

Figure 1: Women as a share of total researchers, 2010 or latest
Source: UNESCO Institute for Statistics Data Centre, accessed in 2012

Women in Science

Gender gap:

Time to break the barriers

Science and technology has always been a foundation of the development in our society throughout history. Especially, with advancement of global knowledge economy in the last decades, knowledge creation in science and technology has played more decisive role in determining the degree of socio-economic development of the country. Hence, a growing number of countries have invested in knowledge creation, resulting in tremendous growth in researchers in the world during the last decade.

On the other hand, there is considerable disparity across Asia and the Pacific region in terms of participation of women in research and development (R&D) activities. Although there is encouraging improvement, female researchers are still under-represented in science and technology. Their potentials are not fully utilized.

This fact sheet highlights such prevailing gender disparities at regional and sub-regional levels in terms of enrolment and graduation from higher education and professional career choice. It also attempts to take an in-depth look in the system to see factors that keep women away from the field.

Today, humans live in a society that is heavily reliant on science and technology. From the paper that was developed 2,000 years ago to the smart phones being used today, humans continue to develop and improve scientific and technological resources and infrastructures. Simultaneously, the world has seen a significant increase in number of people working in the field of science. Data from the UNESCO Institute for Statistics (UIS) indicate that between 2000 and 2012, the number of researchers around the world increased from 1.9 million to 6.9 million. Despite this global rise in interest, predominance of men over women in this field still remains as an issue, as only one third of researchers around the world were female in 2011.

Women remain under-represented in R&D

Figure 2: Percentage of female researchers by sub-regions, 2011 or latest



Source: UNESCO Institute for Statistics Database, accessed in 2015

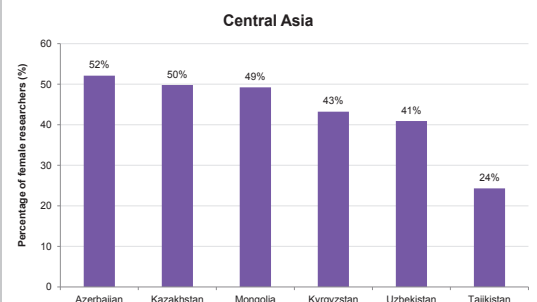
Data show that there are significant gender disparities that exist in the field of research within Asia and the Pacific regions. In 2011, the proportion of women in science stood at 46 per cent in Central Asia, 20 per cent in East Asia and the Pacific, and South and West Asia (see Figure 2). Similarly, only two countries (Kazakhstan and Mongolia) have more than 50 per cent of female Research and Development (R&D) personnel in this region.

Definition: 1) Researchers: Professionals engaged in the conception or creating of new knowledge, products, processes, methods and systems, as well as in the management of these projects. 2) Total R&D personnel: All persons employed directly on R&D, as well as those providing direct services such as R&D managers, administrators and clerical staff. (Source: UIS, Glossary)

Central Asia

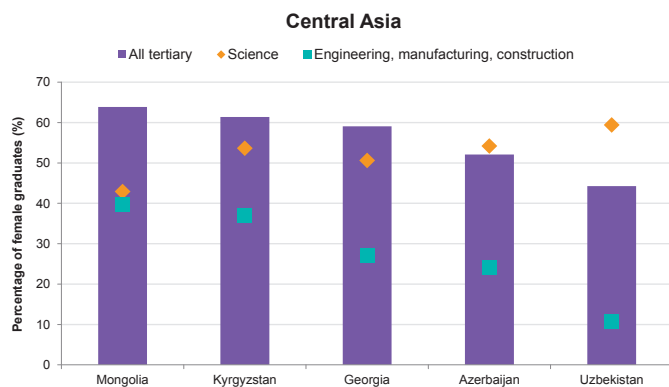
Central Asia demonstrated a similar trend in terms of female researchers in science and technology area. Figure 3 depicts that, more than half of the researchers were women in Azerbaijan and Kazakhstan in 2011, followed by 49 per cent in Mongolia, 43 per cent in Kyrgyzstan, 41 per cent in Uzbekistan, and 24 per cent in Tajikistan. While the share of female researchers is higher than in other Asia-Pacific regions, Central Asia's women tend to pursue more "softer studies" such as natural sciences (see Figure 4).

