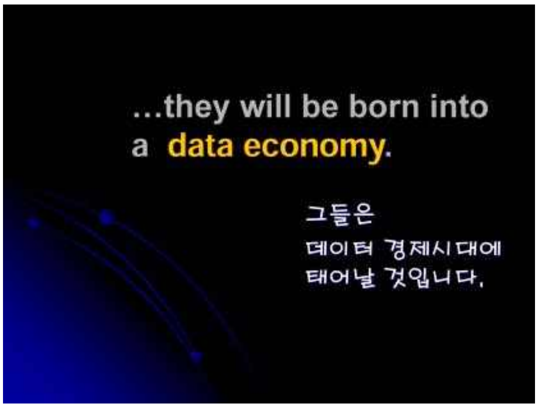
6. Appendix

6.1. 2017 MAPWiST: Contents of Keynote Lectures

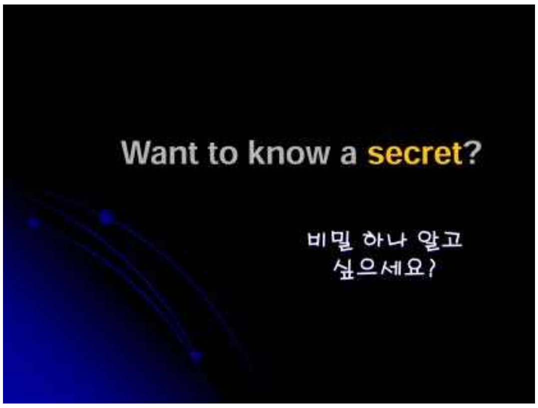
◦ Dr. Kong-Ju-Bock Lee (Professor, Department of Physics, Ewha Womans University)


The world is changing fast…
세상은 빠르게
변화하고 있습니다.

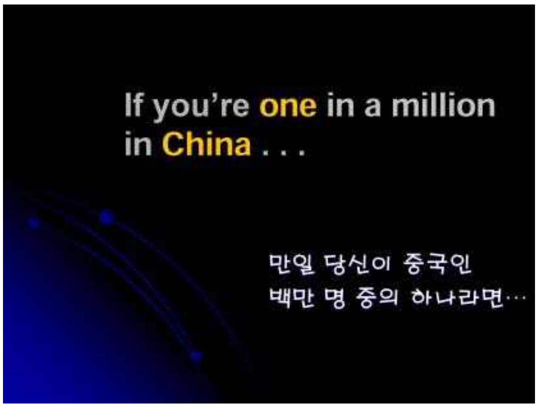

More than 83 million people will be born this year…
8천3백만 명 이상의
아기가 올해 태어날
것이고


…they will be born into a data economy.
그들은
데이터 경제시대에
태어날 것입니다.

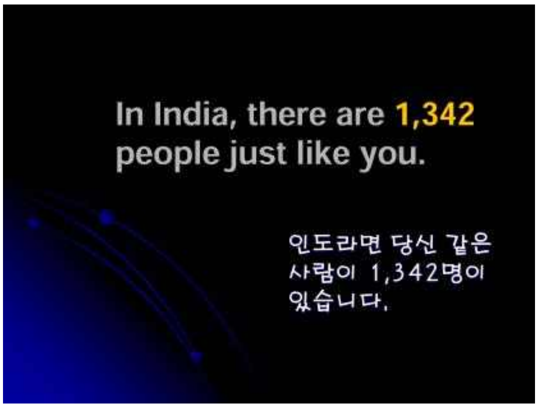

Never has data been so important.
데이터가 이렇게 중요했던
적은 없었습니다.


Want to know a secret?
비밀 하나 알고
싶으세요?

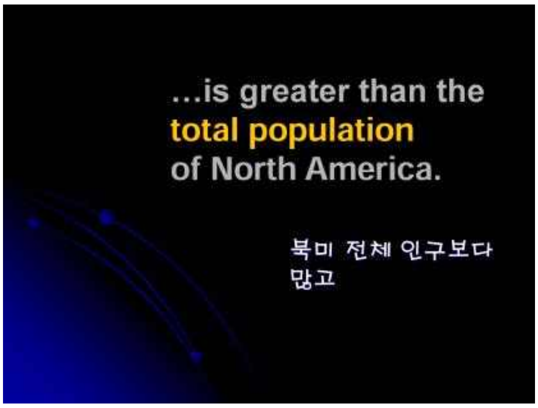

Sometimes size does matter.
때로는 크기가
중요하다는 것을


If you're one in a million in China . . .
만일 당신이 중국인
백만 명 중의 하나라면…

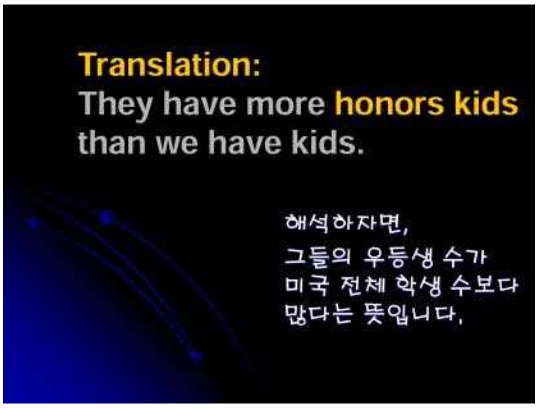

…there are 1,388 people just like you.
당신 같은 사람이
1,388명이나 있고


In India, there are 1,342
people just like you.
인도라면 당신 같은
사람이 1,342명이
있습니다.

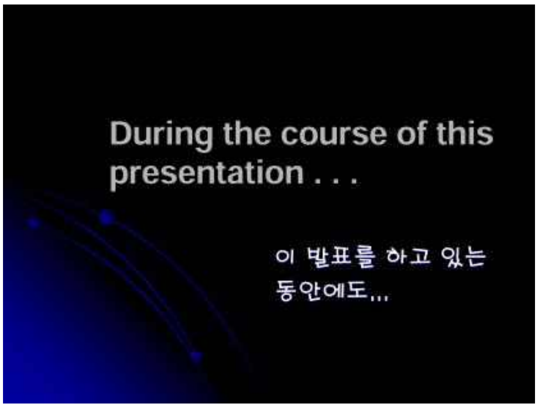

The 25% of China's population
with the highest IQ's . . .
중국에서 IQ 상위
25%에 속하는 인구는


…is greater than the
total population
of North America.
북미 전체 인구보다
많고

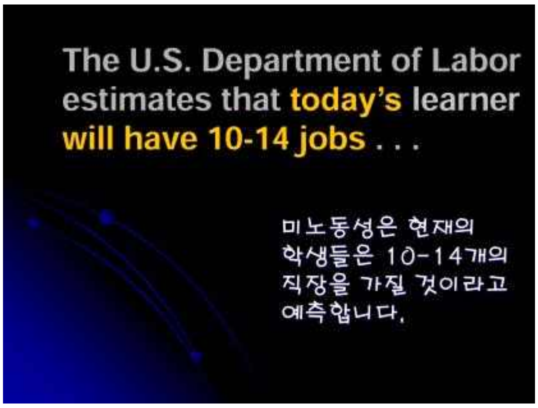

In India, it's the top 28%.
이는 인도의 상위
28%에 해당됩니다.


Translation:
They have more honors kids
than we have kids.
해석하자면,
그들의 우등생 수가
미국 전체 학생 수보다
많다는 뜻입니다.


Did you know . . .
알고 계셨나요?


During the course of this
presentation . . .
이 발표를 하고 있는
동안에도,..


60 babies will be born in the U.S.
244 babies will be born in China.
351 babies will be born in India.
미국에서는 60명,
중국에서는 244명,
인도에서는 351명의
아기가 태어날 것입니다.

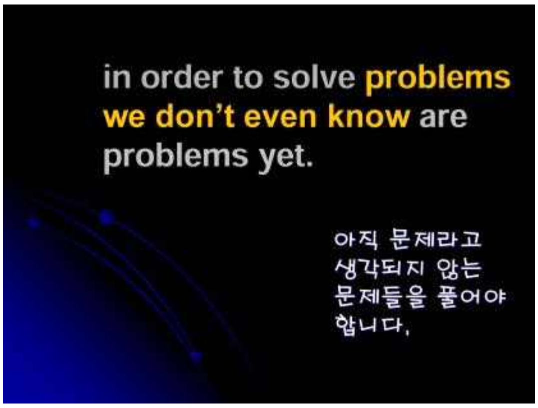

The U.S. Department of Labor estimates that today's learner will have 10-14 jobs . . .
미노동성은 현재의 학생들은 10-14개의 직장을 가질 것이라고 예측합니다.


by age of 38.
그것도 나이 38세까지


The top in-demand jobs that barely existed 10 years ago
지금 필요한 직업들은 10년 전에는 거의 존재하지도 않았던 것입니다


We are currently preparing students for jobs that don't yet exist . . .
현재 있지도 않은 직업을 위해 우리는 학생들을 교육해야 하고


using technologies that haven't been invented . . .
아직 발명되지도 않은 기술을 이용해서

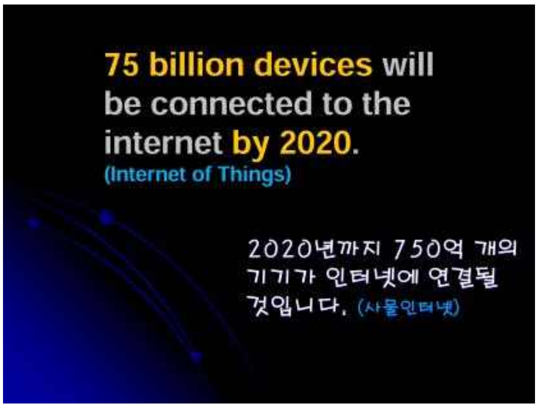

in order to solve problems we don't even know are problems yet.
아직 문제라고 생각되지 않는 문제들을 풀어야 합니다.


For the 1st time in history, we've 4 generations working side by side.
(Traditionalist, Boomer, Gen X, Millennial)
역사상 처음으로 4세대가 함께 일하는 세상을 접하고 있습니다.
(전통주의세대, 베이비 부머세대, X세대, 밀레니얼세대)


Who are very different in the way they grew up communicating
(Write me, Call me, Email me, Text me)
각 세대는 서로 다른 방식으로 소통하며 자랐습니다.
(편지해, 전화해, 메일해, 문자해)


Did you know . . .
알고 계셨나요?


Over 3 billion people
use the internet now.
이제 30억 이상이
인터넷을 사용하고
있습니다.


75 billion devices will
be connected to the
internet by 2020.
(Internet of Things)
2020년까지 750억 개의
기기가 인터넷에 연결될
것입니다. (사물인터넷)


10 million self-driving
cars will be on the road
by 2020.
또, 2020년까지
1,000만대의 자율주행
자동차가 도로를 누비게
될 것입니다.


There are 100 billion searches
on Google every month.
구글에서 매달 천억건이
검색되고 있고,


YouTube is the 2nd largest
search engine in the world.
Every minute, 24 hours of video
is uploaded to YouTube.
유튜브는 두 번째로 큰
검색엔진이고,
24시간에 달하는 영상물이
1분마다 업로드됩니다.


There are over 1.55 billion
monthly active facebook
users.
(It was launched in 2004.)
한달 간 페이스북의 실제
사용자 수는 15.5억이
넘습니다.
(2004년에 생겼는데 말이죠.)


If facebook were a country
it'd be the world's largest.
만일 페이스북이
국가였다면 세계에서
가장 큰 국가였을
것입니다.


+175 million users connected in each moment.
페이스북에는 매 순간
1억 7,500만명이
연결되어있고,


+4.5 billion likes per day.
+350 million photos uploaded per day.
하루에 45억 개의
좋아요가 눌러지고,
3억 5천만 장의 사진이
올라옵니다.


Pinterest, Instagram…
The Age of Images
핀터레스트,
인스타그램...
이미지의 시대


e-Reputation
Your new worst enemies:
Google, facebook, twitter.
당신의 최악의 적은
이제 구글, 페이스북,
트위터일 수 있습니다.


Did you know . . .
알고 계셨나요?

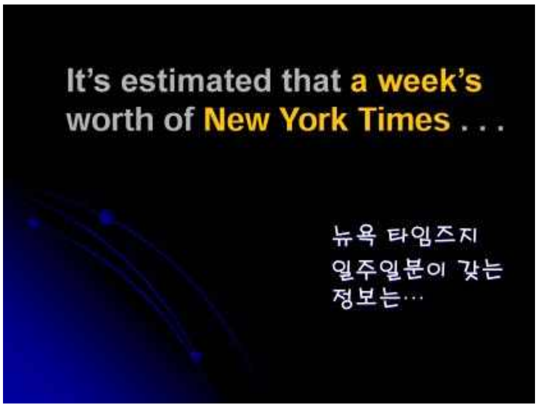

The 1st mobile phone call took place on April 3rd, 1973.
1973년 4월 3일
첫 이동전화통화 이후

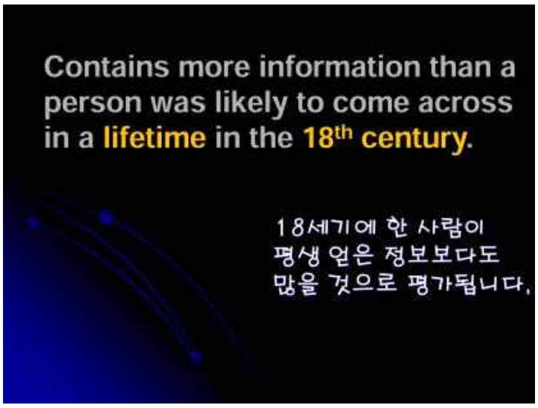

Apple launched its 1st iphone in 2007.
2007년 애플의
첫 아이폰이 나왔고


2 billion people now own a smartphone.
지금은 20억 명이
스마트폰을 사용하고

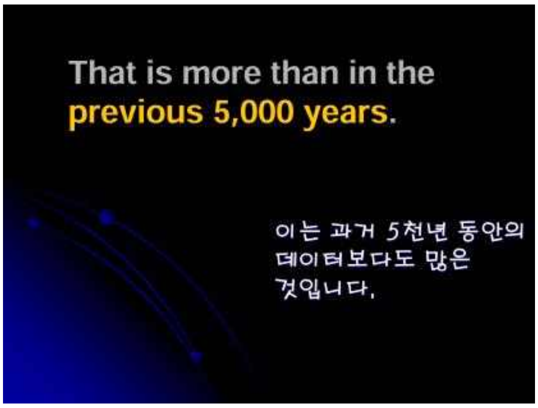

22 million hours of TV shows & movies watched in Netflix, daily.
매일 넷플릭스에서 2,200만 시간에 해당되는 티비쇼와 영화를 보고 있습니다.


More than 4,000 new books are published everyday . . .
4천 권 이상의 새 책들이 매일 출판되고 있고…

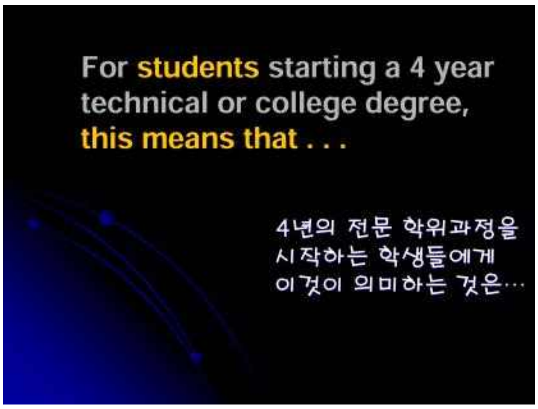

It's estimated that a week's worth of New York Times . . .
뉴욕 타임즈지 일주일분이 갖는 정보는…


Contains more information than a person was likely to come across in a lifetime in the 18th century.
18세기에 한 사람이 평생 얻은 정보보다도 많을 것으로 평가됩니다.


8,000,000,000,000,000,000,000
8 zettabyte (8×10^{21})
of unique new data
created worldwide in 2015
(The Age of BIG DATA)
8제타바이트(8×10^{21}),
2015년 새로 생성된
총 데이터량
(빅데이터의 시대)


That is more than in the previous 5,000 years.
이는 과거 5천년 동안의 데이터보다도 많은 것입니다.


The amount of new technical information is doubling every 2 years.
새로운 기술정보량은 매 2년마다 두 배씩 늘어나고 있습니다.


For students starting a 4 year technical or college degree, this means that . . .
4년의 전문 학위과정을 시작하는 학생들에게 이것이 의미하는 것은…

half of what they learn in their **first year of study** will be **outdated** by their third year of study.

1학년 때 배운 것의
반은 3학년이 되었을
때 이미 진부한 정보가
되어버린다는 것입니다.

While **technical predictions** further out than about 15 years are **hard to do . . .**

15년 이후의 기술
예측은 쉽지 않으나…

Predictions are that by 2049 **a $1,000 computer** will exceed the computational capabilities of **the entire human species.**

2049년에는 천불짜리
컴퓨터 한 대가
인류전체의 계산 능력을
능가할 것이라
예측합니다.

What does it all **mean**?

이 모든 것은
무엇을 의미할까요?

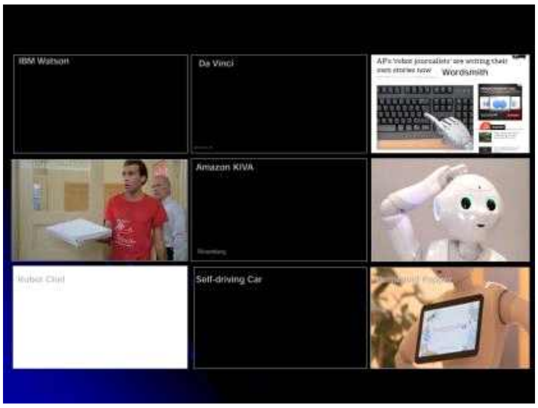
SHIFT HAPPENS

변혁이 일고 있습니다.

Recent Evolution of **Technology**

최근 기술동향

Automation
자동화


IBM Watson
Da Vinci
Wordsmith
Amazon KIVA
Self-driving Car


3D PRINTER
L=32m, W=10m, H=6.6m
→ 200m², 10 houses/day
Adaptive Infrastructure:
4D Printing
NewScientist/CBS News
First human head transplant could happen in two years
25 February 2015 by Helen Thomson
The idea was first proposed in 2013 by Sergio Canavero of the Turin Advanced Neuromodulation Group in Italy. ... the surgery could be ready as early as 2017.


2016. 3. 9/10/12/13/15


AlphaGo
nature
ALL SYSTEMS GO


4th Industrial Revolution
1st ~ 3rd Competition with Human
4th Competition with A.I.


Are you ready for the future?
SuccessFBI


Human Resources Development for the Future?
How about Woman Resources Development for the Present?


