EURO-MEDITERRANEAN RESEARCH COOPERATION ON GENDER AND SCIENCE

Gender and Science – Time for Action
Synthesis Report

DULBEA - ULB

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List of Abbreviations

AMC  ARAB MEDITERRANEAN COUNTRY
ASTF ARAB SCIENCE AND TECHNOLOGY FOUNDATION
BES BUSINESS ENTERPRISE SECTOR
CEDAW CONVENTION ON THE ELIMINATION OF ALL FORMS OF DISCRIMINATION AGAINST WOMEN
DI DISSIMILARITY INDEX
GCI GLASS CEILING INDEX
GDP GROSS DOMESTIC PRODUCT
GER GROSS ENROLMENT RATIO
GERD GROSS EXPENDITURE ON RESEARCH AND DEVELOPMENT
GOV GOVERNMENT SECTOR
HES HIGHER EDUCATION SECTOR
ISCED INTERNATIONAL STANDARD CLASSIFICATION OF EDUCATION
IWSAW INSTITUTE FOR WOMEN’S STUDIES IN THE ARAB WORLD
MENA MIDDLE EAST AND NORTH AFRICA
OWSD ORGANIZATION FOR WOMEN IN SCIENCE FOR THE DEVELOPING WORLD
PNP PRIVATE NON-PROFIT SECTOR
R&D RESEARCH AND DEVELOPMENT
STI SCIENCE, TECHNOLOGY AND INNOVATION
INTRODUCTION

All over the world significant advances in women’s education have paralleled a growing concern about the underrepresentation of women in research careers and especially top positions in research. The percentage of women at higher levels of scientific careers is not increasing at the same speed as the number of women with the age and qualifications to reach these levels. This is not only an unfair situation. It is also a waste of talent and a source of bias that neither science nor the economy can afford.

Fifteen years of data-gathering, research and comparative analysis in the European countries has significantly improved knowledge on gender and science issues and enhanced policy debate and action.

In 1996 the European Commission issued the Communication “Incorporating equal opportunities for women and men into all Community policies and activities”\(^1\). This was the first step towards the implementation of gender mainstreaming in the European Union. The Amsterdam Treaty of 1997 laid the legal foundation for gender mainstreaming. In 1999 the European Commission issued the Communication “Women and Science: mobilising women to enrich European research”\(^2\). This Communication set out an action plan detailing the measures that would be undertaken by the Commission with a view to addressing the question of the under-representation of women in scientific research and technological development and ensuring a better integration of the gender dimension in research policy.

The Helsinki Group of national civil servants was set up in 1998 to enhance the dialogue among the Member States through policy reviews and development of gender indicators in research. The European Technology Assessment Network (ETAN) Expert Working Group on Women and Science was set up in 1999 to identify the challenges to women’s participation in Europe’s scientific and technological development. This led to the publication and wide dissemination of what became known as the ETAN Report (Osborn et al. 2000). The core message was that women did not want to be treated as a special case: the concern was that excellence of science in Europe was being compromised by patronage, institutional discrimination and old-fashioned approaches to human resource management.

In parallel, the European Commission launched “She Figures”\(^3\), a collection of data related to the situation of women in science and research in the European Union. Given that the availability of sex-disaggregated statistics is essential to raise awareness and encourage sound evidence-based policy making in the field of gender and science, the EC’s decision to publish She Figures was of utmost importance. In many EU countries, where such data were absent or not publicly disseminated before, the publication of She Figures in 2003 finally made it possible to measure the extent of gender imbalances in science and design policies to reduce them. Since then, She Figures has been regularly issued every three years to monitor gender equality in the field. This data collection reflects a clear wish to develop pan-European harmonised statistics facilitating cross-national comparisons and to build a base of gender disaggregated data available at the EU-level that makes it possible to track changes over time.

The overall objective of SHEMERA, a project funded by the European Commission under the Science and Society programme of the FP7, was to enhance research cooperation on gender and science between the European Union and the Arab Mediterranean Countries (AMCs): Algeria, Egypt, Jordan, Morocco, Lebanon, Palestine, Syria and Tunisia\(^4\). The project aimed at increasing knowledge about gender and science issues in the AMCs, allowing for further development of Euro-Mediterranean research cooperation in this field. For the purposes of the project, science was understood in its broadest sense, including social sciences and humanities as well as research and technological development.

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\(^1\) COM (96) 67 final.
\(^2\) COM (99) 76 final.
\(^3\) http://ec.europa.eu/research/science-society/index.cfm?fuseaction=public.topic&id=1282&lang=1
\(^4\) It was not possible to involve Libya although this was initially envisaged.
The SHEMERA project was carried out within the framework of Euro-Mediterranean cooperation for strengthening the role of women in all spheres of life, considering that the promotion of women in science is a key issue for developing a Euro-Mediterranean Research Area.

The 1995 Barcelona Declaration recognised ‘the key role of women in development’ in the Mediterranean region, and the need ‘to promote their active participation in economic and social life, and in the creation of employment’.

The First Euro-Mediterranean Ministerial Conference in Higher Education and Scientific Research, held in 2007, envisaged the creation of a Euro-Mediterranean Research Area, in line with the efforts of the European Commission to strengthen the international dimension of the European Research Area and integrate Europe’s neighbours5.

The Euro-Mediterranean Ministerial Conferences “Strengthening the Role of Women in Society”, held in 2006, 2009 and 2013, have established a clear commitment to promote de jure and de facto equality between women and men, preventing all forms of gender discrimination. “Equal participation of women and men in all spheres of life constitutes a fundamental and universal right, as well as an indispensable precondition for sustainable socio-economic development and good democratic governance”6.

The main aim of the SHEMERA project was to support Euro-Mediterranean cooperation in a joint effort to strengthen the role of women in science. During the course of this project, several historical events have shaken up the Middle-East region: the so-called Arab spring, the rise of ultra-conservative Islamist parties, the war in Syria and the intensification of the Palestinian-Israeli conflict with Israel’s attacks on Gaza. On the European side, the economic crisis has had a devastating impact on the Southern countries. In spite of this, the SHEMERA project has brought together researchers from universities and research institutes from both sides of the Mediterranean basin who have found ways to enhance research cooperation on gender and science between the European Union and the AMCs. Our priorities were to increase knowledge on gender and science issues, to empower women in science, to enhance networking and to steer policy-making on gender and science in the years to come.

In this report we present the main findings of our project. The report starts with a chapter presenting our methodological approach and the hurdles faced in the gathering of reliable data on the situation of women in research and academic careers in the AMCs. It is followed by a contextualising chapter addressing major aspects of the labour market situation of women in the AMCs that are essential to understand the issue of gender and science in these countries. The results of our statistical work are presented in the following two chapters on women in research and women in academia. An explanation of the factors affecting gender segregation in employment and science is the theme of the next chapter whilst the last one deals with gender equality policies in science. The report ends with a set of conclusions and policy recommendations to strengthen gender equality in science.

Our work has been based on the premise that gender equality in science is not a women’s issue. It concerns and should fully engage men as well as women. We hope the results of our work not only serve to increase knowledge, but also to support and encourage evidence-based policymaking. Advances in this field require political will and cooperation between a wide range of actors – namely governments, research institutions and the private sector. There is a pressing need for this. Increased awareness and networking around gender and science issues in the AMCs needs to be channelled into effective policy action.

It is also our firm tenet that gender inequality in science cannot be dissociated from the wider context of gender inequalities in society at large. In spite of progress made in terms of human development in the past decades, socio-economic polarisation and gender inequality are persisting and salient trends in the AMCs. High levels of unemployment and poverty are

undermining social cohesion and producing economic and political instability. The progress made regarding women’s access to education and health has not yet been reflected in the spheres of employment and political participation. A wide range of legal, social and economic factors are behind this. Women’s situation is at its worst when gender intersects with other social inequalities - class, religious and ethnic affiliation.

In a time when prospects for women’s rights are uncertain in many AMCs we can only hope that our work, alongside other gender studies, will help to push policy change towards strengthening women’s social, economic and political rights and supporting equal participation in all spheres of life.
Chapter I: METHODOLOGY

The overall objective of SHEMERA was to enhance research cooperation on gender and science between the European Union and the Arab Mediterranean Countries (AMCs): Algeria, Egypt, Jordan, Morocco, Lebanon, Palestine, Syria and Tunisia.

Fifteen years of data-gathering, research and comparative analysis in the European countries has significantly improved the knowledge on gender and science issues and enhanced policy debate and action. Similar experiences in the AMCs were scarce before the project started. SHEMERA thus primarily aimed at increasing knowledge about gender and science issues in the AMCs, allowing for further development of Euro-Mediterranean research cooperation in this field.

Our research priorities were to better understand the root causes of gender inequality in science in the area and to analyse how the AMCs are addressing these. Socio-economic trends and cultural traditions in the area have been taken into account whilst ensuring consistency with existing approaches, methodologies and models at the European level, in order to facilitate future targeted comparison with available data and research from European countries.

The project dealt with gender equality from a twofold perspective: a balanced representation of women in science and the integration of the gender dimension in research content. For the purposes of the project, science was understood in its broadest sense, including the social sciences and humanities as well as research and technological development.

The specific objectives of the project were:

1. To develop state of the art descriptions, data collection and relevant comparative analysis of gender and science in the AMCs, focusing on three key themes:
   - sex-disaggregated statistics on science
   - research on gender inequalities in science careers
   - gender equality policies in science
2. To make the state of the art descriptions, data collection and comparative analysis accessible to the research community, policy makers and society at large in all AMCs via an online database, published reports and workshops.
3. To enhance networking and to steer policy-making on gender and science in the years to come, in particular by developing recommendations for policy makers aimed at enhancing the presence of women in science and ensuring a better integration of the gender dimension in research policy.

The overall strategy of the project is shown in Figure 1. Work package 1 was devoted to the management of the project whilst work package 8 took care of dissemination activities.

The core research work was developed under work packages 2, 3, 4 and 5. Work package 2 established the conceptual and methodological points of departure, taking into account the EU experience in the field of gender and science and the most distinct trends in the situation in the AMCs. The state of the art, data collection and comparative analysis were then carried out in the next three work packages: sex-disaggregated statistics in science (work package 3); gender equality policies (work package 4) and scientific literature on gender inequalities in scientific careers (work package 5).
Activities related to networking and the policy debate were carried out under work package 6. The objective was to enhance awareness and policy debate on gender and science issues in the AMCs, by involving the main players at the national level and promoting Euro-Mediterranean dialogue.

Finally, work package 7 evaluated the results of the previous stages with the aim of drawing the final conclusions and recommendations of the project.

The next sections provide further details of our methodological approach.

### 1.1 Statistics on women in science

Statistics and indicators on women in science are a key element of the mainstreaming approach to equal opportunities in Europe. *She Figures* is a collection of available data related to the situation of women in science and research in the European Union (EU). This data collection has evolved from a willingness to pay attention to the gender dimension of research and to monitor gender equality in a field where strong gender imbalances persist. It also reflects a clear wish to develop pan-European harmonised statistics facilitating cross-national comparisons and to build a base of gender disaggregated data available at the EU-level that makes it possible to track changes over time and that has great value both in increasing knowledge and informing policies.

*She Figures* 2012 is the fourth publication (following *She Figures* 2003, 2006 and 2009) of this key set of indicators that are essential to correctly comprehend the situation of women in science and research in the European Union\(^7\). The *She Figures* data collection is undertaken every three years as a joint venture of the Unit Ethics and Gender of the Directorate-General for Research and Innovation of the European Commission and a sub-group of Statistical Correspondents of the Helsinki Group.

The *She Figures* publication is organised around 4 major chapters. Chapter 1 assesses the presence of women in research from a cross-country perspective. In particular, while it highlights the rapid progression of women in science, engineering and technology, it also draws the broad lines of the problem of gender segregation in science, fully analysed in chapter 2 on scientific fields. Chapter 2 also shows that a rapid catching up movement by women is taking

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place in the EU so that in the near future women will level with men at the PhD level. Chapter 3 on researchers’ seniority illustrates the workings of a glass ceiling that women hit during their ascent in the academic hierarchy. Moreover, there is no spontaneous reduction of vertical segregation and of the gender pay gap over time in Europe. Finally, chapter 4 shows that women’s under-representation at the highest hierarchical levels of the academic career severely cuts their chances of being at the head of higher education institutions, makes it hard for young women in academia to find female role models, and biases all decisions that are taken at these high levels regarding scientific policies, research subjects and credits and nominating rules and criteria. Thus, in general, chapters 1 and 2 are concerned with horizontal segregation, and chapters 3 and 4 with vertical segregation.

Work package 3 “Statistics: state of the art, data collection and comparative analysis” of the SHEMERA project consisted in compiling harmonised sex-disaggregated data in all the AMC s and in calculating the indicators necessary for monitoring and comparing progress towards gender equality in science in the Mediterranean area.

More precisely, the task was to collect sex-disaggregated data on science, in each AMC, with respect to four subject areas, following the example of She Figures:

1. Data that make it possible to quantify women’s presence in science (cfr. chapter 1 of She Figures 2012)
2. Data that illustrate the degree of horizontal segregation or women’s distribution (relative to men’s) across the different fields of science (cfr. chapter 2 of She Figures 2012)
3. Data relative to vertical segregation or women’s distribution (relative to men’s) across the different hierarchical levels of a typical academic career as well as across the hierarchy of occupational groups in research in the government and business enterprise sectors (cfr. chapter 3 of She Figures 2012)
4. Data that help assess the level of fairness and success rates for women in scientific fields or women’s influence (relative to men’s) on the setting of the scientific agenda, notably by their presence on boards, their success rates in gathering research funds, and so forth (cfr. chapter 4 of She Figures 2012).

In order to ensure the establishment of common methodological guidelines, a workshop was organised by DULBEA (Department of Applied Economics of the ULB) in Brussels on June 20, 2011 and addressed to the national experts in charge of the collection of national data.

In the preparation of this workshop, DULBEA drew up a list of all the data that are needed for the establishment of She(mera) Figures as well as an overview of definitions to guide the national experts responsible for collecting the data for their respective countries (cfr. appendix 2). The compilation of data for the AMC s similar to those published in She Figures for the EU should make it possible not just to compare the AMC s among each other but also to contrast the situation of women in science in the AMC s with the prevailing situation in the EU.

In the summer of 2012, DULBEA prepared an intermediate report presenting the first results of the data collection. At that stage, the data collection had been more or less finalised for 6 countries: Egypt, Jordan, Lebanon, Morocco, Palestine and Syria. For the remaining countries, Algeria and Tunisia, more problems were encountered and the collection remained in a very preliminary stage.

In the meantime, most questions regarding the AMC data have been answered although the work in WP3 remains hampered by some major data limitations in a subset of AM countries. Although data on horizontal and vertical segregation in the higher education sector are generally reliable and make it possible to analyse the major issues at stake, data on researchers are usually very scarce because most countries (except for Palestine and Syria) do not carry out R&D surveys such as the ones available in Europe. In some cases, research in higher education can be analysed but there is generally little statistical information available on research in the government sector or in the private sector.

A second shortcoming is that the data collected are generally less detailed than in Europe. Often breakdowns by age or detailed field of science are not available in a reliable form.
Table 1 summarises the data gaps encountered in the SHEMERA project. Cells highlighted in red indicate that there are no data available, cells in green indicate that data exist, cells in orange indicate that partial information is available and finally, cells in grey indicate that these data were not necessary to reproduce the She Figures indicators in the AMCs. The table shows that data on women in academia are more readily available for the AMCs than data on women in research in all broad economic sectors (Higher Education - HES, the Government sector – GOV, the Business Enterprise sector – BES and the Private Non-Profit sector – PNP).

The analysis of women in research in the AMCs is highly dependent on the existence of R&D surveys similar to the European ones. Unfortunately, an R&D survey exists and is regularly conducted in two AMCs only: Palestine and Syria. Despite the existence of an R&D survey in Palestine, it was impossible for the SHEMERA expert to collect data on private sector research (BES), on the age distribution of researchers, on their involvement in different fields of science or on the number of applicants and beneficiaries of research funding. Moreover, only for Syria is it possible to analyse the situation of women in research over time.

In all other AMCs, the absence of an R&D survey makes the analysis of women in research even more difficult. Nevertheless, despite the absence of an R&D survey in Egypt and Morocco, other data sources in these countries make it possible to do some partial analysis of the situation of female and male researchers although restricted to the higher education sector and government research (although in Egypt the total number of researchers by sex is also available for the BES, this is the only information the expert was able to gather concerning private sector research). Also, researchers cannot be distinguished from their colleague technicians and supporting staff as is recommended by the Frascati manual.

In Lebanon, the Ministry of Education publishes the numbers of female and male researchers in higher education but provides no further information. The SHEMERA expert for Lebanon managed to provide additional information on higher education research (male and female researchers by age and field of science) based on a subsample of Lebanese universities that collaborated with the SHEMERA expert to provide the richest data possible. The subsample is comprised of three universities that together represent 48% of the tertiary student population in Lebanon in 2010.

For Algeria, Jordan and Tunisia, no data on R&D personnel and expenditure were collected.

The analysis of women in academia was facilitated by a higher degree of data availability. In the majority of countries it was possible to carry out a thorough analysis of female and male PhD students and graduates and of women’s and men’s presence and advancement on a typical academic career path. The major data shortcomings concern the absence of data on academic wages and on the age distribution of grade A academic staff.

Finally, we were also able to collect sufficient data to investigate the issue of women’s participation in academic decision-making. She Figures addresses this issue by means of indicators relative to the share of female heads of institutions in the higher education sector and their representation on scientific decision-making boards. These indicators have been reproduced for the AMCs so that a comparative analysis of this issue was possible between the AMCs and Europe.

More detailed country-specific meta-data will be presented throughout the different chapters of this report.
### Table 1: Data availability in the AMCs

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1.2 Research on gender inequalities in scientific careers

The objective of WP5 – “Scientific literature: state of the art, data collection and comparative analysis” was to provide an overview and comparative analysis of scientific literature on gender and science in all the AMC.

The review of scientific literature focused on the following themes:

- Horizontal segregation in science careers: unequal presence of women and men in different scientific fields and institutional R&D sectors.
- Vertical segregation in science careers: the presence of women decreases as one moves up higher in the scientific hierarchy.
- The underlying causes and effects of these two aspects, for instance access to education, work-life balance issues, pay gap, mobility-related obstacles, dual careers, evidence of discrimination, working culture, stereotypes, etc.
- Research on policies for gender equality in science.

Our methodological approach was built on the study Meta-analysis of gender and science research (Caprile et al. 2012) launched by the European Commission in 2008. The purpose of the study was to collect and analyse research on horizontal and vertical gender segregation in research careers, addressing the underlying causes and effects of these two types of gender segregation. The study developed the Gender and Science Database (GSD), an online database of scientific literature on gender and science.

In order to share a common understanding of concepts and methodological guidelines, a workshop was organised in Barcelona on May 11 2012, which was addressed to the national experts in charge of collecting and analysing the national bibliography.

A review of the scientific literature has shown that specific research on gender segregation in scientific careers is very scarce in the AMC, although there is more substantial research on the root causes of gender segregation.

The informed bibliographical database (Gender and Science Database in the Arab Mediterranean countries - MeD-GSD) is available online on the website of the project (www.shemera.eu).

1.3 Gender equality policies in science

The objective of “WP4 Policies: state of the art, data collection and comparative analysis” was to collect and analyse the existing gender equality policies in science in all the AMC, with the intention of spreading best practice and enhancing policy debate.

The methodological approach was built on European research in this field. In March 2002, the Commission published a report entitled National Policies on Women and Science in Europe (Rees 2002). This report provided a complete overview of policies implemented in 30 countries to promote women in science, as well as national statistical profiles for the countries concerned. The report was seen as a practical tool, designed to enable each country to draw from the experiences of others and to adopt measures which had proven successful. In 2003 the Enwise group examined the conditions and status of women scientists in Central and Eastern Europe and in the Baltic States. The Enwise report (Blagojevic et al. 2003) highlights the influence of specific gender policy implemented in these countries, the restructuring of research systems during the transition period and the impact of these changes on the prospects for women scientists. In 2008, the study Benchmarking national policies on women and science (Ruest-Archambout 2008) updated the former reports. The report Policies toward Gender Equity in Science and Research (Castaño et al. 2010) looked at the literature evaluating gender equity policies in Europe at national, regional and institutional levels.

8 http://meta-analysisofgenderandscierceresearch.org
In order to share a common understanding of concepts and methodological guidelines, a workshop was organised in Barcelona on May 11, 2012, which was addressed to the national experts in charge of the collection of national data. A set of conceptual issues were first discussed. For the purposes of SHEMERA, ‘science’ was understood in its broadest sense, including social sciences and humanities as well as research and technological development. ‘Gender equality in science’ may refer to organisation issues (promoting women’s and men’s balanced presence in science) and/or content issues (mainstreaming sex and gender analysis into basic and applied research). ‘Gender equality policies in science’ refer to any kind of measure, programme or legislation aimed at promoting gender equality in science: It may be a national policy, but also a measure implemented in one single university.

Following Schiebinger (2008) we differentiate between three policy approaches to gender equality in science:

- Supporting women: supporting women’s educational opportunities and careers
- Promoting institutional change: transforming structures and removing barriers
- Mainstreaming gender in knowledge production: mainstreaming gender analysis into basic and applied research

The first of these approaches focuses on programs targeting women themselves with efforts to increase their participation in science. The second approach seeks to increase women’s participation by reforming research institutions. The third focuses on overcoming gender bias by mainstreaming gender analysis into basic and applied research. These three approaches are interrelated: increasing women’s participation in science will not be successful without restructuring institutions and mainstreaming gender analysis into knowledge production.

Research at the national level was based on documentary analysis and interviews. In order to collect and classify gender equality policies in science, legal frameworks as well as various institutions and agencies were researched: scientific bodies, academies, universities and research institutes. Documentary analysis was combined with interviews of key informants: representatives of key institutions and agencies, representatives of women and science associations and gender experts. In our work, we used the questionnaire used in former European reports (Rees 2002; Ruest-Archambault 2008) in order to facilitate comparison with available data and research from EU countries.

1.4 Networking and policy debate

The objective of WP6 “Networking: activities to enhance awareness and policy debate” was to raise awareness and enhance the policy debate on gender and science issues in the Mediterranean area, by involving the main players in each AMC and stimulating Euro-Mediterranean dialogue.

Networking activities started with the establishment of a Task Force on gender and science issues in each AMC. These task forces provided the opportunity to present SHEMERA to relevant stakeholders at the national level and to encourage them to support the development of the project’s activities.

Once the results of the project were available, the SHEMERA partners in collaboration with the members of the task forces organised national workshops in order to discuss the main findings of the project at the national level and discuss the policy recommendations. In total, eight national workshops were organised, one in each AMC: Algeria, Egypt, Jordan, Lebanon, Morocco, Palestine, Syria and Tunisia. These national workshops were held between March 13, 2013 (Palestine) and May 24, 2014 (Tunisia). They were aimed at institutional policy/decision makers in the field of R&D policies, representatives of the scientific community and R&D organisations and students. Speakers included gender experts, ministry and university delegates. The proceedings of these workshops are available on the website of the project (www.shemera.eu).
The discussions and the ensuing policy recommendations of the national workshops were important in showing that despite the great cultural and structural differences between the AMCs and the European countries there are also strong similarities in the participation of women in science. In order to foster the Euro-Mediterranean dialogue around gender and science issues, a Euro-Mediterranean workshop was held on May 30, 2014, in Naples. The workshop brought together around 50 participants including the whole SHEMERA team as well as relevant gender experts and representatives from women’s scientific associations in the EU and AM countries. The workshop discussed the outcomes of the national workshops and provided an excellent opportunity for comparison and exchange, providing new insights into gender and science issues in the individual countries as well as in the region as a whole. The proceedings of the workshop are available on the website of the project (www.shemera.eu).
Chapter II: WOMEN IN EMPLOYMENT

Over the past four decades, the AMCs have made significant progress in human development. Tunisia, Algeria and Morocco are among the 10 countries recording the world’s fastest progress in human development since 1970 (UNDP 2010). However, socio-economic polarisation is a salient and persisting trend, with high levels of poverty and socio-economic exclusion (El-Baz 2005). The situation in the Arab countries is marked by high chronic unemployment, particularly for adult women and young people of both sexes, whilst the gap in standard of living between the employed and unemployed has widened over the past years (ECSWA 2013). “Even with a better education than their parents, most of the youth today in the region are forced either to compete for limited domestic job opportunities, which are often jobs in the informal sector for which they are highly overqualified, or to emigrate abroad” (ECSWA 2013:v).

