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## Human Resources in Research and Development Situation in the Arab countries

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# Human Resources in Research and Development

## Situation in the Arab countries

### 1 - Introduction :

Goal 9 of the 2030 Agenda for Sustainable Development on “Industries, Innovation and Infrastructure” aims to “*build resilient infrastructure, promote sustainable industrialization, and foster innovation.*”

Among the targets of Goal 9 are to :

- *Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending;*
- *Support domestic technology development, research and innovation in developing countries.*

This Statistical Bulletin focuses on the evolution of the number of Research and Development (R&D) workers. A Special Bulletin will be issued later on R&D spending in the Arab World, in comparison with other regions the world.

The available data indicate a relative increase in the number of R&D workers in the Arab countries during the past decade, but still without reaching the levels of developed countries. Yet, high rates were recorded when it comes to Arab women’s engagement in Research and Development, a positive indicator in terms of equal opportunities and gender equality falling in line with Goal 5 of the Agenda for Sustainable Development.

### 2 - Human resources in Research and Development:

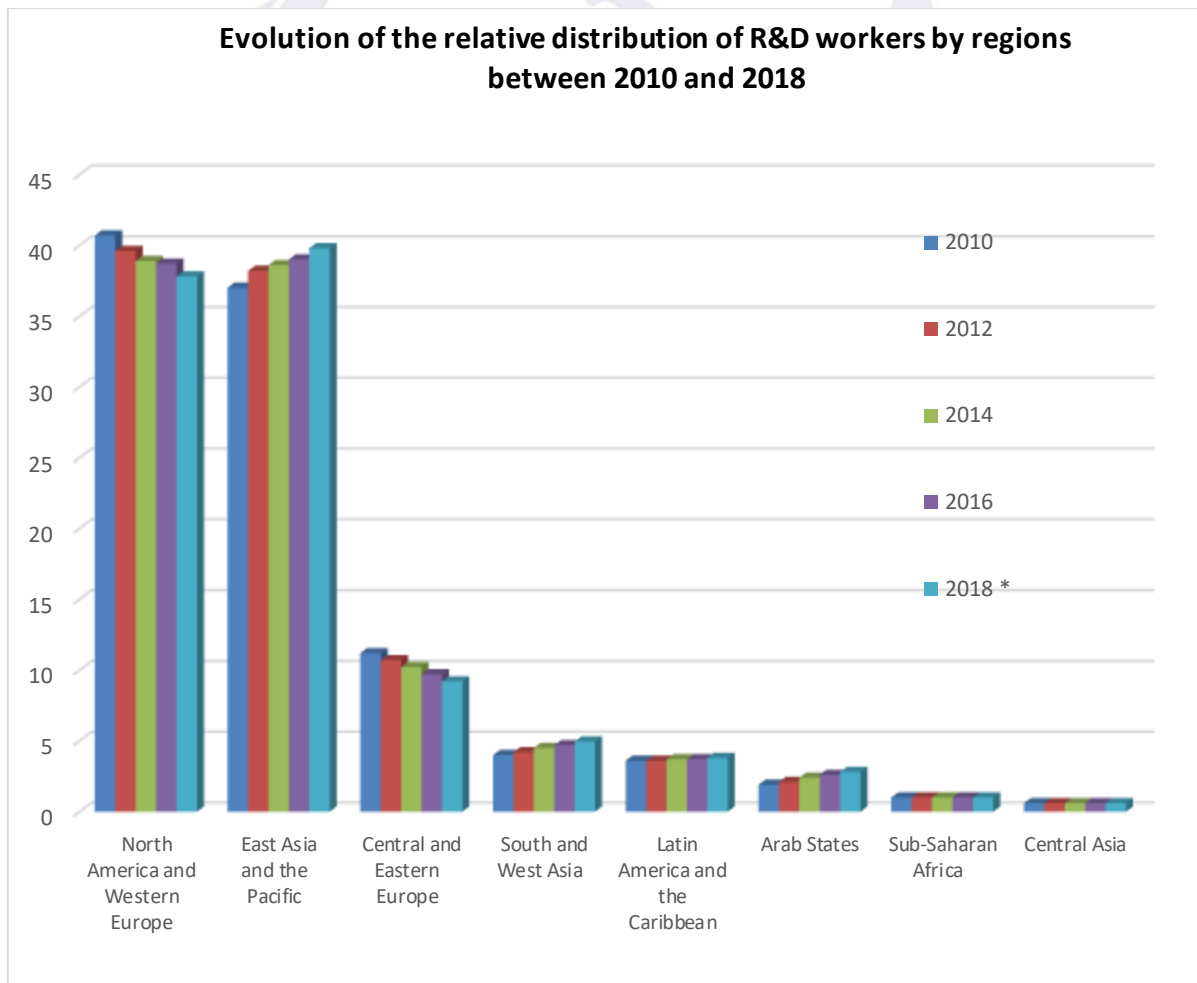
#### 2.1 - Distribution by regions:

The available data indicate that R&D personnel in the Arab countries represented in 2018 2.8% of the total number of R&D workers in the world. This percentage has significantly increased in recent years, compared to only 1.9% in 2010.

Figure 1 below shows the trend in percentage distribution of R&D workers by regions between 2010 and 2018. As can be noted, about 78% of all R&D workers in the world were, in 2018, in North America, Western Europe, East Asia and the Pacific, i.e. in scientifically and technologically advanced countries, compared to 1% in Sub-Saharan Africa and 0.6% in Central Asia.



**Figure 1**



Source : UNESCO Institute for Statistics

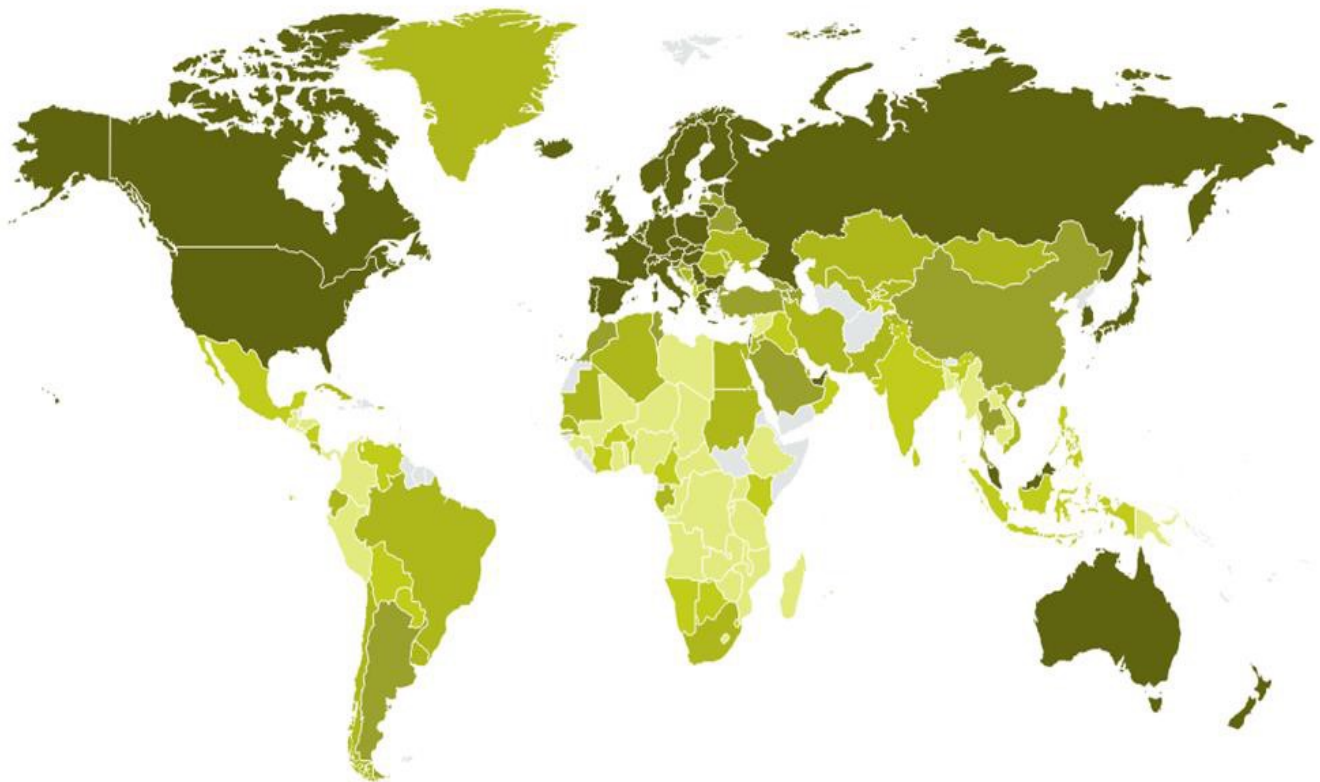
(\*) Estimates by ALECSO Observatory

## 2.2 - Distribution of R&D workers per million inhabitants by countries and regions:

This indicator enables to monitor States' efforts to achieve SDG9, and to draw comparisons across countries.

Map 1 below shows the distribution, by country, of the number of R&D workers per million inhabitants in 2017. As can be noted, the number exceeded 2000 R&D workers in North America, Western Europe, Russia, China, Japan, Australia, New Zealand and the United Arab Emirates. It ranged between 1000 and 2000 R&D workers in Southeast Latin America, Southeast Asia, and in some Arab States such as Tunisia, Morocco and Saudi Arabia, while it did not exceed 1000 R&D workers in the rest of the world.