Human Development Index, UNDP
Gender Inequality Index, UNDP
Gender Gap Index, WEF

The Components of HDI Human Development Index

Components of HDI	Basis of calculation
Life expectancy at birth 기대수명	Life expectancy at birth assuming that the death rate will be maintained as when one was born
Mean years of schooling 평균 교육년수	Years that a 25-year-old person or older has spent in schools
Expected years of schooling 기대 교육년수	Years that a 5-year-old child will spend with his education in his whole life
Gross national income per capita 1인당 실질국민소득	Measured based on Purchasing Power Parity (PPP)

HDI = 1: highest human development

HDI rank	Country	HDI	Life expectancy (years)	Mean years of schooling (years)	Expected years of schooling (years)	Purchasing power parity per person (2011 PPP $)
Very high human development						
1	Norway	0.944	81.6	12.6	17.5	64,992
2	Australia	0.935	82.4	13.0	20.2	42,261
3	Switzerland	0.930	83.0	12.8	15.8	56,431
4	Denmark	0.923	80.2	12.7	18.7	44,025
5	Netherland	0.922	81.6	11.9	17.9	45,435
6	Germany	0.916	80.9	13.1	16.5	43,919
6	Ireland	0.916	80.9	12.2	18.6	39,568
8	U.S.A	0.915	79.1	12.9	16.5	52,947
9	Canada	0.913	82.0	13.0	15.9	42,155
9	New Zealand	0.913	81.8	12.5	19.2	32,689
11	Singapore	0.912	83.0	10.6	15.4	76,628
12	Hong Kong	0.910	84.0	11.2	15.6	53,959
13	Liechtenstein	0.908	80.0	11.8	15.0	79,851
14	Sweden	0.907	82.2	12.1	15.8	45,636
14	England	0.907	80.7	13.1	16.2	39,267
16	Iceland	0.899	82.6	10.6	19.0	35,182
17	**Korea**	**0.898**	**81.9**	**11.9**	**16.9**	**33,890**
18	Israel	0.894	82.4	12.5	16.0	30,676
19	Luxembourg	0.892	81.7	11.7	13.9	58,711
20	Japan	0.891	83.5	11.5	15.3	36,927
49	Montenegro	0.802	76.2	11.2	15.2	14,558
High human development						
62	Malaysia	0.779	74.7	10.0	12.7	22,762
73	Sri Lanka	0.757	74.9	10.8	13.7	9,779
90	China	0.727	75.8	7.5	13.1	12,547
90	Mongolia	0.727	69.4	9.3	14.6	10,729
Medium human development						
116	Vietnam	0.666	75.8	7.5	11.9	5,092
130	India	0.609	68.0	5.4	11.7	5,497
142	Bangladesh	0.570	71.6	5.1	10.0	3,191
Low human development						
145	Nepal	0.548	69.6	3.3	12.4	2,311
147	Pakistan	0.538	66.2	4.7	7.8	4,866
188	Niger	0.348	61.4	1.5	5.4	908
(25)	Taiwan	0.882	79.8	16.2	16.7(2010)	43,148

APNN countries
Asia Pacific Nations Network

Taiwan's data from: [illegible]

Source: 2015 UNDP Human Development Report

GDI = Female HDI / Male HDI

HDI rank	Country	GDI = F. HDI/M. HDI	GDI rank	Female HDI	Male HDI
Very high human development					
1	Norway	0.996	17	0.940	0.944
2	Australia	0.976	42	0.922	0.945
3	Switzerland	0.950	80	0.898	0.945
4	Denmark	0.977	39	0.912	0.934
5	Netherland	0.947	89	0.893	0.943
6	Germany	0.963	64	0.901	0.936
6	Ireland	0.973	48	0.901	0.926
8	U.S.A	0.995	14	0.911	0.916
9	Canada	0.982	31	0.904	0.921
9	New Zealand	0.963	68	0.894	0.920
11	Singapore	0.985	24	0.898	0.912
12	Hong Kong	0.958	71	0.892	0.931
14	Sweden	0.999	3	0.906	0.906
14	England	0.965	52	0.888	0.920
16	Iceland	0.975	44	0.886	0.909
17	**Korea**	**0.930**	**104**	**0.861**	**0.926**
18	Israel	0.971	52	0.879	0.905
19	Luxembourg	0.971	53	0.877	0.903
20	Japan	0.961	66	0.876	0.912
49	Montenegro	0.954	77	0.782	0.819
High human development					
62	Malaysia	0.947	90	0.733	0.795
73	Sri Lanka	0.948	85	0.730	0.769
90	China	0.943	94	0.705	0.747
90	Mongolia	1.028	49	0.737	0.716
Medium human development					
116	Vietnam	-	-	-	-
130	India	0.795	151	0.525	0.660
142	Bangladesh	0.917	109	0.541	0.590
Low human development					
145	Nepal	0.908	114	0.521	0.574
147	Pakistan	0.726	160	0.438	0.603
188	Niger	0.729	158	0.287	0.394

APNN countries
Except Taiwan: No HDI data

Source: 2015 UNDP Human Development Report

APNN Member Countries	UNDP HDI 2013 (187 countries) Rank	Value	UNDP HDI 2014 (188 countries) Rank	Value	UNDP GDI 2013 (187 countries) Rank	Value	UNDP GDI 2014 (188 countries) Rank	Value
Nepal	145	0.912	145	0.548	102	0.912	114	0.908
New Zealand	7	0.971	9	0.913	47	0.971	68	0.961
Malaysia	62	0.935	62	0.779	91	0.935	90	0.947
Mongolia	**103**	**0.698**	**90**	**0.727**	**32**	**1.021**	**49**	**1.028**
Bangladesh *	142	0.558	142	0.570	107	0.908	109	0.917
Vietnam	121	0.638	116	0.666	-	-	-	-
Sri Lanka	73	0.750	73	0.757	66	0.961	85	0.948
India	135	0.586	130	0.609	132	0.828	151	0.795
Japan	17	0.890	20	0.891	79	0.951	66	0.961
Taiwan **	(21)	0.882	(25)	0.882	-	-	-	-
Pakistan	146	0.537	147	0.538	145	0.750	160	0.726
Korea	**15**	**0.891**	**17**	**0.898**	**85**	**0.940**	**104**	**0.930**
Australia	2	0.933	2	0.935	40	0.975	42	0.976

* Bangladesh has been an INWES APNN member country since 2015
** Taiwan's data were determined by the Taiwanese government based on the UNDP and WEF methodology (source: http://eng.stat.gov.tw/ct.asp?xItem=25280&ctNode=6032&mp=5)

Source: UNDP Human Development Report 2014, 2015

The Components of GII Gender Inequality Index

Components of GII	Basis of calculation
Maternal mortality ratio 모성사망률	Mortality of women due to pregnancy, delivery and complications (per 100,000 live births)
Adolescent fertility rate 청소년출산율	Births per 1000 women aged 15-19 years old
Female share of parliamentary seats 여성의원비율	Female ratio in parliament
Ratio of secondary education 중등 이상 교육받은 인구 비율	Ratio of secondary education
Labor force Participation rate 경제활동참가율	Female/male ratio of labor force participation of population over 15 years of age (or ages 15 to 64)

GII Status of OECD (2014) GII=0 : complete equality

MMR: Maternal mortality ratio 모성사망률
AFR: Adolescent fertility rate 청소년 출산율
FSPS: Female share of parliamentary seats 여성의원 비율
RSE: Ratio of secondary education 중등이상 교육 인구비율
LFPR: Labor force participation rate 경제활동참가율

Country	GII Value	GII OECD/UN rank	MMR	AFR	FSPS	RSE F	RSE M	LFPR F	LFPR M
Slovenia	0.016	1/1	7	0.6	27.7	95.8	98.0	52.3	63.2
Switzerland	0.028	2/2	6	1.9	28.5	95.0	96.6	61.8	74.9
Germany	0.041	3/3	7	3.8	36.9	96.3	97.0	53.6	66.4
Denmark	0.048	4/4	5	5.1	38.0	95.5	96.6	58.7	66.4
Austria	0.053	5/5	4	4.1	30.3	100.0	100.0	54.6	67.7
Sweden	0.055	6/6	4	6.5	43.6	88.5	87.3	60.3	67.9
Netherlands	0.062	7/7	6	6.2	36.9	87.7	90.5	58.5	70.6
Belgium	0.063	8/8	6	6.7	42.4	77.5	82.9	47.5	59.3
Norway	0.067	9/9	4	7.8	39.6	97.4	96.7	61.2	68.7
Italy	0.068	10/10	4	4.0	30.1	71.2	80.5	39.6	59.5
Finland	0.075	11/11	4	9.2	42.5	100.0	100.0	55.7	64.0
Iceland	0.087	12/12	4	11.5	41.3	91.6	91.6	70.5	77.4
France	0.088	13/13	12	5.7	25.7	78.0	83.2	50.7	61.6
Rep. Czech	0.091	14/15	5	4.9	18.9	99.9	99.7	51.1	68.3
Spain	0.095	15/16	4	10.6	38.0	66.8	73.1	52.5	65.8
Luxembourg	0.100	16/17	11	8.3	28.3	100.0	100.0	50.7	64.6
Israel	0.101	17/18	2	7.8	22.5	84.4	87.3	57.9	69.1
Australia	0.110	18/19	6	12.1	30.5	94.3	94.6	58.8	71.8
Portugal	0.111	19/20	8	12.6	31.3	47.7	48.2	54.9	66.2
Ireland	0.113	20/21	9	8.2	19.9	80.5	78.6	53.1	68.1
Korea	**0.125**	**21/23**	**27**	**2.2**	**16.3**	**77.0**	**89.1**	50.1	72.1
Canada	0.129	22/25	11	14.5	28.2	100.0	100.0	61.6	71.0
Japan	0.133	23/26	6	5.4	11.6	87.0	85.8	48.8	70.4
Poland	0.138	24/28	3	12.2	22.1	79.4	85.5	48.9	64.9
Greece	0.146	25/29	5	11.9	21.0	59.5	67.0	44.2	62.5
New Zealand	0.157	26/32	8	25.3	31.4	95.0	95.3	62.0	73.8
Estonia	0.164	27/33	11	16.8	19.8	100.0	100.0	56.2	68.9
Slovakia	0.164	28/33	7	15.9	18.7	99.2	99.5	51.1	68.6
England	0.177	29/39	8	25.8	23.5	99.8	99.9	55.7	68.7
Hungary	0.209	30/42	14	12.1	10.1	97.9	98.7	44.8	60.0
U.S.A	0.280	31/55	28	31.0	19.4	95.1	94.8	56.3	68.9
Chile	0.338	32/65	22	55.3	15.8	73.3	78.4	[illegible]	[illegible]
Turkey	0.359	33/71	20	30.9	14.4	39.0	60.0	[illegible]	[illegible]
Mexico	0.373	34/74	49	63.4	37.1	55.7	60.6	[illegible]	[illegible]

* Latvia is not included because it became a member of OECD in May, 2016
* UN: 155 countries
* OECD: 34 members

Source: UNDP Human Development Report 2015

GII Status of APNN (2014) GII=0 : complete equality

MMR: Maternal mortality ratio 모성사망률
AFR: Adolescent fertility rate 청소년 출산율
FSPS: Female share of parliamentary seats 여성의원 비율
RSE: Ratio of secondary education 중등이상 교육 인구비율
LFPR: Labor force participation rate 경제활동참가율

Country	GII Value	GII UN rank/155	MMR	AFR	FSPS	RSE F	RSE M	LFPR F	LFPR M
Taiwan*	0.052	(5)	7	4.0	35.5	-	-	-	-
Australia	0.110	19	6	12.1	30.5	94.3	94.6	58.8	71.8
Korea	**0.125**	**23**	**27**	**2.2**	**16.3**	**77.0**	**89.1**	**50.1**	**72.1**
Japan	0.133	26	6	5.4	11.6	87.0	85.8	48.8	70.4
New Zealand	0.157	32	8	25.3	31.4	95.0	95.3	62.0	73.8
Malaysia	0.209	42	29	5.7	14.2	65.1	71.3	44.4	75.5
Vietnam	0.308	60	49	29.0	24.3	59.4	71.2	73.0	82.2
Mongolia	0.325	63	68	18.7	14.9	85.3	84.1	56.6	69.3
Sri Lanka	0.370	72	29	16.9	5.8	72.7	76.4	35.1	76.3
Nepal	0.489	108	190	73.7	29.5	17.7	38.2	79.9	87.1
Bangladesh**	0.503	111	170	80.6	20.0	34.1	41.3	57.4	84.1
Pakistan	0.536	121	170	27.3	19.7	19.3	46.1	24.6	82.9
India	0.563	130	190	32.8	12.2	27.0	56.6	27.0	79.9

* Taiwan's data were determined by the Taiwanese government based on the UNDP and WEF methodology (source: http://eng.stat.gov.tw/ct.asp?xItem=25280&ctNode=6032&mp=5)
** Bangladesh has been an INWES APNN member country since 2015

Source: UNDP Human Development Report 2015

GII Status of Korea (2008-2014) GII=0 : complete equality

Year	GII Value	GII UN rank	MMR	AFR	FSPS	RSE F	RSE M	LFPR F	LFPR M
2008[a]	**0.310**	20/138	**14**	5.5	13.7	79.4	91.7	54.4	75.6
2011[b]	0.111	11/146	18	2.3	14.7	79.4	91.7	50.1	72.0
2012[c]	0.153	27/148	16	5.8	15.7	79.4	91.7	49.2	71.4
2013[d]	0.101	17/152	16	2.2	15.7	77.0	89.1	49.9	72.0
2014[e]	**0.125**	23/155	**27**	2.2	16.3	77.0	89.1	50.1	72.1
2014(UN Ave)	0.449	-	210	47.4	21.8	54.5	65.4	50.3	76.7
2014(OECD Ave)	0.128	-	9.9	13.5	27.7	85.4	88.1	53.2	68.1

* Latvia is not included because it became a member of OECD in May, 2016

AFR: Adolescent fertility rate 청소년 출산율
FSPS: Female share of parliamentary seats 여성의원 비율

Source: UNDP Human Development Report [a]2010, [b]2011, [c]2013, [d]2014, [e]2015

Summary: UNDP Indices of APNN (2014)

HDI=1: most developed, GDI=1: complete equality, GII=0: complete equality

Country	UNDP HDI		UNDP GDI		UNDP GII	
	Rank/188	Value	Rank/188	Value	Rank/155	Value
Nepal	145	0.548	114	0.908	108	0.489
New Zealand	9	0.913	68	0.961	32	0.157
Malaysia	62	0.779	90	0.947	42	0.209
Mongolia	90	0.727	49	1.028	63	0.325
Bangladesh*	142	0.570	109	0.917	111	0.503
Vietnam	116	0.666	-	-	60	0.308
Sri Lanka	73	0.757	85	0.948	72	0.370
India	130	0.609	151	0.795	130	0.563
Japan	20	0.891	66	0.961	26	0.133
Taiwan**	(25)	0.882	-	-	(5)	0.052
Pakistan	147	0.538	160	0.726	121	0.536
Korea	**17**	**0.898**	**104**	**0.930**	**23**	**0.125**
Australia	2	0.935	42	0.976	19	0.110

* Bangladesh has been an INWES APNN member country since 2015
** Taiwan's data were determined by the Taiwanese government based on the UNDP and WEF methodology (source: http://eng.stat.gov.tw/ct.asp?xItem=25280&ctNode=6032&mp=5)

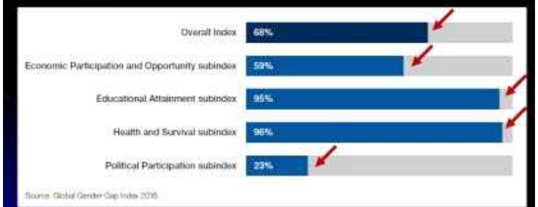
Source: UNDP Human Development Report 2015

Structure of the GGI (ratio = Female/Male)

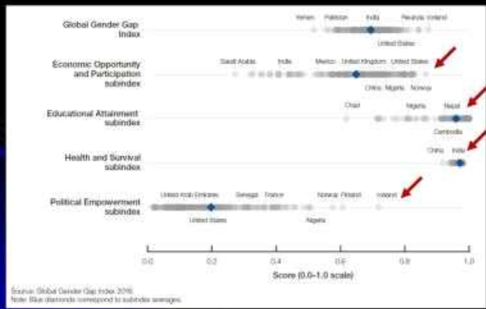
Subindex	Variable	Weights	Source
Economic participation and opportunity	Labor force participation rate ratio	0.199	International Labor Organization
	Wage equality between women and men for similar work	0.310	World Economic Forum
	Female estimated earned income over male value	0.221	World Economic Forum
	Female legislators, senior officials and managers over male value	0.149	International Labor Organization
	Female professional and technical workers over male value	0.121	International Labor Organization
	Total	1	
Educational attainment	Female literacy rate over male value	0.191	UNESCO Institute for Statistics
	Female net primary enrolment rate over male value	0.459	UNESCO Institute for Statistics
	Female net secondary enrolment rate over male value	0.230	UNESCO Institute for Statistics
	Female gross tertiary enrolment ratio over male value	0.121	UNESCO Institute for Statistics
	Total	1	
Health and survival	Sex ratio at birth (converted to female-over-male ratio)	0.693	Central Intelligence Agency
	Female healthy life expectancy over male value	0.307	World Health Organization
	Total	1	
Political empowerment	Females with seats in parliament over male value	0.310	Inter-Parliamentary Union
	Females at ministerial level over male value	0.247	Inter-Parliamentary Union
	Number of years of a female head of state (last 50 years) over male value	0.443	World Economic Forum
	Total	1	

Source: WEF, Global Gender Gap Report

Global performance of 144 countries, 2016



Range of scores, Global GGI and sub-indexes, 2016



Source: Global Gender Gap Index 2016
Note: Blue diamonds correspond to subindex averages.

GGI Status of OECD (2015) GGI=1 : complete equality

UN GII rank*	Country	GGI		E.participation & opportunity		Education attainment		Health and survival		Political empowerment	
		Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value
1	Slovenia	9	0.784	24	0.778	29	1.000	79	0.973	16	0.385
2	Switzerland	8	0.785	17	0.798	69	0.993	74	0.974	18	0.376
3	Germany	11	0.779	38	0.737	88	0.987	56	0.979	11	0.413
4	Denmark	14	0.767	20	0.788	1	1.000	107	0.970	29	0.309
5	Austria	37	0.733	52	0.705	1	1.000	1	0.980	39	0.246
6	Sweden	4	0.823	4	0.836	54	0.996	71	0.974	5	0.486
7	Netherland	13	0.776	39	0.732	1	1.000	104	0.970	13	0.401
8	Belgium	19	0.753	24	0.762	1	1.000	66	0.974	35	0.275
9	**Norway**	**2**	**0.850**	**1**	**0.868**	**32**	**1.000**	**78**	**0.974**	**3**	**0.559**
10	Italy	41	0.726	111	0.603	58	0.995	74	0.974	24	0.331
11	**Finland**	**3**	**0.850**	**8**	**0.815**	**1**	**1.000**	**1**	**0.980**	**2**	**0.607**
12	**Iceland**	**1**	**0.881**	**5**	**0.836**	**1**	**1.000**	**105**	**0.970**	**1**	**0.719**
13	France	15	0.761	56	0.699	1	1.000	1	0.980	19	0.365
15	Rep. Czech	81	0.687	94	0.636	1	1.000	42	0.979	83	0.134
16	Spain	25	0.742	67	0.674	47	0.999	95	0.972	26	0.326
17	Luxembourg	32	0.738	31	0.766	1	1.000	71	0.974	53	0.212
18	Israel	53	0.712	71	0.671	51	0.996	68	0.974	54	0.205
19	Australia	36	0.733	32	0.766	1	1.000	74	0.974	61	0.193
20	Portugal	39	0.732	46	0.712	60	0.993	29	0.973	41	0.244
21	Ireland	5	0.807	26	0.777	44	0.998	56	0.970	6	0.474
23	**Korea**	**115**	**0.651**	**125**	**0.557**	**102**	**0.965**	**79**	**0.973**	**101**	**0.107**
25	Canada	30	0.740	28	0.773	1	1.000	109	0.969	40	0.218
26	**Japan**	**101**	**0.670**	**106**	**0.611**	**84**	**0.988**	**42**	**0.979**	**104**	**0.103**
28	Poland	51	0.715	75	0.667	38	1.000	42	0.979	52	0.213
29	Greece	87	0.685	87	0.644	56	0.996	56	0.979	91	0.120
32	New Zealand	10	0.782	30	0.768	1	1.000	105	0.970	15	0.390
33	Estonia	21	0.749	47	0.711	39	0.999	1	0.980	30	0.306
33	Slovakia	97	0.675	85	0.638	1	1.000	79	0.973	115	0.087
39	England	18	0.758	43	0.724	37	1.000	66	0.974	23	0.335
42	Hungary	99	0.672	62	0.685	76	0.991	42	0.979	139	0.035
55	U.S.A.	28	0.740	6	0.826	40	0.999	64	0.975	72	0.162
65	Chile	73	0.698	123	0.570	36	1.000	41	0.979	42	0.243
71	Turkey	130	0.624	131	0.459	105	0.957	1	0.980	105	0.103
74	Mexico	71	0.699	126	0.545	75	0.992	1	0.980	34	0.281

* Note that the rankings of UNDP GII in 2014(155 countries) are the latest.