During the same period, impressive progress towards gender equality in education and health has been made (World Bank 2013a). The average growth rate of key indicators – such as female literacy (+), infant mortality (-), and life expectancy (+) – exceeded that of most other developing regions. The AMCs are close to achieving gender parity in primary and secondary enrolment rates, comparing favourably to low and middle income countries worldwide, although completion rates are not so favourable. Maternal mortality and fertility rates have declined rapidly over the past decade. Nevertheless, these achievements have not yet translated into a more equal role for women in political and economic life (World Bank 2013a; Hausmann et al. 2011).

This gender equality paradox is essential to understand the situation of women in science in the AMCs. Women are better educated than ever before but face major obstacles to entering the labour force on equal terms with men. For most young women, economic and social aspirations increasingly result in disappointment. In this chapter we present major aspects of the labour market situation of women in the AMCs that are relevant in analysing the situation of women in science in these countries.

Box 1: Global Gender Gap Index 2011

The Global Gender Gap Index (GGI) was introduced by the World Economic Forum in 2006. It is a framework for “capturing the magnitude and scope of gender-based disparities and tracking their progress” (Hausmann et al. 2011:3). The GGI was developed around three basic concepts. Firstly, it focuses on gaps, not levels, for example in terms of access to resources or opportunities. Secondly, it captures gaps in outcome variables rather than gaps in means or input variables. Thirdly, it ranks countries according to their proximity to gender equality and not women’s empowerment. The GGI is comprised of four sub-indices:

- Educational attainment, which deals with literacy rates and enrolment rates in primary, secondary and tertiary education;
- Health and survival, which takes into account the sex birth ratio and healthy life expectancy;
- Political empowerment, which accounts for the representation of women in parliament, in ministerial positions and years in which the head of state was a woman;
- Economic participation and opportunity, which addresses labour force participation, wage and income equality, women among legislators, senior officials and managers and women among professional and technical workers.

The table below shows the results of the GGI in 2011 (we use this year because Tunisia was not included in the 2013 GGI). Out of 135 countries, the best performers are Iceland (1st) and Norway (2nd). EU countries range from the 3rd (Finland) to the 93rd place (Cyprus) whilst the AM countries range from the 108th (Tunisia) to the 129th place (Morocco). These low ranks are mainly due to the AMCs’ weak scores on two sub-indices: political empowerment and economic participation and opportunity. On the sub-indices of educational attainment and health and survival the scores of the AMCs are somewhat better, reflecting less harsh gender differences in these areas. Only Tunisia has a comparatively high number of women in parliament and stands out on the political empowerment sub-index.
2.1 Labour market participation

The MENA region (Middle-East and North Africa) is the world’s region where women’s labour market participation is the lowest with a rate of hardly 25% compared with the world’s average female participation rate of 51% (World Bank 2013a; Talahite 2013).

Whereas the male participation rate is also low it is relatively close to its level in the European countries and other world regions. More than two thirds of all men are active in all AMCs in 2010 but women’s labour market participation rate is much lower, varying between 14% in Syria and 52% in Morocco. In the European Union, the country with the highest female participation rate is the Netherlands (83% in 2010) although this is largely explained by widespread part-time work. The Netherlands are closely followed by the Scandinavian countries where female participation is still well above 70%. The EU country with the lowest rate is Malta (42.5% in 2010). Malta is thus the worst performing EU member in terms of women’s participation to the labour market. Of all the AMCs only Morocco scores better than Malta, Moroccan women participate at a rate of 51.9% in the labour market in 2010. All other AMCs have female participation rates that are far below the Maltese rate.

Except for Syria and Morocco, women’s labour market participation rate has increased between 2004 and 2010 whereas the male rate has generally decreased except for Lebanon, Tunisia and Libya.

The gender gap in labour market participation rates is particularly high in the AMCs. With the exception of Morocco, where the gender gap is just slightly above its level in the European Union, the gaps are 3 to 4 times higher than in Europe, North America and Subsaharan Africa. The gap is the highest in Syria (61.8 percentage points) and lowest, although still at 47.5 points, in Libya.
Table 2: Labour force participation rate by sex (% of female/male population aged 15-64), 2004 and 2010

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Source: World Bank, GenderStats

Figure 2: Gender gap in participation rates, 2010

Like in Europe, educational attainment is an important determinant of female labour supply in the AMCs. The study by Spierings and Smits (2007) confirms this as it shows the enormous difference in labour market participation for women with at least tertiary education (49.7%) and the rest (7.9 to 19.6%), a pattern unequivocal for all countries. Although more and more Arab women are accessing not only primary education but also higher education, their employment perspectives are not improving accordingly (Martín 2006).
2.2 Employment

The labour markets in the AMCs are characterised by low female participation. This in combination with high unemployment results in very low female employment (UNDP 2006; Moghadam 1998; Azzam et al. 1985).

As shown by Table 3, in 2012, among the AMCs, the female employment rate is highest in Libya but still stands at 25.3% only. It is lowest in Syria at 10.4% where just one in ten women is employed. Compared with the European Union and North America, these rates are extremely low. In the EU, in 2012, the average female employment rate stood at 45.4%, at 52.8% in North America and at 58.3% in Subsaharan Africa. The EU member state with the highest female (headcount) employment rate is the Netherlands (55.7%) although the high level of female employment in this country is mainly due to widespread part-time work. The EU member with the lowest female employment rate is Greece (31.8%). Female employment in the AMCs is thus far below the worst performing EU country.

The gender gap in employment rates is also much higher in the AMCs than in Europe, North America and Subsaharan Africa. This fact is entirely due to the low level of female employment in the AMCs as the male employment rate is above the EU average rate in all countries except for Palestine. Male employment in the EU is highest in the Netherlands at 67.2%. Compared with this best European performer, the AMCs score relatively well: male employment is higher than it is in the Netherlands in Syria, Egypt, Morocco and Libya. It is somewhat lower than in the Netherlands in Algeria, Jordan, Lebanon, Tunisia and Palestine, but in all these countries male employment is still far above the rate observed in Greece, the EU member where male employment is lowest.

Gender gaps in employment are thus far greater in the AMCs than in Europe, North America and Subsaharan Africa. The gap is largest in Syria, at 58.2 percentage points, and lowest in Palestine, at 38 points.
Table 3: Employment rate by sex (% of female/male population aged 15+), 2004, 2010 and 2012

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<td>10.4</td>
<td>68.5</td>
<td>58.1</td>
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</tbody>
</table>

Source: World Bank, World Development Indicators

Figure 4: Gender gap in employment rates, 2010

However, European labour markets are characterised by high female part-time employment which, amongst others, hinders their wage and career advancement and their retirement prospects (Meulders and O’Dorchai 2013). This prevalence of part-time work in Europe falsifies the comparison with the MENA countries, where part-time work remains a very limited phenomenon (Mzid 2003). Even if data on part-time work are very spurious, it seems that part-time work is much less widespread in the AMCs than in the EU and its gender dimension appears to be less pronounced. For example, in Palestine, low numbers of men and women work part-time and the male part-time employment rate is higher than the female rate in 2010: 2.9% versus 2.1%.
It should be noted that there is a huge discrepancy between these World Bank data and the national data on headcount employment reported by the national experts for Egypt and Palestine in the SHEMERA project. The other AMCs did not report national rates but rather used the World Bank as the data source on employment. Especially the female rate is reported to be much higher by the Egyptian and Palestinian experts and this cannot be fully attributed to the fact that the World Bank rates concern the population aged 15+ whereas the national experts applied an upper age limit of 64.\(^9\)

The two main sources of female employment in the majority of the countries of the region, obviously apart from agriculture, are the State sector (where there is an almost equal participation of women, at least concerning the number of employees, although wage and promotion discrimination persists) and the manufacturing industry, especially in the textile and garment industry (for example, in Morocco, 68% of the workforce in the textile industry are women). Both of these sectors are suffering a decrease in jobs as a consequence of privatization policies and the reduction of public expenditures in the former and a loss in competitiveness in European markets in the case of the textile industry, and the higher rate of temporary contract work prevailing amongst women as compared to men in the manufacturing industry makes women more vulnerable to this phenomenon.

**Public sector employment**

In Egypt, for example, the public sector traditionally scooped up many educated female workers as a result of Nasser-era policies of guaranteed government employment. Those policies offered additional benefits to married women and those with children. The government employed 52% of all working women by 1998. Women sought government positions because of job security, short working hours and long-term social security benefits that lasted years after leaving a government job. Suspension of the public employment guarantee program in the 1990s and reforms to eliminate costly welfare programs primarily affected women.

**Female self-employment**

Table 4 displays the share of male and female self-employed. Self-employment rates for women show great variation across the AMCs. In Jordan and Syria, the gender gap in self-employment is highest, at respectively 30 and 14 percentage points. On the contrary, a larger share of women than of men is self-employed in Egypt and very large and similar shares of women and men are self-employed in Algeria and Palestine.

<table>
<thead>
<tr>
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<td>North America</td>
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<td>Lebanon</td>
<td>15.2</td>
<td>43.5</td>
<td></td>
<td>na</td>
<td></td>
</tr>
</tbody>
</table>

Source: World Bank Gender Stats

\(^9\) Egypt, for example, is reported to be a high-employment country by its national expert, particularly for men: in 2010, the male employment rate stood at 97%. The female employment rate is also high although there is a large gender gap: in 2010, 77% of women aged 15 to 64 were at work. In Palestine, based on national labour force survey data, the male employment rate was estimated at 77.1% in 2010 and the female rate at 73.6%.
Female entrepreneurship

Although in a number of AMCs (e.g. Algeria, Egypt) a rather large share of women are self-employed, this should not be interpreted as if there were many female entrepreneurs in these countries. Self-employment and entrepreneurship are two different concepts. In all of the world’s regions, female entrepreneurs are a minority and this is also the case in the AMCs.

In the AMCs this is first to be attributed to the overall business environment which suffers from corruption and anti-competitive practices that do not favour entrepreneurship in general, for both men and women. Although these barriers are not specific to women they may be more difficult for women to overcome. In their review of existing literature, Klapper and Parker (2011) show that obstacles inherent in the business regulatory environment disproportionately affect female entrepreneurs both in their decision to start their own business and in their success in leading and managing it.

That female-owned and –managed firms are rare is also witnessed by a World Bank survey conducted on 5887 firms in 10 MENA countries between 2003 and 2010. In this sample of firms only 15% were owned by women.

2.3 Unemployment

The labour markets in the AMCs combine low female participation and employment rates with high unemployment rates, especially among women and young workers.

The small share of women who do participate in the job market suffer from a much higher rate of unemployment than men. Data for 2010 are missing for Lebanon and Libya but in the remaining 7 AMCs, the female unemployment rate is systematically above the male rate. This feature does not characterise the American labour market where unemployment hits more men than women. Since the 2008 crisis, in the European Union, the gender gap has reversed. Whereas before the crisis it was negative with women disproportionately hit by unemployment, after the crisis it has become positive with unemployment hitting more men than women.

In the AMCs, the female rate varies between 9.6% in Morocco and 26.8% in Palestine. Thus, only in Morocco and Lebanon, is female unemployment close to its level in the European Union and North America but it far exceeds the European and American rate in the other AMCs. In 2010, the EU members with the highest female unemployment rates were Spain (20.5%) and Greece (16.2%). Palestine, Syria, Egypt and Libya thus have female unemployment levels that are above the worst performing European country.

Given that male unemployment exceeds female unemployment in Europe and North America whereas the opposite holds true in the AMCs, the gender gaps in unemployment are positive in the former regions and negative in the latter. In absolute value, the gender gap in unemployment is largest in Egypt at 17.7 percentage points and smallest in Morocco at 1 percentage point.

Besides women, unemployment particularly hits young people. Unemployment data for 2010 are available for 6 of the 9 AMCs (not for Lebanon, Tunisia and Libya). Except for Morocco, young women accumulate the disadvantages linked to their sex and their age as their unemployment rate is much higher than that of young men. This is not the case in the European Union and North America where unemployment concerns a larger proportion of the male than of the female force of young workers.
Table 5: Unemployment rate by sex, 2004 and 2010

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Source: World Bank, World Development Indicators

Figure 5: Gender gap in unemployment rates, 2010

Morocco is the only country where male and female youth unemployment is somewhat comparable with its levels in North America and the European Union. On average in the European Union, youth unemployment for men and women stood at 22% in 2010 (there is no gender gap). In North America, male youngsters have an unemployment rate of 20% and young women one of 15.5% (a gender gap in favour of young women of 4 percentage points). Within the EU there is a huge discrepancy in the youth unemployment rate across countries. The EU country with the lowest rate of unemployment in the age group 15-24 is the Netherlands and the country with the highest rate is Greece. In this latter worst performing EU country, especially young women are particularly affected by unemployment, the female rate of 41% is 14 percentage points above the male rate of 27%. In terms of female youth unemployment, many AMCs perform much worse still. The female rate reaches 50% and more in Palestine and Egypt.
Table 6: Youth unemployment rate (15-24) by sex, 2004 and 2010

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</tr>
</tbody>
</table>

Source: World Bank, World Development Indicators

Figure 6: Gender gap in youth unemployment rates (15-24), 2010

In European countries a negative correlation is generally observed between unemployment and education. Access to the labour market is easier for higher-educated people. This is not systematically the case in the AMCs.

In the AMCs, unlike for men, women’s rates of unemployment grow as their level of studies increases, although this largely reflects their increasing rate of participation in the labour force as they become more educated (see Figure 7 for Morocco and Tunisia). In many Arab countries female graduates find it particularly hard to get a job.

In many MENA countries female labour market participation and employment need to catch up with women’s increased level of education. Although more and more Arab women are accessing not only primary education but also higher education, their employment perspectives are not improving accordingly (Martín 2006). Among graduates of higher-education institutions in Jordan two-thirds of the jobless were women, according to the Jordanian Department of Statistics (2013).

Post-revolutionary Egypt is a case in point. One quarter of Egyptian women were unemployed at the end of 2012. And the unemployment rate for women with university degrees was 32%, almost triple that for educated males in 2011.
2.4 The gender wage gap

Persisting gender wage gaps are a common trait of European and North American labour markets even though all wage discrimination is forbidden by law. The same appears to hold true in the AMCs even if no harmonised and reliable data are available. However, some national experts in the SHEMERA project managed to find national data that make it possible to assess gender pay inequality. In 2010, the SHEMERA expert for Egypt reported a gender pay gap of 19.6% (compared with 18% in 2004) although it was estimated at 38% by the United Nations and the Egyptian government. The Palestinian expert estimated the gender pay gap at 16.1% in Palestine (compared with 15.7% in 2004). Gender inequalities on the Lebanese labour market seem to be relatively weaker as the gender wage gap stood at 6% in 2010. Finally, in Jordan, the gender pay gap was reported to stand at 14% in 2010. However, a 2013 study on pay discrimination in private schools and universities in Jordan found a much starker pay gap between women and men and put forward legal amendments to promote equal remuneration for all workers. While the gender pay gap exists across several sectors, the study found that female teachers working in private schools earn 41.6% less than their male counterparts, while the pay gap fell to 23.1% at the university level (ILO 2013). According to Kamel (2012), the gender pay gap in Tunisia and Morocco is as high as 40%.
Chapter III: WOMEN IN RESEARCH

The *She Figures* data collection is undertaken every three years since 2003 by the Directorate-General for Research and Innovation of the European Commission, in cooperation with the Helsinki Group and its sub-group of Statistical Correspondents. It is a collection of data that make it possible to analyse the situation of women in science and research in three broad economic sectors, Higher Education, the Government sector and the Business Enterprise sector. It also shows how this situation evolves over time. *She Figures* is a very rich data set that is constantly being expanded and improved. An analysis as detailed as the one offered by *She Figures* of the situation of women in science and research in the AMC is impossible due to important data limitations (cfr. general introduction and section 2.1.).

Comparing the situation of women in education, research and science between Europe and the AMC is a very hazardous exercise because of three data-related flaws:

1. Lack of data availability
2. Poor data quality
3. Important divergence between different data sources

This chapter analyses all the data the SHEMERA experts were able to gather. These were sufficient to draw up an interesting picture of how female researchers compare with male researchers in the MENA region but unfortunately do not allow for a systematic comparison with the whole set of European indicators.

The coverage of the data analysed in this chapter does not go beyond the year 2010. Since this point in time the political situation has severely degraded in different AMC so that the situation of women in science and research as it is described and analysed in this report may have undergone important changes in the meantime.

3.1 Data limitations

Throughout Europe an R&D Survey is conducted in coordination with Eurostat and according to the standards and guidelines of the Frascati Manual, adopted by the OECD as the terminological and methodological basis for the collection of statistical data on research and development (R&D). The survey collects information on the numbers of researchers, a set of personal characteristics (sex, age, level of qualification, etc.), the sector of activity (higher education, government research, private research or research in the private non-profit sector) and the field of science in which they are active, their occupation (researcher/technician/supporting staff), etc. It also yields information on R&D expenditures in different sectors. Experience shows that R&D surveys are the most appropriate instrument for collecting R&D personnel data. However, as the Frascati Manual points out, population censuses, population registers and labour force surveys are often useful complementary data sources for the analysis of R&D personnel.

The analysis of women in research in the AMC is thus highly dependent on the existence of R&D surveys similar to the European one. Unfortunately, an R&D survey exists and is regularly conducted in two AMC only: Palestine and Syria. Despite the existence of an R&D survey in these countries, it was impossible for the SHEMERA expert for Palestine to collect data on private sector research (business and enterprise sector – BES). Table 7 shows that despite the absence of an R&D survey in Egypt and Morocco, other data sources in these countries allow some partial analysis of the situation of female and male researchers although restricted to the higher education sector and government research (though in Egypt the total number of researchers by sex is also available for the BES but this is the only information the expert was able to gather concerning private sector research). In Lebanon, the Ministry of Education publishes the numbers of female and male researchers in higher education but provides no further information. The SHEMERA expert for Lebanon managed to provide additional information on higher education research based on a subsample of Lebanese universities that collaborated with the SHEMERA expert to supply the
richest data possible. The subsample is comprised of three universities that together represent 48% of the tertiary student population in 2010: the Lebanese University (UL), the Saint-Joseph University of Beirut (USJ), and the University of Balamand (UOB). For Algeria, Jordan and Tunisia, no data on R&D personnel and expenditure were collected.

Table 7: Existence of an R&D Survey

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<tr>
<td>Syria</td>
<td>Yes</td>
</tr>
<tr>
<td>Egypt</td>
<td>No, but data on numbers of researchers (not broken down according to researcher-technician-supporting staff) are available for the HES and the GOV (not broken down by field of science)</td>
</tr>
<tr>
<td>Morocco</td>
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</tr>
<tr>
<td>Lebanon</td>
<td>No, but data on higher education research were collected by the SHEMERA expert for a subsample of three Lebanese universities: UL, USJ and UOB.</td>
</tr>
<tr>
<td>Algeria</td>
<td>No</td>
</tr>
<tr>
<td>Jordan</td>
<td>No</td>
</tr>
<tr>
<td>Tunisia</td>
<td>No</td>
</tr>
</tbody>
</table>

3.2 Researchers

The population of researchers represents a very small share of the labour force in Europe. In 2009, just 0.99% of the labour force was in research. In the AMC's, the proportions are even smaller. Only in Lebanon is the share of researchers in the labour force larger than in Europe, 1.13% compared with 0.99% in the EU27.

Figure 8: Researchers as a proportion of the active population, 2010 (2009 for EU27)

Note: The data for Jordan cover researchers in the higher education sector only. The active population in Jordan was extracted from the World Bank's World Development Indicators series.
Source: She Figures 2012, Eurostat; SHEMERA country experts
She Figures 2012 provides a clear pattern of female under-representation in research in the European Union. The average proportion of female researchers in the EU-27 stood at 33% in 2009 but wide variations were noted between countries: whereas Luxembourg, Germany and the Netherlands respectively had just 21%, 25% and 26% of female researchers, at the top of the country ranking according to the proportion of women in research were two Baltic States, Latvia and Lithuania, with more women than men in research, but also Bulgaria, Portugal, Romania, Estonia, Slovakia, and Poland, all of which had at least 40% of women in their research population. Is this pattern of female underrepresentation in research also observed in the AMC's? The answer is yes. Figure 9 presents the proportions of women in research in the AMC's for which data are available. Compared with the European situation where one in three researchers is a woman, the proportion of female researchers is lower in Jordan, Palestine and Morocco where it stood at 22%, 25% and 32% respectively in 2010. The share of female researchers is slightly higher than in the EU on average in Syria and Lebanon where it stood at 37% and also in Egypt, the country with the largest share of women in the research population (39%).

Figure 9: Proportion of female researchers, 2010 (2009 for the EU27)

![Graph showing proportions of female researchers in various countries.]

Note: data cover the HES, GOV, BES and PNP in Syria, the HES, GOV and PNP in Palestine, the HES and GOV in Egypt and the HES only in Lebanon (Ministry of Education), Jordan and Morocco.
Source: She Figures 2012; SHEMERA country experts

The analysis of the compound annual growth rate of the numbers of female and male researchers over the period 2002-2009 in She Figures 2012 shows that women are catching up with men over time as their share of the total research population grew at a faster rate over the period considered. In the EU-27 on average, the number of female researchers has increased at a rate of 5.1% per year compared with 3.3% for male researchers. Nevertheless, it must be remembered that the growth rate for women is on a smaller base than that for men so that if it is merely sustained and not radically increased, it will still take a long time to significantly improve the gender balance in research. Compound annual growth rates of the numbers of female and male researchers over the period 2004-2010 were computed for 5 AMC's: Egypt, Lebanon, Morocco, Jordan and Syria. In four of these countries, the same trend of women catching up with men is observed as, on average, in the EU27. The compound annual growth rate of female researchers is higher than that of men in Lebanon, Morocco, Jordan and Syria. Data for Syria are very striking with an extremely high compound annual growth rate of 20% for female researchers and a negative growth rate of -6% for male researchers meaning that the female research population is rapidly expanding whereas the male research population is shrinking. Only in Egypt is no correction whatsoever taking place to create a more gender-balanced research environment.
Figure 10: Compound annual growth rate for researchers by sex, 2004-2010 (EU27 2002-2009)

Note: data cover the HES, GOV, BES and PNP in Syria, the HES, GOV and PNP in Palestine, the HES and GOV in Egypt and the HES only in Lebanon (Ministry of Education), Jordan and Morocco.

Source: She Figures 2012; SHEMERA country experts

Figure 11 allows for a more detailed analysis of the proportions of female researchers. It depicts the proportion of female researchers in the broad economic sectors: higher education, the government sector, the business enterprise sector and the private non-profit sector. Due to data limitations the picture presented by Figure 11 is very incomplete for the AMCs.

In the EU27, women’s presence is similar in the Government Sector and in Higher Education but it is considerably weaker in the Business Enterprise Sector. On average in the EU-27, women represent 40% of all researchers in the Higher Education Sector, 40% in the Government Sector but merely 19% in the Business Enterprise Sector.