Figure 3: Share of female researchers in Central Asia, 2011



Source: UNESCO Institute for Statistics Data Centre, accessed in 2015

Figure 4: Share of female graduates by field of study in Central Asia, 2012



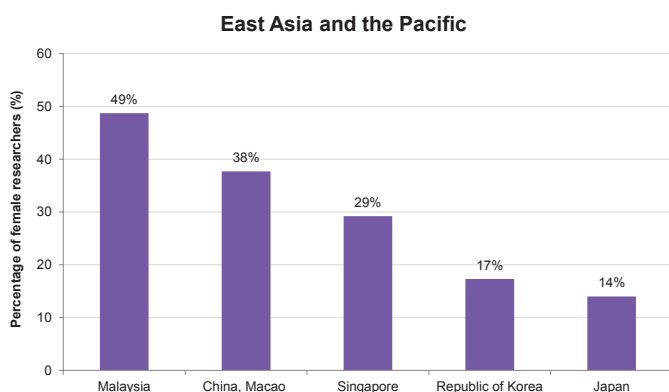
Note: Due to limited available data, Mongolia and Uzbekistan data are from 2011.
Source: UNESCO Institute for Statistics Data Centre, accessed in 2015

In Uzbekistan, data indicated that while 44 per cent of all tertiary school graduates were female, 59 per cent of science sector graduates and 11 per cent of engineering, manufacturing and construction field graduates were women. On the other hand, the gender disparity in Mongolia among graduates in the science and engineering fields was relatively small.

East Asia and the Pacific

With limited available data, a strong variation was found in the East Asia and the Pacific countries. While females accounted for 20 per cent of researchers from this sub-region in 2011, proportion of female researchers stood at 49 per cent in Malaysia, followed by 38 per cent in Macao SAR of China, 29 per cent in Singapore, 17 per cent in Republic of Korea, and 14 per cent in Japan (see Figure 5). Furthermore, preference towards the “softer studies” was prevalent in this sub-region as well.

Figure 5: Share of female researchers in East Asia and the Pacific, 2011



Source: UNESCO Institute for Statistics Data Centre, accessed in 2015

For example, while 58 per cent of graduates in tertiary education were female in Malaysia, 59 per cent of the science graduates and 36 per cent of engineering graduates were females (see Figure 6). Similarly, the difference between science and engineering female graduates recorded at 29 percentage points in Lao PDR.

Moreover, huge disparities existed among countries in this sub-region with regard to the proportion of female graduates in engineering. For instance, in Myanmar 61 per cent of graduates from this field were women while only seven per cent of graduates were in Lao PDR.

Figure 6: Share of female graduates by field of study in East Asia and the Pacific, 2012



Note: Due to limited available data, Australia, Macao SAR of China, Malaysia and Myanmar data are from 2011 whereas Palau data are from 2013.
Source: UNESCO Institute for Statistics Data Centre, accessed in 2015

South and West Asia

In the case of South and West Asia, data have been very limited to the four countries within this sub-region in recent years. While 20 per cent of all researchers were female in this sub-region in 2011, the same goes to 37 per cent in Sri Lanka, 36 per cent in Turkey, 27 per cent in Pakistan, and eight per cent in Nepal. The distribution of female graduates according to their field of study was differentiated by countries as well.

With limited available data in 2012, 38 per cent of graduates from Islamic Republic of Iran’s tertiary education were female, while women comprised of two thirds of the science sector and 21 per cent of the engineering field. Similarly in 2012, females accounted for 57 per cent of total graduates in Sri Lanka, 48 per cent of science graduates and 28 per cent of engineering graduates.