Latvia is not included because it became a member of OECD in May, 2016
OECD: 34 members except Latvia

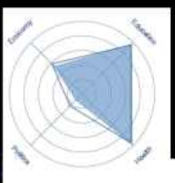
Source: UNDP Human Development Report 2014
WEF, Global Gender Gap Report2015

GGI Status of APNN (2015) GGI=1 : complete equality

Country	GGI		E.participation & opportunity		Education attainment		Health and survival		Political empowerment	
	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value
New Zealand	10	0.782	30	0.768	1	1.000	105	0.970	15	0.390
Australia	36	0.733	32	0.766	1	1.000	74	0.974	61	0.193
Taiwan*	(79)	0.690	(43)	0.727	(1)	1.000	(115)	0.968	(35)	0.275
Mongolia	56	0.709	22	0.783	73	0.992	**1**	**0.980**	117	0.084
Bangladesh **	64	0.704	130	0.462	109	0.948	95	0.971	**8**	**0.433**
Vietnam	83	0.687	41	0.731	114	0.941	139	0.950	88	0.124
Sri Lanka	84	0.686	120	0.577	57	0.995	**1**	**0.980**	59	0.193
Japan	101	0.670	106	0.611	84	0.988	42	0.979	104	0.103
India	108	0.664	139	0.383	125	0.896	143	0.942	**9**	**0.433**
Nepal	110	0.658	121	0.575	122	0.917	94	0.972	70	0.169
Malaysia	111	0.655	95	0.634	100	0.967	110	0.969	134	0.051
Korea	**115**	**0.651**	**125**	**0.557**	**102**	**0.965**	**79**	**0.973**	**101**	**0.107**
Pakistan	144	0.559	143	0.330	135	0.813	125	0.967	87	0.127

* Taiwan's data were determined by the Taiwanese government based on the UNDP and WEF methodology (source: http://eng.stat.gov.tw/ct.asp?xItem=25280&ctNode=6032&mp=5)
** Bangladesh has been an INWES APNN member country since 2015

Source: WEF, Global Gender Gap Report 2015



GGI Status of Korea (2016, 144 countries)
GGI=1 : complete equality

Source: WEF, Global Gender Gap Report 2016

	2016	
	rank	score
Global Gender Gap Index	116	0.649
Economic participation and opportunity	123	0.537
Educational attainment	102	0.964
Health and survival	76	0.973
Political empowerment	92	0.120

GGI Status of Korea (2016) GGI=1 : complete equality

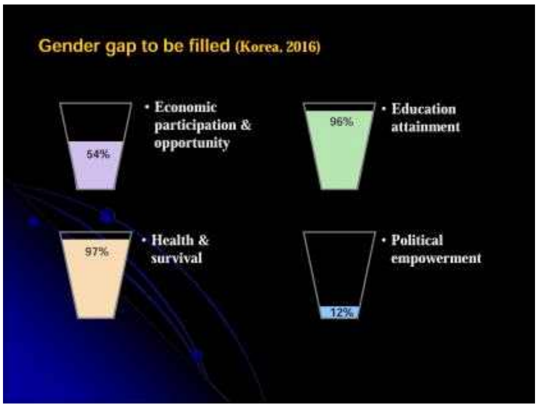
	rank	score	avg	female	male	f/m ratio
Economic participation and opportunity	123	0.537	0.586			0.54
Labour force participation	91	0.731	0.665	56	76	0.73
Wage equality for similar work (survey)	125	0.524	0.622	—	—	0.52
Estimated earned income (US$, PPP)	120	0.450	0.502	20,760	46,183	0.45
Legislators, senior officials, and managers	114	0.117	0.358	10	90	0.12
Professional and technical workers	78	0.930	0.862	48	52	0.93
Educational attainment	102	0.964	0.955			0.96
Literacy rate	66	[illegible]	0.897	[illegible]	[illegible]	[illegible]
Enrolment in primary education	79	0.994	0.980	96	97	0.99
Enrolment in secondary education	99	0.991	0.970	96	97	0.99
Enrolment in tertiary education	112	0.754	0.930	81	108	0.75
Health and survival	76	0.973	0.957			0.97
Sex ratio at birth	125	0.936	0.918	—	—	0.94
Healthy life expectancy	1	1.060	1.043	75	70	1.07
Political empowerment	92	0.120	0.233			0.12
Women in parliament	90	0.205	0.269	17	83	0.21
Women in ministerial positions	128	0.063	0.236	6	94	0.06
Years with female head of state (last 50)	29	0.094	0.204	4	46	0.09

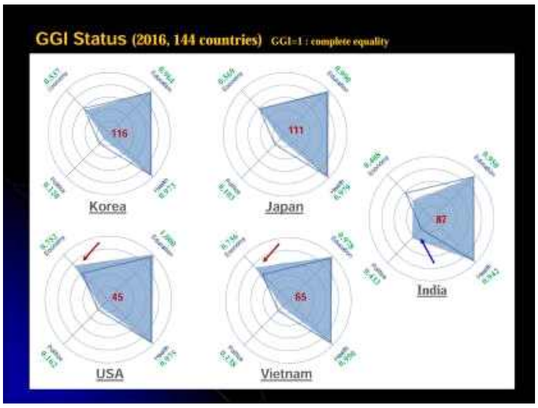
Source: WEF, Global Gender Gap Report 2016

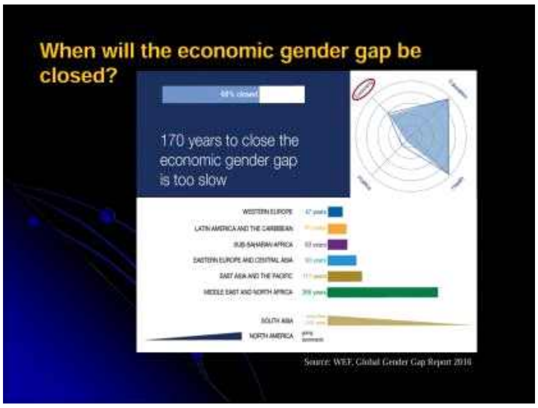
GGI Status of Korea (2006-2016) GGI=1 : complete equality

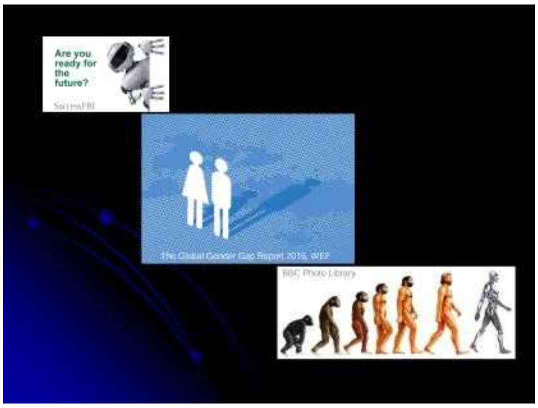
Year (country no.)	GGI		E. participation & opportunity		Education attainment		Health and survival		Political empowerment	
	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value
2006 (115)	92	0.616	96	0.481	82	0.948	94	0.967	84	0.067
2007 (128)	97	0.641	90	0.580	94	0.949	106	0.967	95	0.067
2008 (130)	108	0.615	110	0.487	99	0.937	107	0.967	102	0.071
2009 (134)	115	0.615	113	0.520	109	0.894	80	0.973	104	0.071
2010 (134)	104	0.634	111	0.520	100	0.947	79	0.973	86	0.097
2011 (135)	107	0.628	117	0.493	97	0.948	78	0.974	90	0.097
2012 (135)	108	0.636	116	0.509	99	0.959	78	0.973	86	0.101
2013 (136)	111	0.635	118	0.504	100	0.959	75	0.973	86	0.105
2014 (142)	117	0.640	124	0.512	103	0.965	74	0.973	93	0.112
2015 (145)	115	0.651	125	0.557	102	0.965	79	0.973	101	0.107
2016 (144)	116	0.649	123	0.537	102	0.964	76	0.973	92	0.120
changes		+0.033		+0.056		+0.016		+0.006		+0.053

Source: WEF, Global Gender Gap Report 2016









◦ Dr. Yanghee Kim (CEO, Gender & Leadership)

BIEN 2017. Sept.2

GENDER BARRIERS PERCEIVED AND EXPERIENCED BY WOMEN SCIENTISTS AND ENGINEERS AMONG APNN MEMBER COUNTRIES

YANGHEE KIM/GENDER & LEADERSHIP

Speaker

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<Education Background>
Loyola University Chicago, Ph.D. in Social Psychology

<Professional Background>
Senior Researcher & Director of Gender Mainstreaming Dept., Korean Women's Development Institute
Adjunct professor, Sookmyung Women's University, Catholic University

<Major Publications & Research>
2017 *Leadership Model of Successful Organizations*, Isae Pub.
2010 *Development of Global Women's Leadership Training Program for Informal Sector*, Korea Foundation for Women
2007 *Empowerment in Asia and the Pacific: Linking the Millenium Development Goals(MDGs) with the CEDAW and Beijing Indicators*, UNESCAP
2002 *Assessment of Resources, Best Practices and Gaps in Gender, Science and Technology in ROK*, UNESCO

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순서

1. Background of survey
2. Theory and methodology
3. Result of survey
4. Summary and recommendations

Based on <The 2016 Policy Report on Balanced Development of Human Resources for the Future> by Kong-Ju-Bock Lee et. al. (2016)

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1. Background of survey

BACKGROUND OF SURVEY

- Role of S & T in improving quality of life is now more prominent than ever.
- Women's active inclusion in scientific fields is crucial in efforts to alleviate poverty and in promoting sustainable development.
- But in many parts of the world, scientific fields remain male-dominated and women who continue to actively practice science after obtaining higher degrees remain under-represented.
- Yet, policymakers don't realize the potential significance of the gender gap in STEM fields.
- UNESCO has called on the international community to help countries gather data on women in STEM fields and put in place strategies for increasing women's participation in S & T.
- Reliable evidence can inform and help policymakers identify areas to target for intervention.

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BACKGROUND OF SURVEY

- Myth about STEM field
  - People tend to believe that science is rational, objective and free of bias
  - Meritocracy prevails: "You can do anything if only you are smart and try hard"
- World Reality
  - World's total science researchers, only 27 per cent are women (UNESCO, 2010)
- Reality in Korea: Ministry of Science, ICT & Future Planning) report(2014)
  - Women in R&D personnel in STEM field: 18.7%
  - Full timer: 55% among women, 78.7% among men
  - Women managers: 7.3% (glass ceiling)
- MIT report (1999)
  - Despite the fact that the number of women who study science and engineering has been increasing, real change has been slow in the fields due to collective ignorance of what consists gender discriminations.
  - Lab-coat culture and work environment inconsiderate of specific needs of women
- Awareness of gender barriers & efforts to get rid of them is imperative

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PROJECT DESCRIPTION

- KWSE(Association of Korean Women Scientists & Engineers)
  - In 2014, launched policy study as part of the International Cooperation Policy Project
  - Since then, KWSE has been carrying out to examine the state of women in S&T in APNN (Asia Pacific Nations Network) member countries
  - The purpose is to lay a foundation to create an Asian equivalent to *She Figures* (by EU) and to serve as a useful reference in policy development for the balanced utilization of highly educated and talented female scientists and engineers in the Asia-Pacific region, including Korea
  - Major contents include 1) analysis of international situation on the development as well as utilization of female human resource and 2) survey of women scientists and engineers
- Today's presentation
  - Introduces the major results of survey on gender barriers that female scientists and engineers among APNN member countries perceive and experience
- The original research report is
  - *The 2016 Policy Report on Balanced Development of Human Resources for the Future*. by Kong-Ju-Bock Lee, Jung Sun Kim and Yanghee Kim (2016)

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2016 RESEARCH

- Focused on
  1. Review of international indices for female human resources development
     - Cross-country comparisons based on HDI by UNDP
     - Cross-country comparisons based on GII of UNDP
     - Cross-country comparisons of the GGI of the WEF
     - Cross-country comparisons of labor force participation rates of the OECD member countires
     - Cross-country comparisons based on the overview of female scientists by UNESCO
  2. Joint survey on gender barriers perceived and experienced by women in science and engineering among APNN member countries
     - The purpose was to examine various gender-related challenges experienced by female scientists and engineers of APNN member countries.
- Participating APNN countries
  - Nepal, New Zealand, Malaysia, Mongolia, Bangladesh, Vietnam, Sri Lanka, India, Japan, Taiwan, Pakistan, Korea and Australia

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II. Theory and Methodology

GENDER BARRIERS

- Gender barriers
  - Refers to experiences of gender discrimination, which function as hindrances to achieving gender equality.
  - Includes:
    - Institutional vs. customary barriers
    - Conscious vs. unconscious barriers
  - Specific examples are:
    1. Gender role stereotypes
    2. Discriminations in employment, wages, promotion, etc.
    3. Burdens of balancing work-life and family responsibilities
    4. Sexual harassment and other unfair treatment

GENDER BARRIERS

- Gender role stereotypes
  - A set of beliefs about the proper roles of men and women.
  - It is exhibited as an assertion on the roles that men and women should assume, and involves gender stereotypes of characteristics, interests and behavior.
  - An individual's gender role ideology reflects his or her tendency to uphold gender equality or gender discrimination.
- Discriminations in employment, wages, promotion, etc...
  - "Glass ceiling": refers to an invisible barrier that prevents women from assuming high-ranking positions regardless of their levels of attainment or strengths
- Burdens of balancing work & life and family responsibilities
  - M-curve, L-curve
  - Cost of career break
- Sexual harassment and other unfair treatment
  - Research funding, being a project manager, etc...

METHODOLOGY

- Respondents
  - 1,379 female scientists and engineers in 12 countries except for Australia among 13 APNN member countries
- Period of survey
  - May 15th, 2016 ~ June 30th
- Data collection
  - On-line as well as off-line survey using a questionnaire, consisting 24 items
- Analysis of data
  - Data cleaning and pre-coding
  - Analysis using SPSS Statistics version 23.0
    - Basic descriptive analysis, including frequencies
    - Differential & correlational analyses: t-test, ANOVA, Pearson's correlations, etc...
    - Multivariate analysis: Multiple regression analysis

QUESTIONNAIRE ITEMS

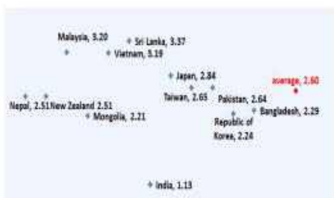
Category		Items	Number
General		Year of birth, Major, Vocation and Title, Career break, Marital status, Number of children, Nationality	9
GENDER BARRIER (5 point Likert)	Perception of Discrimination	①Boys rather than girls are encouraged to pursue majors in STEM. ②Women face more difficulties than men in finding jobs in STEM despite having the same competence as their male counterparts. ③Female scientists face more difficulties than male scientists in becoming full-time faculty or principal investigators. ④Women receive less wages than male colleagues having the same qualifications in the fields of science and technology.	4
	Experiences of Discrimination	①I have experienced disadvantages in participating in a research project or becoming a principal investigator because I am female. ②I have experienced disadvantages in receiving research funds or scholarships because I am female. ③I have been sexually harassed or received unfair treatment at work. ④Maintaining work-life balance (marriage, family) has been a handicap in my career.	4
	Gender Role Stereotype	①Men must be the breadwinner of households. ②Women have an innate ability to take care of children, men do not. ③Husbands must have more power and authority than wives for peace and order in the household. ④Men and women must assume adequate roles because the former tends to be more rational and the latter more emotional.	4
Career prospect		I believe my career will go well.	1
Policy needs		Strong policies are necessary to overcome gender inequality in STEM fields.	1
Equality belief		I believe that gender equality will be fully achieved once women are given the same opportunities as men.	1

III. Results of Survey

RESULTS OF SURVEY

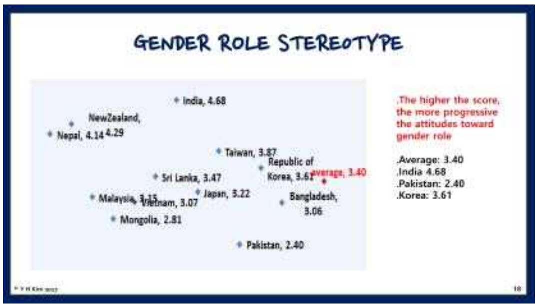
- Respondents by country: Average=114.9
  - (Total 1,379) Malaysia: 175, Mongolia: 161, Japan: 138,... Taiwan: 79, New Zealand: 68
- Age: Average=35.36
  - 20s: 39.3%, 30s: 30.1%, 40s: 15.3%, 50s: 15.3%
- Marital status
  - Single: 41.8%, Married: 51.8%, Divorced/Separated: 3.8%, Others: 2.6%
- Number of children: Average=0.84
  - 0: 53.1%, 1: 17.1%, 2: 22.5%, 3+: 7.3%
- Occupation
  - Professor/teacher: 26%, Engineer: 24.5%, Researcher: 16.5%, Students: 15.9%, Health personnel: 6.3%, Others: 10/8%
- Area of study/Major
  - Engineering: 47.9%, Natural science: 23.6%, Medical/pharmaceutical: 14.1%, Social science: 9.6%, Education 2.9%, Humanities 1.1%, etc...
- Duration of career break: Average=18.07 months
  - None: 49.5%, Less than 1year: 8.4%, 1~2year: 11.6%, 2~3year: 10.3%, 3year+: 20.2%

DISCRIMINATION PERCEIVED

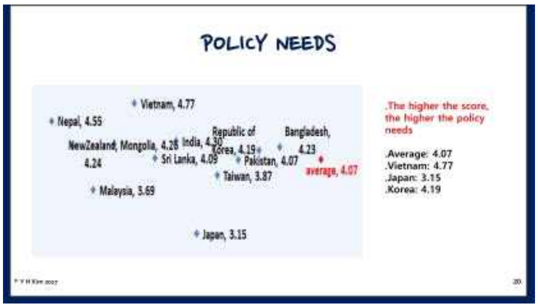


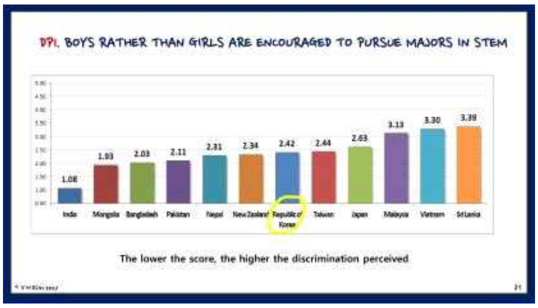
- The lower the score, the higher the discrimination perceived
- Average: 2.60
- India: 1.13
- Sri Lanka: 3.37
- Korea: 2.24

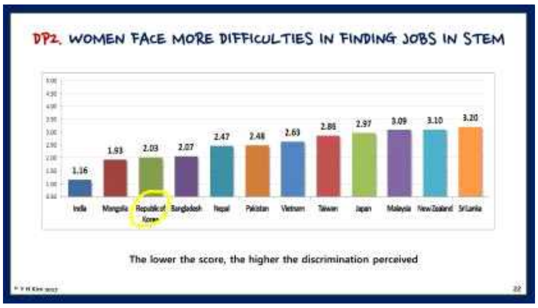

DISCRIMINATION EXPERIENCED
Sri Lanka, 3.61
Malaysia, 3.43
Nepal, 3.26
Pakistan, 3.18
Bangladesh, 3.18
Taiwan, 3.19
NewZealand, 2.99
Mongolia, 2.89
Japan, 2.91
Republic of Korea, 2.99
average, 3.05
Vietnam, 2.44
India, 2.27
.The lower the score, the higher the discrimination experienced
.Average: 3.05
.India: 2.27
.Sri Lanka: 3.61
.Korea: 2.29
17