Despite the important data gaps, from Figure 11 it appears that in the AMCs female researchers are more present in the government sector than in higher education. Women represent between 19% (Syria) and 39% (Egypt) of all researchers in the higher education sector, compared with between 31% and 47% in the government sector (31% in Palestine and Syria and 47% in Egypt). A comparison with the private non-profit sector is possible only for Palestine and Syria. The share of women in the Palestinian private non-profit sector is much higher than in the other sectors at 75% (which according to the SHEMERA expert for Palestine simply reflects the fact that the PNP sector is a highly feminised sector of economic activity) whereas in Syria it stood at just 9% in 2010 similar to the share of female researchers in the business enterprise sector (8%).

The only two countries for which data on private sector research are available are Egypt and Syria. The share of female researchers in this sector stood at 13% in Egypt and 8% in Syria in 2010. It thus seems that this sector is even more male-dominated in the AMCs than in the EU27.
Has this gender imbalance across broad economic sectors been levelling out over recent years? For the EU27, the answer to this question seems to be yes. Both in the Higher Education and the Government Sector, where 40% of researchers were women in 2009, the compound annual growth rate of the number of female researchers has been stronger than that of men over the period 2002-2009 in almost all countries.

Regarding the AMCs, Figure 12a, which refers to the higher education sector, shows two different scenarios. On the one hand, in Morocco and Syria, growth rates in the numbers of male and female researchers have been negative between 2004 and 2010 but less negative for women than for men. The difference is almost zero in Morocco but it is large in Syria so that in Syria the research population in higher education is noticeably more gender-balanced in 2010 than it was in 2004. On the other hand, in Egypt, Lebanon and Jordan, compound annual growth rates for female and male researchers were positive over the period 2004-2010. However, whereas they were more positive for female researchers than for male researchers in Lebanon and Jordan, just as in the EU27 between 2002 and 2009, the gender gap in higher education research has widened in Egypt as the number of male researchers has grown more rapidly than that of female researchers.

Figure 12b presents the trends that were observed in government sector research between 2004 and 2010. Whereas Egypt seems to have witnessed a status quo with equal and low growth rates for both female and male researchers between 2004 and 2010, the situation has been much more dynamic in Syria where the number of female researchers in this sector has grown at an annual rate of 31% over the period 2004-2010 compared with the much lower growth rate for male researchers of 6%. Syrian women have thus been catching up rapidly with their male colleagues in public sector research between 2004 and 2010.
The picture of women in research is further completed by Figures 13 and 14, which break down the distribution of both male and female researchers into 4 different age groups (<35 years, 35-44 years, 45-54 years, and 55+ years). Figure 13 does this for the higher education sector and Figure 14 for the government sector. An analysis of the research population by sex and age group in Europe is also carried out in She Figures 2012. This analysis shows that both in the higher education and the government sector, the greatest gender differences are in most countries observed in the two extreme age classes, among the youngest researchers aged under 35 and among those above 55 years of age. Women outnumber men in the youngest age group, while the opposite was observed for researchers above 55 years of age. In Europe, a generation effect is thus clearly at work. The data for the European countries that are analysed in She Figures 2012 were too disparate to compute an EU27 average. That is why in Figures 13 and 14 we have compared the AMCs with two EU member states as illustrating what is observed in European countries in general.
Figure 13: Distribution of researchers in the Higher Education Sector (HES) by sex and age group, 2010 (2009 for Spain and Austria)

Source: She Figures 2012; SHEMERA country experts

Figure 14: Distribution of researchers in the Government Sector (GOV) by sex and age group, 2010 (2009 for Spain and Austria)

Source: She Figures 2012; SHEMERA country experts
From Figure 13 it seems that, just like in Europe, in the 4 AMCs for which the data are available, there is a generation effect at play as female researchers outnumber male researchers in the youngest age group whereas the opposite holds true in the population aged 45+. For the government sector (Figure 14), the only countries for which the necessary data were retrieved are Egypt and Syria. In Egypt, the annual recruitment ratio in higher education is larger than it is in the government sector. The generation effect thus appears more in higher education and less in the government sector, where the annual recruitment ratio has been very low in the last 10 years. Figure 16 also depicts the distribution of female and male researchers across age groups in Syria. It is striking to see that although a generation effect was at play in the higher education sector there is no such effect in public sector research. In the government sector female researchers are more numerous in the older age groups but they are outnumbered by male researchers in the age groups under 45 years of age.

Although girls are generally more successful than boys at school – they less often repeat a year and obtain better results (EC, 2008) –, when key study field choices need to be made girls often end up in literary and tertiary fields yielding uncertain professional prospects, whereas boys predominantly move towards scientific, technical and industrial fields from which it is generally easier to find a place in the labour market. This signals a gender pattern of study choice that needs to be addressed by considering both sexes equally. The reasons why study field decisions are gendered include stereotypes often found in children's books and school manuals, gendered attitudes of teachers, gendered advice and guidance on courses to be followed, different parental expectations regarding the future of girls and boys, and so forth. As a result, some professions are thought of as feminine, others as masculine. If the aim is to change these trends and introduce more of a gender balance in all study fields, then it is with respect to the entire set of factors upstream of the study field choices that genuine theoretical and political questioning should take place, and while doing so equal attention should be given to both girls’ and boys’ decisions.

3.3 Horizontal segregation in research

The average proportion of female researchers stood at 22% in Jordan, 25% in Palestine, 32% in Morocco, 37% in Syria and Lebanon and 39% in Egypt. Women's presence appeared to be relatively higher in the government sector than in higher education. Women represent between 19% and 39% of all researchers in the higher education sector: 19% in Syria, 20% in Palestine, 22% in Jordan, 32% in Morocco, 37% in Lebanon and 39% in Egypt. In the EU27 the proportion stood at 40% in 2009.

As shown by She Figures, 2012, in Europe, in the Higher Education Sector, female researchers were best represented in the social sciences in 12 of the 28 countries and these were mainly the Southern European countries and the most recent EU members. Female researchers were most present in the medical sciences in 11 of the 28 countries, mainly former EU-15 member states as well as Japan. The share of female researchers is lowest in agriculture in all countries except Croatia and Romania. The European data for researchers across scientific fields did not make it possible to compute an EU27 average. We can therefore not compare the distribution of higher education researchers across scientific fields in the AMCs with the situation in the average European country. However, we can check whether the social and medical sciences are also important havens for female researchers in the AMCs and whether agriculture is also the field female researchers least favour.

Figure 15 below focuses on the higher education sector in Syria, Egypt, Jordan, Lebanon and Morocco, showing the distribution of male and female researchers across the different fields of science in 2010. Just like in most former EU15 countries, female researchers were best represented in the medical sciences in Syria (39%) and Egypt (44%). In Jordan, even though the largest share of female researchers is in the humanities (38%), their share in the medical sciences is also very large at 31%. Just like in the South of Europe and the most recent entrants into the EU, female researchers were best represented in the social sciences (29%) in Lebanon. In Lebanon, besides the social sciences, the humanities host a large share of all female higher education researchers (25%) (This is also the case in Jordan). In Morocco female researchers are rather
evenly distributed across four fields of science: the humanities, the natural sciences, the medical sciences and engineering and technology. The distribution of male and female researchers is most unequal in Jordan and Egypt. On the contrary, they are very similar in Lebanon and Morocco. The widest gender gap is observed in different fields according to the country considered.

**Figure 15: Distribution of researchers in the Higher Education Sector (HES) across fields of science, 2010**

Just like in *She Figures* 2012, we tried to analyse the evolution in the distribution of female researchers across scientific fields over time. The data for Europe do indeed show a promising picture for the higher education sector as in most European countries and in most subfields of science the compound annual growth rate of female researchers was positive over the period 2002-2009 (*She Figures* 2012:63). Especially the very high growth rates in engineering and technology deserve attention as they point towards a dynamic catching up of female with male researchers in this field where women tend to be severely underrepresented. The humanities are a second field where the growth in the number of female researchers has been positive in all countries but Hungary and their number has risen at a very high annual rate (10% or more) in 11 of the 24 European countries considered. However, there is wide variation in the level and pace at which female researchers are gaining ground in the different fields of science across individual European countries.

Table 8 shows that compound annual growth rates of female researchers in the higher education sector over the period 2004-2010 could be computed only for 4 AMCs: Syria, Lebanon, Jordan and Morocco. The growth rate of female researchers has been positive over the period in all subfields of science in Syria, Jordan and Lebanon (except for medical sciences). The most positive growth figures were noted in the fields of medical sciences (+44%), social sciences (+37%) and the humanities (+52%) in Syria. The dynamism that characterises the female research population in the humanities in many European countries is thus also observed in Syria. In Jordan, the compound annual growth rate between 2004 and 2010 of the number of female researchers (aged 25-70) has been largest in the field of engineering and technology where there is nevertheless still a very large gender imbalance in the research population. In this field the number of female researchers has grown at an annual rate of 22%. Growth rates of 11-12% were observed in the humanities and the agricultural sciences (which in 2010 still host just 3-6% of female and male researchers). The number of female researchers has grown at a rate of 8% on average per year in the natural and the medical sciences and at a rate of 7% in the social sciences. In Lebanon, there was a growth of around 10% per year in all fields except for the humanities (+4%) and the slight negative growth of the female research population in the medical sciences (-1%). On the contrary, in Morocco, negative annual growth rates are observed for female researchers in natural sciences, medical

Note: Data not available for Algeria, Palestine and Tunisia

Source: SHEMERA country experts
sciences and humanities between 2004 and 2010. Although the data for these four AMCs do not allow drawing general conclusions on the evolution in the distribution of female researchers across scientific fields over time in the MENA region as a whole, the scarce data that are presented in Table 8 do not confirm that similar trends to those characterising the European countries are taking place in the AMCs. The humanities are not as systematically characterised by high female growth rates. This is only observed in Syria and to a lesser extent in Jordan. The field of engineering and technology shows high growth rates in the number of female researchers, just as in most European countries, in Syria, Jordan and Lebanon, but in Morocco their growth rate has been much lower at 3% per year.

Table 8: Compound annual growth rates of female researchers in the Higher Education Sector (HES) by field of science, 2004-2010

<table>
<thead>
<tr>
<th></th>
<th>Natural sciences</th>
<th>Engineering and technology</th>
<th>Medical sciences</th>
<th>Agricultural Sciences</th>
<th>Social Sciences</th>
<th>Humanities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syria</td>
<td>6</td>
<td>23</td>
<td>44</td>
<td>22</td>
<td>37</td>
<td>52</td>
</tr>
<tr>
<td>Lebanon</td>
<td>10</td>
<td>12</td>
<td>-1</td>
<td>11</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Jordan</td>
<td>8</td>
<td>22</td>
<td>8</td>
<td>11</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Morocco</td>
<td>-2</td>
<td>3</td>
<td>-1</td>
<td>na</td>
<td>0</td>
<td>-3</td>
</tr>
</tbody>
</table>

Note: Full information only available for Jordan, Lebanon, Morocco and Syria. Source: SHEMERA country experts

An analysis similar to the previous one can be carried out for the government sector in two AMCs only. The data exist only for Syria and Morocco. For illustrative purposes Figure 16 presents the distribution of female and male researchers across scientific fields in Morocco and Syria and Table 9 shows, also, the compound annual growth rate between 2004 and 2010 of the number of female researchers in the different fields of science for these countries. Figure 16 shows that larger shares of female researchers are attracted to the medical and the natural sciences but over time women are losing ground in these fields in Morocco whereas they are rapidly gaining even more ground in Syria as shown by Table 9. On the contrary, larger shares of male researchers are in the humanities and the social sciences and particularly in engineering and technology. Men continue to gain ground in the humanities in Morocco as the compound annual growth rate of female researchers in this field has been negative (Table 9). On the contrary, the annual growth rate of female researchers in engineering and technology has been positive at 3% in Morocco and 11% in Syria between 2004 and 2010.

Figure 16: Distribution of researchers in the Government Sector (GOV) across fields of science, 2010

Note: Full information only available for Morocco and Syria. Source: SHEMERA country experts
Table 9: Compound annual growth rates of female researchers in the Government Sector (GOV) by field of science, 2004-2010

<table>
<thead>
<tr>
<th>Field of Science</th>
<th>GOV</th>
<th>Medical sciences</th>
<th>Agricultural Sciences</th>
<th>Social Sciences</th>
<th>Humanities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morocco</td>
<td>-1.5</td>
<td>3.0</td>
<td>-0.7</td>
<td>na</td>
<td>0.0</td>
</tr>
<tr>
<td>Syria</td>
<td>8</td>
<td>11</td>
<td>31</td>
<td>6</td>
<td>28</td>
</tr>
</tbody>
</table>

Note: Full information only available for Morocco and Syria.
Source: SHEMERA country experts

The Dissimilarity Index (DI) provides a theoretical measurement of the percentage of women and men in a given field who would have to move to an occupation in another field of science to ensure that the proportions of women were the same across all fields. It can therefore be interpreted as the hypothetical distance from a balanced gender distribution across fields of science. In order to interpret this index correctly, it is important to know which gender is in the majority overall. The maximum value is 1, which indicates the presence of only either women or men in each of the occupations, depending on the majority gender. The minimum value of 0 indicates a distribution between women and men within each occupation which is equal to the overall average proportion of women. Therefore the closer the index is to 1 the higher the level of dissimilarity and thus the more men and women would have to move across science fields in order to achieve a balanced gender distribution. In Europe, in 2009, in the higher education sector, the index varied between 0.86 in Poland and 0.03 in Spain. A very high index value was recorded in Finland as well, 0.42. Low index values (below 0.15) were observed in Italy, Cyprus, Portugal, and Romania (She Figures 2012:77).

Table 10 presents the 2010 values of the dissimilarity index in the different AM countries for the higher education sector. Seven fields of occupation were considered in computing the DI: natural sciences, engineering and technology, medical and health sciences, agricultural sciences, social sciences, humanities and any other field of science. In higher education, the DI stood at 0.10 in Lebanon, 0.14 in Morocco, 0.15 in Syria, 0.18 in Egypt and 0.27 in Jordan. The DI in the AMCs thus seems to be closer to the lowest values recorded across Europe pointing towards less segregation across fields than on average in the EU.

Table 10: Dissimilarity index for researchers in the Higher Education Sector (HES), 2010 (2009 for European countries)

<table>
<thead>
<tr>
<th>Country</th>
<th>Dissimilarity Index HES (DI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spain</td>
<td>0.03</td>
</tr>
<tr>
<td>Lebanon</td>
<td>0.10</td>
</tr>
<tr>
<td>Italy</td>
<td>0.12</td>
</tr>
<tr>
<td>Cyprus</td>
<td>0.13</td>
</tr>
<tr>
<td>Romania</td>
<td>0.13</td>
</tr>
<tr>
<td>Morocco</td>
<td>0.14</td>
</tr>
<tr>
<td>Portugal</td>
<td>0.14</td>
</tr>
<tr>
<td>Syria</td>
<td>0.15</td>
</tr>
<tr>
<td>Egypt</td>
<td>0.18</td>
</tr>
<tr>
<td>Jordan</td>
<td>0.27</td>
</tr>
<tr>
<td>Finland</td>
<td>0.42</td>
</tr>
<tr>
<td>Poland</td>
<td>0.86</td>
</tr>
</tbody>
</table>

Source: She Figures 2012; SHEMERA country experts
Box 2: Dissimilarity Index

The Dissimilarity Index (DI) provides a theoretical measurement of the percentage of women and men in a group who would have to move to another occupation to ensure that the proportions of women were the same across all the possible occupations. It can therefore be interpreted as the hypothetical distance from a balanced gender distribution across occupations, based upon the overriding proportion of women. The formula for the Dissimilarity Index is:

$$ DI = 1/2 \sum_{i} |F_i / F - M_i / M| $$

where:  
- $i$ denotes each occupation  
- $F_i$ is the number of female researchers in each occupation  
- $M_i$ is the number of male researchers in each occupation  
- $F$ is the total number of female researchers across all occupations  
- $M$ is the total number of male researchers across all occupations.

|| indicates that the absolute value is taken, but not the sign.

For example, if we have three occupations, A, B and C with 17, 37, and 91 women and 108, 74, 182 men respectively, the overall proportion of women is 28.5%. We therefore need to calculate:

$$ \frac{\left| \frac{(17/145) - (108/364)}{2} \right| + \left| \frac{(37/145) - (74/364)}{2} \right| + \left| \frac{(91/145) - (182/364)}{2} \right|}{2} = \frac{0.1795 + 0.0519 + 0.1276}{2} = 0.1795 $$

This means that 18% of researchers will have to change occupation in order to maintain the background proportion of 28.5% women in each occupation.

In order to interpret the DI correctly, it is important to know which gender is in the majority overall. The maximum value is 1, which indicates the presence of only either women or men in each of the occupations, depending on the majority gender. The minimum value of 0 indicates a distribution between women and men within each occupation which is equal to the overall average proportion of women. If the same occupational categories are used for different countries, the DI yields a comparable and descriptive statistic that reflects the extent to which the two sexes are differently distributed. The results also depend on the number of categories. If more categories are used, the indicator will reflect greater variability in the distribution, which in turn will yield results indicating a higher level of segregation.

3.4 Vertical segregation in research

As noted in *She Figures* 2012 (p.101), “Given that the grade system applies to the Higher Education sector only, it is hazardous to study the hierarchical position of female scientists in the other broad sectors of economic activity. Available data refer to the distribution of R&D personnel by sex within different occupations (researchers, technicians and others) for 2009.” *She Figures* goes on showing that, in nearly all EU countries studied, the proportion of male researchers exceeds that of female researchers but the reverse pattern marks the lowest occupational level of other supporting staff, where the proportion of women tends to exceed that of men in most countries in the three broad economic sectors (HES, GOV and BES). The proportion of women among technicians is also systematically higher than that of men in Higher Education (there are just 4 exceptions, Ireland, Luxembourg, Malta and the UK); in the Government Sector there are already more exceptions to this overall pattern and in the Business Enterprise Sector the countries are divided into two groups of roughly equal size, one where there are more female than male technicians and one where the opposite is observed.

According to the Frascati manual, researchers are “professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned”; technicians are “persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physical and life sciences or social sciences and humanities. They participate in R&D by performing scientific and technical
tasks involving the application of concepts and operational methods, normally under the supervision of researchers”; and other supporting staff includes "skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects”. For the only purpose of describing these indicators a hierarchy can be defined with researchers placed highest, followed by technicians and other supporting R&D staff.

In order to break down R&D personnel by occupation (researchers, technicians and other supporting staff), the existence of an R&D survey is crucial. Unfortunately, as indicated at the beginning of this section, such a survey is conducted only in Palestine and Syria. For these two countries, the distribution by sex of R&D staff within different occupations (researchers, technicians and others) is presented for 2010 in the higher education sector in Figure 17 and in the government sector in Figure 18.

**Figure 17: Distribution of R&D personnel across occupations for the Higher Education Sector (HES) by sex, 2010**

Note: Full information only available for Palestine and Syria.
Source: SHEMERA country experts

**Figure 18: Distribution of R&D personnel across occupations for the Government Sector (GOV) by sex, 2010**

Note: Full information only available for Palestine and Syria.
Source: SHEMERA country experts
In Syria, just as in most European countries, in both sectors, the proportion of male researchers exceeds that of female researchers, whereas in Palestine there is no real gender difference in this occupational group (note nevertheless that the proportions of female and male researchers are much higher in the higher education than in the government sector). The lack of women among researchers in Syria is compensated by a strong feminisation of the occupational group of technicians. It seems strange that in Syria such a huge part (63% in HES and 45% in GOV) of female R&D personnel work as technicians (compared with just 24% of male R&D personnel in HES and 22% in GOV). The distribution of male R&D personnel across occupations is more comparable to what we are used to in Europe. The SHEMERA statistical expert for Syria explained that the difference between the shares of female and male technicians could be due to several factors. First, the number of girls registered at technical institutes has increased more than the number of boys over recent years. And, secondly, women more frequently work in the public sector because of more generous policies regarding work-life balance in this sector compared with the private sector.
Chapter IV: WOMEN IN ACADEMIA

One of the main characteristics of contemporary labour markets is the remarkable increase in women’s education. In the European Union and most other developed regions of the world, women have caught up or even surpassed men in terms of level of education (EC 2013). Baudelot and Establet (2013) show that, in 2009, in the world, 28% of women compared with 26% of men are enrolled in tertiary education. The only region in the world where there are still more men than women enrolled in higher education is Subsaharan Africa (8% of men and 5% if women). In the Arab countries, equality in access to higher education is almost attained, with 23% of men and 22% of women, and the number of female students is increasing at a faster pace than the number of male students. In Latin America, women have surpassed men in 23 of the 28 countries and their number is equal to that of male students in another three countries. Except for Iran, in South-East Asia the student population in higher education remains male-dominated but women are catching up. In Central Asia women outnumber men in 5 countries and their number is equal to that of men in one country; only in Tadzhikistan and Uzbekistan is the size of the male student population in higher education bigger than that of the female student population. In East Asia and the Pacific women also dominate the student population in higher education (28% compared with 27% of men). And, finally, female supremacy is a universally observed fact in Europe and North America, with very high access rates to higher education that for girls come very close to 100%. In the United States, women have surpassed men in 1980 already; in 2009, their access rate to higher education is 100% whereas that of men stood at 69% only. The massive increase in women’s participation in higher education is thus a universal phenomenon.

In Europe, She Figures shows that women not only dominate the student population in higher education but that they are also more successful at completing tertiary education. The share of women among tertiary graduates exceeds that of men. The result of this is straightforward: women’s level of education is higher than men’s, at least in Europe. A first aim of this chapter is to check whether this also holds true for the AMCs. Is it the case in these countries, as in Europe, that women have a higher level of educational attainment than men?

In Europe it is a well-documented fact that, even if women dominate in terms of participation and performance in higher education, they continue to face many challenges in the labour market. The impressive increase in female labour market participation that began in the early sixties has not translated into a real regression of disparities between male and female jobs. Highly educated women do not advance in their career to the same extent as their male peers. For years now it has been as if it was thought that there would be a natural slope towards equality, as if it was thought that gender gaps would be diluted in modernity. None of this, however, has occurred. The facts are there and they are stubborn: there are few areas where social change of this magnitude is achieved on a background of such persistent inequalities (Maruani 2003).

One explanation that is advanced in the literature for the paradox between women’s high level of education and their disadvantaged position in the labour market is the unequal distribution of girls and boys across different fields of study. In the EU-27, in higher education institutions, female students account for 72% and 78% of all students in health sciences and education while they are only 25% in engineering, manufacturing and construction and 38% in the field of science, mathematics and computing (Eurostat 2009). This unequal distribution of girls and boys across study fields translates into their unequal distribution across sectors of economic activity and occupations on the labour market with male study fields granting access to higher-paid and more prestigious sectors and jobs and female dominated fields leading to lower-paid and less advantageous professional opportunities. Although educational segregation is not the only determinant of labour market inequalities between women and men, a second aim of this chapter is nevertheless to analyse the distribution of women and men across scientific fields in higher education in the AMCs in order to compare it with the situation in Europe.

In Europe, horizontal segregation across study fields comes with another form of segregation, vertical segregation. Vertical segregation refers to the finding that the feminization of the student population is not reflected in an increase in the percentage of women at the highest levels of the academic career and in decision-making bodies of universities. Women are lost at each stage of the academic career:
Although they form the majority among higher education students and graduates, they start losing ground as of the PhD level, and at the highest level of the academic career, among full professors, they no longer count more than 20% in the EU. According to figures from She Figures 2012 (EC 2013), the proportion of women among full professors ranges between 36% in Romania and 9% in Luxembourg. The third aim of this chapter is to analyse the presence of women at all levels of the typical academic career in the AMCs and also to compare the European phenomenon of underrepresentation or absence of women in decision-making positions in science and research with the situation in the AMCs.