**Map 1**



■ 2000-1001 ■ 1001-301 ■ 300-101 ■ 101-0 ■ There are no data ■ 2001 and above

Source : UNESCO Institute for Statistics

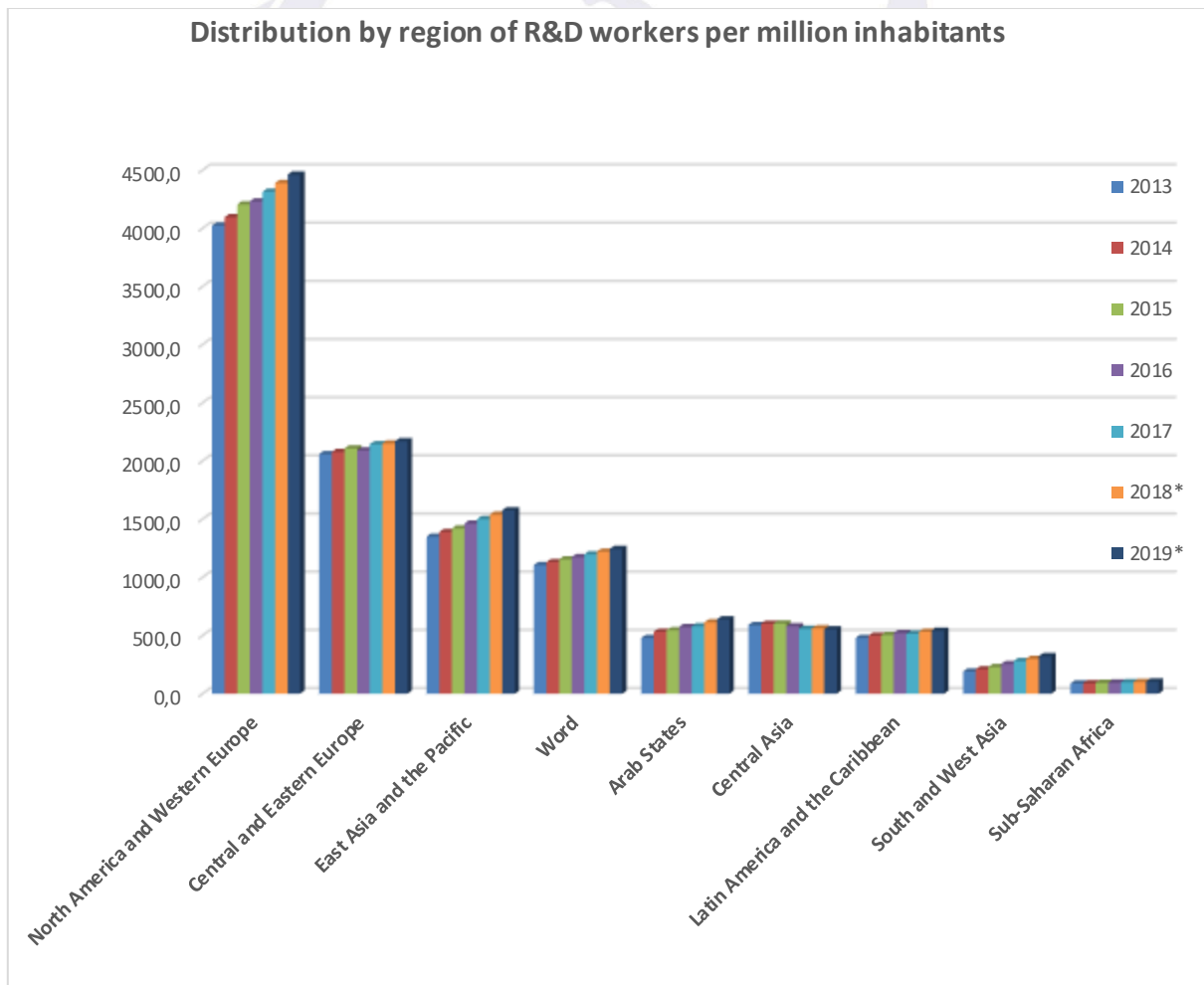
Figure 2 below (distribution by region of R&D workers per million inhabitants) indicates a significant increase in recent years in the Arab average, up from 480 R&D workers per million inhabitants in 2013 to 640 in 2019. In the other regions of the world, the pace of evolution was uneven, but the fact remains that significant efforts have been invested, in most of the world's countries including in the Arab region, to achieve Sustainable Development Goals in this field.

Figure 2 also shows that the highest percentages were recorded in North America, Europe, and East Asia and the Pacific, and that the pace of evolution of the number of R&D workers per million inhabitants in the countries of North America and Western Europe is higher than that of other regions.

Although the Arab average exceeds that of Central Asia, Latin America, the Caribbean and sub-Saharan Africa, it nevertheless remains low compared to the global average (1244 researchers per million inhabitants).