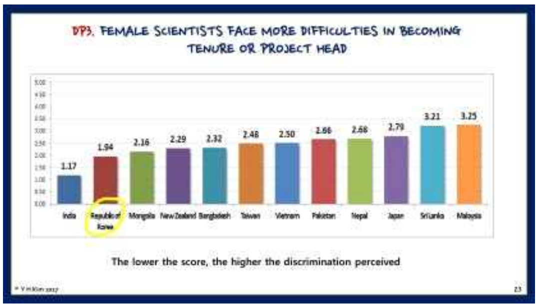

GENDER ROLE STEREOTYPE
India, 4.68
NewZealand, 4.29
Nepal, 4.14
Taiwan, 3.87
Republic of Korea, 3.61
average, 3.40
Sri Lanka, 3.47
Japan, 3.22
Bangladesh, 3.06
Malaysia, 3.15
Vietnam, 3.07
Mongolia, 2.81
Pakistan, 2.40
.The higher the score, the more progressive the attitudes toward gender role
.Average: 3.40
.India 4.68
.Pakistan: 2.40
.Korea: 3.61
18

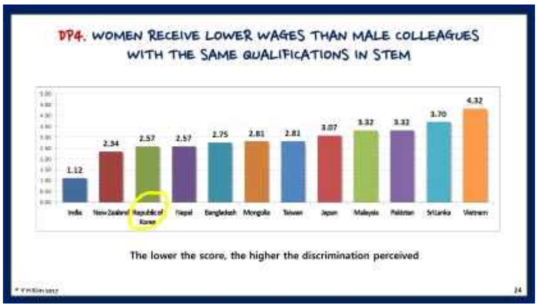

CAREER OUTLOOK
Bangladesh, 4.37
Sri Lanka, 4.11
Pakistan, 4.02
Nepal, 3.83
Mongolia, 3.99
average, 3.70
Taiwan, 3.78
NewZealand, 3.74
Malaysia, 3.62
India, 3.55
Republic of Korea, 3.39
Vietnam, 3.37
Japan, 2.96
.The higher the score, the more positive the career outlook
.Average: 3.70
.Bangladesh: 4.37
.Japan: 2.96
.Korea: 3.39
19

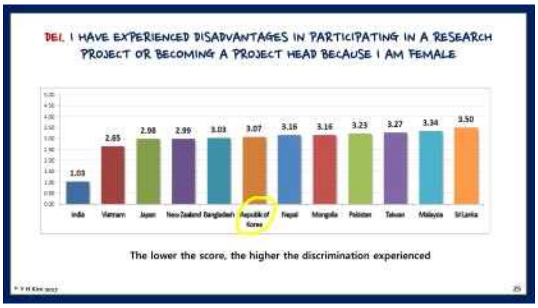

POLICY NEEDS
Vietnam, 4.77
Nepal, 4.55
Republic of Korea, 4.19
Bangladesh, 4.23
NewZealand, 4.24
Mongolia, 4.28
India, 4.30
Sri Lanka, 4.09
Pakistan, 4.07
average, 4.07
Taiwan, 3.87
Malaysia, 3.69
Japan, 3.15
.The higher the score, the higher the policy needs
.Average: 4.07
.Vietnam: 4.77
.Japan: 3.15
.Korea: 4.19
20

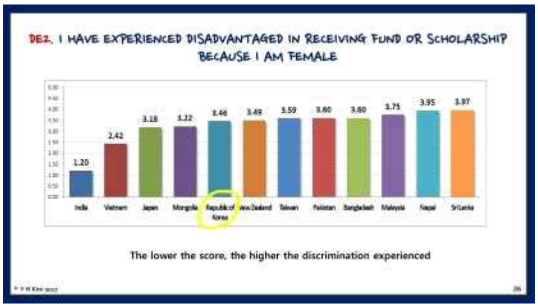

DP1. BOYS RATHER THAN GIRLS ARE ENCOURAGED TO PURSUE MAJORS IN STEM
1.08 India
1.93 Mongolia
2.03 Bangladesh
2.11 Pakistan
2.31 Nepal
2.34 New Zealand
2.42 Republic of Korea
2.44 Taiwan
2.63 Japan
3.13 Malaysia
3.30 Vietnam
3.39 Sri Lanka
The lower the score, the higher the discrimination perceived
21

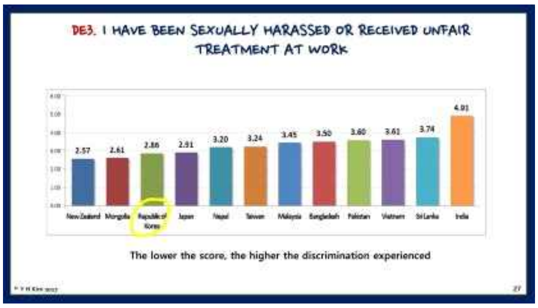

DP2. WOMEN FACE MORE DIFFICULTIES IN FINDING JOBS IN STEM
1.16 India
1.93 Mongolia
2.03 Republic of Korea
2.07 Bangladesh
2.47 Nepal
2.48 Pakistan
2.63 Vietnam
2.86 Taiwan
2.97 Japan
3.09 Malaysia
3.10 New Zealand
3.20 Sri Lanka
The lower the score, the higher the discrimination perceived
22

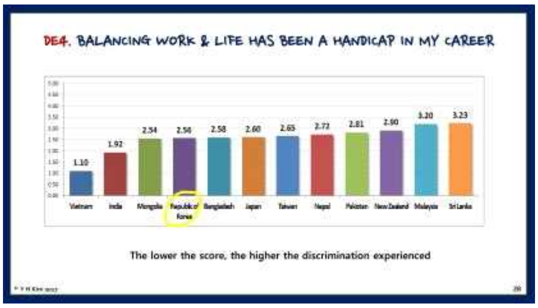

DP3. FEMALE SCIENTISTS FACE MORE DIFFICULTIES IN BECOMING TENURE OR PROJECT HEAD
1.17 India
1.94 Republic of Korea
2.16 Mongolia
2.29 New Zealand
2.32 Bangladesh
2.48 Taiwan
2.50 Vietnam
2.66 Pakistan
2.68 Nepal
2.79 Japan
3.21 Sri Lanka
3.25 Malaysia
The lower the score, the higher the discrimination perceived
23

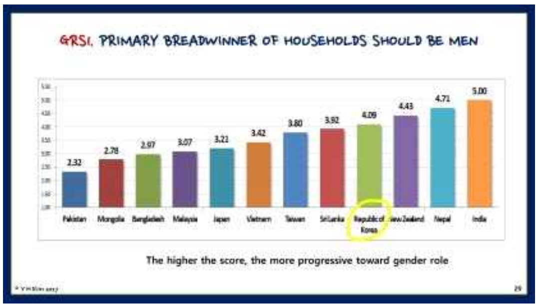

DP4. WOMEN RECEIVE LOWER WAGES THAN MALE COLLEAGUES WITH THE SAME QUALIFICATIONS IN STEM
1.12 India
2.34 New Zealand
2.57 Republic of Korea
2.57 Nepal
2.75 Bangladesh
2.81 Mongolia
2.81 Taiwan
3.07 Japan
3.32 Malaysia
3.32 Pakistan
3.70 Sri Lanka
4.32 Vietnam
The lower the score, the higher the discrimination perceived
24

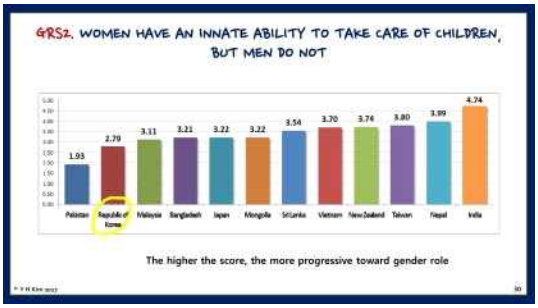

DE1. I HAVE EXPERIENCED DISADVANTAGES IN PARTICIPATING IN A RESEARCH PROJECT OR BECOMING A PROJECT HEAD BECAUSE I AM FEMALE
1.03 2.65 2.98 2.99 3.03 3.07 3.16 3.16 3.23 3.27 3.34 3.50
India Vietnam Japan New Zealand Bangladesh Republic of Korea Nepal Mongolia Pakistan Taiwan Malaysia Sri Lanka
The lower the score, the higher the discrimination experienced
25

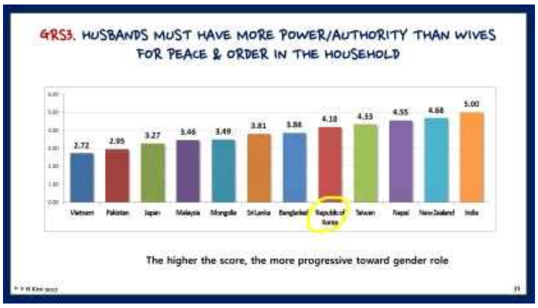

DE2. I HAVE EXPERIENCED DISADVANTAGED IN RECEIVING FUND OR SCHOLARSHIP BECAUSE I AM FEMALE
1.20 2.42 3.18 3.22 3.46 3.49 3.59 3.60 3.60 3.75 3.95 3.97
India Vietnam Japan Mongolia Republic of Korea New Zealand Taiwan Pakistan Bangladesh Malaysia Nepal Sri Lanka
The lower the score, the higher the discrimination experienced
26


DE3. I HAVE BEEN SEXUALLY HARASSED OR RECEIVED UNFAIR TREATMENT AT WORK
2.57 2.61 2.86 2.91 3.20 3.24 3.45 3.50 3.60 3.61 3.74 4.91
New Zealand Mongolia Republic of Korea Japan Nepal Taiwan Malaysia Bangladesh Pakistan Vietnam Sri Lanka India
The lower the score, the higher the discrimination experienced
27

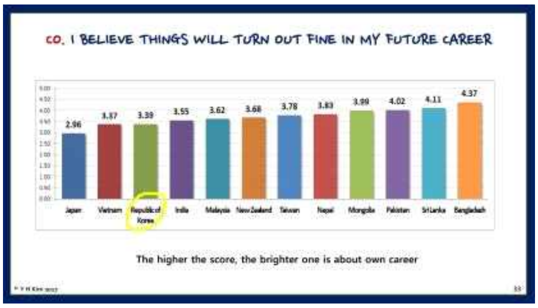

DE4. BALANCING WORK & LIFE HAS BEEN A HANDICAP IN MY CAREER
1.10 1.92 2.54 2.56 2.58 2.60 2.65 2.72 2.81 2.90 3.20 3.23
Vietnam India Mongolia Republic of Korea Bangladesh Japan Taiwan Nepal Pakistan New Zealand Malaysia Sri Lanka
The lower the score, the higher the discrimination experienced
28

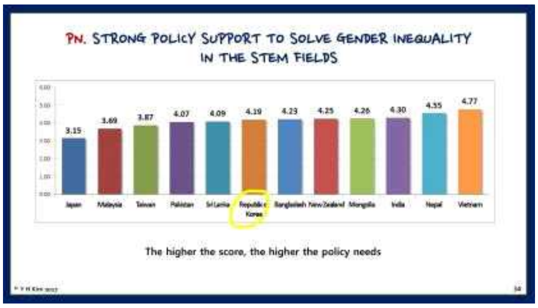

GRS1. PRIMARY BREADWINNER OF HOUSEHOLDS SHOULD BE MEN
2.32 2.78 2.97 3.07 3.21 3.42 3.80 3.92 4.09 4.43 4.71 5.00
Pakistan Mongolia Bangladesh Malaysia Japan Vietnam Taiwan Sri Lanka Republic of Korea New Zealand Nepal India
The higher the score, the more progressive toward gender role
29

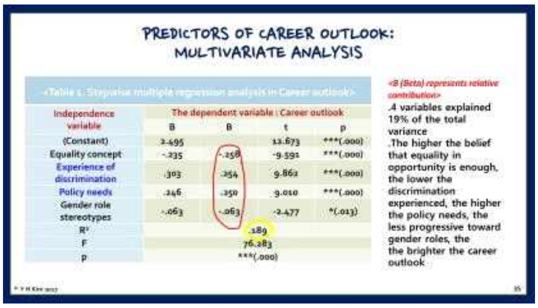

GRS2. WOMEN HAVE AN INNATE ABILITY TO TAKE CARE OF CHILDREN, BUT MEN DO NOT
1.93 2.79 3.11 3.21 3.22 3.22 3.54 3.70 3.74 3.80 3.99 4.74
Pakistan Republic of Korea Malaysia Bangladesh Japan Mongolia Sri Lanka Vietnam New Zealand Taiwan Nepal India
The higher the score, the more progressive toward gender role
30


GRS3. HUSBANDS MUST HAVE MORE POWER/AUTHORITY THAN WIVES FOR PEACE & ORDER IN THE HOUSEHOLD
2.72 2.95 3.27 3.46 3.49 3.81 3.86 4.18 4.33 4.55 4.68 5.00
Vietnam Pakistan Japan Malaysia Mongolia Sri Lanka Bangladesh Republic of Korea Taiwan Nepal New Zealand India
The higher the score, the more progressive toward gender role
31

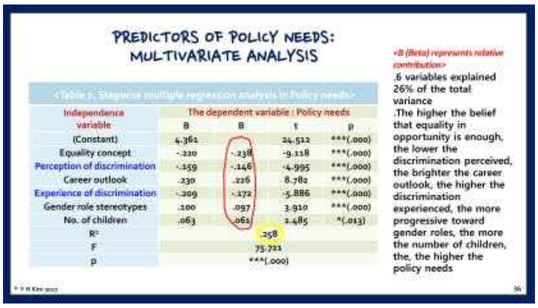

GRS4. MEN AND WOMEN MUST ASSUME ADEQUATE ROLES BECAUSE THE FORMER TEND TO BE MORE RATIONAL AND THE LATTER MORE EMOTIONAL
1.74 2.21 2.41 2.44 2.59 2.94 3.20 3.27 3.38 3.56 3.97 4.29
Mongolia Bangladesh Pakistan Vietnam Sri Lanka Malaysia Japan Nepal Republic of Korea Taiwan India New Zealand
The higher the score, the more progressive toward gender role
32



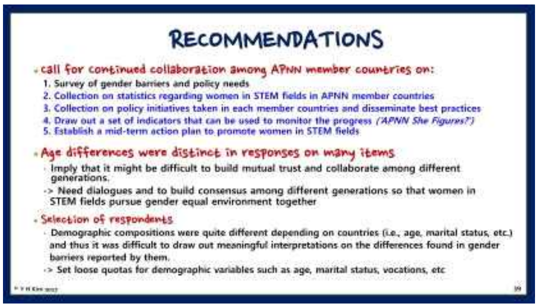




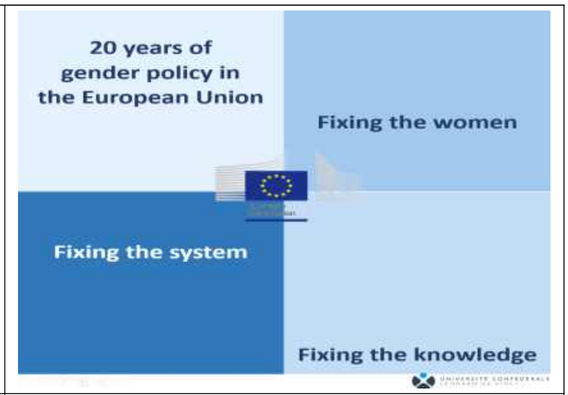
Independence variable	The dependent variable : Career outlook			
	B	B	t	p
(Constant)	2.495		12.673	***(.000)
Equality concept	-.235	-.258	-9.592	***(.000)
Experience of discrimination	.303	.254	9.862	***(.000)
Policy needs	.246	.250	9.010	***(.000)
Gender role stereotypes	-.063	-.063	-2.477	*(.013)
R^2	.189			
F	76.283			
p	***(.000)			

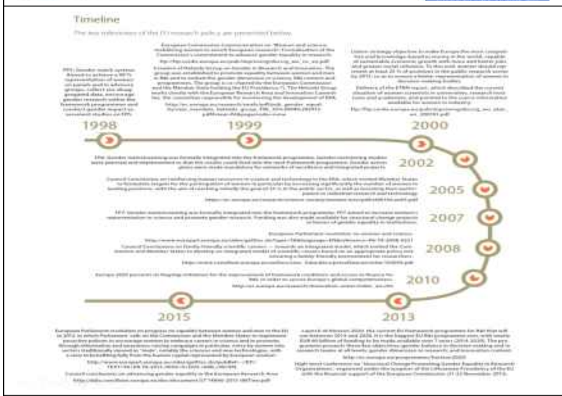


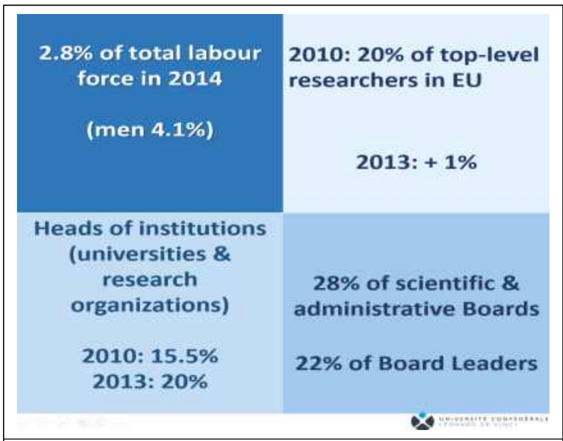
Independence variable	The dependent variable : Policy needs			
	B	B	t	p
(Constant)	4.361		24.512	***(.000)
Equality concept	-.220	-.238	-9.118	***(.000)
Perception of discrimination	-.159	-.146	-4.995	***(.000)
Career outlook	.230	.226	8.782	***(.000)
Experience of discrimination	-.209	-.172	-5.886	***(.000)
Gender role stereotypes	.100	.097	3.910	***(.000)
No. of children	.063	.061	2.485	*(.013)
R^2	.258			
F	75.721			
p	***(.000)			



◦ Dr. Caroline Belan-Menagier (Confederal University Leonardo da Vinci, Head of Unit, International Relations and Lifelong Learning Strategies)

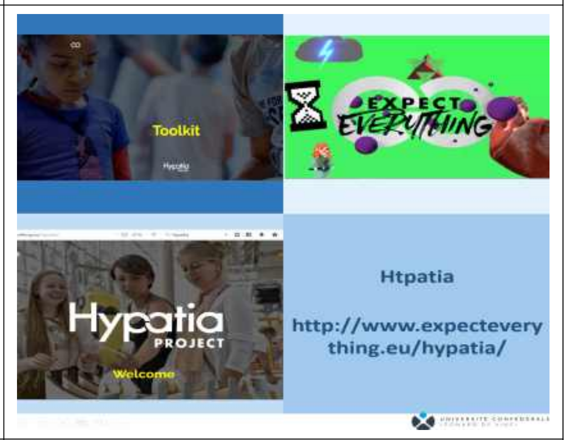


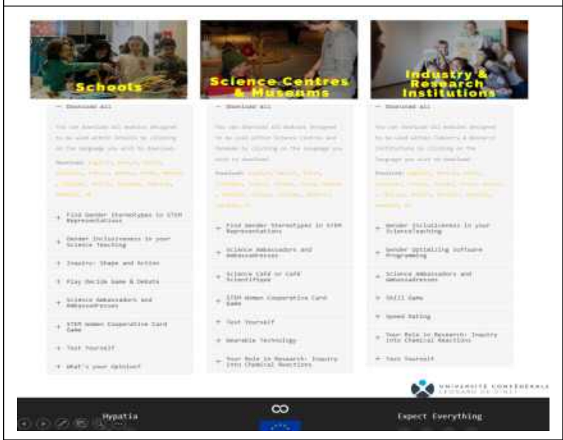


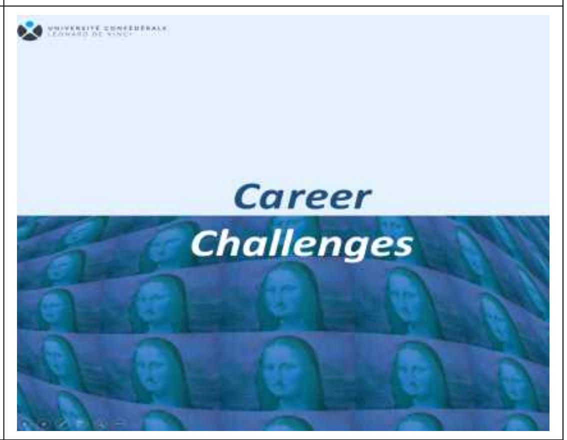

2.8% of total labour force in 2014
(men 4.1%)
2010: 20% of top-level researchers in EU
2013: + 1%
Heads of institutions (universities & research organizations)
2010: 15.5%
2013: 20%
28% of scientific & administrative Boards
22% of Board Leaders