For more information, please visit UIS website:
<http://www.uis.unesco.org/ScienceTechnology/Pages/women-in-science-leaky-pipeline-data-viz.aspx>

Why fewer women in science and technology?

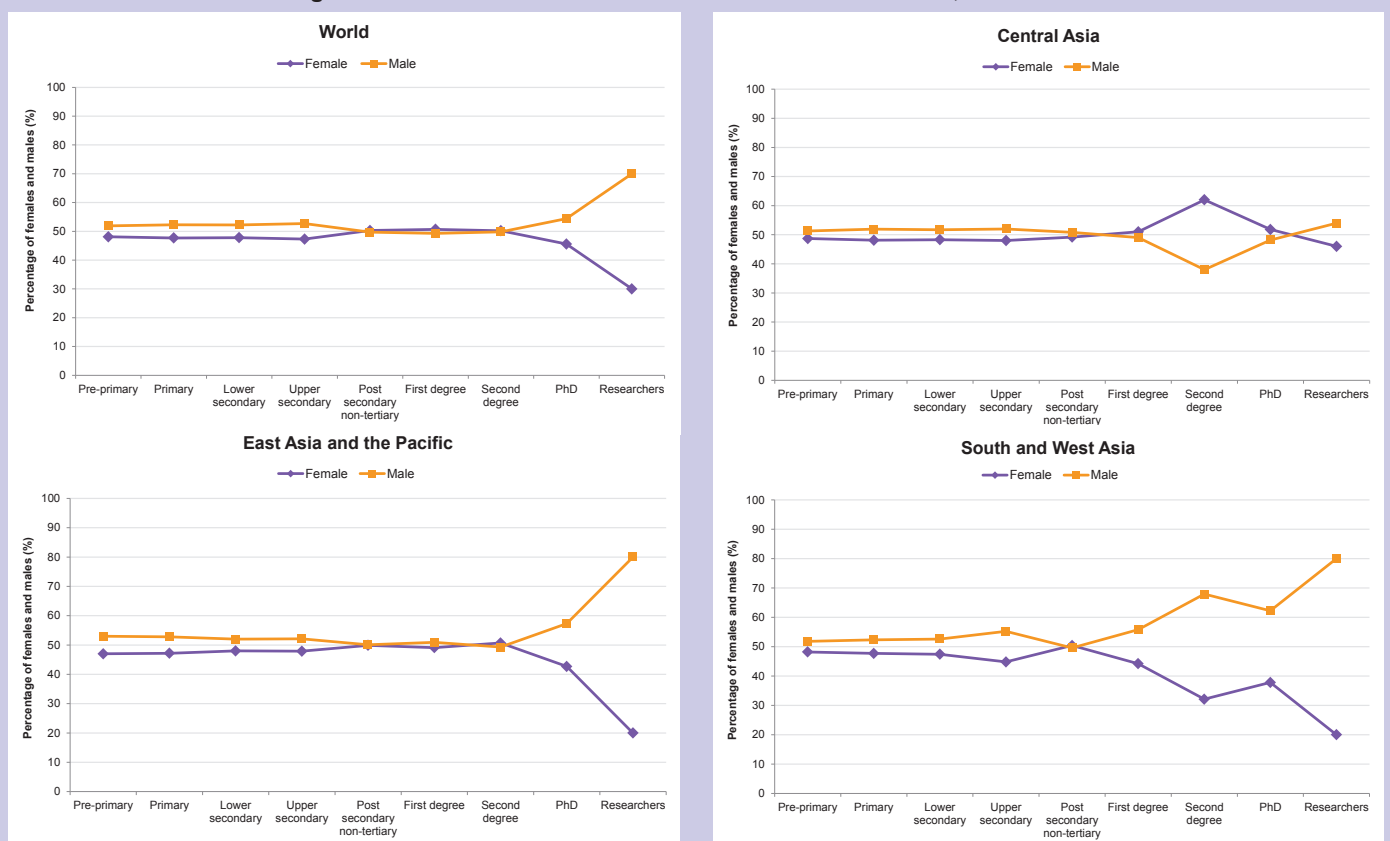
The work-life balance challenge faced by working women is particularly difficult for those whose works involves STEM (Science, Technology, Engineering and Math). Although number of women working in these disciplines are increasing over time, data show that there are still a significant gender disparities in the field of research.