4.1 Level of education

Figure 19 presents the share of the female and the total population aged 30-34 with tertiary educational attainment in 2010. To construct this figure two different data sets were used: the indicator “tertiary educational attainment by sex, age group 30-34” of the set of Europe 2020 indicators published by Eurostat for the European Union and its member states and the indicator “Percentage of population age 30-34 with tertiary schooling (Completed Tertiary)” of the World Bank dataset “Education statistics (EdStats)” for the AMCs.

In all European countries, the share of women aged 30-34 with a tertiary degree is higher than that of men. This is also the case in Libya, Algeria and Syria but it is not the case in Egypt, Morocco, Tunisia and Jordan. Another finding is that the share of tertiary educated people in the AMCs is lower than in the 28 European member states.

**Figure 19: Percentage of population age 30-34 with tertiary schooling (Completed Tertiary), 2010**

Source: for the EU and its Member States: the indicator “tertiary educational attainment by sex, age group 30-34” of the set of Europe 2020 indicators published by Eurostat; for the AMCs: the indicator “Percentage of population age 30-34 with tertiary schooling (Completed Tertiary)” of the World Bank dataset “Education statistics (EdStats)”
4.2 Enrolment patterns in higher education

The Gross Enrolment Ratio (GER) is a statistical measure used to determine the number of students enrolled in school at different grade levels. It measures the ratio of the number of students who live in a country to those who qualify for a particular grade level. The United Nations Educational, Scientific and Cultural Organization (UNESCO) describes the ‘Gross Enrolment Ratio’ as the total enrolment within a country “in a specific level of education, regardless of age, expressed as a percentage of the population in the official age group corresponding to this level of education.” The GER is thus obtained by dividing the number of individuals who are actually enrolled in schools by the number of individuals who are of the corresponding school enrolment age. The Gross Tertiary Education Enrolment Ratio considers the number of young people in the five-year age group following the secondary school leaving age, which is usually 18. The gross enrolment ratio can be greater than 100% as a result of grade repetition and entry at ages younger or older than the typical age at that grade level.

Figure 20 presents the 2008 tertiary gross enrolment rate of women and men in the AMCs, the EU and North America. First, it shows that in the AMCs, both for women and men, the enrolment rate in higher education is lower than in the European Union and North America. Whereas for women the rate is close to 100% in North America and to 70% in the EU, it is below 60% in the AMCs. Of the AMCs, Palestine is the country with the highest enrolment rates of men and women in higher education, followed by Lebanon and Jordan. The rates are lowest in Morocco. A second finding is that, as in the EU and North America, women’s tertiary enrolment exceeds men’s in 4 of the 7 AMCs for which data are available. In Egypt, Syria and Morocco, the male rate remains slightly higher than the female rate.

*Figure 20: Tertiary gross enrolment rate by sex, 2008*

Source: The indicator “Gross enrolment ratio. Tertiary (ISCED 5 and 6)” of the World Bank dataset “Education statistics (EdStats)”
4.3 Graduation patterns in higher education

In Europe, women not only dominate the student population in higher education but they are also more successful at completing tertiary education (EC 2008, 2013, Barone 2011). In all European countries women form the majority of tertiary education graduates. With the exception of Morocco (where women constitute 47.3% of all tertiary graduates), this is also the case in all AMCs for which data are available. The highest percentage of female tertiary graduates is observed in Tunisia where they represent 61% of all graduates at this level.

![Figure 21: Percentage of female graduates from tertiary education, 2010](image)

Source: Indicator "Percentage of female graduates in tertiary education (ISCED 5 and 6)" of the World Bank dataset "Education statistics (EdStats)"

4.4 Study field orientations

One explanation that is advanced in the literature for the paradox between women’s high level of education and their disadvantaged position in the labour market is the unequal distribution of girls and boys across different fields of study (Baudelot and Establet 2013, Xie and Shauman 2003, OECD 2006, Caprile and Vallès 2010). In the EU-27, in higher education institutions, female students account for 74% and 77% of all students in health sciences and education while they are only 25% in engineering, manufacturing and construction and 38% in the field of science, mathematics and computing (Eurostat 2009). This unequal distribution of girls and boys across study fields translates into their unequal distribution across sectors of economic activity and occupations on the labour market with male study fields granting access to higher-paid and more prestigious sectors and jobs and female-dominated fields to lower-paid and less advantageous professional opportunities. Is this also the case in the AMCs? What does the distribution of women and men across scientific fields in higher education look like in the AMCs? Are the same patterns of female under- and over-representation observed in them as in Europe?
Table 11 presents the share of female students across the different fields of study offered by higher education institutions in the AMCs and the EU in 2010. To construct this figure two different data sets were used: the indicator “Tertiary students (ISCED 5-6) by field of education and sex [educ_enrl5]” of the set of education statistics published by Eurostat for the European Union and the indicator “Enrolment in [field]. Tertiary” of the World Bank dataset “Education statistics (EdStats)” for the AMCs.

Although these indicators are to a large extent comparable, it should be noted that some fields of study are denoted differently by both. The table below presents the exact field names used in the Eurostat and World Bank indicators.

<table>
<thead>
<tr>
<th>World Bank</th>
<th>Eurostat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>Teacher training and education science</td>
</tr>
<tr>
<td>Humanities and arts</td>
<td>Humanities and arts</td>
</tr>
<tr>
<td>Social sciences, business and law</td>
<td>Social sciences, business and law</td>
</tr>
<tr>
<td>Science</td>
<td>Science, mathematics and computing</td>
</tr>
<tr>
<td>Engineering, manufacturing and construction</td>
<td>Engineering, manufacturing and construction</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Agriculture and veterinary</td>
</tr>
<tr>
<td>Health and welfare</td>
<td>Health and Welfare</td>
</tr>
<tr>
<td>Services</td>
<td>Services</td>
</tr>
<tr>
<td>Unspecified programmes</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Table 11 shows that health and welfare is a female-dominated study field in the AMCs as in Europe. In the EU-27, 74% of all students enrolled in this field are women. Tunisia and Lebanon come closest to this high percentage with 70% of women enrolled in this field. These countries are followed by Algeria and Jordan where 65% of students in health and welfare are women. Finally, the shares of female students stood respectively at 60% and 53% in this field in Palestine and Egypt.

Education is also a very female-dominated study field. Whereas in the EU-27, 77% of all students in this field are women, it is even more feminised in Tunisia (82% of all students in education are women), Jordan (85%) and Lebanon (94%). In Algeria and Palestine, 72% of students enrolled in the field of education are women.

In the EU-27, in the humanities and arts, women represent 65% of the student population. Their share is quite similar in this field in the AMCs varying between 62% in Egypt and 75% in Tunisia.

The social sciences, business and law are a female-dominated field in Tunisia and Algeria as they are in Europe. In the EU-27, 58% of all students enrolled in this field are women and their share stood at 60% in Algeria and 66% in Tunisia. In Lebanon, although the field of social sciences, business and law also hosts more female than male students, it is less feminised as the share of women stood at 52% in 2010. In the remaining AMCs more male than female students enrol in this study field; women represent respectively 44%, 41% and 36% of all students in Palestine, Jordan and Egypt.

Agriculture and services are the two fields that in the EU-27 come closest to a gender balance in the student population: the share of female students in these fields stood at 49% in 2010. Among the AMCs too, agriculture is a rather balanced field of study in Algeria, Lebanon and Jordan. In Tunisia the share of female students in agriculture is much higher, at 65%, and in Egypt and Palestine, it is much lower, at 42% and 22% respectively. The field of services is almost gender balanced, as it is in the EU-27, in Tunisia and Jordan. It is rather a female-dominated study field in Lebanon with 63% of female students. On the contrary, women form a minority in this field in Palestine (42%), Algeria (39%) and Egypt (34%).
Besides these female-dominated or gender-balanced study fields, two fields are systematically characterised by small shares of female students in the EU-27: women constitute just 38% of the student population in science, mathematics and computing and 25% only in engineering. Whereas women's under-representation in engineering characterises the AMCs as well, it does not mark the field of science, mathematics and computing. Compared with the share of 25% of women in the EU-27, the share of female students in engineering varies between 24% in Egypt and 38% in Tunisia. Tunisia is thus the country with the largest share of women in engineering. As regards the field of science, mathematics and computing, the shares of female students are systematically higher in the AMCs than in the EU-27. Except for Egypt, unlike in Europe, in the AMCs women form a majority of all students enrolled in science, mathematics and computing. Their share ranges from 52% in Palestine to 59% in Algeria. Only in Egypt is the share of female students below 50%, at 47% in 2010.

Table 11: Percentage of female students enrolled in the different fields of education in 2010

<table>
<thead>
<tr>
<th></th>
<th>Agriculture</th>
<th>Education</th>
<th>Engineering, manufacturing and construction</th>
<th>Health and welfare</th>
<th>Humanities and arts</th>
<th>Science</th>
<th>Services</th>
<th>Social sciences, business and law</th>
<th>Unspecified programmes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tunisia</td>
<td>65.4</td>
<td>82.4</td>
<td>38.0</td>
<td>69.6</td>
<td>74.6</td>
<td>53.8</td>
<td>49.1</td>
<td>65.8</td>
<td>37.3</td>
<td>59.1</td>
</tr>
<tr>
<td>Algeria</td>
<td>48.2</td>
<td>72.2</td>
<td>32.8</td>
<td>65.3</td>
<td>73.0</td>
<td>58.8</td>
<td>39.2</td>
<td>39.5</td>
<td>44.4</td>
<td>58.3</td>
</tr>
<tr>
<td>Palestine</td>
<td>22.4</td>
<td>72.2</td>
<td>31.4</td>
<td>55.9</td>
<td>68.2</td>
<td>51.8</td>
<td>41.7</td>
<td>44.4</td>
<td>48.0</td>
<td>56.3</td>
</tr>
<tr>
<td>EU27</td>
<td>49.4</td>
<td>76.7</td>
<td>25.0</td>
<td>74.0</td>
<td>65.4</td>
<td>37.6</td>
<td>49.4</td>
<td>58.3</td>
<td>59.6</td>
<td>55.4</td>
</tr>
<tr>
<td>Lebanon</td>
<td>49.9</td>
<td>93.6</td>
<td>25.9</td>
<td>69.8</td>
<td>63.6</td>
<td>56.6</td>
<td>62.9</td>
<td>51.9</td>
<td>48.3</td>
<td>53.7</td>
</tr>
<tr>
<td>Jordan</td>
<td>52.4</td>
<td>84.8</td>
<td>32.7</td>
<td>65.0</td>
<td>64.3</td>
<td>54.1</td>
<td>51.5</td>
<td>41.3</td>
<td>54.3</td>
<td>52.1</td>
</tr>
<tr>
<td>Egypt</td>
<td>41.5</td>
<td>24.1</td>
<td>21.4</td>
<td>53.3</td>
<td>61.9</td>
<td>47.3</td>
<td>33.6</td>
<td>36.0</td>
<td>66.6</td>
<td>46.7</td>
</tr>
</tbody>
</table>

Source: the indicator "Tertiary students (ISCED 5-6) by field of education and sex [educ_enrl5]" of the set of education statistics published by Eurostat for the European Union; the indicator "Enrolment in [field]. Tertiary" of the World Bank dataset "Education statistics (EdStats)" for the AMCs.

Tables 12 and 13 and Figures 22 and 22 enable us to compare the distribution of female and male students across the different study fields. In the EU-27 the main differences between the female and male distributions concern, on the one hand the larger shares of female students enrolled in education, health and welfare and the humanities and arts and, on the other, the larger shares of male students enrolled in science, mathematics and computing and particularly in engineering, manufacturing and construction.

Concerning education, the same trend is observed in the AMCs, although it should be noted that this field hosts only very small shares of female and male students. The exception is Palestine where 41% of female tertiary students are enrolled in the field of education and 20% of all male tertiary students. Except for Palestine, in the AMCs larger shares of female than of male tertiary students enrol in health and welfare. In the humanities and arts, the gender gap is wider than in the previous two fields, women are much more likely than men to enrol in this field.

As regards the two study fields that are male-dominated in the EU-27, tables 12 and 13 show that in the AMCs the situation is more ambiguous in the field of science, mathematics and computing than it is in engineering. Science, mathematics and computing is a field that attracts roughly equal shares of female and male tertiary students in Lebanon, Algeria, Egypt, Palestine and Jordan. Only in Tunisia is the share of male tertiary students in this field significantly above that of female students; 27% of male students compared with 22% of female students are enrolled in science, mathematics and computing. On the contrary, just as in the EU-27, engineering attracts more male than female students in the AMCs. The gender gaps are very large in this field with the share of male students twice or three times higher than that of female students.
Table 12: Distribution of female tertiary students across the different fields of education in 2010 (Algeria: 2009)

<table>
<thead>
<tr>
<th></th>
<th>Agriculture</th>
<th>Education</th>
<th>Engineering, manufacturing and construction</th>
<th>Health and welfare</th>
<th>Humanities and arts</th>
<th>Science</th>
<th>Services</th>
<th>Social sciences, business and law</th>
<th>Unspecified programmes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morocco</td>
<td>0.6</td>
<td>1.1</td>
<td>3.7</td>
<td>7.1</td>
<td>21.5</td>
<td>19.6</td>
<td>1.7</td>
<td>44.6</td>
<td>0.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Lebanon</td>
<td>0.5</td>
<td>5.1</td>
<td>6.7</td>
<td>12.6</td>
<td>19.3</td>
<td>11.0</td>
<td>0.7</td>
<td>43.7</td>
<td>0.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Algeria</td>
<td>1.4</td>
<td>2.2</td>
<td>4.9</td>
<td>5.5</td>
<td>28.2</td>
<td>7.6</td>
<td>0.4</td>
<td>39.4</td>
<td>10.3</td>
<td>100.0</td>
</tr>
<tr>
<td>EU27</td>
<td>1.6</td>
<td>11.1</td>
<td>6.5</td>
<td>18.2</td>
<td>14.4</td>
<td>6.8</td>
<td>3.6</td>
<td>35.8</td>
<td>2.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Egypt</td>
<td>2.2</td>
<td>4.6</td>
<td>15.7</td>
<td>27.8</td>
<td>4.1</td>
<td>1.4</td>
<td>28.3</td>
<td>15.9</td>
<td>100.0</td>
<td></td>
</tr>
<tr>
<td>Tunisia</td>
<td>2.2</td>
<td>0.6</td>
<td>9.6</td>
<td>6.4</td>
<td>26.4</td>
<td>21.9</td>
<td>2.8</td>
<td>27.4</td>
<td>2.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Palestine</td>
<td>0.2</td>
<td>40.9</td>
<td>3.9</td>
<td>6.9</td>
<td>12.5</td>
<td>8.5</td>
<td>0.1</td>
<td>25.6</td>
<td>1.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Jordan</td>
<td>1.7</td>
<td>16.3</td>
<td>10.3</td>
<td>10.6</td>
<td>19.1</td>
<td>13.6</td>
<td>0.0</td>
<td>24.9</td>
<td>3.4</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: the indicator "Tertiary students (ISCED 5-6) by field of education and sex [educ_enrl5]" of the set of education statistics published by Eurostat for the European Union; the indicator "Percentage of female tertiary enrolments (ISCED 5 and 6) in [field]" of the World Bank dataset "Education statistics (EdStats)" for the AMCs

Table 13: Distribution of male tertiary students across the different fields of education in 2010

<table>
<thead>
<tr>
<th></th>
<th>Agriculture</th>
<th>Education</th>
<th>Engineering, manufacturing and construction</th>
<th>Health and welfare</th>
<th>Humanities and arts</th>
<th>Science</th>
<th>Services</th>
<th>Social sciences, business and law</th>
<th>Unspecified programmes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lebanon</td>
<td>0.6</td>
<td>0.4</td>
<td>22.2</td>
<td>6.3</td>
<td>12.8</td>
<td>9.8</td>
<td>0.5</td>
<td>47.0</td>
<td>0.4</td>
<td>100.0</td>
</tr>
<tr>
<td>Egypt</td>
<td>2.7</td>
<td>0.0</td>
<td>12.8</td>
<td>12.0</td>
<td>15.0</td>
<td>4.0</td>
<td>2.3</td>
<td>44.1</td>
<td>7.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Algeria</td>
<td>2.5</td>
<td>1.4</td>
<td>16.5</td>
<td>4.8</td>
<td>17.1</td>
<td>8.7</td>
<td>1.0</td>
<td>43.9</td>
<td>3.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Palestine</td>
<td>0.8</td>
<td>20.2</td>
<td>10.9</td>
<td>7.0</td>
<td>7.5</td>
<td>10.1</td>
<td>0.2</td>
<td>41.2</td>
<td>2.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Jordan</td>
<td>1.7</td>
<td>3.2</td>
<td>23.0</td>
<td>6.2</td>
<td>11.5</td>
<td>12.6</td>
<td>0.0</td>
<td>38.6</td>
<td>3.1</td>
<td>100.0</td>
</tr>
<tr>
<td>EU27</td>
<td>2.0</td>
<td>4.2</td>
<td>24.3</td>
<td>8.0</td>
<td>9.5</td>
<td>14.1</td>
<td>4.6</td>
<td>31.8</td>
<td>1.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Tunisia</td>
<td>1.6</td>
<td>0.2</td>
<td>22.6</td>
<td>4.0</td>
<td>12.9</td>
<td>27.2</td>
<td>4.3</td>
<td>20.6</td>
<td>6.5</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: the indicator "Tertiary students (ISCED 5-6) by field of education and sex [educ_enrl5]" of the set of education statistics published by Eurostat for the European Union; the indicator "Enrolment in [field], Tertiary" of the World Bank dataset "Education statistics (EdStats)" for the AMCs
Figure 22: Distribution of female tertiary students across the different fields of education in 2010 (Algeria: 2009)

Source: the indicator “Tertiary students (ISCED 5-6) by field of education and sex [educ_enrl5]” of the set of education statistics published by Eurostat for the European Union; the indicator “Percentage of female tertiary enrolments (ISCED 5 and 6) in [field]” of the World Bank dataset “Education statistics (EdStats)” for the AMCs

Figure 23: Distribution of male tertiary students across the different fields of education in 2010

Source: the indicator “Tertiary students (ISCED 5-6) by field of education and sex [educ_enrl5]” of the set of education statistics published by Eurostat for the European Union; the indicator “Enrolment in [field], Tertiary” of the World Bank dataset “Education statistics (EdStats)” for the AMCs
To summarise, as in Europe, the fields of education, health and welfare, and the humanities and arts are highly female-dominated and engineering, manufacturing and construction are highly male-dominated. Differences between Europe and the AMCIs are most pronounced in the field of science, mathematics and computing which is highly male-dominated in the EU but female-dominated in all AMCIs except for Egypt where this study field is rather gender-balanced.

<table>
<thead>
<tr>
<th>Field</th>
<th>Female-dominated</th>
<th>Gender-balanced</th>
<th>Male-dominated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education</td>
<td>EU, AMCIs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health and welfare</td>
<td>EU, AMCIs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Humanities and arts</td>
<td>EU, AMCIs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering, manufacturing and construction</td>
<td></td>
<td>EU, AMCIs</td>
<td></td>
</tr>
<tr>
<td>Science, mathematics and computing</td>
<td>AMCIs (except Egypt)</td>
<td>Egypt</td>
<td>EU</td>
</tr>
<tr>
<td>Social sciences, business and law</td>
<td>EU, Algeria, Tunisia</td>
<td>Lebanon</td>
<td>Palestine, Jordan, Egypt</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Tunisia</td>
<td>EU, Algeria, Lebanon, Jordan</td>
<td>Egypt, Palestine</td>
</tr>
<tr>
<td>Services</td>
<td>Lebanon</td>
<td>EU, Tunisia, Jordan</td>
<td>Palestine, Algeria, Egypt</td>
</tr>
</tbody>
</table>

4.5 The academic career

Despite the feminisation of the student population, in most European countries women’s academic careers remain markedly characterised by strong vertical segregation. Is this also the case in the Arab Mediterranean countries? Given that the PhD degree is a necessary entrance condition for a career in academia, this section will start by analysing women’s presence at this level before entering into the details of the academic hierarchy and of women’s presence in academic decision-making.

4.5.1 PhD graduates

A first indicator is the proportion of women among PhD graduates. In 2010, in the EU-27, 46% of all PhD graduates were women. From representing a majority among the student population in higher education women have thus lost ground, because at the level of the PhD their share has dropped below 50%. Within the EU-27, the country where the share of female PhD graduates is lowest is Malta with 25% whereas in Portugal women represent 62% of all PhD graduates.

Is this also the case in the AMCIs? The share of women among PhD graduates varied between 33% in Syria and 56% in Tunisia in 2010. The share of 10% of women in Palestine refers to PhD holders rather than PhD graduates. The figure is not entirely comparable with the other countries. Data on PhD graduates are non-existent for Palestine as there is only one local university accredited to deliver a PhD degree in just one field of science, chemistry. Therefore, for Palestine, the figure shows the proportion of women among PhD holders (stock) instead of graduates (flow). The country where the share of female PhD graduates is highest, Tunisia, is closely followed by Lebanon where women represent 52% of all PhD graduates. In these two countries women thus continue to outnumber men at the entrance to the academic career. In the remaining AMCIs the share of female PhD graduates ranges from 33% to 39%. More precisely, their share stood at 33% in Syria, 35% in Jordan, 36% in Morocco, and 39% in Egypt.
The share of female PhD graduates varies considerably across the different fields of study. Table 14 shows that in 2010, on average throughout the EU-27, women accounted for 64% of all PhD graduates in education, 56% in health and welfare and 54% in the humanities and arts. A more or less balanced gender composition is observed only in the social sciences, business and law, with 49% of women, and in agricultural and veterinary sciences, with 52% of women.

On the other hand, the fields of science, mathematics and computing and especially of engineering, manufacturing and construction are characterised by a strong gender imbalance. In the former, women constitute just 40% of PhD graduates and in the latter their share drops even lower to 26%. In 2010 science and engineering thus remained very male-dominated scientific fields in the EU27.

Regarding the AMCIs, the bold and italic figures in Table 14 indicate that these proportions were computed on a total number of PhD graduates below 50. These figures should thus be interpreted with caution as they rely on small samples. Table 14 nevertheless shows that there is no feminisation of the field of education as in European countries. Only in Lebanon are 50% of PhD graduates in education women but this figure may be biased due to small samples. Egypt comes close with 46% of female PhD graduates in this field. However, in the remaining AMCIs women are a minority among PhD graduates in education.

We also note that the humanities and arts are not feminised to the same extent in the Mediterranean Arab countries; only in Lebanon is the share of female PhD graduates as high as 60% (and again the figure should be interpreted with caution due to sample sizes) but in the other AMCIs women represent at most 41% of PhD graduates in this field.

The social sciences, business and law are a feminised field of study only in Tunisia and Lebanon (small sample!).

PhD graduates are small in number in the field of health and welfare in Syria, Tunisia and Jordan. In the other AMCIs the feminisation of this field which we generally note in the EU27 is not observed. In Morocco the situation is close to equality, with 49% of female PhD graduates, but in Lebanon, Egypt and particularly Palestine women form a minority among PhD graduates in this field.
However, it is striking to see that women dominate in the field of science, mathematics and computing in Egypt and Tunisia and that there is a gender balance in this field in Lebanon (although this figure may be biased due to small samples).

In engineering, mathematics and computing, apart from Jordan, where there is a sample size factor, in the other AMC’s the situation of women’s under-representation is less pronounced than in the EU-27. The only exception is Palestine where women represent just 5% of all PhD graduates in engineering. The patterns of gender segregation across fields of study that we note in the EU27 are thus less marked in the AMC’s.