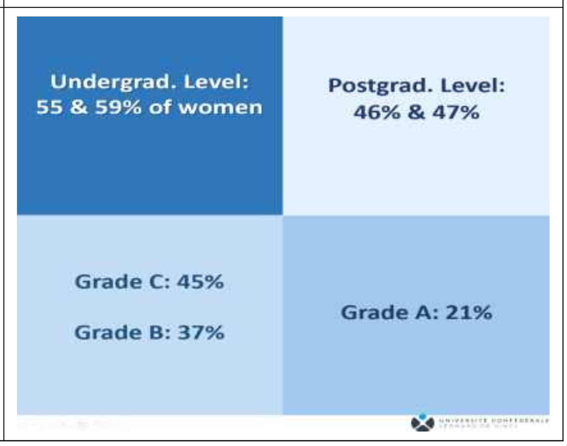

Questionnaire
How strongly do you associate the following with males and females?
Science
Project Implicit

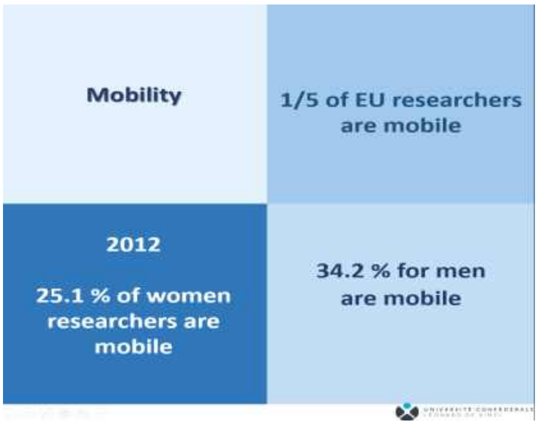

Women at the top are also role models
Awareness &Training on unconscious bias
Need for transparency
Clear criteria
& justification for recruitment and promotion
GETTING WOMEN TO THE TOP IN RESEARCH

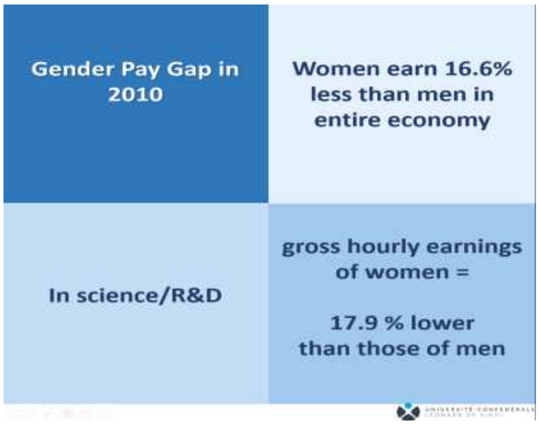

Toolkit
EXPECT EVERYTHING
Hypatia PROJECT
Welcome
Htpatia
http://www.expectevery thing.eu/hypatia/

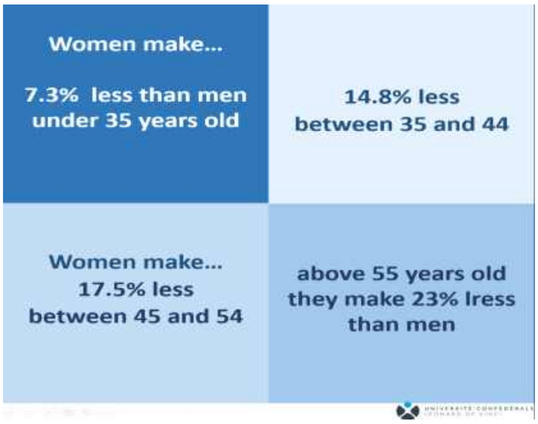

Schools
Science Centres & Museums
Industry & Research Institutions
Hypatia
Expect Everything


Career
Challenges


Undergrad. Level: 55 & 59% of women
Postgrad. Level: 46% & 47%
Grade C: 45%
Grade B: 37%
Grade A: 21%


Mobility
1/5 of EU researchers are mobile
2012
25.1 % of women researchers are mobile
34.2 % for men are mobile


Gender Pay Gap in 2010
Women earn 16.6% less than men in entire economy
In science/R&D
gross hourly earnings of women =
17.9 % lower than those of men


Women make...
7.3% less than men under 35 years old
14.8% less between 35 and 44
Women make...
17.5% less between 45 and 54
above 55 years old they make 23% lress than men


Thank you
BIEN 2017

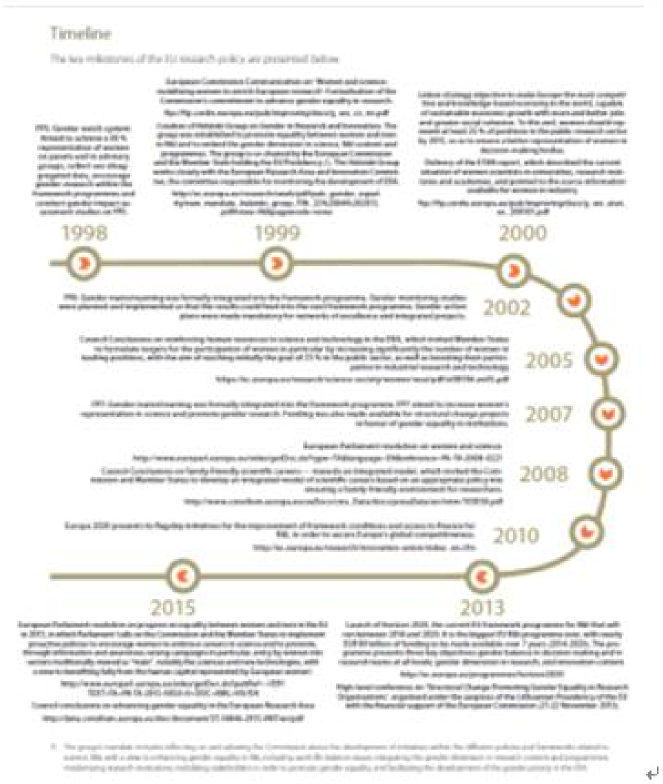
Making full use of human potential:

How structural change is being promoted in the European Union

Caroline Bélan-Ménagier

Speech delivered for BIEN MAPWIST 2017, September 2017

In the last twenty years or so, gender equality policies in Europe have evolved from simply "fixing women" to "fixing the system" and finally "fixing knowledge". The chronology below shows the journey that the European Union chose to take to improve the situation of women in science since the 1990s.



Source: Gender in Research, European Institute for Gender Equality, January 2017.
http://eige.europa.eu/rdc/eige-publications/gender-research

It is a pathway made of different and successive stepping stones that, together, build up a comprehensive vision and policy framework of what Europe thinks gender equality in research should

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be (in its own higher education and research institutions as well as at the national level, in its Member state ministries for research). The European Union (EU), as of today made of 28 countries, is organized in such a way that it originates policies and annually monitors their implementation in each Member state; it devises common objectives for which it supports countries by funding European projects and organizing peer learning activities and best practice exchange. The EU is therefore a very efficient political tool that, for almost twenty years, has slowly but surely set up a major policy framework to advance the situation of women in science and the integration of the gender dimension in research.

The title of BIEN 2017 is "Shaping the Future". Keeping in mind that we need to have a forward-looking vision and address the next generations, I would like to step back a little and, through the European collection of statistics called "She Figures", have a look at the current situation for women in Europe and focus on a few indicators: **horizontal and vertical segregation and career challenges.** At the same time, I will try to indicate, in each situation, a few European projects or the directions chosen by the EU--they might resonate with what you are actively doing here in the APNN network.

We know that gender equality in research is essential, not only for fairness, justice and democracy but also because it could help address current and future deficits in skilled labour within the EU. How do 28 countries address this issue together? Those past 20 years, tremendous work has been achieved by those 28 countries. The EU has endeavored a gigantic task: making each government implement a gender action plan for its research sector (as research is a policy competence that belongs to the EU—it can propose legislation on research and evaluate progress).

From the 1990s until the end of the years 2000, Europe has discovered, through a regular collection of statistics, that women were largely discriminated against, in all fields of science and that they were not contributing to science and technology as much as mem—which was considered a great waste of talents. The policy response at EU level was therefore shaped in three distinct but complementary ways: the first batch of initiatives was called "fixing the women". Indeed, the very first time the EU engaged into real policy on gender in science was in 1999, with a policy text proposed bY the

2.

European Commission (EC). This "Communication on Women and Science"[1] primarily aimed at assisting women to better fit the requirements of academic professions. Today, the phrase "fixing women" sounds like "women are not smart enough to adapt to the system, so we should fix them—correct them" as if there was something wrong with them... And yet if the phrase "fixing women" is barely acceptable today, there were—and there still are—things to fix, notably, in the self-image of women in science and the issue of self-censorship for instance. As a result, between 1999 and 2009, Europe supported the countries which organized and funded actions for individual women, such as coaching and mentoring and the European Commission (that can be considered as the "armed wing" of European policy) also supported the launch of networks such as the European Platform for Women Scientists[2].

Then, in 2008 and 2009, two major publications introduced another concept: "fixing the system".

The two reports published by the EC were called "The Gender Challenge in Research Funding[3]" and "Mapping the maze: Getting more women to the top in research[4]". To put it shortly, they both took stock of the problems: too few women in decision-making positions and a lack of equal access of women to funding—two issues that, again, emphasize that the potential of women in research, science and technology was largely overlooked. Based on that observation, those reports recommended to change the way things were done and not only the way women acted. This second phase in European policy, called "fixing the system", promoted the adoption by European universities and research centers of disruptive policies for systemic cultural change. In those "structural change projects"—still funded today by the EU—between 3 and 5 institutions from different countries commit to implementing reforms in their institutional culture. This means that there is still a long way to go to cover all the universities in Europe! However, these projects have produced an incredible

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[1] "Women and science: mobilising women to enrich European research", Communication from the Commission, 19 February 1999.

[2] http://epws.org/

[3] http://ec.europa.eu/research/science-society/document_library/pdf_06/gender-challenge-in-research-funding_en.pdf

[4] http://ec.europa.eu/research/science-society/document_library/pdf_06/mapping-the-maze-getting-more-women-to-the-top-in-research_en.pdf

3.

amount of research, expertise and deliverables readily available to all willing to change...

To this implementation phase of gender policies has been added a focus on funding research on gender and science. That phase is called "fixing the knowledge" and it has proved indispensable to gather arguments in favor of gender equality and the promotion of women, to evaluate the waste of talents and of excellence and to devise trainings, like the Yellow Window "gender in research toolkit[5]" and case studies like those in "gendered innovations" to help researchers in Europe understand unconscious bias and introduce the gender dimension in their own research contents. Two reports characterize those directions taken by the EU: "Meta-analysis of gender and science research[6]" and "Gendered innovations: how gender analysis contributes to research[7]". The EU has, as we can see, devised a systemic way of addressing the gender issue. This is definitely long-term work.

- **Horizontal and vertical segregation**

The "She Figures" collection shows, however, that there is still a long way to go to reach equality and gender balance in European countries. Statistics show that, in recent decades, there have been strides towards parity in the pool of higher education graduates: while women were once largely under-represented at doctoral level, in 2012 they made up 47 % of PhD graduates in Europe. But despite relative progress, European research still shows a pronounced under-representation of women, particularly in what we call "hard sciences" (ie STEM), and in leadership positions but also all across scientific fields. In 2011, women in the EU accounted for only 33 % of researchers – a figure unchanged since 2009. In the business enterprise sector, they only represent about one in five researchers and in science & technology occupations, in more than half of the EU countries, women make up less than 45 % of scientists and engineers. And as far as their number is concerned, women

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[5] https://yellowwindow.com/en/work/policy/gender-in-research

[6] https://ec.europa.eu/research/swafs/pdf/pub_gender_equality/meta-analysis-of-gender-and-science-research-synthesis-report.pdf

[7] http://ec.europa.eu/research/science-society/document_library/pdf_06/gendered_innovations.pdf as well as the web site: http://ec.europa.eu/research/swafs/gendered-innovations/index_en.cfm?pg=home

4

scientists and engineers made up 2.8 % of the total labor force in 2013, when men made up 4.1 % of the total labor force in Europe. In addition to this low global percentage of women researchers and engineers, women are also under-represented in top-level and decision-making positions in European research. "She figures" show that gender inequalities persist when it comes to career advancement and participation in academic decision-making. In 2013, women made up only 21 % of the top-level researchers (grade A), showing very limited progress compared to 2010 when they represented 20 %. In 2014, the proportion of women among heads of higher education institutions rose to 20 % from 15.5 % in 2010 and women made up 28 % of scientific and administrative board members and only 22 % of board leaders.

For the first time in "She Figures 2015[8]", a deeper analysis of senior university staff, by field of science, reveals that there are still relatively few women in leadership positions even in the fields where they are overrepresented like Social Sciences and Humanities (SSH). In fact, there is a serious dichotomy in career outcomes for men and women in academia whatever the number of women.

To back up those figures, some French researchers from CNRS have used the "Project Implicit[9]" as a tool to see, in their own research organization, in each scientific committee, if women and men were more or less unconsciously biased depending on the number of women. The result was surprising: women and men were more unconsciously biased against women in SSH whereas in mathematics, women and men were less biased. From this experiment, they concluded two things: the first one was that there was a strong need to deconstruct stereotypes together with the scientific committees so that they could be aware of their own bias especially in recruitment, promotion and retention of women. The second point was that they concluded that women in science were also undergoing the "Stereotype threat". The "stereotype threat" has been shown to reduce the performance of individuals who belong to negatively stereotyped groups. If negative stereotypes are present regarding a specific group, like women in science, group members are likely to become anxious about their own performance, which may hinder their ability to perform at their maximum level. This

[8] http://ec.europa.eu/research/science-society/document_library/pdf_06/she-figures-2012_en.pdf

[9] https://implicit.harvard.edu/implicit/

5

refection is really in line with “fixing the women” : men and women alike need to be trained and to become aware of gender stereotypes which are social constructs. The fact that women were more numerous did not make them less sensitive to their male and female counterperts' pressure and sexism. However, “fixing stereotypes” is definitely not enough: the report published by the European Commission called “Mapping the maze: Getting more women to the top in research” already tackled, back in 2008, this issue of the absence of women in decision-making positions in research. It noticed that one of the consequences of the inexistence of women at the top was that if women scientists are not visible and if they are not seen to be succeeding in their careers, they cannot serve as role models to attract and retain young women in scientific professions. There is here a vicious circle: no women in top positions give the signal that there is no future for women in science and technology. As a result, as a Rector of a university for example, one has trouble attracting interested female students, and even if it is decided that women will be supported to reach top positions, the pool of women is not large enough as the institution never was attractive to them. And the few women who are working in that institution only have 24 hours in their day; they cannot be everywhere, in all the panels, all the boards and all the committees. Working together, European experts on gender came up with recommendations that are part of “fixing the system”. Indeed, the report (“Mapping the maze”) showed that the reasons for gender unbalance was that the funding, promotion and nomination procedures lacked transparency and fostered bias—which, in turn, disadvantaged women. This is why, for the past ten years, the EU has funded in European universities, the implementation of gender action plans that entail rethinking procedures and defining clear criteria for recruitment, promotion and retention and that promote writing down the arguments for each decision made in career management, in order to spot discriminatory items. Training panels, juries and committees about stereotypes is also one of the main tools to fight against unconscious bias.

Another major issue in Europe, as “She Figures” show us, is horizontal segregation. There are marked differences by sex when it comes to the most popular subjects and educational pathways. For instance, men are more than two times more likely than women to choose engineering, manufacturing and construction, whereas women are twice as likely to pursue an education degree. In 2012 in Europe, women accounted for just 28 % of PhD graduates in engineering, manufacturing and construction, and only 21 % of those graduating from computing. While men comprise the vast

6.

majority of students at the masters and PhD levels in natural science and technology subjects, women tend to dominate in medicine and health sciences. As you can see, "She Figures" clearly reveal the strong common gender patterns in the distributions of women and men in the scientific fields across Europe, among PhD graduates, in research and in academia. Gender segregation in education is widely acknowledged as one of the root causes of different choices made by women and men about their field studies in research. In spite of the efforts to change this situation over the last decade, choices of fields of study remain largely gendered. Research shows that gender segregation in research is driven by the same root causes as gender segregation in the labor market as a whole (those causes are gender stereotypes, gender division of labor and time constraints, covert barriers and biases in organizational practices).

But let us be positive; the influence of these factors seems to be diminishing among the younger cohorts of highly qualified women. Maybe we should also acknowledge the role of communication actions in all European countries aimed at changing the vision that girls and boys have of science. To fight the gender stereotypes early on, the European Commission, through a funding program called "Science with and for society" is supporting the Hypatia project[10]. On top of a web site designed for kids[11] the Hypatia project is now providing toolkits in several languages for teachers, schools and science centers as well as for the business sector on how to communicate about science and teach in a gender-neutral way while playing with children and teenagers[12]. For example, one of the toolkits is called "Gender Optimizing Software Programming" and it aims to reach out to developers, teachers and facilitators in order to ultimately target a broader group of girls and boys. In terms of human potential, attracting the next generation with a different approach to science and fighting those stereotypes is really worth it and it is not such an investment if the ministries in each country decide to train teachers so that they can teach science without installing or reinforcing stereotypes when they teach the little ones in elementary school but also the bigger ones--teenagers.

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[10] http://www.expecteverything.eu/hypatia/

[11] http://www.expecteverything.eu/

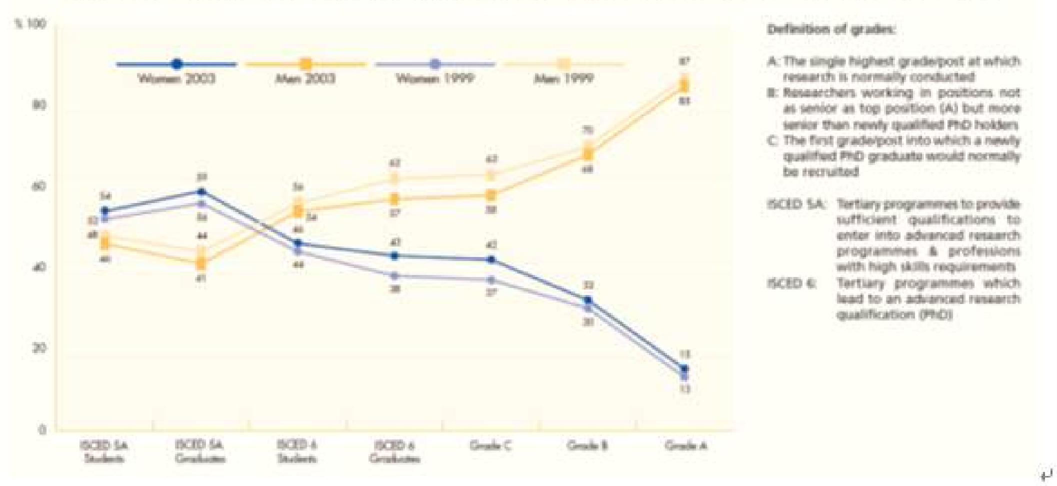
[12] http://www.expecteverything.eu/hypatia/toolkit/

7

- **Career challenges: glass ceiling, mobility and access to funding & equal pay**

Despite making progress, women scientists seeking to climb the career ladder still face many barriers. In the EU, while men's and women's access to science in schools and universities has improved, the same cannot be said for women's access to scientific careers. Women account today for almost 60% of university degrees in Europe, and they achieve excellent grades, better on average than their male counterparts. However, their presence is too scarce at the top of scientific and academic careers. The academic career of women, according to "She Figures" 2015, remains persistently characterised by strong vertical segregation. The two scissors diagrams[13] that you can see below represent the periods between 1999 and 2003 and then 2007 and 2013.