**Figure 2**



Source : UNESCO Institute for Statistics

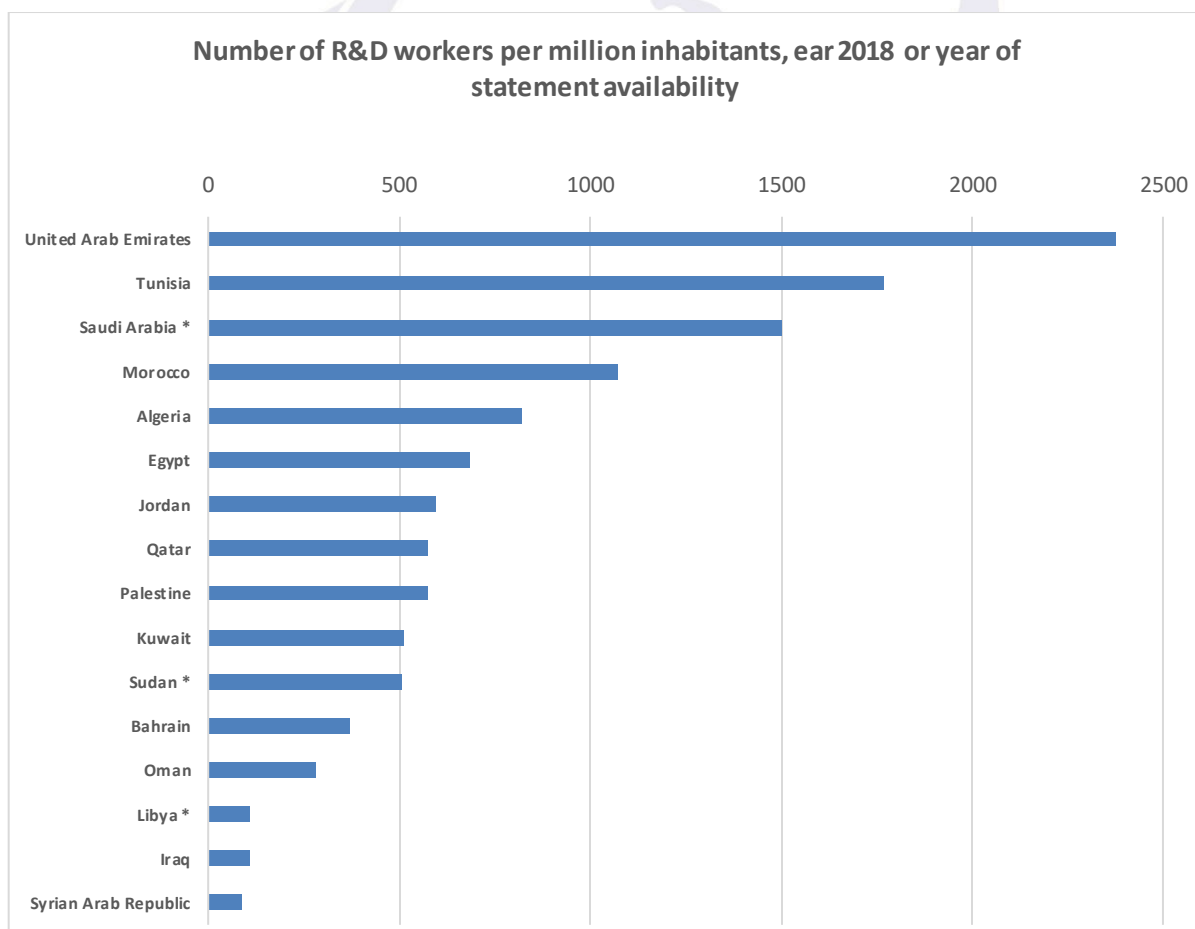
(\*\*) Projections by ALECSO Observatory

### 2.3 – Distribution of R&D workers per million inhabitants by Arab country

The data provided by the UNESCO Institute for Statistics for 2018 (latest update) and the preceding years indicate a discrepancy between Arab States in terms of number of R&D workers per million inhabitants, perhaps due to political and economic conditions. The number amounted to 2380 R&D workers in the UAE, 1780 in Tunisia, about 1500 in Saudi Arabia, and 1074 in Morocco. It ranged between 500 and 1000 in Algeria, Egypt, Jordan, Qatar, Palestine, Kuwait and Sudan, and was below 500 in Bahrain, Oman, Libya, Iraq and Syria (Figure 3).

Further action is, in fact, needed to further enhance scientific research in the Arab countries, by providing the needed infrastructure and research centers, allocating adequate budgets to meet research needs, and establishing policies and laws to regulate and stimulate research and innovation.