Table 14: Proportion of female PhD (ISCED 6) graduates by broad field of study, 2010

<table>
<thead>
<tr>
<th></th>
<th>Education</th>
<th>Humanities and arts</th>
<th>Social sciences, business and law</th>
<th>Science, mathematics and computing</th>
<th>Engineering, manufacturing and construction</th>
<th>Agriculture and veterinary</th>
<th>Health and welfare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palestine</td>
<td>17</td>
<td>10</td>
<td>13</td>
<td>13</td>
<td>5</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>EU27</td>
<td>64</td>
<td>54</td>
<td>49</td>
<td>40</td>
<td>26</td>
<td>52</td>
<td>56</td>
</tr>
<tr>
<td>Morocco</td>
<td>38</td>
<td>31</td>
<td>34</td>
<td>38</td>
<td>32</td>
<td>na</td>
<td>49</td>
</tr>
<tr>
<td>Egypt</td>
<td>46</td>
<td>39</td>
<td>30</td>
<td>79</td>
<td>36</td>
<td>30</td>
<td>41</td>
</tr>
<tr>
<td>Syria</td>
<td>33</td>
<td>30</td>
<td>25</td>
<td>41</td>
<td>43</td>
<td>48</td>
<td>57</td>
</tr>
<tr>
<td>Tunisia</td>
<td>22</td>
<td>41</td>
<td>63</td>
<td>61</td>
<td>45</td>
<td>55</td>
<td>68</td>
</tr>
<tr>
<td>Jordan</td>
<td>43</td>
<td>25</td>
<td>27</td>
<td>44</td>
<td>67</td>
<td>71</td>
<td>100</td>
</tr>
<tr>
<td>Lebanon</td>
<td>50</td>
<td>60</td>
<td>63</td>
<td>50</td>
<td>na</td>
<td>na</td>
<td>40</td>
</tr>
</tbody>
</table>

Notes: (1) Data on PhD graduates are non-existent for Palestine as there is only one local university accredited to deliver a Ph.D. degree in just one field of science, chemistry. Therefore, for Palestine, the figure shows the proportion of women among PhD holders (stock) instead of graduates (flow). These data come from the 2007 Census which was published in 2009. They include only the population counted during the period of 1-16/12/2007 in the West Bank. They do not include those parts of Jerusalem which were annexed by Israel in 1967. (2) There are no data on PhD graduates available in Algeria.

Source: She Figures 2012; SHEMERA country experts

She Figures 2012 continues to analyse the growth rates of the numbers of female and male PhD graduates. It is shown that in most EU member states the compound annual growth rate of female PhD graduates has exceeded that of men between 2002 and 2010. On average, in the EU-27 the number of female PhD graduates increased at a rate of 3.7% per year compared with 1.6% for male PhD graduates. At the PhD level, women are thus catching up with men in most countries although the pace has slowed down substantially since 2006.

To measure the evolution in the number of female and male PhD graduates in the AMC’s, the SHEMERA country experts tried to collect data for the years 2004 and 2010. However, the data for the earlier year 2004 could be retrieved only for two countries, Jordan and Syria. Figure 28 presents the compound annual growth rate in the numbers of female and male PhDs between 2004 and 2010 for these two countries as illustrative examples. However, it is impossible to draw a general conclusion on trends in the numbers of PhD graduates in all AMC’s from this table. Jordan and Syria present very different situations. In Jordan female PhDs are indeed catching up with male PhD graduates, as is observed in most European countries over the last decade, where the growth rate of female PhD graduates largely exceeds that of their male counterparts (the annual rate for women is 25% compared with 9% for men). In Syria, growth rates are extremely high but do not confirm a catching up trend by women. The annual growth rate of male PhD graduates (63%) exceeds that of female PhD graduates (49%). Comparing both countries to the EU27 average highlights the dynamism that characterises the PhD population in Jordan and Syria, as annual growth rates are much higher than in the EU.
4.5.2 Women’s presence at all stages of the academic career

As in the EU, there is a great variation in nationally applied classifications of academic grades throughout the AMC s. The analysis in this section will mainly concern the presence of women at grade A of the academic career. Grade A is indeed the most uniformly defined grade across the different countries. It corresponds to the highest level of the academic career; in most countries this is the level of Full Professors.

However, even grade A seems to have a different meaning across the different AMC s. In some countries the majority of all academic personnel hold grade A whereas in others this grade is restricted to a far smaller number of university professors. The exclusivity and prestige associated with grade A thus differs across the AMC s.

In the EU-27, of all female professors 7% have reached grade A and of all male professors 17% have this grade. These figures show two things, firstly that grade A is relatively exclusive as it concerns only a small number of all university staff and secondly that grade A is harder to reach for women than for men.

As shown in Figure 26, the exclusivity of grade A also differs between the AMC s. In Palestine this grade is reserved to just 1% of female and 5% of male academic staff whereas in Egypt the majority of male professors and 48% of female academics have this grade.

The gender gap observed for the EU27, with a larger share of male than female professors at the top of the academic ladder, also characterises the AMC s. The share of female grade A staff among all women working in academia is always lower than the share of male grade A staff among all men working in academia. Women are thus relatively more present at the lower levels of the academic career. The share of female grade A staff among all women in academia varies between very low levels of 1% in Palestine, 2% in Tunisia, 4% in Algeria and 5% in Jordan and very high proportions of 35% and 48% respectively in Morocco and Egypt. In these latter countries, grade A is thus far more accessible and less exclusive than in the other AMC s and the EU27. However, even at the highest levels, the gap between the proportions of women and men at this grade level remains sizeable.
Figure 26: Percentage of grade A among all academic staff by sex, 2010

Table 15 indicates that, on average, female representation at grade A stood at 20% in the EU-27 in 2010. The two EU Member States where the share of women among grade A academic staff is the highest (above 30%) are Romania and Latvia. In contrast, the proportion of women was the lowest in Luxembourg, Cyprus, Belgium and the Netherlands. Their proportions ranged from 9% in Luxembourg to 36% in Romania.

In the AMCs, female representation at grade A ranges between 3% in Palestine and 35% in Egypt. In Jordan and Syria the share of female grade A academics is also very low and in Lebanon, Algeria and Morocco it is around one fifth. The proportion of female academic staff at grade A is thus much higher in Egypt than in the other countries. This is certainly linked to the higher degree of accessibility of grade A in Egypt as shown by Figure 26. Moreover, the SHEMERA statistical expert for Egypt explains that serious steps have been taken over recent years to build a gender-equal academic system and change the culture of women’s role in education and research, for example, by increasing the number of available places in university hostels for women (up to 75% in some universities).

Table 15: Proportion of female academic staff by grade and total, 2010

<table>
<thead>
<tr>
<th>Country</th>
<th>grade A</th>
<th>grade B</th>
<th>grade C</th>
<th>grade D</th>
<th>all grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palestine</td>
<td>3</td>
<td>6</td>
<td>10</td>
<td>22</td>
<td>15</td>
</tr>
<tr>
<td>Jordan</td>
<td>6</td>
<td>8</td>
<td>18</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Syria</td>
<td>8</td>
<td>13</td>
<td>26</td>
<td>20</td>
<td>17</td>
</tr>
<tr>
<td>Tunisia</td>
<td>13</td>
<td>23</td>
<td>36</td>
<td>57</td>
<td>45</td>
</tr>
<tr>
<td>Algeria</td>
<td>18</td>
<td>27</td>
<td>45</td>
<td>29</td>
<td>40</td>
</tr>
<tr>
<td>Morocco</td>
<td>18</td>
<td>27</td>
<td>30</td>
<td>33</td>
<td>24</td>
</tr>
<tr>
<td>EU27</td>
<td>20</td>
<td>37</td>
<td>44</td>
<td>46</td>
<td>40</td>
</tr>
<tr>
<td>Lebanon</td>
<td>23</td>
<td>33</td>
<td>34</td>
<td>61</td>
<td>34</td>
</tr>
<tr>
<td>Egypt</td>
<td>35</td>
<td>-</td>
<td>58</td>
<td>42</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: She Figures 2012; SHEMERA country experts
As regards the evolution of women’s presence at grade A over time, *She Figures* 2012 shows that in the EU-27, between 2002 and 2010, it has strengthened in all countries except Estonia. On average, the share of women increased from 15% in 2002 to 20% in 2010. This is also observed in the AMCs (cfr. Figure 27). The only exception is Syria where there is almost certainly a data problem as the share of women among grade A academics has plummeted between 2004 and 2010 from 40% to 8%. The SHEMERA statistical expert for Syria explains that this huge drop in women’s presence at the top of the academic hierarchy is due to the adoption of a new law that severely hampers access to this grade level, especially for women.

**Figure 27: Proportion of women in grade A academic positions, 2004/2010**

![Image of Figure 27](image_url)

Note: Data for Algeria concern the years 2005 and 2010.
Source: *She Figures* 2012; SHEMERA country experts

Viewing the different fields of study separately, in 2010, on average throughout the EU-27, the proportion of women among grade A academic staff was highest in the humanities and social sciences (respectively 28.4% and 19.4%). In contrast, in engineering and technology the under-representation of women was most striking, with on average 7.9% of women among academic personnel at grade A and particularly small shares of women (under 6%) in Lithuania and Germany. The proportion of women stood between these two extremes in the natural, agricultural and medical sciences, respectively at 13.7%, 15.5% and 17.8%. At the level of the EU Member States, the share of female grade A academics is consistently lowest in engineering and technology (it is highest in Slovakia at 12 %), but there is a high level of disparity between the countries as to the science field where grade A women are best represented.

With regard to the AMCs, table 16 shows again some figures in bold and italic indicating that these proportions were computed on a total number of grade A academics below 50. These figures should thus be interpreted with caution as they rely on small samples. Nevertheless the table shows that, in 2010, the proportion of women among grade A academic staff was the highest in the medical sciences, except for Syria. The medical sciences thus host a larger share of female grade A staff in most AMCs than in the EU-27. In Jordan, the medical sciences are the only scientific field with a share of female grade A academics above 10%. Just as in the EU-27, the social sciences and the humanities also host large shares of women at grade A except for Jordan, Morocco and Tunisia (although in Morocco the figure of 7% of female grade A staff in social science could be biased due to small underlying sample). Just as in the EU-27, in engineering and technology, the absence of women is striking in all countries except Egypt. However, even if there are 32% of grade A women in engineering in Egypt, this figure needs to be interpreted in the light of the high accessibility of this grade level in Egypt. As explained at the beginning of this section, 48% of all female academics hold grade A in Egypt (cfr. Figure 26). The same comment can be made regarding the share of 32% of female grade A academics in the natural sciences in Egypt as, once again, this share is far above that observed in the other AMCs in this field. Finally, in agriculture, reliable data are available for 3 AMCs only. In Egypt, female grade A academics represent 28% of all grade A staff in this field but in Jordan and Syria the share of women is only 3% and 5% respectively, which is low even in European terms.
Table 16: Proportion of female grade A staff by main field of science, 2010

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Natural sciences</th>
<th>Engineering and technology</th>
<th>Medical sciences</th>
<th>Agricultural Sciences</th>
<th>Social sciences</th>
<th>Humanities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jordan</td>
<td>6</td>
<td>7</td>
<td>2</td>
<td>16</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Syria</td>
<td>8</td>
<td>5</td>
<td>3</td>
<td>9</td>
<td>5</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td>Lebanon</td>
<td>23</td>
<td>17</td>
<td>5</td>
<td>35</td>
<td>22</td>
<td>24</td>
<td>31</td>
</tr>
<tr>
<td>EU27</td>
<td>20</td>
<td>14</td>
<td>8</td>
<td>18</td>
<td>16</td>
<td>19</td>
<td>28</td>
</tr>
<tr>
<td>Tunisia</td>
<td>13</td>
<td>16</td>
<td>10</td>
<td>27</td>
<td>8</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Morocco</td>
<td>18</td>
<td>given 18</td>
<td>11</td>
<td>28</td>
<td>na</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Egypt</td>
<td>35</td>
<td>32</td>
<td>32</td>
<td>54</td>
<td>28</td>
<td>54</td>
<td>50</td>
</tr>
<tr>
<td>Palestine</td>
<td>3</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Algeria</td>
<td>18</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>na</td>
</tr>
</tbody>
</table>

Source: She Figures 2012; SHEMERA country experts

The pattern shown in Figure 28 confirms these trends. At the level of the EU-27 larger shares of female than of male grade A staff are active in the humanities and the social sciences and particularly in engineering and technology. The trends shown in Table 16 for the AMCs are also largely represented in figure 28. In all AMCs the medical sciences attract larger shares of female than of male grade A academics and, except for Egypt, the medical sciences host more grade A academics than we see in the EU.

Moreover, Figure 28 illustrates the particular cases of Egypt and Morocco. In Egypt, there is a very pronounced concentration of both male and female grade A staff in the humanities. The SHEMERA statistical expert for Egypt explains this particularity in different ways. Given that the humanities also host the bulk of students, the number of staff follows and is proportional to the number of students. Moreover, as in most countries, in Egypt government financial resources for Higher Education are limited. In the past, given the relatively lower cost of developing the humanities, the government has disproportionately invested in this field, and much less in “more expensive” fields such as medicine and engineering. Currently, there are local efforts to improve this situation. The second particular case is that of Morocco (and to a lesser extent also Tunisia). The Moroccan case is particular in that the shares of female and male grade A academics active in the field of the natural sciences are much larger than in the EU-27 and the other AMCs. The important role played by the natural sciences compensates for the low shares of grade A academics in the humanities and the social sciences.

Figure 28: Distribution of grade A staff across fields of science by sex, 2010

Note: Data are not available for Algeria and Palestine
Source: She Figures 2012; SHEMERA country experts
A possible explanation for women’s under-representation at the highest hierarchical level could be that a generation effect is at work, meaning that women who are currently at grade A only accounted for a very small proportion of female students at the different study levels when they were young. To test this hypothesis, it would have been necessary to use data on cohorts of women in order to monitor their progression in the academic career at different points in time. Such data are unfortunately not available. To assess this potential generation effect, Table 17 presents the proportion of women at grade A level for the different age groups (<35 years, 35-44 years, 45-54 years, and +55 years). Given that in some countries the proportion of academic staff at grade A level is very small in the youngest age group (those aged under 35), it is best not to comment on this group for these countries. The existence of a generation effect could be exemplified by the fact that the proportion of women is larger in the younger age groups. *She Figures* 2012 checks the existence of a generation effect exactly in this way in the EU. It is shown that the existence of a generation effect can only be confirmed for Finland. The share of female grade A academics being highest in the group of 35 to 44 year olds in Slovakia and Iceland, these are thus two more countries suggesting a generation effect. The other European member states follow diverse patterns and provide no evidence for the fact that younger generations of female academics face fewer obstacles on their career path. *She Figures* thus concludes that the situation appears to be more favourable for the youngest generations of female academics in a subset of countries but that still the gender gap is disproportionately high compared with the increase in the proportion of women among students, so that the hypothesis that women will automatically catch up should be rejected.

Does a generation effect exist in the AMCs? In the SHEMEERA project, the statistical experts tried to collect data on grade A staff by age group, but these data could be retrieved for two countries only: Syria and Lebanon. These data are presented in Table 17 which shows the proportion of female grade A staff by age group in 2010 and also in Figure 29 which presents the distribution of these female grade A academics according to their age. It seems that, like in Finland, in Lebanon female grade A academics are also better represented in lower age groups but the gender gap is still high and thus casts doubt on the hypothesis that women will automatically catch up. Finally, in Syria, the situation of female grade A academics is catastrophic in all age groups. According to the national expert, the recently adopted law that introduced much harder conditions regarding the research experience and quality necessary to apply for a promotion to grade A helps to explain why women are generally older than men when they apply for a grade A promotion.

**Table 17: Proportion of female A grade staff by age group, 2010**

<table>
<thead>
<tr>
<th></th>
<th>&lt;35</th>
<th>35-44</th>
<th>45-54</th>
<th>55+</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Syria</td>
<td>na</td>
<td>4</td>
<td>14</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Lebanon</td>
<td>29</td>
<td>22</td>
<td>28</td>
<td>17</td>
<td>23</td>
</tr>
<tr>
<td>Finland</td>
<td>15</td>
<td>22</td>
<td>26</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>Slovakia</td>
<td>na</td>
<td>27</td>
<td>24</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Iceland</td>
<td>na</td>
<td>35</td>
<td>28</td>
<td>21</td>
<td>24</td>
</tr>
</tbody>
</table>

Note: Data are not available for Algeria, Egypt, Jordan, Morocco, Palestine and Tunisia.
Source: *She Figures* 2012; SHEMEERA country experts.
The Glass Ceiling Index (GCI) better illustrates the difficulties women have in gaining access to the highest hierarchical levels. This index measures the relative chance for women, as compared with men, of reaching a top position. The GCI compares the proportion of women in grade A positions (equivalent to Full Professors in most countries) to the proportion of women in academia (grade A, B, and C), indicating the opportunity, or lack of it, for women to move up the hierarchical ladder in their profession. The GCI can range from 0 to infinity. A GCI of 1 indicates that there is no difference between women and men being promoted. A score of less than 1 means that women are over-represented at grade A level and a GCI score of more than 1 points towards a glass ceiling effect, meaning that women are under-represented in grade A positions. In other words, the interpretation of the GCI is that the higher the value, the thicker the glass ceiling and the more difficult it is for women to move into a higher position.

As indicated by She Figures 2012, on average, throughout the EU-27 the GCI equals 1.8 in 2010 which means that slow progress has been made since 2004 when the index stood at 1.9. In 2010, in no European member state is the GCI equal to or below 1. Its value ranges from 3.6 in Cyprus to 1.3 in Romania (and Turkey). Aside from Cyprus, the highest GCI was reported in Lithuania and Luxembourg.

Figure 30 compares the value of the GCI among the EU-27 and the AMC s. A first finding is that, just as in Europe, the GCI is equal or below 1 in none of the AMC s. In 2010, the GCI is below the average EU level in 3 AMC s as it equalled 1.1 in Egypt, 1.4 in Morocco and 1.5 in Lebanon. In the other AMC s vertical segregation in the academic career is stronger than on average in the EU27. The index amounted to 2.2 in Algeria, 2.3 in Syria and Jordan, 3.4 in Tunisia and 5.4 in Palestine.
Like in Europe, as stated in *She Figures* 2012, proactive policies need to be implemented in order to balance out the unequal situation that continues to prevail in the academic sector. A gender-mixed composition of nominating commissions, an increase in the objectivity of the applied selection criteria, tutoring of women, or even the fixing of targets and/or quotas are policies that are generally evoked in this context. Moreover, the fight against gender stereotypes and the introduction of measures to promote a gender mix in all primary and secondary school study fields could favour a more gender balanced distribution across study fields at later stages of the educational and professional career.

4.5.3 The scissors diagram

The famous scissors diagram shows the entire picture of gender segregation in a typical academic career. It is the most commonly used representation of vertical segregation in the academic world.

Figure 31 presents the scissors diagram for the EU27 for the two years 2002 and 2010. It shows that at the first two levels of university education (students and graduates of largely theoretically-based programmes to provide sufficient qualifications for entry to advanced research programmes and professions with high skills requirements), respectively 55% and 59% of enrolled students are female in 2010. However, men outnumber women at the third level (students in programmes leading to the award of an advanced research qualification such as the PhD that are devoted to advanced study and original research) at which the proportion of female students enrolled drops back to 49%. At this level of education, where the total number of students has already fallen back substantially as compared with the first level, men are more numerous among enrolled students and the gender gap widens at the PhD level. Indeed, women comprise only 46% of PhD graduates. The PhD degree is often required to embark on an academic career, which means that the squeezing of women at this level will have a knock-on effect on their relative representation at the first stage of the academic career. Whereas 46% of PhD graduates are women, they account for only 44% of grade C academic staff (the first grade/post into which a newly qualified PhD graduate would normally be recruited). The take-off phase in the academic career is consequently also more hazardous for women, as shown by the fact that their proportion drops to 37% among grade B academics (researchers working in positions not as senior as top position but more senior than newly qualified PhD holders). These figures illustrate the workings of a sticky floor, a metaphor to illustrate the difficulties graduate women face when trying to gain access to the first levels of the academic career. Although women are more successful than men in completing tertiary education programmes (EC 2008), they are less successful in entering the PhD level and the lowest steps of the academic career.
The question is thus to know why women fall victim to such reduced representation; is it because of direct discrimination that derives from choices and decisions made by selection committees that are composed mainly of men, because of indirect discrimination that operates through gender-biased selection criteria or because of self-censuring rooted in gender stereotypes?

The proportion of women is the smallest at the top of the academic hierarchy, falling back to just 20% of grade A academic staff in 2010 (the highest grade/post at which research is normally conducted). This figure clearly indicates the existence of a glass ceiling composed of difficultly identifiable obstacles that hold women back from accessing the highest positions in the hierarchy.

A comparison between 2002 and 2010 shows an improvement in women's relative position at the PhD level and at the different stages of the academic career, as noted in grades A, B and C.

To sum up, at the outset girls do well; they form a majority in the population of ISCED 5A students and graduates, but the scissors cross once one reaches the doctoral preparation stage and the other levels that open the way to academic and research careers, the pipeline leaks and, at the very top, at grade A, we are left with just 20% of women. Although women's share increases over time at all levels, policies are needed to accelerate the pace of women's catching-up. This positive progress is nevertheless slow and should not mask the fact that, in the absence of proactive policies, it will take decades to close the gender gap and bring about a higher degree of gender equality.

In the SHEMERA project the data to construct the scissors diagram were collected for all AMCs except Libya. However, as noted at the outset of this section, there is great variation in nationally applied classifications of academic grades throughout the AMCs so that comparison of scissors diagrams across countries is a very delicate exercise. Moreover, data on PhD students and graduates are non-existent for Palestine as there is only one local university accredited to deliver a PhD degree in just one field of science, chemistry. Therefore, for Palestine, the scissors diagram omits the ISCED6A (PhD students) and ISCED6B (PhD graduates) levels. There are no data on PhD graduates available in Algeria. Finally, in Egypt, data on academic personnel at grade B are not available so that the scissors diagram for this country directly passes on from grade C to grade A.
The eight diagrams below show the scissors diagrams for the 8 AMCs for which the data were collected. Just as in the EU27, at the first two levels of university education, women either outnumber men or their share is at least as high as that of men in the AMCs, with the exception of Syria (where female students represent roughly 40% only) and Morocco (where the shares of female and male students are roughly equal).

At the third level showing the gender distribution among PhD students, the proportion of female students drops back noticeably in all countries so that men come to outnumber women at this level. The only exceptions are Tunisia, where there is a slight increase in the share of women between the level of Master graduates and that of PhD students so that women continue to represent roughly 60% of all PhD students, and Syria where women are roughly 40% at the first two levels of university education, a share that remains stable at the level of PhD students.

Among PhD graduates, the gender gap narrows again, except for Syria. The share of female PhD graduates is very close to that of men in Egypt, Lebanon and Tunisia.

As the PhD degree is often required to embark on an academic career, in some countries, the catching up of women with men among PhD graduates is reflected in high shares of women at the early stages of the academic career (e.g., Lebanon and Tunisia) whereas in others the high share of female PhD graduates does not translate into the early stages of the academic career as a reduction of women’s numbers starts straight after the PhD level (Palestine and Morocco but also Egypt, Syria and Algeria). The take-off phase in the academic career is more hazardous for women in the latter countries.

After the start of the academic career, except for Egypt and Algeria, a general finding is observed in all countries: that of a widening gender gap because of ever smaller shares of women as we move up the grades. As in the EU27, this illustrates the workings of a sticky floor. The proportion of women is the smallest at the top of the academic hierarchy, falling back to almost 0% of grade A academic staff in Palestine and Jordan, to around 10% in Syria and Tunisia, and to around 20% in Lebanon, Morocco and Algeria. These figures clearly indicate the existence of a glass ceiling. One of the obstacles is certainly women’s lesser likelihood to have well-developed social networks; they tend to be in a weaker position to employ wasata, or personal connections, to advance professionally (UNDP 2013). Egypt stands out from the other countries with a percentage of 35% of women among grade A academic staff, a fact that should again be interpreted in light of the lesser exclusivity of this grade in the Egyptian academic system (48% of all female and 60% of all male academic staff hold grade A).