Figure 3.1: Proportions of men and women in a typical academic career, students and academic staff, EU-25, 1999-2003



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[13] Sources: "She Figures" 2006, p.55

http://www.europeanwomeninmaths.org/sites/default/files/documents/reports/she_figures_2006_en.pdf and "She Figures" 2015, p.127.

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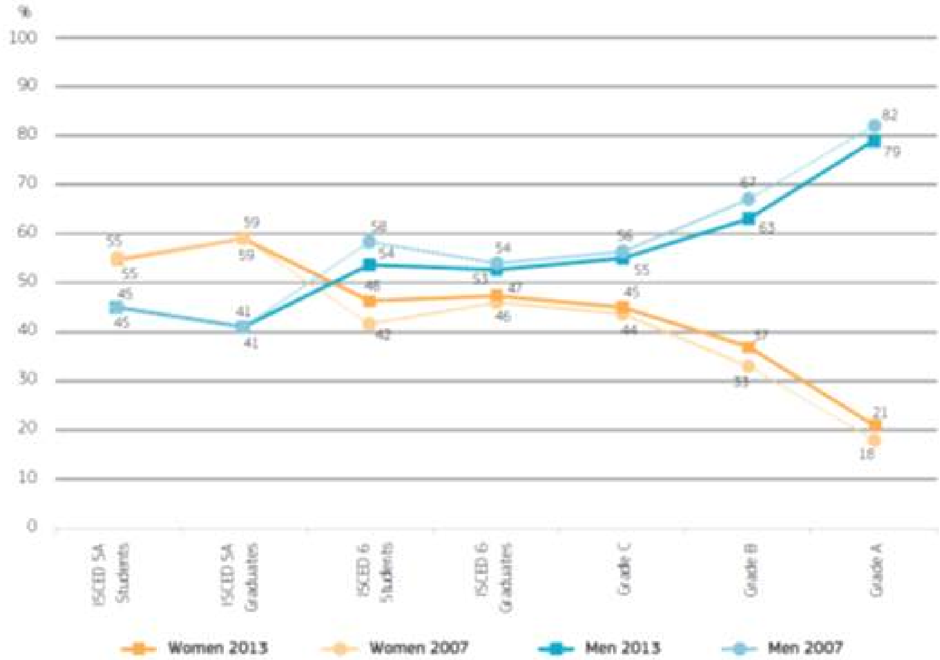
Figure 6.1. Proportion of women and men in a typical academic career, students and academic staff, EU-28, 2007–2013



As one can see, the "scissors" diagram graphically illustrates the way in which the gender gap evolves and deepens throughout the stages of an academic career, beginning with studying at the basic level of higher education, through to the senior level of grade A, equivalent to a full professor in most countries[14]. On the most recent diagram, the proportion of women students (55 %) and graduates (59 %) at the first level of academic education exceeds that of male students. Yet, in postgraduate studies, men already outnumber women at the highest level of education, with women making up respectively 46 % of students and 47 % of graduates. Finally, women represent only 45 % of grade C academic staff, 37 % of grade B and 21 % of grade A.

[14] For the first 4 sections, the diagram distinguishes students from graduates in the undergraduate program and the post-graduate programs.

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Unfortunately, although the proportion of women has increased slightly at all stages since 1999, the pattern remains constant in 2015. This reality reflects an inefficient use of highly skilled women in the EU, which is a considerable loss of talent. The diagram also demonstrates that, despite the increase in the percentage of women in research between 1999 and 2003, the gender differences are so persistent that they will not self-correct in the foreseeable future. This is an important issue, of course, as it shows that policy intervention is still essential and that it is to be well focused and effectively implemented.

In the very same way, the difference between men and women in **mobility** becomes more marked as researchers enter more senior career stages. In the EU as a whole, more than a fifth of researchers of both sexes are mobile. Mobility is strongly encouraged for researchers in Europe as the largest research projects are funded by Europe and entail having a minimum of three different countries. It means that building strong and long-lasting cooperation with other countries is a requirement and that working abroad and doing research abroad is one of the safest ways of guaranteeing the success of a European project. And yet, as researchers become more senior, the pattern of mobility for women and men begins to change[15]. While there is no clear pattern to suggest that, in the EU, men are more mobile than women at the start of their researchers' careers, by the time they progress to middle and senior positions, the situation has drastically changed. In 2012, the difference in the mobility of women and men researchers in the EU was approximately 9 % in favor of men (25.1 %/34.2 %).

Last, but not least, in scientific R&D in Europe, women earn less, on average than men, with a wider **gender pay gap** than in the total economy. "She Figures" show that the gender pay gap exists in all countries, particularly within scientific R&D in Europe. In 2010, women's average gross hourly earnings were 16.6 % lower than those of men in the entire economy. In scientific R&D, their gross hourly earnings were 17.9 % lower than those of men (again in 2010). We also have to note that he gender pay gap widens with age, both in scientific R&D and in the total economy. In Europe, the average gross hourly earnings of women in scientific R&D are 7.3 % lower than those of men when

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[15] At EU level when we talk about mobility, we are talking about having worked abroad, in the last decade, for at least three months in a country other than the one where they attained their highest educational degree.

10.

they are younger than 35. This difference rises to 14.8 % for those aged 35–44, to 17.5 % for those aged 45–54 and to 23 % for those aged 55 or more. Besides the gender pay gap, based on hourly earnings, the difference between the average annual earnings of women versus men is also influenced by the higher proportion of part-time employees among women. Even if, compared to the whole economy, part-time employment is relatively uncommon amongst researchers (approximately 10.4 % of all researchers), still, women researchers are more likely to be working part-time than men (13.5 % of women researchers and 8.5 % men researchers are working part-time).

The money issues, whether it is fixing the gender pay gap or fixing access to research funding for women, often comes down to a lack of transparency, accountability and lack of access to data to monitor individual situations. In the framework of structural change in higher education and research institutions, there is no doubt that the information linked to wages has to circulate and human resource management has to be modernized by integrating a systematic gender perspective. As usual, in-depth monitoring exercises, both quantitative and qualitative, should be carried out at the level of the institution and compared nationally.

To wrap up this overview of the current situation of women in European science, the following figures should be kept in mind: only 18% of full professors in Europe are women; 13% of heads of higher education institutions and 22% of board members in research decision-making. Women's skills, knowledge and qualifications are grossly underused in the labor market. The low numbers of women in decision-making positions throughout the science and technology system is a waste of talent that European economies cannot afford. Nor can Europe afford to waste the professional contributions of so many of its best- prepared citizens, particularly in the context of global economic recession and crises and the emerging global competitor. The challenges facing Europe today require the full participation of women in its science and technology system if it wants to develop suitable solutions for all its citizens and does not want to continue losing ground in the new economic world order. This is why extensive research has been undertaken into the reasons and mechanisms that keep women away from research and from moving up the career ladder in this field. Studies have revealed gender discriminatory practices such as biased recruitment, promotion and funding processes and criteria. There is also a strong influence of gender stereotypes in relation to science. Although progress has

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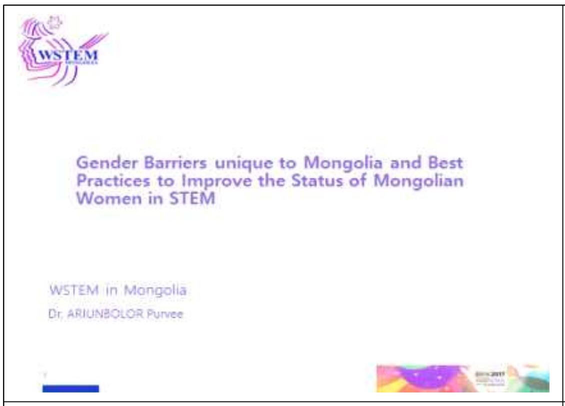
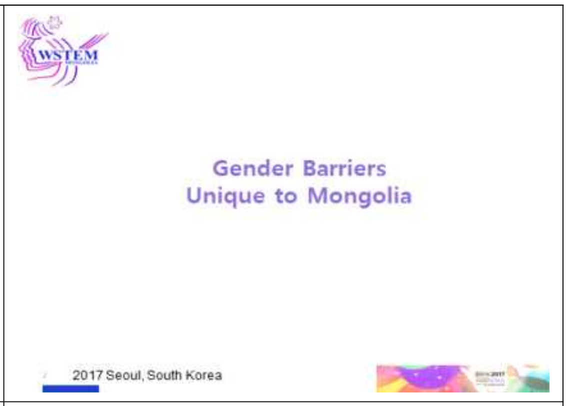
been made since the years 2000, the large difference which continues to be observed, suggests that much work remains to be done in order to reduce the gender gap at the highest levels of the academic career pathway, on the pay check and in working conditions in general. Rumor has it, however (and I could witness it in Dongseo University a few days ago) that Y and Z generations are coming and they are different.... They are already negotiating work-life balance in their workplace and teleworking or telecommuting. I have no doubt that they will also come with demands for equal pay as soon as they realize that do not have it.. The way has been paved, it is now up to them to take equality road!

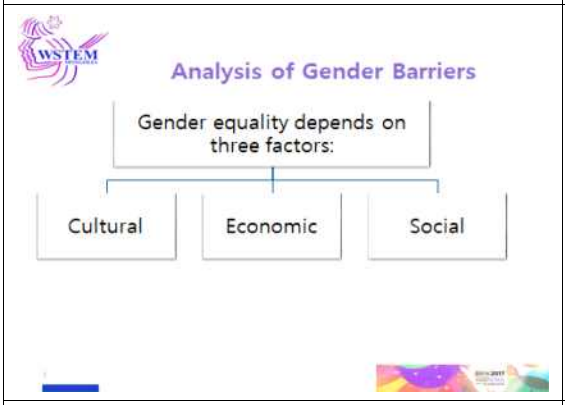
12.

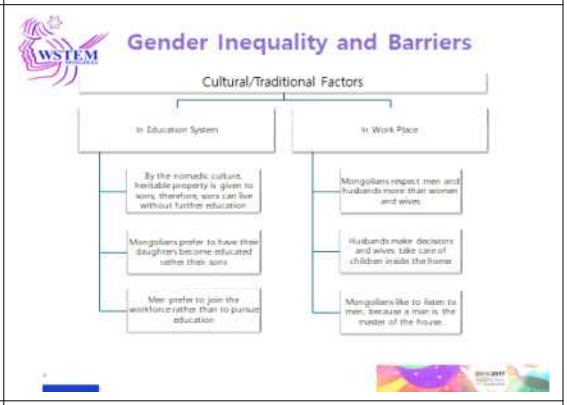
6.2. 2017 MAPWiST: Discussion of Status by Country

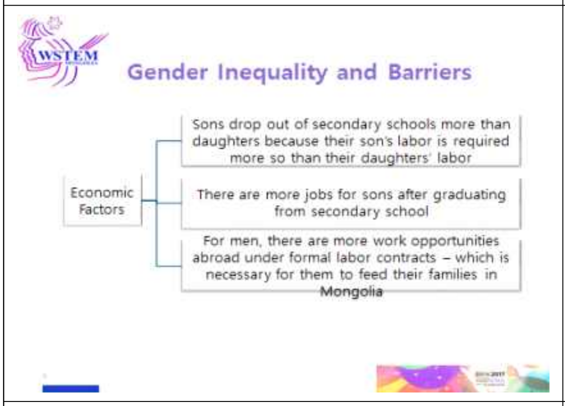
◦ Mongolia

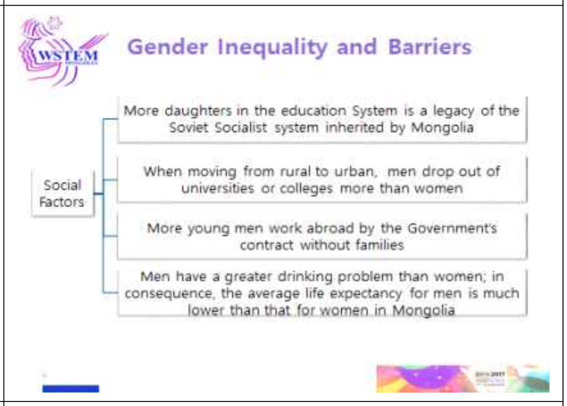


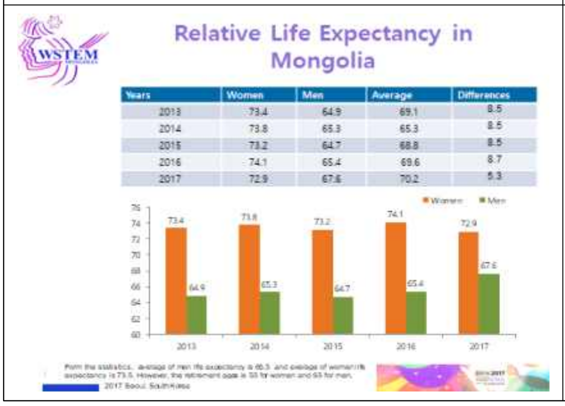


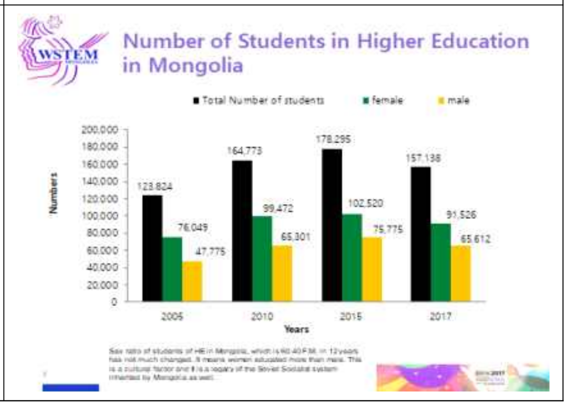






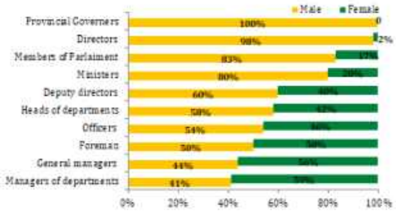






Mongolian Women in Decision-Making Positions

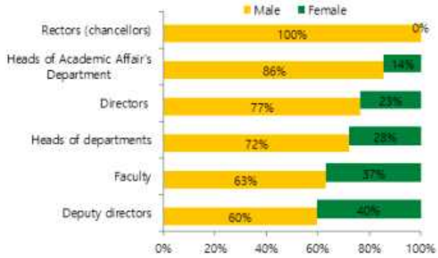
State and NGOs



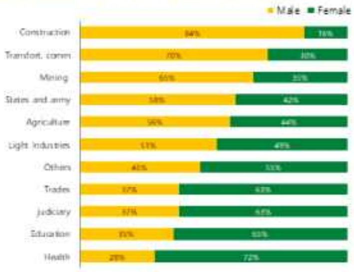
Participation of women in social and economic sectors is stronger as women make up 52% of the total population. More than 70% of workers in the education, health and social sectors are women and they have shouldered responsibility in these sectors very well indeed. However, it still remains a paradox that more than 90% of the people in positions of power in Mongolia are males.

Mongolian Women in Decision-Making Positions

State Higher Education Institutions



Sex Ratio in the Work Place



This economic factor, the increasing gender gap in the work force, is due to the limited labor participation of women in fast growing, better-paying sectors of the economy, such as mining and construction. Employers prefer to hire men at high salaries for their strength, therefore employers value their educational level. Educated women can find jobs in Mongolia, but they are lower status positions.

Work Abroad

- Many Mongolian people live and work abroad: approximately more than 150000 in 2016, 130000 in 2013 and 90000 in 2011.
- Mongolian living abroad are mostly men.
- Approximately 80% of these people are between the ages of 23-53.
- About 80% of Mongolians who live in Korea young men. Korean employers have contracts with the Mongolian government for male workers.
- The main reason to work abroad is to have greater income. Therefore, women work more than men in Mongolia. Few Mongolian educated women are in decision-making positions.

2017 Seoul, South Korea

Best Practices to Improve the Status of Mongolian Women in STEM

2017 Seoul, South Korea

Best Practice 1: Brief of Development of Mongolian Women

Development of Mongolian Women:

- Before 1921 (Nomadic livestock breeding)
- 1921-1990 (Socialist period)
- After 1990 (Democratic period)

Best Practice 1: Mongolian Women Before 1921

Before 1921, there was not a single industrial enterprise in Mongolia, which means that there was no working class and no educated women except of noble class. The classes were distinguished from each other by the design of their hair and clothes

Best Practice 1: Period of Socialist Mongolia

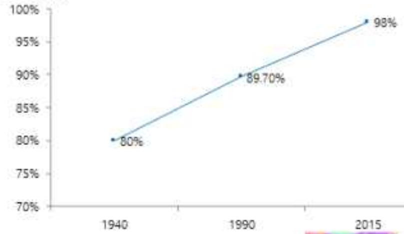
In 1921, the Socialist system brought major changes for Mongolian women.

The education of women is often seen as an important lever to empower women and to raise their social status beyond the traditional roles assigned them, such as bearing numerous children.

Best Practice 1: Today's Mongolian Women

Best Practice 1: Female Literacy Rate

With free and universal primary and secondary school education, Mongolia has a literacy rate between 80% and 98%.



Best Practice 1: Mongolian Economy

- The transition to a market economy in Mongolia started in 1990, bringing another wave of change to the Mongolian Education system.
- During the transition, the number of schools and universities increased dramatically.
- The Socialist system brought major changes for Mongolian women.

2017 Seoul, South Korea

Best Practice 2: Law on Gender Equality in 2011

In February 2011, the Mongolian parliament passed a law on gender equality, which was the fruit of 16 years work and effort by female members of parliament and NGOs*.

*https://futurechallenges.org/local/mongolian-womens-participation-in-politics/

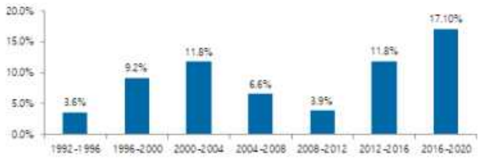
Best Practice 2: Law on Gender Equality in 2011

Guarantees for gender equality in Clause 10 of the Law is to improve the status of Mongolian Women in politics:

1) Within the appointed persons of a political party, representatives of either gender shall be not less than15% for provincial governors and the capital city, 20% for district governors, and 25% in soums, 30% in khoroos
2) Within the senior management of the public sector, representatives of either gender shall be not less than15% for state secretaries and government agencies, 20% in administration and management of state organizations, 30% as heads of departments of ministries, 40% as heads of department provinces, capital city, soum and governor's offices of a district.
3) Within all organizations except for armed forces, border troops, intelligence, police, court decisions, anti-corruption and emergency organizations, representatives of either gender shall be not less than 40 % for heads of state and special official departments.

Best Practice 2: Woman as Members of Parliament in Mongolia

The Law on Parliamentary Elections provides for female candidates, which requires a 20% quota, based on the Law on Gender Equality.



Current Policy in Mongolia

2017 Seoul, South Korea

1. Work Abroad

Young Mongolian men work abroad by contract between the governments.

1. Most young men are married and usually have 1-2 children before working abroad.
2. Young families usually divorce after more than 2 years.
3. There are more and more single mothers
4. Women are getting hired more than men in the work place
5. Women are married to foreign men because of the shortage of men in Mongolia
6. Men who work abroad are exposed to bad influences

Contracts for men to work abroad should be changed so that they can bring their families.