**Figure 3**



Source : UNESCO Institute for Statistics

(\*) Estimates by ALECSO Observatory

### **3 - Gender disparity in Research and Development:**

#### **3.1 Women's participation by region :**

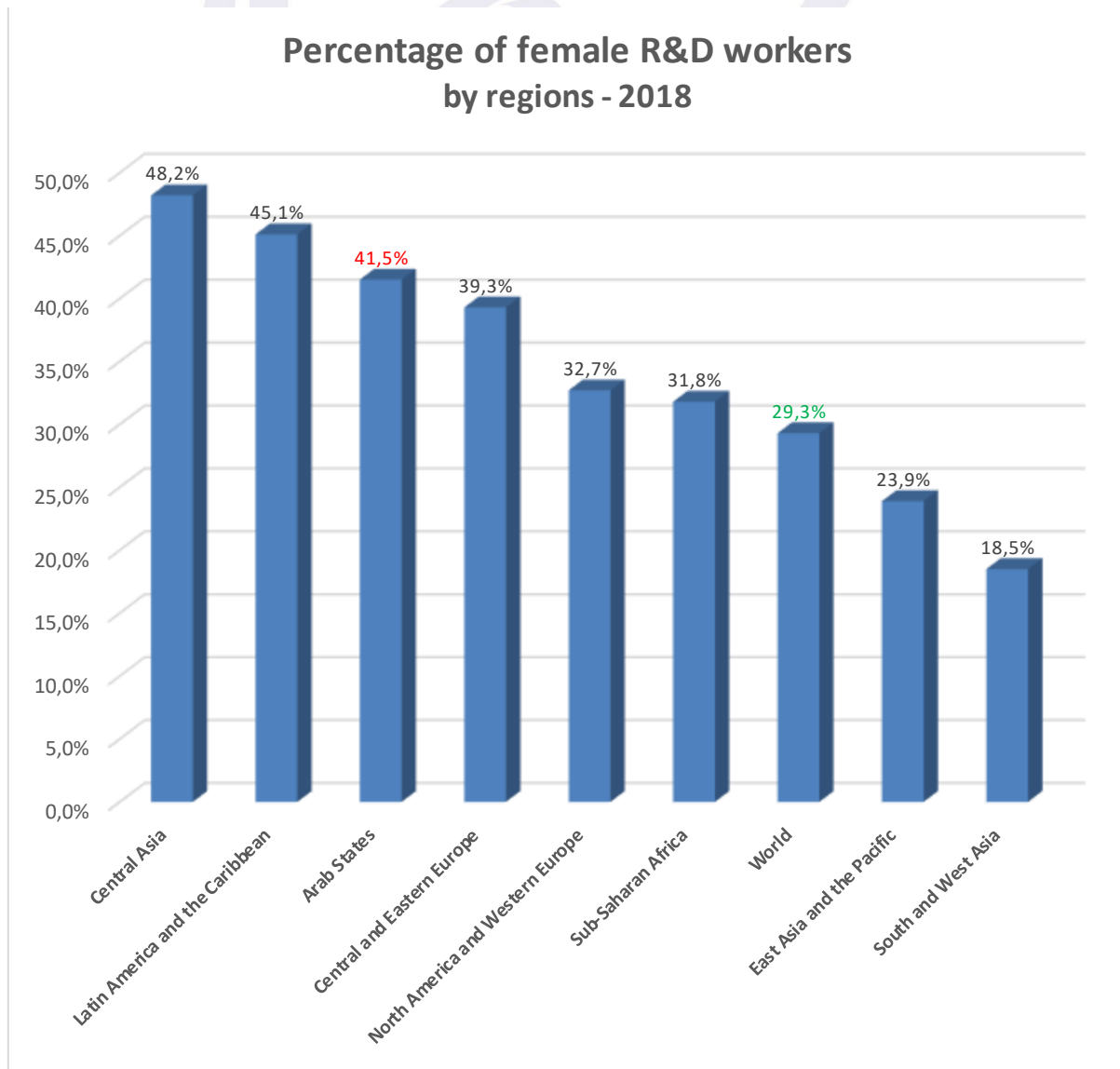
The presence of women in science fields is still below expectations in all countries, including developed ones. Figure 4 below indicates a low presence of women in the field of scientific research, with a global average of 29.3% in 2018.

It is to be noted that the average in developed countries is not far from the global average, with 32.7% in Western Europe and North America. For the Arab World, the average stands at 41.5%, a respectable figure compared to other regions.

A statistical study issued by UNESCO in 2014 shows that female R&D workers represent the majority only in 14 out of the 127 countries covered by the study. Balance with male R&D workers (between 45 and 55% of women) is achieved in only one out of five countries. In half of the world's countries, the percentage of female R&D workers does not exceed 30%.