A comparison between 2004 and 2010 shows an improvement in women’s relative position at the PhD level and at the different stages of the academic career, as shown in grades A, B and C. As in the EU27, this positive progress is very slow so that policies are needed to speed up the progress towards more gender equality in academia in the AMCs. The very negative evolution for women at grade A level in Syria between 2004 and 2010 is to be attributed to the adoption during this period of the aforementioned law that severely complicates access to grade A positions, penalising particularly female academics in Syria.
Figure 32: Proportions of men and women in a typical academic career, students and academic staff, 2004/2010
Note: In the Jordanian data ISCED 5 students and graduates cover only bachelor students and graduates, ISCED 6 data represent PhD students and graduates conform to UNESCO’s 1997 ISCED classification for higher education.

Source: SHEMERA country experts
Although a picture of vertical segregation emerges through the analysis of the scissors diagrams for the AMCs, the situation varies considerably according to the country considered and comparisons between countries are made very difficult because of the country-specific structuring of the academic career. Besides cross-country variation in the level and form of vertical segregation, the glass ceiling can also be thicker or thinner and situated at different career levels in different fields of science. In Europe, for example, the under-representation of women is more striking in the field of science and engineering. Unfortunately, due to data limitations, field-specific scissors diagrams were impossible to construct for the AMCs.

4.5.4 Academic decision-making

According to the Human Development Report 2013, across the Arab region the proportion of women in leadership and managerial positions is under 10 percent for most countries. This under-representation of women in high-level decision-making positions is also observed in academia. She Figures 2012 presents different indicators measuring the participation of women in scientific decision-making. The SHEMERA national statistical experts gathered data to reconstruct, on the one hand, the number of female heads of higher education institutions and, on the other, the proportion of women on scientific boards. Figure 33 presents the first indicator or the proportion of female heads of higher education institutions. On average throughout the EU-27, 15.5% of institutions in the Higher Education Sector are headed by women. This proportion varies between 27% in Sweden and 6.5% in France. Whereas the average proportion of women among grade A academics stood at 20% in the EU-27 in 2010, just 15.5% of higher education institutions were headed by women. The more we advance along the academic ladder, the fewer women we find. Is the image of the leaky pipeline also confirmed in the AMCs? In Jordan, Syria, Lebanon and Algeria, only about 4-5% of institutions in the higher education sector are headed by women. This proportion rises to 10-11% in Tunisia and Egypt. As for the EU27, it is interesting to compare these figures with the proportions of women among grade A academic staff as analysed previously in this section. Whereas the average proportion of women among grade A academics ranged between 3% in Palestine and 35% in Egypt, just between 4% and 11% of institutions in the higher education sector are headed by women in 2010. The image of the leaky pipeline is thus felt also in the AMCs. Jordan and Syria both have some of the smallest shares of female grade A staff and of higher education institutions headed by women. Lebanon and Algeria have relatively more female grade A academics (respectively 23% and 17%) but still only few female heads of higher education institutions. Tunisia, on the other hand, has a small share of female grade A professors but relatively many female-headed institutions in higher education. Finally, Egypt presents a high-high scenario, the proportion of female grade A academics is very high at 35% and 11% of all higher education institutions have a female head.
A second indicator can be usefully added to this overall pattern, although it is not restricted to higher education but also covers research and scientific activities in other sectors: the proportion of women on boards. The coverage of boards shows considerable cross-country variation. Table 18 lists the boards and councils considered in each of the AMCs.
Table 18: List of boards considered in the AMCs to construct the indicator “Proportion of women on boards”

<table>
<thead>
<tr>
<th>Country</th>
<th>Boards Considered</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Palestine</strong></td>
<td>Birzeit University (<a href="http://www.birzeit.edu">http://www.birzeit.edu</a>): The University is governed by an autonomous Board of Trustees composed of educators and professionals from the Palestinian community. The Board appoints the President of the University. It also confirms the appointment of the Vice-Presidents and Deans upon the recommendation of the President. The Board approves the budget and general development plans presented to it by the University Council. The University is administered by the President of the University, who is assisted by the University Council, which is composed of the Vice-Presidents and the Deans.</td>
</tr>
<tr>
<td></td>
<td>An-Najah National University (<a href="http://www.najah.edu">http://www.najah.edu</a>): The University is governed by an autonomous Board of Trustees composed of educators and professionals from the Palestinian community. The Board appoints the President of the University. It also confirms the appointment of the Vice-Presidents and Deans upon the recommendation of the President. The Board approves the budget and general development plans presented to it by the University Council.</td>
</tr>
<tr>
<td></td>
<td>The Palestine Polytechnic University (<a href="http://www.ppu.edu">http://www.ppu.edu</a>): The University is governed by an autonomous Board of Trustees composed of educators and professionals from the Palestinian community. The Board appoints the President of the University. It also confirms the appointment of the Vice-Presidents and Deans upon the recommendation of the President. The Board approves the budget and general development plans presented to it by the University Council.</td>
</tr>
<tr>
<td></td>
<td>Accreditation and Quality Assurance Commission (<a href="http://www.aqac.mohe.gov.ps">http://www.aqac.mohe.gov.ps</a>): The ultimate goal of AQAC is the improvement of the quality of Palestinian higher educational programs and institutions. It has the responsibility to accredit new academic programs, and license and accredit any new educational institutions, regardless of specialization and level of degree.</td>
</tr>
<tr>
<td></td>
<td>Riwaq (<a href="http://www.riwaq.org">http://www.riwaq.org</a>) establishes the National Register of Historic Buildings</td>
</tr>
<tr>
<td><strong>Jordan</strong></td>
<td>The Boards of Trustees of all private and public universities in Jordan</td>
</tr>
<tr>
<td></td>
<td>The University Councils of all private and public universities in Jordan</td>
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<tr>
<td></td>
<td>The Councils of Deans of all private and public universities in Jordan</td>
</tr>
<tr>
<td></td>
<td>The Councils for Appointment and Promotion all private and public universities in Jordan</td>
</tr>
<tr>
<td><strong>Syria</strong></td>
<td>Highest boards of the five biggest Syrian universities:</td>
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<td></td>
<td>University of Damascus</td>
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<tr>
<td></td>
<td>University of Aleppo</td>
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<td></td>
<td>University of Tishreen</td>
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<td></td>
<td>University of Al-Baath</td>
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<td>University of Alfurate</td>
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<tr>
<td><strong>Lebanon</strong></td>
<td>Highest boards of the five biggest Lebanese universities:</td>
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<tr>
<td></td>
<td>Lebanese University</td>
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<tr>
<td></td>
<td>Saint-Joseph University of Beirut</td>
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<td></td>
<td>American University of Beirut</td>
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<td></td>
<td>Holy Spirit University of Kaslik</td>
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<td></td>
<td>Beirut Arab University</td>
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<td><strong>Egypt</strong></td>
<td>Highest boards of the 19 governmental universities in Egypt:</td>
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<td></td>
<td>Cairo University</td>
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<td></td>
<td>Alexandria University</td>
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<td>Ain Shams University</td>
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<td>Assuit University</td>
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<td>Tanta University</td>
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<td>Mansoura University</td>
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<td>Zagazig University</td>
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<td>Helwan University</td>
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<td>Minia University</td>
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<td>Menofya University</td>
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<td>Beni Suef University</td>
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<td>Fayoum University</td>
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<td>Benha University</td>
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<td>Kafr Elshikh University</td>
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<td>Sohag University</td>
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<td></td>
<td>Damanhour University</td>
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<td>Port Said University</td>
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</tbody>
</table>

Source: SHEMERA country experts
Figure 34 illustrates to what extent women are involved in top decision-making committees that have a crucial impact on the orientation of research. On average in the EU-27, 36% of board members were women in 2010. In the EU27, the most important institutions in the scientific landscape thus continue to be dominantly led and managed by men. When boards have such an unbalanced composition, a gender bias, mostly very subtle and largely unconscious, is likely to influence the decisions that are made (Addis 2010, Meulders et al. 2010). In view of this, She Figures 2012 refers to the fiercely debated question of the usefulness of fixing quotas in order to reach a critical mass of women in scientific decision-making. In the Nordic countries, where such quotas exist, the share of female board members approaches equality (respectively 49%, 46% and 45% in Sweden, Norway and Finland).

Compared with an average 36% of female board members in the EU27, only between 6% and 23% of board members are women in the AMCs. In other words, less than a quarter of all board members are women. Lebanon stands out from the other AMCs with 23% of female board members.

Note: Data are not available for Algeria, Morocco and Tunisia. Data for Syria concern the university boards of the five biggest universities; Data for Jordan concern 4 types of boards and cover all public and private universities: the Board of Trustees, the University Council, the Council of Deans and the Council for Appointment and Promotion; Data for Egypt cover the administrative boards of all universities; Data for Palestine cover the Board of Trustees and the University Council of Bir Zeit University, the Board of Trustees of An-Najah University, the Board of Trustees of the Polytechnic University and the management boards of AQAC, MAS and RiWAQ; Data for Lebanon cover the University Councils of UL, USJ, USEK and BAU and the Board of Trustees and International Advisors of AUB.

Source: She Figures 2012; SHEMERA country experts

To sum up, women’s under-representation at the highest hierarchical levels of the academic career severely hampers their chances of being at the head of universities or similar institutions in higher education. As noted in She Figures 2012, the small proportion of women at the head of institutions in the higher education sector or in decision-making committees has various consequences. On the one hand, it makes it very difficult for young women in academia to find female role models, and thus to identify with the highest levels of academic life. On the other hand, from a gender point of view, the weak presence of women in high-power positions, and the male dominance that results from this, bias (often unconsciously) decisions that are taken at these high levels and that shape scientific policies, determine the choice of research subjects, orient research credits and fix nominating rules and criteria. What could be called a discriminatory snowball effect is thus revealed: women’s under-representation at the highest echelons is an obstacle for the access of young women to the PhD level and the first stages of the academic career.
Chapter V: GENDER SEGREGATION IN EMPLOYMENT AND SCIENCE

Gender segregation in employment refers to the tendency of women and men to work in different occupations and sectors. It has long been acknowledged as a pervasive phenomenon (Anker 1998; OECD 1998; Rubery and Fagan 1993). The literature usually distinguishes between different types of segregation. According to Bettio and Verashchagina (2009), horizontal segregation is understood as the under- (over-) representation of a certain group of workers in occupations or sectors not ordered by any criterion, whilst vertical segregation refers to the under- (over-) representation of a group of workers in occupations or sectors at the top of a ranking based on ‘desirable’ attributes - income, prestige, job stability, and so on. In the literature, vertical segregation is often referred to as the ‘glass ceiling’, which points to the existence of invisible obstacles that lead to the scarcity of women in power and decision-making positions (Laufer 2000). This is completed by the concept of the ‘sticky floor’, which describes the forces that tend to keep women at the lowest levels in the organisation (Maron and Meulders 2008).

Evidence in Europe and other regions in the world shows that patterns of horizontal and vertical gender segregation are clearly present when scientific careers are analysed. The statistical analysis carried out in SHEMERA shows a similar situation in the AMC. In this chapter we review the literature on gender segregation in employment and science. Our objective is to identify the most relevant explanatory factors in the AMCs as compared with Europe.

5.1 Root causes of gender segregation in employment

Gender segregation in employment is a persistent trend in Europe. There is no evidence of any spontaneous movement towards a reduction in gender employment segregation in European countries. On the contrary, the evolution of labour markets over the last 20 years points towards unchanging, if not rising levels of segregation, although with significant variation across countries and divergent de-segregation and re-segregation tendencies (Bettio and Verashchagina 2009).

In the AMCs, gender segregation in employment is also a pervasive trend and appears to be more pronounced than in Europe. According to the UN Arab Development Report “women do not enjoy equality with men in job opportunities, conditions or wages let alone in promotion to decision-making positions” (UNDP 2006:8). Women’s participation rate in labour forces in the MENA region is the lowest in the world, although it is widely acknowledged that standard statistics do not reflect the high share of women in informal activities, i.e., family workers in agriculture and informal service jobs (UNDP 2005). For women with low education levels, segregation encompasses very low rates of female participation in the formal labour market with employment concentrated in low paid occupations and informal activities. Participation rates are far higher for well educated women, but so are unemployment rates, namely for young women. In turn, employment tends to be concentrated in a narrow set of jobs, namely on the lower rungs of the ladder of certain occupations (health, education) in the public sector (UNDP 2006; World Bank 2013a).

In Europe, gender segregation in employment persists in spite of significant changes in recent decades: impressive advances of women in education, the loss of importance of physical attributes for productivity, the enforcement of equality legislation, changes in family roles and the stance taken by feminism in defiance of traditional gender norms (Bettio and Verashchagina, 2009). According to these authors, research focuses on four sets of factors in order to explain the persistence of gender segregation: gender stereotypes, choice of study field, gender division of labour and time constraints, and covert barriers and biases in organisational practices. They highlight the persistence of subtle discrimination against women in spite of legal equality:
“Although legal barriers to entry or restrictive practices have long been outlawed, covert biases or forms of impediments still exist, often restricting career paths and career prospects within occupations. Examples that bear special importance for vertical or hierarchical segregation are closer rungs on ladders in the career tracks of feminised jobs, discretionary managerial practices in selection, hiring and promotions, networking and mechanisms of co-optation” (Bettio and Verashchagina 2009: 45)

Our analysis shows that these factors are also relevant in the AMCs, obviously coupled with others more directly related to the specificity of the political, social and economic context. Overt legal restrictions combine with traditional gender norms and covert discriminatory practices; education disparities are more relevant as advances of women in education are still recent; and women’s employment opportunities appear to be disproportionately hindered by slow economic growth and the contraction of the public sector (UNDP 2006; World Bank 2013a).

Research in this field has paid special attention to the very low level of women’s labour force participation. It is a feature shared by all AMCs but one that is difficult to explain as stressed by different authors:

“Women’s participation in the economy, as an integral part of their empowerment, is a major challenge facing the MENA-region, since women’s labour market participation (LMP) is among the lowest throughout the world in these countries. Nonetheless, on a broad comparative scale, the determinants of women’s LMP in this region are understudied, especially the interplay between them.” (Spierings and Smits 2007:1).

“The academic consensus on what explains MENA’s low female labor force participation has yet to emerge. This lack of agreement reflects the multiplicity of issues at work, their complicated interplay, and the inability of any one factor to explain the MENA puzzle. Across the world, region-specific factors such as gender norms, the legal framework, and the structure of the economy are important determinants of female labor force participation.” (World Bank 2013a:12).

5.1.1 Legal constraints

“Laws concerning labour and personal status are considered to be among the most daunting obstacles to Arab women’s participation in economic life” (UNDP 2006: 92). All AMCs have constitutional clauses that set out the equality of citizens and all have ratified international conventions that affirm gender equality, namely the Convention on the Elimination of all Forms of Discrimination against Women (CEDAW). Nevertheless, they all maintain reservations to CEDAW and there are laws that differentiate between the sexes in all the AMCs.

The main reason behind the reservations to CEDAW is the conflict with Family Codes. The legal framework in the AMCs shows great diversity and has evolved from different sources: colonial legislation, religious law and customary law; constitutional law; international conventions; and regional treaties. The personal status law, or family code, regulates matters such as marriage, divorce and child custody and is governed in most countries by Muslim law. In countries such as Egypt, Lebanon and Morocco, non-Muslim religious communities are allowed to apply their own communities’ religious standards to some personal status matters. Family codes in most AMCs do not comply with CEDAW provisions in terms of equality in marriage and family life (article 16). It is worth noting that the extent of the conflict between CEDAW and Muslim law depends on the interpretation of Muslim precepts. As highlighted by CEDAW, the Organization of Islamic Cooperation (OIC) states that article 16 is compatible with Muslim law.

According to the CEDAW committee, Tunisia is the country which has shown the firmest determination in achieving gender equality and aligning its legislative framework with international standards. Indeed, the Tunisian Council of Ministers adopted in 2014 a draft decree to withdraw all reservations to the CEDAW. Nevertheless, the CEDAW committee has indicated that gender-discriminatory laws do persist in all AMCs, including Tunisia. Discriminatory provisions are mostly found in family and penal legislation, although the CEDAW committee also highlights problems in the labour codes. Among the

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most salient factors, it should be noted that the principle of equal remuneration for women and men for work of equal value is not fully incorporated in Egypt and Jordan; regulation of sexual harassment in the workplace is absent or only partially incorporated in several countries; and informal workers (domestic, agricultural, family workers), mostly women, are excluded from the protection of the labour codes in most countries.

Research in this field reflects the diverging interpretations of Muslim law. The principle of discrimination between the sexes is embedded in some schools of Islamic jurisprudence on the basis of custom, although other legal interpretations have always existed (UNDP 2006). Judge Mohamed Fathy Naguib, chief justice of the Constitutional Court in Egypt, states how narrow and limited interpretations of Muslim jurisprudence have undermined women’s legal status, whereas a more liberal view would guarantee women’s rights and equality before the law (Naguib 2004). It is worth noting that the Organization of Islamic Cooperation (OIC) has recently stated that CEDAW provisions on equality in marriage and family life are indeed compatible with Muslim law 12.

The bulk of research focuses on the extent of legal constraints to women’s participation in public life and the problem of enforcing laws when they are aligned to international conventions. Women face legal constraints to a greater or lesser extent in all AMCs, namely in family and personal codes. They not only impact on women's autonomy within their family but also determine their access to property and ability to function independently. Labour and pension laws may also limit women’s options. Legal constraints to gender equality are not unique to the AMCs, but they are more marked there than in Europe or other Western countries (World Bank 2013a). Research in this field has been promoted by women's movements in their struggle against discriminatory laws. Al Raida, the journal of the Institute for Women’s Studies in the Arab World, has paid due attention to this concern, with several articles and monographies (i.e. Hamadeh 2005-2006 on the status of women in Lebanese legislation). Several AMCs have recently enacted reforms to align some of their laws with international standards, but the effective enforcement of such laws remains problematic, including protection against women’s discrimination in the workplace. A substantial strand of the literature highlights that the existence of fair legislation for women is not enough to achieve equality, since the gap between legislation and practice is wide (Saleh and Kadhijah, 2011). Alongside legal constraints, other factors contribute to pervasive gender segregation in employment.

5.1.2 Gender norms and division of labour

“The prevailing masculine culture and values see women as dependants of men. As a result, men take priority both in access to work and the enjoyment of its returns. This tendency ignores the role of women in contributing to family income or in supporting entire families, a phenomenon that is on the rise in all societies, including Arab societies” (UNDP 2006: 91). In all the AMCs, the persistence of patriarchal attitudes and strong stereotypes about the roles and responsibilities of women and men in family and society is widely acknowledged as a root cause of gender discrimination. According to the CEDAW committee, this applies to all AMCs, although to varying degrees. Gender norms tend to be in line with the traditional male breadwinner model which confines women to the home and limits access to economic and political power to men (Moghadam 2004, Offenhauer 2005). Traditional gender norms are also present in the EU and other Western countries, but they appear to be more pronounced in the AMCs (World Bank 2013a).

The literature usually acknowledges that gender stereotypes and the predominance of patriarchal values and traditions are deep-rooted obstacles for women’s empowerment (e.g. Khoury et al. 2006 in Syria). A major concern is to ascertain whether traditional gender norms are being devaluated among young people. Research led by the World Bank shows that young and well-educated women express greater confidence in women’s ability to contribute in the public sphere. However, the erosion of patriarchal attitudes and values cannot be taken for granted. (World Bank 2013a) Mostafa (2003) highlighted that Egyptian students hold attitudes towards women who work similar to those of older generations, with significant differences between women’s and men’s attitudes. There is evidence from Jordan that women’s level of education has a significant impact on women’s participation in family decisions (El Kharouf and Khamash 2005); however, a study carried out among young people found that traditional values are still predominant, although women are more inclined towards gender

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equality than men (El Kharouf 2010). Research is also paying increasing attention to gender-based violence, as an extreme indication of the persistence of patriarchal attitudes (Clark et al. 2008; Oweis et al. 2009; Hammoury and Khawaja 2007; Usta et al. 2007; SCFA 2005).

With regard to the gender division of labour, there is clear evidence that women in the AMC, as in other countries, typically bear a disproportionate share of unpaid household work. Data from time-use surveys show that gender roles are deeply ingrained, and that while men divide their time between work and leisure, women spend most of their time doing household work. In Tunisia, one study indicated that women’s total daily workload, including paid employment, family concerns, and domestic work, is on average two hours longer than that of men, and that “whatever their professional situation, women always have a greater workload than men” (Triki 2000). A similar conclusion is reached in Syria: women bear the burden of domestic and care work, irrespective of their level of education or whether they are or not in employment (Kaled and Akl-Ali 2009). In Algeria, the official survey on the use of time indicated that 93% of women but only 40% of men are involved in household tasks; women spend on average 5.3 hours on housework in contrast to 1.8 hours for men; finally, household tasks themselves are also clearly gendered, with men’s activity concentrated on shopping while women are in charge of all the other tasks (ONS 2012).

Research stresses that work-life balance is considered as a women’s issue whilst public policies and employers’ practices do not provide adequate support for the reconciliation of work and family life. Maternity leave provisions vary greatly across the AMC, but maternity leave is generally absent. A major concern is the lack of adequate care services for children and dependent adults (UNDP 2006). “Even though many Arab States extol family values in their public discourse, they leave it to employers rather than to the State to bear the cost of women’s reproductive role in society, an approach that reduces job opportunities for women ... At the same time, some employers prefer to employ men in the belief that they are less expensive, using paid maternity leave as a pretext not to employ women as though such leave were a privilege for women and not a right of the new-born child and a service to society” (UNDP 2006: 91). Evidence shows that the employment rates of married women are substantially lower than the employment rates of single women, with differences even more marked when married women have children (Spierings and Smits 2007). Although this trend is also well documented in European and other Western countries, the contrast in the AMC is much more pronounced. This is an indication of the extent of work and family tensions that women face in the AMC, a fact that undermines women’s employment opportunities and contributes to gender segregation in employment. Employment conditions are widely considered as unsupportive to motherhood and family life: research reflects the difficulties of enforcing maternity leave provisions and supporting working mothers (i.e. Saade et al. 2010 in Lebanon; Hammami 1997 in Palestine); women are compelled to decide whether to engage in a career postponing marriage and motherhood or to favour the formation of a family without excluding employment at a later stage (Boufeni 2001 in Algeria); young adult single women in employment are emerging as a new phenomenon that challenges traditional gender norms (Kawar 2000 in Jordan).

5.1.3 Education disparities

In recent decades the AMC have made impressive advances towards gender equality in education, but gender disparities in education remain a major cause of segregation in the labour market. Advances in education are still recent in many AMC. The area is close to achieving gender parity in primary and secondary enrollment rates, but there are disparities in completion rates. The level of education of adult women is still far lower than men’s, whilst illiteracy rates are higher (World Bank 2013a). Research provides evidence that girls from poor families in rural areas face greater obstacles to attending primary and secondary school, highlighting how gender disparities intersect with class and urban/rural divides (Megahed 2010; Ali et al. 2011; Sika 2011).

The literature also points out that the improvement in female enrolment and completion rates, though necessary, does not automatically lead to equality in educational outcomes. The persistence of a hidden curriculum in education is a major concern. “Despite the inroads Arab women have made in political, social and economic fields, the gap between such progress and the stereotypical images of women in school curricula is enormous. Those images invariably confine a woman to the roles of mother, homemaker and housekeeper” (UNDP 2006:17). A pioneering study in this field is “She cooks, he reads: Women’s image in school textbooks in Lebanon” written in 1983, where Ilham Kallab highlights that textbooks treat women primarily as mothers and caregivers. Recent research shows
that gender bias in textbooks and in teachers’ and parents’ expectations remains widespread, even though covert and inconspicuous (El Kharouf 2006; Mougharbel and Bahous 2010; Velloso 1996).