2017 Seoul, South Korea

2. Corruption of Mongolian Politics

- Members of Parliament who convicted of corruption are mostly men
- None of women members of Parliament have been convicted of corruption

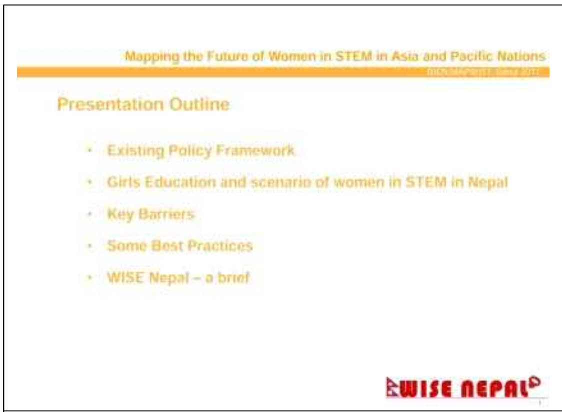
Although anti-corruption laws are in place, they are not enforced. Stronger policies on Gender Equality, the development of programs to improve political education, and enforcement of current laws need to take place.

3. Policy or Law on Gender Equality for Organizations and Companies

- There are not many laws and policies on gender issues at organizations and companies.
- Organizations and companies need to develop laws and policies on Sexual Harassment and Workplace Harassment.

Thank You!

◦ Nepal

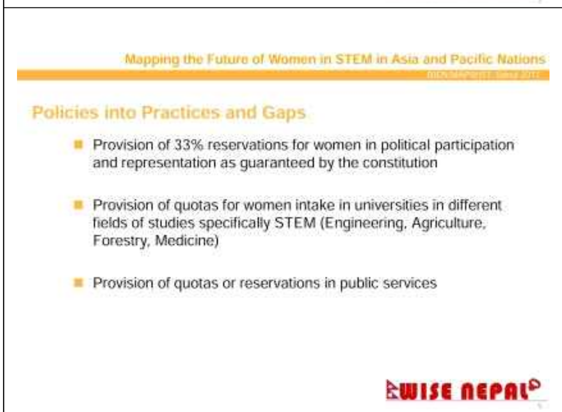


Mapping the Future of Women in STEM in Asia and Pacific Nations
Presentation Outline
Existing Policy Framework
Girls Education and scenario of women in STEM in Nepal
Key Barriers
Some Best Practices
WISE Nepal – a brief
WISE NEPAL

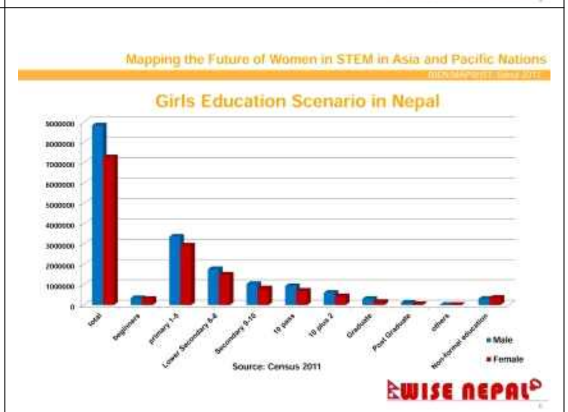
Mapping the Future of Women in STEM in Asia and Pacific Nations
NEPAL
INDIA
CHINA
WISE NEPAL

Mapping the Future of Women in STEM in Asia and Pacific Nations
Nepal's Broader Policy Frameworks concerning Gender Equality and Mainstreaming
Local Self-governance Act 1999
Act on upliftment of indigenous communities 2002
Right to Information Act 2007
Gender Mainstreaming Strategy 2007
Girls Educating Strategy for gender equity and development 2007
Caste-based Discrimination and Untouchability Act 2011
Constitution of Nepal 2015
Anti Sexual Harassment Act 2015
Social Protection Program Operation Procedure 2016
14th National Plan of Action 2017-20
WISE NEPAL

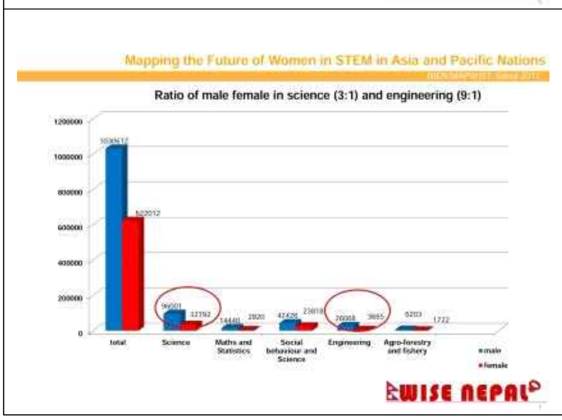
Mapping the Future of Women in STEM in Asia and Pacific Nations
Women's Rights ensured by these Policy Frameworks
Right to equality with affirmative action
Right to inclusive and proportional participation
Right to employment and equal opportunities
Right to education, healthcare
Right against exploitation, discrimination
Right against workplace sexual harassment
WISE NEPAL



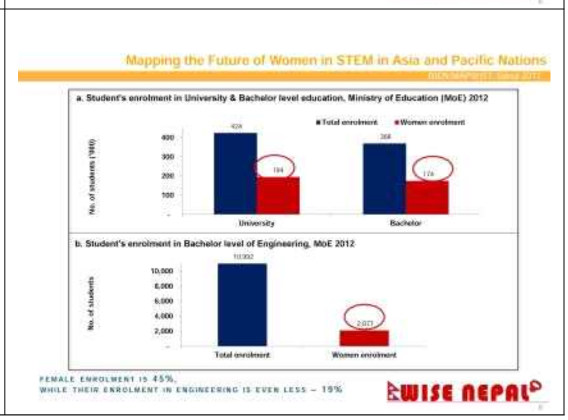
Mapping the Future of Women in STEM in Asia and Pacific Nations
Policies into Practices and Gaps
Provision of 33% reservations for women in political participation and representation as guaranteed by the constitution
Provision of quotas for women intake in universities in different fields of studies specifically STEM (Engineering, Agriculture, Forestry, Medicine)
Provision of quotas or reservations in public services
WISE NEPAL



Mapping the Future of Women in STEM in Asia and Pacific Nations
Girls Education Scenario in Nepal
total
beginners
primary 1-5
Lower Secondary 6-8
Secondary 9-10
10 pass
10 plus 2
Graduate
Post Graduate
others
Non-formal education
Male
Female
Source: Census 2011
WISE NEPAL

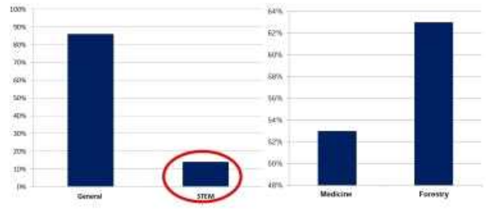


Mapping the Future of Women in STEM in Asia and Pacific Nations
Ratio of male female in science (3:1) and engineering (9:1)
1200000
1000000
800000
600000
400000
200000
0
622012
total
Science
Maths and Statistics
Social behaviour and Science
Engineering
Agro-forestry and fishery
male
female
WISE NEPAL



Mapping the Future of Women in STEM in Asia and Pacific Nations
a. Student's enrolment in University & Bachelor level education, Ministry of Education (MoE) 2012
Total enrolment
Women enrolment
No. of students ('000)
University
Bachelor
b. Student's enrolment in Bachelor level of Engineering, MoE 2012
No. of students
10,000
8,000
6,000
4,000
2,000
Total enrolment
Women enrolment
FEMALE ENROLMENT IS 45%,
WHILE THEIR ENROLMENT IN ENGINEERING IS EVEN LESS – 19%
WISE NEPAL

Mapping the Future of Women in STEM in Asia and Pacific Nations



THE FEMALE ENROLMENT IN STEM IS LESS THAN 20%

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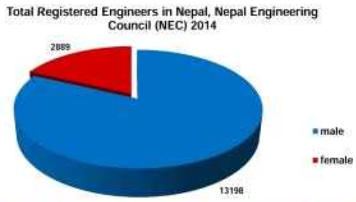
Mapping the Future of Women in STEM in Asia and Pacific Nations

Professional women engineers in Nepal

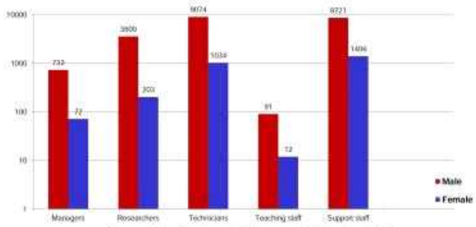


Despite quotas, women engineers in public service constitute less than 3 % percent of the total engineers !!

WISE NEPAL

Mapping the Future of Women in STEM in Asia and Pacific Nations

Science and Technology Human Resources in Nepal



Source: Nepal Academy of Science and Technology, 2012

WISE NEPAL

Mapping the Future of Women in STEM in Asia and Pacific Nations

Key Barriers (socio-cultural and economic)

- Prevalent patriarchal norms
- Girls are required to do all the household chores while boys are not
- Lack of awareness among family members and individuals (stereotyping)
- STEM field of study, especially engineering is still male dominant profession
- Studying STEM needs a lot of investment (if one has to study in private institutes)
- The fee structure of government engineering colleges is cheaper, but admissions are highly competitive
- Girls after marriage will go to husbands' homes – so why need to invest in their education ?

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Mapping the Future of Women in STEM in Asia and Pacific Nations

Some of the unequal social practices

WISE NEPAL

Mapping the Future of Women in STEM in Asia and Pacific Nations

Some of the cultural mal-practices

Women in Nepal still keep their fasts for the longevity of their husbands !!

WISE NEPAL

Mapping the Future of Women in STEM in Asia and Pacific Nations

Key Barriers (when in profession)

- Workplace safety and security for women engineers/technicians/doctors when it requires to travel
- Reluctance to travel and less willingness to relocate
- Women migration due to marriages
- Family taking a priority over women's career ambitions
- Difficulty managing work-life balance – women's multiple roles
- Lack of support systems at home and workplace
- Lack of space at work leading to difficulty getting recognition and raise
- Lack of role models

WISE NEPAL

Mapping the Future of Women in STEM in Asia and Pacific Nations

Two Best Practices (Where I work)

1. *Affirmative Actions during recruitments*

- Qualified women given preference over equally qualified men
- Setting target to increase their inclusion and representation
- Targeted announcement for women - reserving positions for women
- Replacement of female engineers by new females engineers in case of turnovers
- Conducive and supportive working environment to retain them

WISE NEPAL

Two Best Practices

2. Internship Programme for Fresh Female Engineering Graduates

- Reserving quotas for female interns (5% of the total staff requirements) for fresh female graduate engineers
- Guide, coach and mentor them for hands on technical experience in the field
- Prepare them to compete with others in the job markets
- Secure them positions when they complete their internships
- Retain them in the projects as needed

WISE NEPAL

Female Engineers/Sub-engineers in the workforce before application of Inclusion policy in 2009

Projects	Total	Male	Female	%
Motorable Bridge	85	84	1	1.2
Trail Bridge	42	42	1	0
Roads	127	103	8	14.8
Irrigation	25	23	2	8
Total	**279**	**252**	**27**	**8.6**

WISE NEPAL

Female Engineers/Sub-engineers in the workforce after application of Inclusion policy in 2014

Projects	Total	Male	Female	%
Motorable Bridge	85	76	9	10.5
Trail Bridge	46	42	4	8.6
Rural Roads	102	82	20	19.6
Irrigation	25	16	4	36
Internships	38	3	35	92.1
Total	**296**	**219**	**72**	**24.3**

WISE NEPAL

Brief on WISE Nepal

- **Established in 2013 as a voluntary network of women engineers**
- **Registered as a company in 2016 as a non-profit company**
- **Affiliated to Social Welfare Council of Nepal in 2016**
- **Joined International Network of Women Engineers and Scientists (INWES) as an Institutional Member in 2014**
- **Joined Asia Pacific Nations Network (APPN) in 2014**

WISE NEPAL

Goal

- Women engineers in Nepal have better prospects through their active involvement and participation in science and engineering.

Objectives

- Women scientists and engineers in Nepal take advantage of increased networking and knowledge sharing for their professional development.
- Women scientists and engineers in Nepal raise their voice for inclusive and women-friendly policies in their workplace.

WISE NEPAL

Some activities

- Orientation to girl students to encourage them in STEM fields in public high schools
- Supporting scientific equipment to the school labs
- Take part in gender equality surveys for APNN
- Making critical mass aware of gender gap in STEM
- Study on impact of gender mainstreaming on rural transport sector
- Participate in national and international networking

WISE NEPAL




WISE NEPAL




WISE NEPAL

◦ Taiwan

Progress and Prospects of Taiwanese Women's Participation in Science and Technology Fields

Li-Ling TSAI
Associate Professor
Graduate Institute of Gender Education
National Kaohsiung Normal University
Kaohsiung, Taiwan

BIEN, Sept. 2, 2017

TWiST

- The Society of Taiwan Women in Science and Technology (TWiST)

台灣女科技人學會

2002 South Korea Act on Fostering and Supporting Women Scientists and Technicians

KWSE, BIEN2017, >600 posters, >2000 authors WISET, GISTeR

2004 Taiwan Gender Equity Education Act

First Female President of Taiwan

- As the first in the region, on May 24, 2017, Taiwan's constitutional court ruled that exclusion of homosexual couples in marriage is violating the country's constitution. Taiwanese government should Legalize same-sex marriage in two years from now, otherwise, same-sex couples can automatically fit in the current law to get married.

Same-Sex Marriage in Taiwan

Source：台灣同志遊行聯盟，20161028台灣英文新聞（Taiwan News）

Same-Sex Marriage in Taiwan

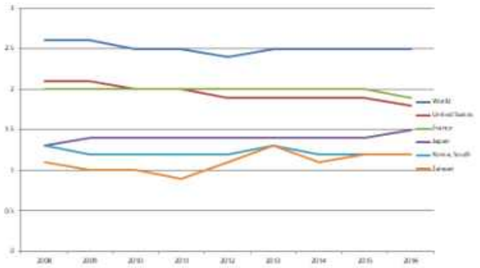
Source：20130430中央通訊社

Total Fertility Rate of Taiwan-3

	World	United States	France	Japan	Korea, South	Taiwan
2008	2.6	2.1	2	1.3	1.3	1.1
2009	2.6	2.1	2	1.4	1.2	1
2010	2.5	2	2	1.4	1.2	1
2011	2.5	2	2	1.4	1.2	0.9
2012	2.4	1.9	2	1.4	1.2	1.1
2013	2.5	1.9	2	1.4	1.3	1.3
2014	2.5	1.9	2	1.4	1.2	1.1
2015	2.5	1.9	2	1.4	1.2	1.2
2016	2.5	1.8	1.9	1.5	1.2	1.2

Source：Population Reference Bureau, USA

Total Fertility Rate of Taiwan

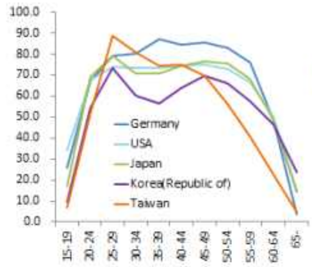


Source：Population Reference Bureau, USA

Female Labor Participation Rate of Taiwan

Source：The Directorate General of Budget, Accounting and Statistics (DGBAS) of Executive Yuan, Taiwan

Female Labor Participation Rate of Taiwan, 2014



勞動部 Ministry of Labor

Country	Germany	USA	Japan	Korea (Republic of)	Taiwan
Total	54.8	57.0	49.2	51.3	50.6
15-19	23.8	34.5	16.7	9.4	7
20-24	67.2	67.7	69.4	54.6	51.7
25-29	79.1	74.1	79.3	73.4	88.8
30-34	80.0	73.5	71	60	80.6
35-39	87.0	73.6	70.8	56.7	74.5
40-44	84.4	74.6	74.3	63.8	75
45-49	85.6	74.9	76.8	69.7	69.6
50-54	83.1	72.8	75.7	66.2	56.1
55-59	75.8	66.4	67.9	57.8	40.4
60-64	48.8	50.2	48.7	46.3	22.6
65-	3.9	15.1	14.5	24	4.6

Source: International labor statistics, Ministry of Labor, Taiwan

High Cost for Childcare

Age of child	Average	Nannies	Private	Public
Under 3	533 (50%)	550 (51%)	557 (52%)	277 (26%)
3-6	291 (27%)	550 (51%)	344 (32%)	125 (12%)

(In US dollars)

From:

Yang, C-L. (under revision). The metaphor of 'home/family' in introducing the Nordic Model to Taiwan. In D. Mulinari &L. Martinsson (Eds.), *Dreaming Global Change, Doing Local Feminisms: Feminism Visions. Global North/Global South Encounters, Conversations and Disagreements*. London & New York: Routledge.

Gender Equality World Rankings

	HDI (Human Development Index, Total 188 countries)		GII (Gender Inequality Index, Total 156 countries)		GGI (Gender Gap Index, Total 144 countries)	
Year	2014	2016	2014	2016	2014	2016
TAIWAN	25	27	5	9	41	38
JAPAN	20	17	27	21	104	111
KOREA (Republic of)	17	18	24	10	117	116
	By UNDP				BY WEF	

GII vs. GGI

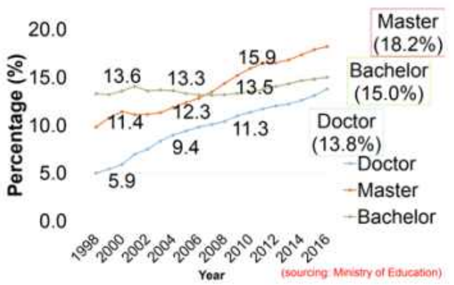
- GII Dimensions & Indicators
  - Health: Maternal mortality ratio; Adolescent birth rates
  - Empowerment: Female and male population with at least secondary education, Female and male share of parliamentary seats
  - Labour market: Female and male labour force participation rate
- GGI Dimensions & Indicators
  - Economic participation and opportunity: Labour force participation; Wage equality for similar work (survey); Estimated earned income (US$, PPP); Legislators, senior officials and managers; Professional and technical workers
  - Educational Attainment: Literacy rate; Enrolment in primary education; Enrolment in secondary education; Enrolment in tertiary education
  - Health and Survival: Sex ratio at birth; Healthy life expectancy
  - Political Empowerment: Women in parliament; Women in ministerial positions; Years with female head of state (last 50)

2004-2017 gender equity in Taiwan

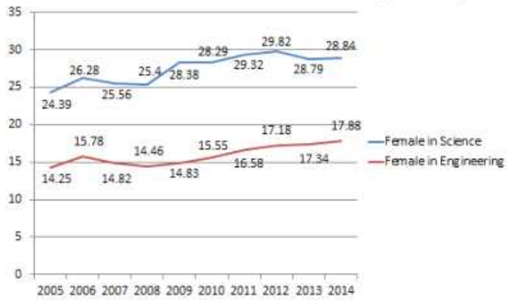
- Female president
- Fast homosexuality rights
- Extremely low fertility rate
- Extremely high cost of childcare

Female Students (%) in Natural Sciences

Female Students (%) in Engineering



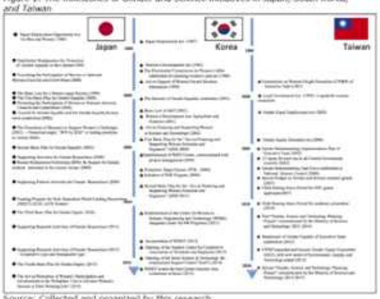
Female researchers in Sciences & Engineering



Source: Ministry of Science and Technology, Taiwan

Gender Segregation on Campuses: A Cross-Time Comparison of the Academic Pipeline in Japan, South Korea, and Taiwan

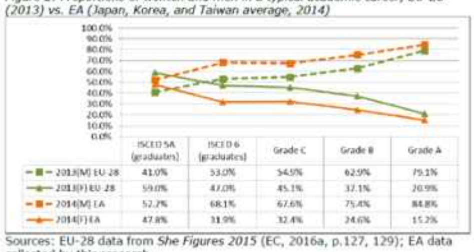
Figure 1: The milestones of Gender and Science initiatives in Japan, South Korea, and Taiwan



Source: Collected and organized by this research.