Figure 4

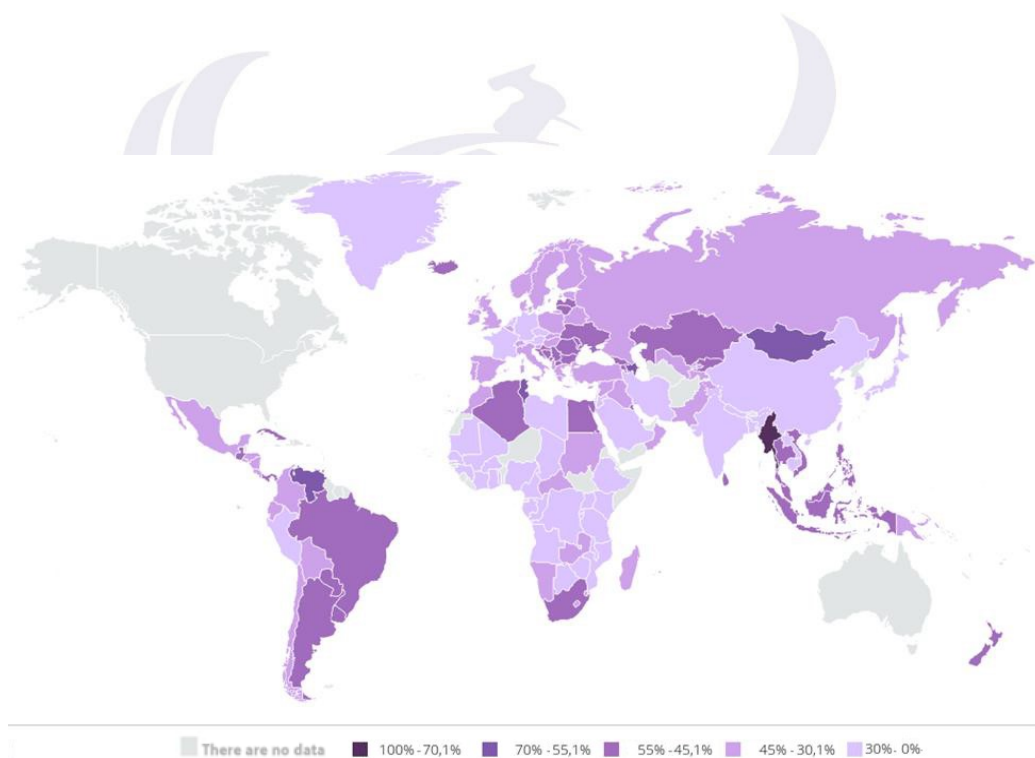


Source : UNESCO Institute for Statistics

### 3.2 Percentage of women's participation by country :

Map 2 shows differences between countries in terms of women's engagement in Research and Development. The countries of Eastern Latin America and some Arab countries (such as Tunisia, Algeria and Egypt) recorded high percentages that exceeded those of the countries of Western Europe and East Asia. This confirms that gender equality, especially in terms of scientific research, is not exclusive to advanced countries.