Gender disparities in education are also evident in horizontal segregation, which is a salient trend in all AMC. The lack of diversification in women’s training and education is one of the factors that explains their disadvantage on the labour market by comparison with men. Overall, women tend to pursue studies which are less valued than those pursued by men, a fact that restricts women’s employment prospects (UNDP 2006). This applies to vocational education and the choice of study field in post-secondary and tertiary education. Vocational education is the only educative stage in which boys’ enrolment rates are consistently higher than girls’, with no clear evolution towards convergence. As regards the choice of study field, patterns of horizontal segregation are similar to those present in Europe, although they appear to be somewhat less marked, mainly because women’s share among university graduates in mathematics, natural sciences and computing is higher than in Europe. The literature highlights the role of gender socialization of boys and girls to explain their uneven distribution across the variety of scientific fields (Ben Hassine 1999, 2004; El Kharouf 2004). The family and especially parents play a key role as they often bring up their children to conform to traditional gender roles, while the education system, teachers and peers, tend to reinforce these stereotypes, giving support to gendered choices with regard to studies and career prospects. As in Europe, research links segregation across scientific fields at the university level to segregation downstream across choice of study fields at the secondary school level. This early segregation hinders girls’ and women’s later study and career opportunities (Ben Hassine 2004, 2005 and 2006). In both Europe and the AMC, however, concerns about horizontal segregation tend to be presented from the perspective of the educational choices made by girls, even though gender segregation is also due to boys’ preferences for certain fields of study. If the aim is to change these trends and introduce more of a gender balance in all study fields, equal attention should be given to girls’ and boys’ choices. Working towards a more mixed composition of all study fields should not mean an alignment on the male model (Meulders et al. 2010).
Box 3: Gender norms and women’s labour market participation

The study by Spierings and Smits (2007) illustrates the influence of gender norms to explain women’s low labour market participation in the AMC s. The study used data from the Pan Arab Project for Family Health (PaPFam) surveys for Syria (2001), Tunisia (2001) and Morocco (2004, in cooperation with DHS) and the Demographic and Health Surveys (DHS) for Egypt (2003) and Jordan (2002) to compute women’s labour market participation rates in the presence/absence of a partner and according to the number of children. The figures below show their results.

Women’s labour market participation according to the presence of a partner

Of women with a partner, 13.9% are active overall, while this is 20.0% for those without a partner. Whereas this percentage differs between countries, the pattern is the same in all.

Marriage often damages Arab women’s chances of becoming employed. A 2010 survey of community-college graduates in Jordan found that 92% wanted to work. A year later, only 7% of married graduates were employed, while 21% of single women were employed (Solovieva 2013).

Women’s labour market participation in relation to the presence of children

Next to the presence of a partner, care duties seem important as well. If women have children and the number of children rises, the participation of women steadily declines. Furthermore, the chance of participating is lower for women with younger children. Especially women in households with more than four children have a low chance of being active with 6.2% when they are young children and 7.6% when all children have reached the age of six, whereas the other groups all score over 13%.

The contrasted effect of children on men’s and women’s labour market participation and employment is a well-documented fact in Europe as well. Men with children have higher employment rates than those without, while the reverse is true for women.

The effect of children on the employment rate of women is the most negative in the UK and Germany, and in several new EU member states such as the Czech Republic, Hungary, Slovakia, Estonia and Bulgaria. In 2012, on average in the EU27, the employment rate of women of childbearing age (25-49 years of age) decreased from 77.1% in the absence of children to 71.6% when they have one child, 69.5% when they have two children and 54.8% when they have at least three children (Eurostat). On the contrary, the male employment rate in this age group increases from 78.9% in the absence of children to 86.5% in the presence of one child, 89.9% when there are two children, falling back to 84.7% in the presence of at least three children (Eurostat). Not only the number of children matters but also their age. The employment penalty for women is largest where there are very young children. For example, compared with an employment rate of 77.1% in the absence of children, women’s employment decreases to 62.1% when there is a child under 6 years of age in the household (Eurostat). For men, the presence of a child under 6 years of age increases their employment rate from 78.9% (no children) to 88.4% (Eurostat).
5.1.4 Scarcity of jobs and inadequate working conditions

The scarcity of jobs is a major cause of gender segregation in employment. “Slow growth in the region predisposes economies towards low demand for female labour” (UNDP 2006: 8). Overall, slow economic development does not provide the jobs needed to absorb increases in the labour force, whether in the number of men or women. Nevertheless, the scarcity of jobs has a greater impact on women’s employment. One of the main sources of female employment in the AMC is the public sector, which is suffering a contraction due to privatisation policies and the reduction of public expenditure. A decrease of jobs due to a loss of competitiveness in European markets is also apparent in the manufacturing industry, which is another major source of female employment, notably in the textile and clothing industries in Morocco and Tunisia.

Women’s employment opportunities appear to be seriously hindered by the contraction of the public sector combined with inadequate working conditions in the private sector (UNDP 2006). Research highlights that well-educated women have traditionally looked for employment in the public sector because it offers better working conditions in terms of wages, job security and work and family balance. However, young women find it more and more difficult to find such a job under current structural adjustment policies (Gadallah 2011; World Bank 2013a). In contrast, working conditions in the private sector appear to be especially hostile to women. A recent conference on women’s employment in the private sector in the MENA countries (Swedish Institute Alexandria 2014) highlights the pervasiveness of gender discriminatory practices affecting wages, with women earning less than men for work of equal value. A second major concern is the lack of adequate human management policies to support the reconciliation of work and family responsibilities. When maternity protection is enforced, it can be a double-edged sword, acting as a barrier to the recruitment of women. Finally, sexual harassment is also a key barrier to working in the private sector, occurring both within the workplace but also during travel to and from the workplace.

Research in most AMC provides evidence, although fragmented, of these trends, suggesting that it is restrictive labour markets, rather than restrictive social norms, that are the main obstacles to the expansion of female employment (PWRDC 2009; Gadallah 2011; Hammami 1997 and 2011). “When there is “No Respect” at Work: Job Quality Issues for Women in Egypt’s Private Sector” is the telling title of a study in Egypt (Barsoun et al. 2009). Evidence of wage discrimination is scarce due to the lack of quality data for wages in most countries (Hausmann et al. 2011). However, when available, research shows that wage discrimination is substantial. In Morocco, a study analysed the extent of gender wage inequalities using data from a survey conducted by the High Commission for Planning (HCP) on Moroccan households in 1991, 2004 and 2007 (Duidich 2011). The data show that, on average, a male employee earned 56% more than a female employee in 1991, 28% in 1999 and 17% in 2007. The study highlights that nearly two thirds (64%) of the wage gap result from wage discrimination against women, whilst only 36% is due to diverging traits, namely professional experience and educational background. The study found that discrimination explains a higher proportion of the gender wage gap in rural areas (92.6%) than in urban areas (44.7%). In terms of economic sector, a higher level of discrimination was found in the primary sector (105.2%) than in the secondary (63.8%) and tertiary (23.2%) sectors.

The Cairo Declaration on the Post-2015 Development Agenda for Arab Women13, adopted on 23 February 2014, acknowledges these concerns. “Recognize women’s right to work on a just and fair basis with equal pay for work of equal value” is the first recommendation for promoting women’s economic empowerment. It is followed by the necessity to “provide a work environment where the personal health and safety of employees, access to leadership positions for women, protection against physical abuse in the workplace, and the right to equal tax treatment and advancement in the workplace, including through mentoring programs and technical and vocational training, are considered”. The declaration also addresses other major factors that undermine gender equality in employment, namely the need to ensure constitutional protection against gender discrimination, to strengthen equality policies and mechanisms for women and men to enjoy equal protection under the

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13 The Cairo Declaration was adopted by representatives of member states of the League of Arab States (LAS) and will be submitted to the 2015 LAS summit meeting in Tunisia. The text of the Declaration is available at: http://www.unwomen.org/~/media/Headquarters/Attachments/Sections/CSW/58/CSW58-declaration-cairo-en%20pdf.pdf
law and to develop protection and social security policies in both the formal (public and private) and non-formal sectors.

5.2 Gender segregation in scientific careers

All over the world, evidence shows that the move towards gender equality in science cannot be taken for granted. In Europe gender segregation appears to be slowly eroding, but women are still unable to fully develop a scientific career on equal terms with men. Gender inequalities persist in education while the gender ratio differs across fields of study. The existence of a ‘glass ceiling’ or a ‘sticky floor’ affects women attempting to progress to senior positions. Women do not have equal opportunities to attain academic status equal to that of men. Our research on the situation of women in science in the AMC shows similar trends. In Europe research on gender segregation in scientific careers is a relatively recent field which has developed in close relation to political debates and initiatives to foster women’s advancement in science (Caprile et al. 2012). It is thus not a surprise that research is very scarce in the AMC, where awareness and policy debates are just emerging.

5.2.1 Policy debates and research in Europe

Policy debates in Europe in the 1980s were mainly focused on gender differences in the choice of studies and career. It was stressed that young women were discouraged from science by deeply rooted ideas about science being a ‘masculine’ field. Criticism of this position emerged in the 1990s, when it was claimed that it was not enough to ask girls to ‘fit in’ to science: the manner of teaching science and how scientific jobs were organised also needed to be changed. Thus policy focus moved from entry and qualification issues to retention and attrition rates and accordingly from individuals to scientific organisations, cultures and practices. Initially, special attention was paid to work-life balance issues and equal opportunities with respect to progress in the scientific workplace alongside men, free from harassment or gender discrimination. Policy debates during the 2000s have emphasised the need to address the implicit and apparently neutral norms, values and standards of science and scientific institutions, including the epistemological basis of scientific knowledge. The policy debate has thus come to converge on the idea of structural change in scientific organisations: making institutions fully gender aware (Cronin and Roger 1999, Glover 2001, Schiebinger 2008, EC 2012).

Research on gender segregation in scientific careers shows a similar shift, from supply-side to demand-side factors. The initial focus was on gendered socialization – how from an early age individuals internalise ‘feminine’ and ‘masculine’ roles that shape their educational and professional choices. From this perspective, a considerable bulk of the literature on gender and science focused on women’s biographies and subjective experiences, their ways of building a professional identity and solving conflicts in a male-dominated environment and how they manage to reconcile their families and careers. Women were said to be less professionally ambitious than men and to give priority to their family over their career. Overall, the explanations for the underrepresentation of women in science were sought outside science and scientific institutions. Research focused only on women, without any systematic comparison between women’s and men’s scientific careers (Stolte-Heiskanen 1988).

Due to feminism and women scientists’ activism among other factors, the 1990s witnessed a gradual shift in research towards organisations and professions, their implicit norms and standards, institutional practices and power relations. In the late 1990s, gender discrimination in academia was paid further attention as a result of two major ‘scandals’: the article by Wennerås and Wold (1997), which provided evidence of sexism and nepotism in the peer-review system in Sweden, and the report by the Massachusetts Institute of Technology, which publicly admitted having given lower pay and fewer resources to female scientists than to male scientists of equal seniority (MIT 1999).

Since then, research started to place particular emphasis on overt and covert discrimination against women, attempting to unveil the hidden mechanisms of male domination in scientific institutions (Bagilhole & Goode 2001; Krais 2000). The EC-commissioned ETAN report (Osborn et al. 2000) pleaded for an end to patronage and the ‘old boys’ network’ in European academic institutions and the implementation of greater transparency and fairness in recruitment and assessment procedures. Recent studies address the progressive differentiation of men’s and women’s scientific careers through both supply-side and demand-side factors. The overall impression is that there is no single-
factor explanation for gender segregation in science. It has the same root causes as gender segregation in the labour market as a whole.

5.2.2 Policy debates and research in the AMCs

The results of our work show that policy debates and initiatives to foster women's advancement in science are just emerging in the AMCs whilst research in this field is scarce. Research rather focuses on the root causes of gender segregation in employment, including horizontal segregation in education, with only a few studies that specifically deal with gender segregation in scientific careers.

A first strand of the literature, namely in Lebanon and Tunisia, focuses on mapping the presence of women in science and technology and uses statistics to illustrate the existence of horizontal and vertical segregation (Cheikh 2010; CERD, 2008). This is combined with an effort to give greater visibility to women's achievements in science. The "Who Is She" in Lebanon is an online database with profiles of prominent contemporary Lebanese women. This project started in 2008 following a bilateral partnership between the Institute for Women's Studies in the Arab World (IWSAW) at the Lebanese American University (LAU) and KVINFO, the Danish Centre for Information on Women and Gender. The aim behind this project is to provide the public with easy access to biographical information on a large number of women working as opinion leaders, senior managers, politicians, professionals, artists, researchers and experts within a wide range of subjects. "The Directory of Moroccan women" written in Arabic, identifies the most relevant achievements of women in several areas, including their contribution to different fields of science (Abdelhaq 1993). Similarly, the Arab Human Development Report devotes a whole section to highlighting women's outstanding contributions in the field of the social and natural sciences (UNDP 2006).


Yet vertical segregation in scientific careers is an under-researched topic in the AMCs, with only a few studies in Tunisia. Ben Hassine (1999, 2004) states that vertical segregation is partly due to the fact that recruitment, nomination and promotion commissions remain male bastions of power, through cooptation practices that favour male candidates over their female counterparts. This contributes to the increasing scarcity of women as one advances up the levels of the scientific career. However, additional factors are at play in explaining why the scientific career remains marked by a gender bias. These factors include the unequal division of responsibilities in the household and the career penalty associated with motherhood, which limits women in their professional advancement and reduces their chances of being promoted to higher positions in the hierarchy. The so-called objective and gender-neutral character of promotion rules is thus challenged. Promotions in the area of scientific research are conditional upon the publication of a number of articles in selected scientific journals. Women being in charge of the lion's share of care and domestic work generally face great difficulty in increasing their scientific production at the same rate as men and therefore tend to fall back in the academic hierarchy.
inclusively achieve, such prestige leads to more invitations for research collaboration, to being quoted in colleagues' work and to receiving research funding, all crucial in getting published (Wennerås & Wold 2001/2004). In other professional fields, the academic ladder is a hierarchy of power, recognition and income and gender segregation is not only the result of women’s time and mobility constraints.

Xie and Shauman (2003) show that productivity is not an independent characteristic of individuals but rather a reflection of their position in the academic hierarchy and the access to resources that those positions make possible: when academic track, academic position, type of institution and available resources are held constant, men and women scientists are equally productive and family status (marriage, parenthood) has no impact on productivity. These results may be interpreted in terms of Merton’s concept of cumulative advantage (Merton 1973, 1988): once a certain academic position has been achieved, such prestige leads to more invitations for research collaboration, to being quoted in colleagues’ work and to receiving research funding, all crucial in getting published (Wennerås & Wold 2000). As in other professional fields, the academic ladder is a hierarchy of power, recognition and income and gender segregation is not only the result of women’s time and mobility constraints.

Box 4: Vertical segregation in science

Prof. Oum Kalthoum Ben Hassine
University of Tunis

“In Tunisia, although women account for over 30% of the population in fundamental sciences (40% in France), they reach only 12.4% at the grade of professors, placing Tunisia behind Turkey (21.5 %), Finland (18.4%), Portugal (17%), Australia (14%), the USA (13.8%), France (13.8%) and Spain (13 2%), but ahead of Canada (12%), Norway (11.7%), Sweden (11%), Italy (11%), New Zealand (10.4%), Greece (9.5%), the UK (8.5%), Iceland (8%), Israel (7.8%), Denmark (7%), Ireland (6.8%), Belgium (6%), Austria (6%), Germany (5.9%), Switzerland (5.7%) and the Netherlands (5%). Although these figures show that, in all countries, a large gap exists between the career paths of women and men at university, for Tunisia they also reflect the considerable efforts that have been made with regard to women's education.

This situation is not specific neither to the exact sciences nor to Tunisia. It concerns the whole of higher education and scientific research in many countries (…) Women do not enjoy the same career opportunities as their male colleagues. The causes of this situation must be thoroughly analyzed.

Moreover, in the West, some studies have shown that, at the recruitment stage, women often face the rule of two weights, two measures. With an equivalent CV, a man is still perceived as more competent than a woman, be it for a nomination or a promotion. The result is a major difference between the career paths of men and women in higher education. Men, who remain the majority in recruitment committees (in the last five years, women have represented 12.5% of board members of recruitment committees in fundamental sciences in Tunisia), seem to favour male candidates, even when the records of male and female applicants are identical. Indeed, research has shown that bodies with a majority of men tend to employ mostly men while gender-balanced bodies apply a more gender-balanced recruitment strategy.

To this it should be added that women are absent from scientific positions entailing high levels of responsibility in institutions (5% in France, a lower percentage in Tunisia). Moreover, in all countries, there are very few women in the most important scientific committees and in the circles that define science policy. They rarely receive important distinctions or appear on the lists of members of academies. Discrimination is subtle and often unconscious. Young women feel well integrated into their institution at the start. However, as they move through the ranks, they feel increasingly excluded from the bastions of power.

Figures show that in the majority of countries, men overwhelmingly dominate senior scientific committees that allocate research funds and distinctions. The lack of women in these areas is not only an issue of fairness and equity, it can affect the very definition of science policy. This male dominance has a lasting impact on the representation of science in the media and education.”


These studies are in line with research in Europe (Caprile et al. 2012). It is widely acknowledged that the scientific career takes the traditional life course of men as the norm. This out-dated model entails difficulties for combining professional and personal lives for scientists of both sexes, but it disproportionately affects women as they continue to bear the primary responsibility for family care and housework. The conflict is particularly acute in the early stage of the scientific career, where the greatest pressures for achievement coincide with women’s childbearing years and social expectations about the right moment to have a family. Family and career tensions help to explain why fewer women than men engage in a scientific career and more women than men leave academia at the early stage of the scientific career. However, it cannot fully account for vertical segregation.
Wennerås and Wold (1997) demonstrated the existence of gender bias in the peer-review system in Sweden: women had to be 2.5 times more productive than men to get the same score on scientific performance. Obstacles to women’s promotion are related to subtle discrimination and cumulative disadvantages in career advancement. The lack of transparency in decision-making processes and the persistence of unconscious gender bias in assessing scientific performance are major factors at play (EC 2012).

Women in science are well aware that these are common problems, not specific to the AMCs. Yet they highlight the existence of other social factors that tend to limit women’s career prospects in the area. Prof. Farkhonda Hassan, professor of geology at the American University of Cairo (Egypt) highlights in Science that “there are a number of sociocultural factors that limit career advancement opportunities in science and technology for Muslim women. Women are raised and educated in a male-dominated society with very traditional attitudes and constraints. These vary greatly not only from one Muslim country to the next, but also between, for example, urban and rural areas of the same country. Other factors, well known to Western women, also exist, such as the challenges of combining responsibilities for a household and family (usually extended family) with a professional career. In addition, because scientific communities are highly resistant to change and science itself advances at a remarkable pace, it is extremely difficult for a woman to re-enter the scientific workforce once she has put her career on hold to raise a family” (Hassan 2001). Dr. Rana Dajani, assistant professor of molecular biology at the Hashemite University in Zarqa (Jordan) and Fulbright visiting professor at Yale University, stresses in Nature that some of the problems faced by women scientists in the Middle East are the same as those faced by women around the world, although “women also have challenges specific to the Middle East. These may not be so obvious because they are subtle, and must be identified, studied and solved by Arab women themselves” (Dajani 2012).

In addition, research reveals that scientific institutions are not free from problems such as sexual harassment and unequal pay. A study in Morocco brings to the fore the incidence of sexual harassment in universities (Ghissassi and Moulay Rachid 2003). Studies on the work climate in European academic institutions tend to highlight that a male-dominated environment can be hostile to women in several ways, from difficulties in socialising with male colleagues to bullying and sexist attitudes. The most blatant one is sexual harassment, a particularly delicate matter which tends to remain unarticulated and underestimated (Bagilhole and Woodward 1995). As regards pay, a study in Jordan found a gender-based pay gap of 23% in private universities (ILO 2013). Concern about unequal pay in academic and research institutions is also present in Europe and elsewhere since the Massachusetts Institute of Technology (MIT) publicly admitted having given less pay and resources to female than to male scientists of equal seniority (MIT 1999). To carry out pay-gap audits in all research institutions is one of the recommendations for improving gender equality in science (EC 2012). Overall, research shows that measures are needed to foster a work environment that is more supportive of women in science in the Arab world in both academia and the private sector (EIU 2012).

Although evidence is only fragmented, it sets forth a clear picture of gender segregation in scientific careers. The “International Conference on Women in Science and Technology in the Arab Countries” organised by the Organization for Women in Science for the Developing World (OWSD) in Kuwait in 2013, highlighted two basic facts:

“Women have made significant advances in science and technology professions during the past decades. However, they often lag behind men in pay, access to resources, and opportunities for promotion and advancement into leadership positions. While their numbers in university science programs are at historic highs, a growing body of research shows that a host of cultural pressures, family responsibilities, and professional frustrations drive too many young women out of scientific careers. This has high costs for the women, but also for national institutions, economies and societies”14.

14 owsd.ictp.it/Files%20for%20download/the-role-of-arab-women-in-addressing-global-environmental-and-development-challenges-in-the-region
Literature in the AMCs, as in other countries, reflects the concern that this situation is clearly at odds with the scientific ethos of universalism and meritocracy. Prof. Ismail Serageldin, Director of the Bibliotheca Alexandrina, clearly expressed this concern in his address to the Annual Meeting of the Academy of Sciences for the Developing World, held in Egypt in 2005:

"Why should we be concerned by the inadequacy of the representation of women among practising scientists? For two separate and distinct reasons. First, it is one more domain where the obstacles to women’s advancement are manifesting themselves, and should be overcome, as part of the ongoing struggle to get the rights of women recognized as inalienable human rights. Second, science itself and the practice of science, is ill served by biases of any kind, and this pernicious discrimination is one that must be ended."

(Serageldin 2005:7).

It is expected that research in this field will develop as a result of increasing awareness and pressure to implement policies and measures to support women’s advancement and gender equality in science.
Despite impressive progress in the AMCs towards gender equality in education and health, women’s political and economic participation has not improved at the same pace. This trend is also observed in science. Women are more present than ever in higher education and research but remain severely underrepresented at the top of scientific careers.

The statistical analysis carried out in SHEMERA shows that the situation of women in science in the AMCs has many similarities with the EU countries. This is a remarkable fact, as women’s access to higher education is a more recent trend and gender inequalities in employment are more pronounced in the AMCs. This chapter shows that differences between EU and AM countries are also sharp in the policy context and the extent to which gender equality policies in science are developed.

6.1 Policy context

Research reveals that employment opportunities and career prospects for well educated women in the AMCs, and in particular for women who want to pursue a scientific career, are shaped by a policy context which shows distinct salient trends as compared to the policy context in EU countries. This includes both the research and innovation system and the equality climate.

6.1.1 Research and innovation system

Overall, the R&D sector in the AMCs lags behind Europe and North America with regard to R&D expenditure, outputs and recognition.

According to the last UNESCO science report (2010), the AMCs form a distinct group within Arab countries as regards per capita income, development in science, technology and innovation (STI) and higher education systems. GDP per capita income is much lower in the AMCs than in the oil dependent states (Gulf States of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates), but higher education systems are more mature and include some of the oldest universities in the Arab world.

It was after the Second World War when the majority of Arab countries gained independence that STI really came onto the policy landscape. From the 1960s national governments invested in STI infrastructure by founding universities and research centres. Despite advances made in creating the basic institutions for carrying out STI, strategies and policies in this field have been lacking. UNESCO points out that, where STI policies do exist, ‘they are either too ambitious or ambiguous’ (UNESCO 2010:256).