When do boys and girls start to separate?

Figure 7 shows an interesting trend that involves the proportion of females and males in their different levels of education. Globally, boys exceed girls in educational enrolment up until post-secondary, non-tertiary level. However, the gap between female and male students has widened in the second tertiary degree. A similar pattern can be seen in the East Asia and the Pacific sub-region as well. For instance, in 2011, the percentage of female PhD students stood at 43 per cent with males at 57 per cent respectively. Yet, while males exceeded females from end of second tertiary degree in this sub-region, a

different pattern was found in Central Asia. Similar to the other sub-regions, equality remained until first tertiary degree. However, with regard to the enrolment of the first tertiary degree, women exceeded men in great numbers (62 per cent of female in second tertiary degree) and gender equality has been succeeded in terms of PhD and researcher levels. Finally, South and West Asia demonstrated a very typical pattern. Males dominated females throughout the whole education path, with the most significant gender disparity occurring at the tertiary level. Consequently, only 20 per cent of researchers from this sub-region are female while 80 per cent are male.

Figure 7: Share of females and males in different level of education, 2012 or latest



Note: Education levels are based on [ISCED 1997](#).

Source: UNESCO Institute for Statistics Data Centre, accessed in 2015

What are the barriers for women who pursue careers in the fields of science and technology?

As shown in Figure 7, the proportion of females is decreasing as they move up to the educational ladder to the area of research. With males consisting of 54 per cent of PhD students and 70 per cent of all researchers globally, the gender inequality still pervades especially in higher levels of education. What factors explain the increasing gender inequality that women face when pursuing an academia or research based career? What are the barriers that prevent women from pursuing professions in the field of science and technology field? There are several factors to answer this question.

◆ Low enrolment of females in higher education

In the Asia-Pacific region, out of 25 countries with available data, 15 comprised of more than half of the female students in Bachelor's and Master's degrees (ISCED 5) in 2012 (see Figure 8). However, nine countries still have less than 50 per cent of female enrolments. This tendency indicates that even though the situation of gender equality has been improved, for many countries more effort is needed.

Also, significant disparities existed among countries in Doctorate degrees (ISCED 6). While 80 per cent of PhD students in Myanmar were women in 2012, only six per cent in Cambodia and 11 per cent in Nepal were females. In conclusion, Figure 8 indicates that, enrolment of males exceeded that of females more in ISCED 6, unlike ISCED 5 level.

◆ Requirement for a researcher

In UNESCO, “researchers” are defined as “professionals who engage in the conception or creation of new knowledge, products, processes, methods and systems as well as the management of these projects”. To accomplish all these conditions, generally researchers are required to acquire advanced degrees. However, as presented in Figure 8, most of the countries in Asia-Pacific region showed decreasing pattern of females in transition from Bachelor’s and Master’s degree (ISCED 5) to Doctorate degree (ISCED 6). If this trend continues, the gender gap will get widened in future.