**Map 2**



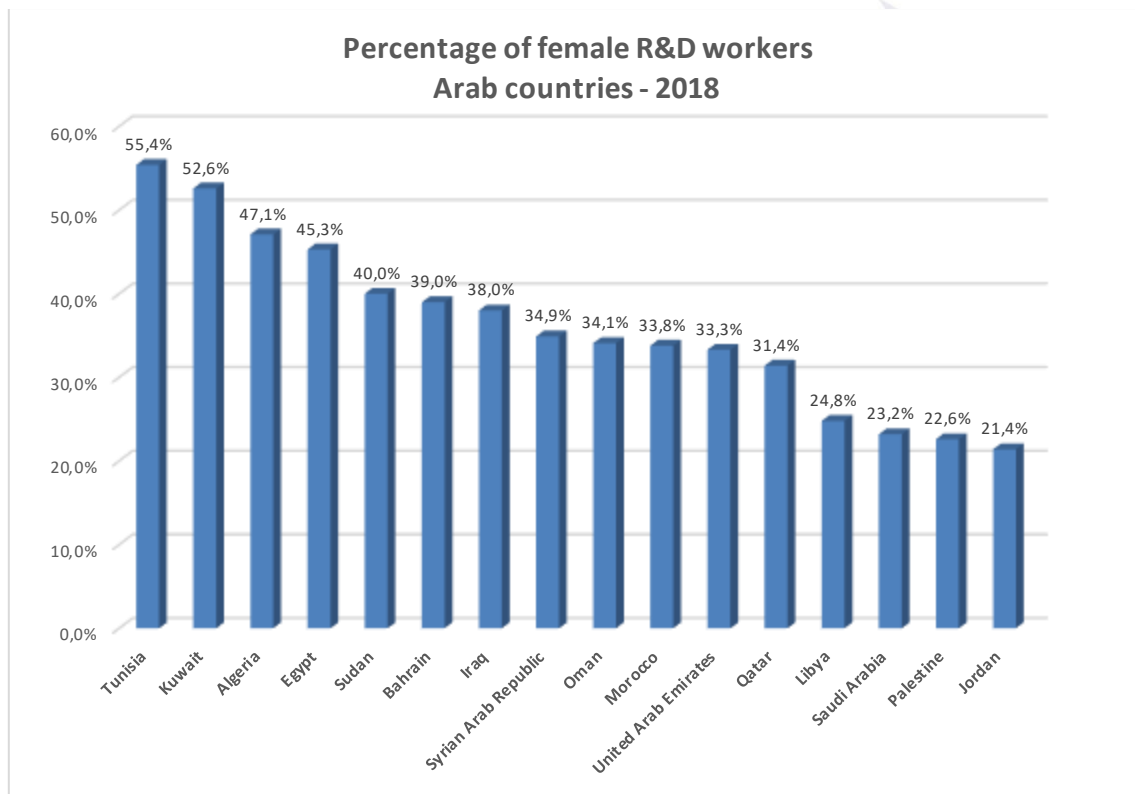
Source : UNESCO Institute for Statistics

### **3.3 Female involvement in R&D in the Arab countries:**

In the Arab World, the percentage of female R&D workers reaches 55.4% in Tunisia, 52.5% in Kuwait, 47.1% in Algeria, and 45.3% in Egypt. Moreover, 12 out of 16 Arab States have percentages of female R&D workers that exceed the global average (29.3%).

**Figure 5**





#### 4 - Conclusion

The available data on human resources involved in Research and Development show that despite the economic downturn the world witnessed over the past decade and the crises experienced by some Arab countries, there has been a significant evolution in the number of R&D workers in the Arab World. The gap between Arab States and developed countries can actually be reduced through:

- Giving more attention to basic and secondary education, imbuing students with a spirit of initiative and self-confidence, encouraging scientific research and setting up scientific clubs, along the lines of youth and science clubs created, in the late 20<sup>th</sup> century, in secondary schools in some Arab countries;
- Developing a plan to attract graduates and researchers, and strengthening linkages between scientific research and society's priorities and real problems in all fields;
- Preparing action plan and programs to address the Arab brain drain, while providing an enabling ground for society to benefit from their works and research;
- Following up on the research conducted by faculty members in Arab universities, and highlighting research outcomes and their positive impacts on society;
- Facilitating the involvement of universities in economic and industrial life, considering the key role of cognitive intelligence in wealth creation;
- Fostering partnerships between universities, R&D centers and institutions on the one hand, and production and service companies and institutions on the other hand;
- Enacting laws that encourage scientific research, and setting up mechanisms designed to provide a stimulating environment for innovation and creativity;

- Strengthening linkages between scientific research and all other sectors;
- Promoting the private sector's role in supporting and financing scientific research activities in the Arab countries, as well as in investing in venture capital.