Gender Segregation on Campuses: A Cross-Time Comparison of the Academic Pipeline in Japan, South Korea, and Taiwan

Figure 2: Proportions of women and men in a typical academic career, EU-28 (2013) vs. EA (Japan, Korea, and Taiwan average, 2014)

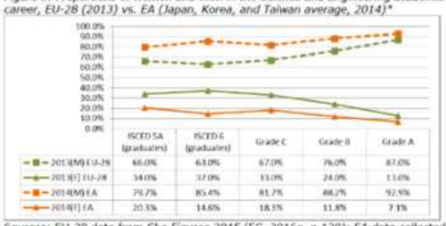


	ISCED 5A (graduates)	ISCED 6 (graduates)	Grade C	Grade B	Grade A
2013(M) EU-28	41.0%	53.0%	54.9%	62.9%	79.1%
2013(F) EU-28	59.0%	47.0%	45.1%	37.1%	20.9%
2014(M) EA	52.2%	68.1%	67.6%	75.4%	84.8%
2014(F) EA	47.8%	31.9%	32.4%	24.6%	15.2%

Sources: EU-28 data from *She Figures 2015* (EC, 2016a, p.127, 129); EA data collected by this research.

Gender Segregation on Campuses: A Cross-Time Comparison of the Academic Pipeline in Japan, South Korea, and Taiwan

*Figure 3: Proportions of women and men in the Science and Engineering academic career, EU-28 (2013) vs. EA (Japan, Korea, and Taiwan average, 2014)**

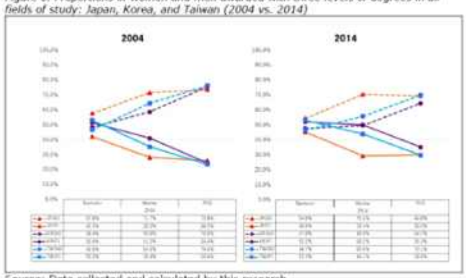


	ISCED 5A (graduates)	ISCED 6 (graduates)	Grade C	Grade B	Grade A
2013(M) EU-28	66.0%	63.0%	67.0%	76.0%	87.0%
2013(F) EU-28	34.0%	37.0%	33.0%	24.0%	13.0%
2014(M) EA	79.7%	85.4%	81.7%	88.2%	92.9%
2014(F) EA	20.3%	14.6%	18.3%	11.8%	7.1%

Sources: EU-28 data from *She Figures 2015* (EC, 2016a, p.128); EA data collected by this research.
* There in no data in Japan on the percentage of male and female faculty in the S&E fields, so the EA numbers for the Grade A, B, and C faculties here is the average for only Korea and Taiwan.

Gender Segregation on Campuses: A Cross-Time Comparison of the Academic Pipeline in Japan, South Korea, and Taiwan

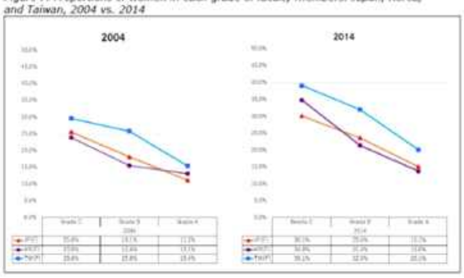
Figure 6. Proportions of women and men awarded with three levels of degrees in all fields of study: Japan, Korea, and Taiwan (2004 vs. 2014)



Source: Data collected and calculated by this research.

Gender Segregation on Campuses: A Cross-Time Comparison of the Academic Pipeline in Japan, South Korea, and Taiwan

Figure 7. Proportions of women in each grade of faculty members. Japan, Korea, and Taiwan, 2004 vs. 2014



2004-2017 gender equity in Taiwan

- Female president
- Fast homosexuality rights
- Extremely low fertility rate
- Extremely high cost of childcare

?

- Women's percentage in science and technology
- Knowledge leading to gender equity

Good Practices, Taiwan

- Project GST：Gender and Technology Research Project, since 2007
- Project A：An action plan on promoting gender studies in science and technology fields, since 2011
- Project B：Activities and publications for promoting women in science and technology, since 2014

Good Practices, Taiwan

- Project GST：Knowledge
- (US$ 700,000-1,000,000/yr to 40 projects)

- Project A：Policy
- (US$70,000-90,000/yr to 1 project/3yr)

- Project B：Activities
- (US$ 300,000/yr to 12 or 13 projects)

Project A

Year	Granted Amounts in NT$	Granted Amounts in US$
2011-2014	27,616,000	920,533
2014-2017	8,103,000	270,100
Total	35,719,000	1,190,633

Source: Ministry of Science and Technology, Taiwan

Project B

Year	No. of granted projects	Granted Amounts in NT$	Granted Amounts in US$
2014	12	9,401,000	313,366
2015	13	10,679,000	355,966
2016	6	4,865,000	162,166
Total	25	24,945,000	931,500

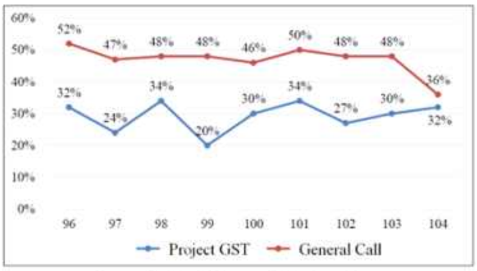
Source: Ministry of Science and Technology, Taiwan

Project GST

Year	No. of applied projects	No. of granted projects	Granted Amounts in NT$	Granted Amounts in US$
2007	198	63	29,660,000	988,667
2008	149	36	21,030,000	701,000
2009	121	41	26,560,000	885,333
2010	10	2	2,680,000	89,333
2011	94	28	20,460,000	682,000
2012	165	56	33,700,000	1,123,333
2013	140	38	22,700,000	756,667
2014	120	36	24,640,000	821,333
2015	156	42	26,120,000	870,667
2016	127	41	22,100,000	736,667
2017	142	41	25,020,000	834,000
Total	1,422	424	254,670,000	8,489,000

Source: Ministry of Science and Technology, Taiwan

Project GST



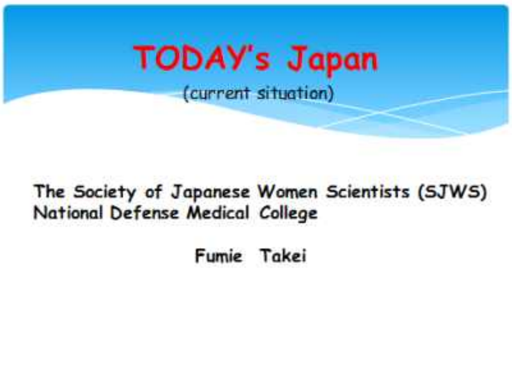
Source: Ministry of Science and Technology, Taiwan

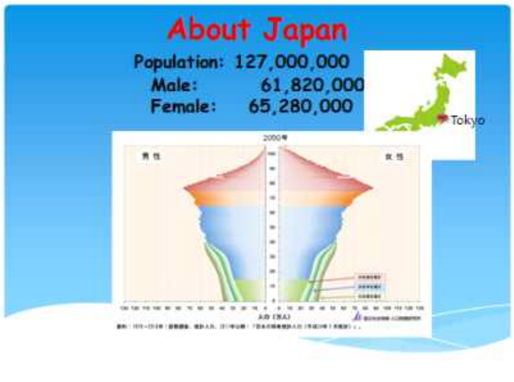
Gendered Innovations

Gendered Innovations (Taiwanese translation)

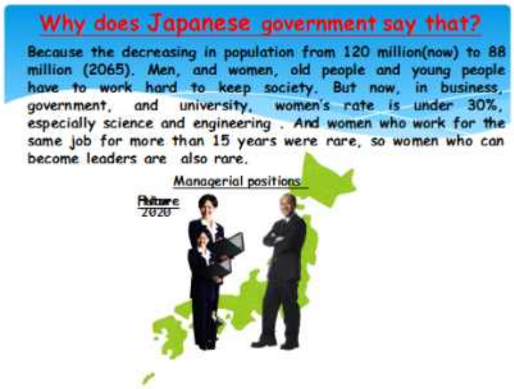

GENDER
POLICY IN S&T
GENDERED
INNOVATIONS
THE 2017 INTERNATIONAL CONFERENCE
ON GENDER IN SCIENCE & TECHNOLOGY
10/27 Fri.
10/28 Sat.
Deadline of proposal submission: June 30th 23:59 (GMT+8), 2017
Google: taiwangist2017

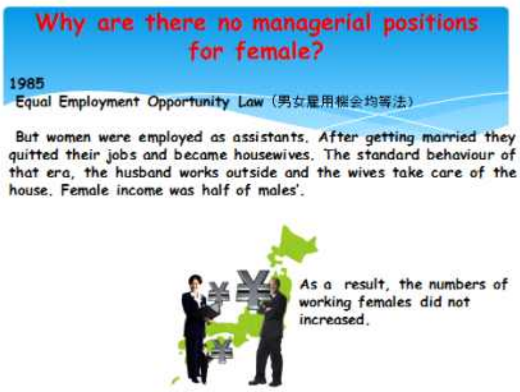
◦ Japan


TODAY's Japan
(current situation)
The Society of Japanese Women Scientists (SJWS)
National Defense Medical College
Fumie Takei


About Japan
Population: 127,000,000
Male: 61,820,000
Female: 65,280,000
Tokyo


Do you know 202030?
Japanese government target
By 2020 the proportion of female managerial positions should be over 30%.
From 2012 (11 %)
According to a certain theory, if the minority accounts for 30% of the number of constituents, it will become influential to decision making.
But now a day, we did not achieve our goal (15%).

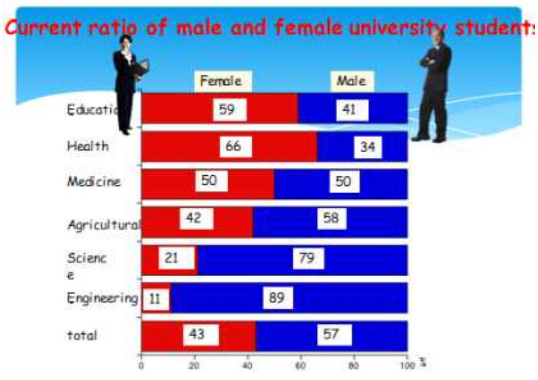

Why does Japanese government say that?
Because the decreasing in population from 120 million(now) to 88 million (2065). Men, and women, old people and young people have to work hard to keep society. But now, in business, government, and university, women's rate is under 30%, especially science and engineering . And women who work for the same job for more than 15 years were rare, so women who can become leaders are also rare.
Managerial positions
Future
2020


Why are there no managerial positions for female?
1985
Equal Employment Opportunity Law (男女雇用機会均等法)
But women were employed as assistants. After getting married they quitted their jobs and became housewives. The standard behaviour of that era, the husband works outside and the wives take care of the house. Female income was half of males'.
As a result, the numbers of working females did not increased.


Japanese government scheme
(It is my opinion)
However, there are lack of workers in many professions today.
Japanese government idea
Let women work!
How?
Increase the number of women who are in managerial positions.
They fix the environment for women to work.
Increase the number of working women!


Current situation
The Japanese government has launched several policies.
One of them is 202030
Recently, female don't quit their jobs after getting married and becoming mothers. Because working system become enriched, but not enough. And I thought women's consciousness changed. Women want to work not only for money but also for themselves, taking advantage of their own abilities.


Why has women's consciousness changed?
I think main reason is female enter the university.
2015: 50 % people of the graduated high school enter university.



Female want to work outside and got the special works after graduated university. And the environment of female working is improving.

-Problem-
On the other hand, the woman's advancement to society progresses, the age of first marriage increases, the birthrate decreases. As the result, the total population decreases and became declining birthrate and aging.

⬆

The reason for the 202030

How to promote women's empowerment in society

- Prohibition of long working hours
- Consciousness reform of the man
- Consciousness reform of the women
- Improvement of the labor circumstance

etc.

The society that the women are easy to work is also good for men.

In Japan, women are always dush! in their life. Women are required a lot of roles in their life, work, get married, have a baby, take care of their children, parents, and husband. Women lost their confidence and quit the jobs. The company, government, university need to change the labor efficiency to work well.

Thank you

6.3. 2017 Questionnaire for Gender Barriers in Science and Engineering in Asia and the Pacific

Gender Barriers in STEM* in Asia and the Pacific: The 2017 survey for Science and Engineering Professionals in Asia and the Pacific Nations Network (APNN)_*For male respondents*

The purpose of this survey is to assess how the male scientists and engineers perceive the existence of "gender barriers" experience by women in STEM. The term "gender barriers" is used in this study to describe hurdles and obstacles women in STEM experience in their educational and professional lives because of their biological and social identity as women.

Please take time to answer each and every question as truthfully as possible. There are no right or wrong answers. Please respond based on your experiences and thoughts. Your response and those of approximately 1200 other male scientists and engineers from over 12 countries in APNN will be utilized in drawing out policy agenda to expand women's participation as well as to promote regional and national progress in STEM. Please be assured that your answers will be used only for analytical purposes. Your personal information will be kept in strict confidence. We deeply appreciate your cooperation.

***STEM : Science, Technology, Engineering and Mathematics**

□ **Personal Information**

1. Sociodemographic characteristics

(1) Year of birth ____________(eg. 1970)

(2) Year of entering college____________(eg. 1989)

2. Professional characteristics

(1) What is your major field? ____________(eg. Electronics, Physics, Economics).

***If you have double or triple majors, please list all of them starting from the latest.**

(2) Your level of education ____________(eg. Bachelor, Master, Ph.D)

(3) What is your occupation?

① Teacher/Professor ② Researcher ③ Medical or health Professional ④ Engineer
⑤ Others______________ **(Please specify)**

(4) What is your position in your workplace?

① Staff / researcher / lecturer ② Middle manager /senior researcher / assistant professor
③ Senior manager / principal researcher / Associate Professor ④ Director / Full Professor
⑤ Others______________ **(Please specify)**

(5) Between the year you entered college and now, you have taken leave from your scientific activities for ( ) years and ( ) months ***Please write 0 if you've never left from your research/work.**

(6) If you have left scientific activities, what was the main reason? ________________

(eg. Military service, Educational transition, Studying abroad, Changing jobs, Marriage…)

□ **Male/Female RATIO**

*Please indicate 'O' or '√' in the box below that corresponds to your case.

	①Mostly male	②Slightly more male	③ Balanced	④Slightly more female	⑤Mostly female
(1) The male/female ratio of my department during my university (college) education is(was)					
(2) (If having taken graduate course) The male/female ratio of my department while at graduate school is (was)					
(3) The male/female ratio of my current workplace is					
(4) The male/female ratio at management level at my current workplace is					

□ **Perception of 'gender barrier' in STEM field**

* Please indicate 'O' or '√' in the box that corresponds to your answer.

	① Strongly agree	② Somewhat agree	③ Neutral	④ Somewhat disagree	⑤ Strongly disagree
(1) Girls and boys were equally encouraged to choose their majors in STEM during their education period.					
(2) It is more difficult for a woman to get a job in the STEM field than for a man with the same qualifications.					
(3) Women in STEM receive equal work distribution and work appraisal compared to men of the same qualifications and level.					
(4) Being promoted or becoming a tenured professor/a principal investigator is more difficult for female scientists than for male scientists.					
(5) Women in STEM generally receive less pay for equal work, compared with their equally-qualified male colleagues.					

□ **(Indirect) Experience of 'gender barrier' in STEM**

* Please indicate 'O' or '√' in the box that corresponds to your (indirect) experiences.

	①Saw for myself	②Heard from others	③Neither saw nor heard but recognize the possibility	④Never saw nor heard from others
(1) Woman in STEM is disadvantaged in receiving research funds or scholarships because she is female.				
(2) Woman in STEM is disadvantaged in participating or leading a research project because she is female.				
(3) Woman in STEM being sexually harassed or treated unfairly				
(4) Woman in STEM leaving work due to her marriage, pregnancy or childcare				

□ **Perception on the supporting law or policy to overcome 'gender barrier'**

* Please indicate 'O' or '√' in the box that corresponds to your response.

	① Strongly agree	② Somewhat agree	③ Neutral	④ Somewhat disagree	⑤ Strongly disagree
(1) I believe things will turn out fine in the future career <u>for women</u> in STEM					
(2) It is crucial to have strong policy support to solve gender inequality in the STEM field.					
(3) It is appropriate to introduce the quota system or affirmative plan to solve gender inequality in the STEM field.					

□ **Perception of gender equality**

* Now these are our final questions. Please indicate '0' or '√' in the box that corresponds to your response.

	① Strongly agree	② Somewhat agree	③ Neutral	④ Somewhat disagree	⑤ Strongly disagree
(1) In a relative sense, men are rational while women are emotional and thus, they ought to complement each other by doing what is appropriate for themselves.					
(2) Primary breadwinners (who take care of financial obligations) of households should be men.					
(3) Women are born to have a way of caring children that men are not capable of in the same way.					
(4) In order to maintain the order and peace of a family, the husband should have greater power and authority than the wife.					
(5) I believe gender equality will be fully achieved only if women are given equal opportunities as men.					

□ **Marital Status**

* Please check your marital/national status for statistical analysis.

(1) My marital status is

① Single ② married(☛ Go to (2)-1 below) ③ divorced ④ Others________(Please specify)

(2) If you are married, please choose one of the answers

① Husband and wife both work ② Only one person works ③ Others__________(Please specify)

(3) If you have children, how many? Daughter ( ), Son( )(Please write the number)

□ **Nationality**

(1) What is your nationality? ____________________

(2) Are there any laws or policies in your country to support/promote for resolving 'gender barrier' in STEM?

① No ② Yes(☛ Go to (2)-1 below) ③ Don't know

(2)-1. Please write all the laws and policies which you know

Law ____

Policy ____

◈ We have come to the end of the survey. Thank you for your time and participation!◈

6.4. Email Requesting for Survey Participation

May 31, 2017

Dear APNN members,

We at the Association of Korean Woman Scientists and Engineers (KWSE) thank you for your cooperation over the past years in the international joint survey. We kindly ask that your organization participate again in this year's international survey among APNN member countries. Unlike previous years, however, this year's survey will be conducted among "**male scientists and/or engineers**." We ask that at least 100 male scientist or engineer affiliated with your organization participate in the survey by filling up the attached questionnaire sheets. Please send us the raw sheets with summary of the survey no later than by **July 31st, 2017** by e-mail to kwse@kwse.or.kr or by surface mail to #801 National Nanofab Center, 291 Daehak-ro, Yuseong-gu Daejeon, Korea 305-338. You or your members can alternatively participate by responding to the online version of this survey which is being prepared and will be notified within one or two weeks. Please make sure that each person only participate **once** either online or offline, and not both.

This year's theme is identical to last year's, which is "gender barriers in STEM in Asia and the Pacific" but responded by men and not women. Your cooperation will be crucial in constructing a report on the APNN countries. We are fortunate to have received funding from the Korean government for this project which is managed by KWSE. As we did last year, we will be reimbursing you or your organization for expenses up to 500,000 KWon (equivalent to about 450 USDollars). We may also ask for reports for which we may send you an honorarium of 300,000 KWon (about 270 USDollars) to 500,000 KWon (about 450 USDollars) depending on the content and length.

Please note that the report from this survey is separate from the annual APNN country report.

We look forward to hearing from you at your earliest convenience and thank you for your participation and cooperation. Please do not hesitate to contact KWSE (kwse@kwse.or.kr) or myself (jskimdsu@gmail.com) for any questions you may have.

Yours sincerely,

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