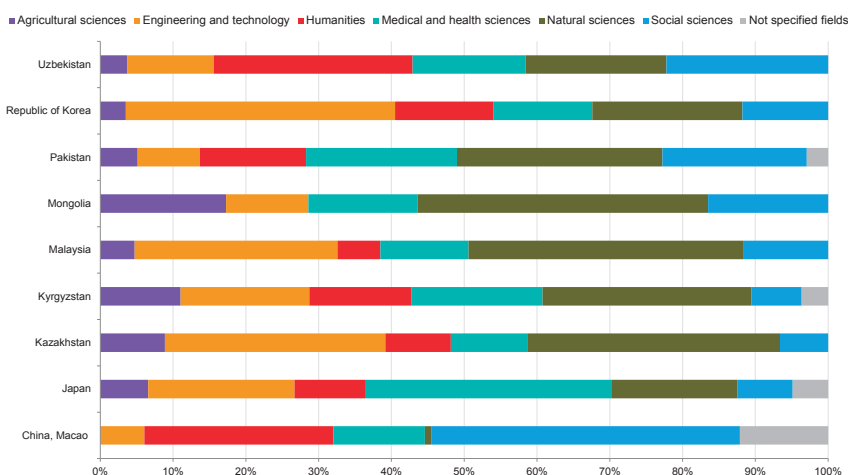
◆ Gender stereotype

Gender stereotypes of male and female roles in society, especially with regard to the professional engagement of women in the field of science serves as a common obstacle to female researchers. Many girls and their advisers are influenced by stereotypes, which dictate that certain jobs are recommended for men only (UNESCO, 2007). As a result, well qualified girls may not receive appropriate information on science and technology careers and may be steered into other fields.

◆ Limitation in studying areas

As mentioned, the proportion of female graduates who strictly majored in science field was relatively moderate among Asia-Pacific countries. However, the number of female graduates remained low in engineering, manufacturing and construction studies. Research revealed that women had a tendency to pursue natural science sectors such as mathematics, physics, chemistry, biology, limiting their potential in the area of research. Figure 9 displays this phenomena in detail through its illustration of the field of science in various countries.

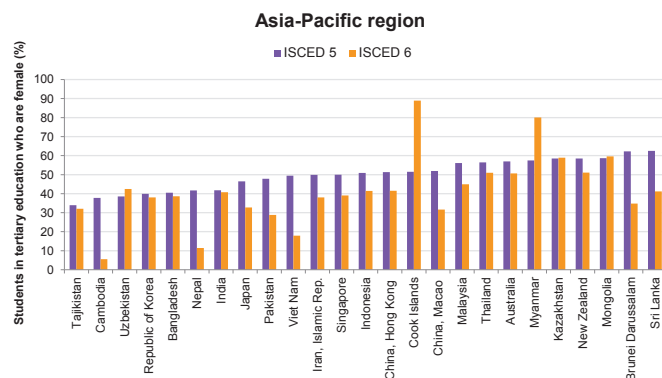
Figure 9: Distribution of female researchers in higher education sector by field of science, Asia-Pacific countries, 2012



Source: UNESCO Institute for Statistics Data Centre, accessed in 2015

- All the data are available at UIS data centre: <http://www.uis.unesco.org/datacentre/pages/default.aspx>
- For further information on “Women and Science” please visit UIS website: <http://www.uis.unesco.org/ScienceTechnology/Pages/gender-and-science.aspx>
- Should you have any inquiries, kindly contact to UIS-AIMS: aims.bgk@unesco.org

Figure 8: Share of female students in tertiary education, Asia-Pacific countries, 2012



Note: Due to limited available data, some countries’ data are from 2011. Education levels are based on ISCED 1997. Source: UNESCO Institute for Statistics Data Centre, accessed in 2015

Boys outperform girls in science

Myth or Truth?

In some cultures, there are strong stereotypes in believing that boys outperform girls in science field. With this prejudice, parents and societies are implicitly sending their daughter to liberal art and humanity studies while sons go to science and engineering sector. However, is it true that boys outperform girls in science field? What does the data show?

- ◆ PISA (Programme for International Student Assessment) results conducted by OECD in 2012 indicate that, differences between females and males in science are smaller compared with student performance in reading and mathematics.
- ◆ Gender differences were observed in two of the science processes. First, girls scored higher in the area of identifying scientific issues, while second, boys outscored girls in the explanation of scientific phenomena.
- ◆ Among the Asia-Pacific countries that participated, girls performed better than boys in science in Indonesia, Kazakhstan, Macao SAR of China, Malaysia, Singapore, Thailand and Turkey whereas boys outperformed girls in Australia, Hong Kong SAR of China, Japan, New Zealand, Republic of Korea and Shanghai-China.

Source: PISA 2012 Results, OECD