R&D expenditure

In the majority of Arab countries Gross Expenditure on Research and Development (GERD) as a percentage of GDP has been consistently low for over four decades (UNESCO 2010). It varies from 0.1 to 1% of GDP, whereas advanced countries spend over 2.5% of GDP on R&D (UNESCO 2010:258). Overall, Arab countries show lower spending per capita on R&D than countries with a relatively similar level of development (UNDP and Mohammed bin Rashid Al Maktoum Foundation, 2009).

Some AMCs have set ambitious targets for GERD. In 2005, Tunisia was spending most on R&D at slightly more than 1% - which is still short of the government’s objective for 2009 of reaching a GERD/GDP ratio of 1.25%. In 2007 Egypt’s GERD was 0.23% of GDP but there were plans to raise it to 1% GDP by 2012 (UNESCO 2010:258). However, the increase in the GERD/GDP ratio has not hit these targets: it was 1.1% in Tunisia (2009) and 0.43% in Egypt (2011). The ratio stands at 0.07% in Algeria (2005), 0.43% in Jordan and 0.73% in Morocco (2010) 15.

15 This data is taken from ERAWATCH county fiches, which use the latest available data.
In the Arab countries private sector investment in STI is reported as ‘minimal’ (UNESCO 2010: 260). Mouton and Waast (2009) conducted a survey on National research systems using the World Economic Forum Competitive Report to rank company spending on STI – 131 countries were studied and the AMCs overall ranked poorly with the only exception of Tunisia in the 36th place: Morocco ranked 75th, Algeria 92nd, Jordan 96th, Egypt 99th, and Syria 108th (Mouton and Waast 2009:10). The Tunisian government has introduced ambitious targets in this field –19% of GERD to be funded by the private sector – as of 2009 it had reached 16%16.

Responsibility for R&D policies

Research has shown that the bulk of S&T research in the Arab world is carried out within the higher education system, even in Egypt where this represents 65% of R&D (IDSC, 2007). Table 19 shows that, in four AM countries (Algeria, Egypt, Tunisia, and Palestine), it is the ministries of higher education and scientific research that are solely responsible for R&D (in Palestine in cooperation with the Ministry for Planning). In another three countries, Jordan, Syria and Libya, these ministries share responsibility for R&D policies with councils and government academies. In Lebanon, the National Council for Scientific Research is charged with R&D policies autonomously. This function falls to a combination of ministries, councils and universities and research centres in Morocco. Only five of the seven AM countries have a national academy of sciences (Egypt, Morocco, Palestine) or play host to a supranational academy (Jordan, Lebanon).

Table 19: Government bodies responsible for R&D policies and co-ordination in the AMCs, 2006

<table>
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<tr>
<th>Country</th>
<th>Bodies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>Ministry of Higher Education and Scientific Research</td>
</tr>
<tr>
<td>Egypt</td>
<td>Ministry of State for Scientific Research</td>
</tr>
</tbody>
</table>
| Jordan   | Ministry of Higher Education and Scientific Research  
            Higher Council for Science and Technology |
| Lebanon  | National Council for Scientific Research |
| Morocco  | Hassan II Academy of Sciences and Technologies  
            Ministry of National Education, Higher Education, Staff-Training and Scientific Research  
            Permanent Interministerial Commission of Scientific Research and Technological Development  
            National Centre for Scientific and Technical Research  
            Co-ordination Council of Higher Education Institutions outside Universities |
| Palestine | Ministry of Higher Education  
            R&D Unit at Ministry of Planning |
| Syria    | Higher Council for Sciences  
            Ministry of Higher Education |
| Tunisia  | Ministry of Higher Education, Research and Technology |

Source: UNESCO 2010:258

R&D outputs

Scientific production in the Arab world has been characterised as ‘relatively low but growing in some countries’ (World Bank 2013b:87). Between 2002 and 2009 publications of scientific and technical articles by authors residing in Tunisia have more than doubled whilst in Egypt they have risen by approximately one third. The UNESCO (2010) report highlights that between 2000 and 2008 there was a steady increase in collaborative publications between Arab scientists resident in Arab countries and the Arab diaspora. In Egypt in 2008 one third of all publications were co-authored by scientists outside the country. Despite these advances Arab countries produce less books and less scientific and technical articles than other world regions (World Bank 2013b). Differences in scientific production are nevertheless marked among AMCs. The number of scientific publications per million population in 2008 ranged between 9.6 in Syria and 196.2 in Tunisia.

16 ERAWATCH
Table 20: Scientific production in selected AMC, 2008

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Syria</td>
<td>198</td>
<td>9.6</td>
</tr>
<tr>
<td>Morocco</td>
<td>1,167</td>
<td>36.9</td>
</tr>
<tr>
<td>Algeria</td>
<td>1,289</td>
<td>37.5</td>
</tr>
<tr>
<td>Egypt</td>
<td>3,963</td>
<td>48.6</td>
</tr>
<tr>
<td>Lebanon</td>
<td>591</td>
<td>140.9</td>
</tr>
<tr>
<td>Jordan</td>
<td>928</td>
<td>157.1</td>
</tr>
<tr>
<td>Tunisia</td>
<td>2,026</td>
<td>196.2</td>
</tr>
</tbody>
</table>

Source: UNESCO 2010

Despite recent increases in numbers of patents – the Arab region as a whole falls way behind other parts of the world. In 2008 for example the entire Arab region registered 71 patents – this can be contrasted to the Republic of Korea, which registered more than 84 thousand patents this year. The number of patents registered by AMC was extremely low (UNESCO 2010:267).

Brain drain

Brain drain is a major issue in Arab countries. Brain drain depresses investment in S&T capacity as the return to this investment is lost as soon as the trained population moves abroad. Data indicates that about one third of qualified scientists and engineers who were born in developing countries move to developed nations to work (Meyer 2003). In the Arab World in 2000 approximately 8.3% of higher education graduates emigrated (World Bank 2013b:58). This average however varies greatly across the region. It is relatively high in some of the AMCs (43.9% in Lebanon; 18.6% in Morocco; 12.6% in Tunisia; 9.5% in Algeria), whereas countries in the Arab Gulf have been more effective at stemming the tide (World Bank 2013b:58). Reasons for the brain drain vary, but generally include poor working conditions (including lack of basic instrumentation and technical support, lack of access to high level research networks, highly uncertain socio-economic conditions for the future and weak integration of basic science and technology or R&D with public and private enterprises) (UNESCO 2007:32). The World Bank in its ‘Transforming Arab Economies: Travelling the Knowledge and Innovation Road’ (2013b) considers the low social recognition of researchers as a major obstacle which STI policies must combat. This has not only implications for the brain drain. Low social recognition can manifest itself in low pay and job precariousness for those who pursue careers in education – which can impede knowledge creation and transmission (World Bank 2013b:58).

Prospects

The Arab regional strategy for science, technology and innovation was approved at the 14th congress of Ministers of Higher Education and Scientific Research in the Arab World held in Saudi Arabia in March 2014. 22 Arab states signed off the strategy. The strategy aims to improve education and research through various means including: Reforming and upgrading universities, Improving science education, Facilitating international and regional cooperation, Boosting scientific research capacity and Increasing financial support for research and development. The strategy urges Arab states to increase financial support for research and development to 3% of gross domestic product, with the private sector contributing 30% to 40%. The strategy aims to target some long-term weaknesses in the STI systems in the Arab World. Among its objectives are increasing the attractiveness of research careers in order to tackle the brain drain and strengthening university-industry linkages with a view to promoting innovation.

6.1.2 Equality climate

Research highlights the clear divide in women’s legal status between the AMCs and the EU countries, although indirect, subtle forms of discrimination are found (to varying degrees) in both AMCs and EU countries. Legal constraints to gender equality and traditional gender norms are more marked in the AMCs whilst prospects in this field seem rather uncertain.

Legal framework

All AMCs have constitutional clauses that set out the equality of citizens and all have ratified international conventions that affirm gender equality, namely the Convention on the Elimination of all Forms of Discrimination against Women (CEDAW). This also includes Palestine, which has symbolically signed this convention although it is not eligible to ratify it due to its political status. Nevertheless, there are laws that differentiate between the sexes in all AMCs and all maintain reservations to CEDAW.

According to the CEDAW committee, discriminatory provisions are mostly found in family and penal legislation, although problems in the labour codes and pension laws are also highlighted. Legal constraints to gender equality are not unique to the AMCs, but they are more marked than in Europe or other Western countries (World Bank 2013a).

To this it should be added that a major challenge in all AMCs is the implementation and enforcement of the law. Several AMCs have recently enacted reforms to align some of their laws on international standards, but the effective enforcement of these laws remains problematic, including protection against women’s discrimination in the workplace.

Gender norms

All AMCs are officially committed to gender equality and gender mainstreaming in policy making. Gender equality institutions are present in all the AMCs, although their role and influence vary greatly. In all AMCs a national strategy for the advancement of women in all spheres of life is in place. However, the statement of the SHEMERA expert in Palestine may apply to all the AMCs: “In terms of main official policies and discourse, gender issues and gender mainstreaming are on the top of the agenda at ministerial levels … On the ground, less is being done to affect and influence social norms and the traditional division of roles and labour that set women and men apart”.

A major concern expressed by the CEDAW committee is the persistence of patriarchal attitudes and strong stereotypes about the roles and responsibilities of women and men in family and society. Traditional gender norms are also present in the EU and other Western countries, but they appear to be more pronounced in the AMCs (World Bank 2013a). All SHEMERA experts stress that the persistence of these norms is a major obstacle to the advancement of women in society, although recent developments in some countries show that gender norms are evolving, parallel to the expansion of education, strong pressure from women’s movements and policy reforms.

Uncertain prospects

The political climate in the region is turbulent, marked by the so-called Arab spring, the increasing influence of ultra-conservative Islamist parties, the persistence of the Palestinian-Israeli conflict and the war in Syria. Prospects for women’s rights are unclear. Whilst military conflict seriously undermines any progress in this field, there is also pessimism in the aftermath of the revolutions in Tunisia and Egypt, since much of the progress made in the last decade was prominently linked to the former regimes. Both secular and Islamic women’s movements in the region consider ultra-conservative Islamism a serious risk for the prospects of women’s rights. The words of Prof. Dr. Rana Dajani, assistant professor of molecular biology at the Hashemite University in Zarqa (Jordan) accurately reflect the opportunities and threats of the current volatile situation: “I see the Arab spring as an opportunity for women to learn about their rights and to advocate for them — to distinguish between what is tradition and what is religion. This would weed out extremists who, through ignorance, distort the image of Islam. And it would weed out opportunists who want to misrepresent Muslim women. In the period of the Islamic civilization that flourished in the Middle Ages there were more than 8,000 women scholars. There are many more on the way today” (Dajani 2012).
6.2. Gender equality policies in science

Initiatives to promote gender equality in science have developed worldwide over recent decades. Ensuring equal opportunities in education has been a common international concern since the Beijing Platform for Action in 1995 called on governments to eliminate disparities between women and men in both access to education and educational outcomes. Significant advances in women’s equal access to education have paralleled a growing concern about the underrepresentation of women in scientific careers and especially in decision-making positions. Evidence from all over the world shows that progress in this field is at best slow and cannot be taken for granted. Gender equality is one of the eight United Nations Millennium Development Goals and this clearly calls for action in the field of science, technology and gender.

Evidence from the US and Europe has shown that, taken alone, affirmative action measures encouraging women to pursue scientific careers are insufficient to bring about real change. Affirmative action measures for advancing women’s science careers may be highly beneficial for individual scientists, but institutional constraints and implicit norms and values remain largely unchanged (Caprile et al. 2012). This has led to a shift in focus towards more systematic efforts to promote the structural transformation of institutions. The US has paved the way with the ADVANCE18 programme funded by the National Science Foundation, which started in 2001. In the EU, support for structural change has been progressively embedded in research and innovation policies over recent years19 (EC 2012). The UN’s 2011 agreement on women in science and technology underlines that progress in this area requires a systematic and comprehensive approach, “including policy, legislative and programmatic interventions and, as appropriate, gender-responsive budgeting, at all levels” (UN 2011).

In the AMC, the issue of women in scientific careers has attracted attention in recent years. The establishment of the Women’s Initiative20 at the Arab Science and Technology Foundation (ASTF) has been a significant step forward. The idea for this initiative came from a group of Arab women researchers and was adopted in the ASTF conference SRO4, held in 2004. The Women’s Initiative was launched based on the belief that “the empowerment of women entails a qualitative and quantitative improvement in the educational, training and engagement opportunities offered. It also involves promoting higher profiles for women in the socio-economic development of their societies”21. Major objectives of this initiative are to facilitate networking between individuals and institutions active in the field of empowering Arab women in science and technology and creating further opportunities for young Arab women through fellowships and mentoring.

The first conference on “Arab Women in Science and Technology: Empowerment for the Development of the Arab World” was organised with success by the ASTF in 2009 in Dubai, United Arab Emirates. The second conference was held in May 2014 in Khartoum, Sudan, under the title “Arab Women in Science and Technology for Sustainable Development”. Its aims were to emphasize the leading role of Arab women in science and technology, highlight the success of Arab women scientists, launch an infrastructure for communication between women in science and technology, and initiate working groups to develop projects to be implemented for the second phase of the Women’s initiative.

Other relevant events have already been mentioned in Chapter V. In 2005, the Annual Meeting of the Academy of Sciences for the Developing World, held in Egypt, discussed the lecture “Women in science: Time to recognise the obvious” addressed by Prof. Ismail Serageldin, Director of the Bibliotheca Alexandrina. In 2013, the Organization for Women in Science for the Developing World (OWSD) organised the “International Conference on Women in Science and Technology in the Arab Countries” in 2013 in Kuwait.

20 woman.astf.net
21 woman.astf.net
Box 5: Women in science associations in Algeria, Lebanon, Morocco and Tunisia

Algeria

- The **Women in Science association**, created in 2013, is starting to organise activities in order to give visibility and recognition to women’s contributions in scientific and technical fields, strengthening the position of women in scientific and technical positions in the public and private sectors, fighting negative stereotypes regarding science and technology among women and negative stereotypes against women in science and technology.

Lebanon

- The **Collective for Research and Training on Development-Action** (CRTD.A) is a NGO registered in 2003 which seeks to contribute to citizenship, social justice and gender equality through four key programme areas: Gender and inclusive citizenship, Gender and economic rights, Gender, leadership and participation, Right to information and knowledge. ([www.crtda.org.lb](http://www.crtda.org.lb))

- The **Lebanese League for Women in Business** (LLWB) is an NGO established in 2006 as a scientific and cultural organization that aims to bring together professional women by providing them with a forum in which they can exchange experiences and expertise, discuss common challenges and issues, provide specialized training, facilitate the exchange of information, network and promote the potential of women in the world of business. ([www.llwb.org](http://www.llwb.org))

- The **Lebanese Association of Women Researchers** (Bahithat) is an independent, non-profit association whose members have been engaged in scholarly activities in Lebanon and the Arab world. The principal aims of the association are to bring women researchers into contact with one another, to support and promote the research of its members, to encourage young women researchers find their way, and to provide a forum for intellectual exchange. They received formal recognition in 1992. The idea for Bahithat arose during the long civil war in Lebanon when women scholars on both sides of the divide, refusing the forced divisions along confessional lines, and wishing to carry on intellectual exchange despite the raging violence, began to meet regularly to discuss matters of intellectual interest. The association presently consists of around forty members. They are women actively involved in research in different fields, including health, economics, social and behavioural sciences, education and humanities. The majority are university professors, mostly at the national Lebanese University. ([www.bahithat.org](http://www.bahithat.org))

Morocco

- The **Women and Science Association** in Casablanca and the **Association of Women Engineers** are NGOs actively engaged on gender and science issues. Their goal is to promote the presence of women in science and technology, encouraging young girls to specialise on SET fields and to promote gender equality in the professional field.

Tunisia

- The **Women and Science** association at the Faculty of Science of Tunis University organises numerous activities that facilitate networking of scientists and researchers:
  - Organisation of conferences, debates, meetings and round tables.
  - Organization, since 2005, of an annual multidisciplinary conference to make women’s participation in scientific research visible and to encourage young researchers to persevere in this area. Prizes are awarded to the best presentations in different scientific fields.
  - Provision of information and training on science and business.
  - Realisation of studies on women in science and research.
  - Creation of a database on women in science.
  - Participation in national, regional and international conferences on women, especially on "Women and Science".
  - Communication with the media on women, science and technology

Source: SHEMERA experts
Efforts to increase the visibility and recognition of women in science have also strengthened. The Islamic Development Bank (IDB) established the IDB Prize for Women’s Contribution to Development in 2006 to draw international attention to the vital role women play in developing their communities and the world. “The Prize aims to recognize, encourage, inspire and reward women’s participation in the socio-economic development process”22. In 2011, the IDB prize focused on “Women in Science” and was awarded to Prof. Zoubida Charrouf, professor at the Chemistry Department of the faculty of Science of the Mohammed V-Agdal University in Morocco, where she had been teaching at the Chemistry department and doing research on medicinal plants for 35 years. The “Concours Femme francophone Entrepreneur” is another project launched three years ago by the Agence Universitaire de la Francophonie, the incubator Berytech at Saint Joseph University, and the We initiative of BLC Bank in Lebanon. The goal of this project is to support a francophone woman entrepreneur through financial support and adequate assistance for the creation of a start-up within Berytech premises. At the Lebanese American University LAU, the Mary Turner Lane Award is open to any currently enrolled female LAU student. The award goes to the best research paper on women/gender studies or original piece of writing such as a personal or argumentative essay, (possibly but not necessarily) completed as one of the requirements of a course taken at LAU (literature, language, social sciences, cultural studies, philosophy, education, etc.)

Over recent years, women scientists from the AMCs have also actively contributed to the debate on gender equality in science at international events and in international journals (Ben Hassine 1999; 2004; Dajani 2012; Hassan 2001). Women in science networks have been established in some AMCs, with associations in Algeria, Lebanon, Morocco and Tunisia addressing a variety of objectives such as encouragement of girls to pursue SET studies, facilitation of networking of scientists, promotion of studies on women in science and research and support of women in scientific careers.

International initiatives are also relevant in the AMCs. Examples of such initiatives are UNESCO activities and the mentoring programmes of the Embassy of the United States of America, such as TechGirl, TechWomen or IVLP WISE (Women’s Innovation in Science and Engineering) or fellowships for women such as those provided by UNESCO-L’OREAL, the Agence Universitaire de la Francophonie (AUF) or Schlumberger. Many of these foreign grants have gender requirements and sometimes even state explicit preferences for women researchers per se. Overall, these initiatives, whilst providing support to women’s scientific careers, also contribute to increasing gender awareness in scientific research.

In spite of these trends, the reports from the SHEMERA experts show that policy initiatives are scarce. In order to strengthen women’s situation in science and promote gender equality in the field, more systematic efforts are needed at different levels and involving a variety of actors, including governments, relevant scientific institutions (academic, educational, research and funding institutions), professional associations, employers’ organisations and trade unions, women’s and other relevant non-governmental associations.

6.2.1 Structures for gender equality in science

The setting up of units or steering committees at high-governmental level is considered a necessary step in order to give serious attention to gender equality in science and develop a consistent set of policies and initiatives in the field. This has been the experience of some European countries with the establishment of National Steering Committees or Gender Units at ministerial level to focus on gender equality in science (Rees 2002:9). One of the recommendations of the EC report on structural change in organisations is to “create organisational structures on gender and science at the highest possible governmental level, with good resources of personnel, expertise and funding” (EC 2012:44).

These structures are present in some of the AMCs, usually linked to more general gender mainstreaming strategies which have been launched recently.

In Egypt there is a Gender and Equal Opportunity Unit in the Ministry of Higher Education, as well as in all ministries. Gender units were created in order to mainstream gender into the five-year development planning, starting from 2002-2007. Their objectives are: to integrate the perspective of women and equal opportunities in ministerial plans and programmes, to support monitoring and

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22 www.isdb.org/irj/portal/anonymous?NavigationTarget=navurl://744f417a19ed335f9f3f27decc21e0c4
evaluation of progress in achieving equal opportunities in the programmes of each ministry, to train ministry staff on the integration of women and equal opportunities in programmes and projects, to cooperate with the Office of the Ombudsman to discuss and resolve complaints of discrimination against women.

Similarly, science and research issues in Lebanon are directly linked to the Higher Education Ministry, in which a gender focal point is actively represented. The role of the gender focal point in each ministry is as follows:

- Advise ministry on gender equality issues, practices and policies relevant to gender mainstreaming in each sector
- Assess proposals/documents for the inclusion of gender issues and, where appropriate, suggest ways in which gender can be incorporated
- Liaise with NCLW, CAS, World Bank, UNDP, UN Women on Gender, and other development partners. The collaboration between NCLW, NGOs, ministries and public institutions will be strengthened through a new Gender Equality program that was launched in February 2014 by the NCLW and funded by the EU
- Be involved in the process of drafting reports on women’s issues

However, even when ministerial gender units have been created, there seems to be little awareness and policy commitment to gender and science at the highest government levels in the AMCs. None of the AMCs has developed a national strategy for addressing bias and barriers to women’s careers in science and there is no legislation requiring universities and research institutions to adopt gender equality plans. In Palestine, the Ministry of Higher Education established a steering committee for developing a national strategy on science and technology in 2000. The strategy devoted a whole chapter to women in science but was never finalized. The Ministry has a unit of scientific research, mostly involved in information collection and reporting, and a council for scientific research, but no specific agenda for gender issues. The University reform in Morocco (Emergency Plan 2009 - 2012) was launched with the aim of strengthening higher education and research in order to meet the demands of the labour market and economic development. However, the reform did not issue any specific recommendation on equal opportunities for women in research and technology, and gender issues are also absent in the Action Plan 2013-2016.

6.2.2 Gender balance measures

Adopting gender balance measures such as quotas or targets can be an effective although contentious way to address the underrepresentation of women in scientific careers and particularly in top decision-making positions. The use of quotas involves preferring women to men in appointments (where equally suitable candidates exist) in order to achieve a better gender balance. Quotas can encourage applications from good women candidates who might not otherwise have felt it worthwhile to apply, although they can also give rise to accusations of tokenism. Setting targets implies taking active measures to encourage more applications from women. They tend to be time-limited and are often seen as a less contentious form of positive action.

In some of the EU countries there is legislation to ensure a gender balance in public bodies which has had an impact on scientific committees and boards. The usefulness of fixing quotas in order to achieve a critical mass of women in scientific decision-making positions has been a fiercely debated question. In the Nordic countries, where such quotas apply, the share of female board members approaches equality (respectively 49%, 46% and 45% in Sweden, Norway and Finland). Similarly, when equality plans in scientific institutions are developed, they tend to adopt some kind of gender balance measure in combination with other initiatives in order to address disparities (Caprile et al. 2012). The UN explicitly recommends to “set concrete goals, targets and benchmarks, as appropriate, while supporting a merit-based approach, to achieve equal participation of women and men in decision-making at all levels, especially in science and technology institutions, such as science academies, research funding institutions, academia and the public and private sectors, as well as in the design of science and technology policies and research and development agenda-setting” (UN 2011). Adopting gender balance measures is also in line with the UN Millennium Development Goals and CEDAW recommendations to enhance women’s participation in public life and decision-making positions.

In many AMCs, the use of quotas is a hot issue, although mostly in the field of political participation. Quotas may establish a minimum presence of women in electoral lists or reserve a share of elected
positions for women. Morocco and Jordan started to apply quotas in elected positions in the early 2000s; quotas in electoral lists have been applied in Palestine since 2005 and very recently in Algeria and Tunisia, whilst the adoption of an electoral quota is now under debate in Lebanon where religious quotas are adopted (the confessional quota system distributes power, benefits, and posts).

In general, quota measures are contributing to increasing women’s presence in political life. In Jordan, the share of women in the Senate increased from 2.6% in 1990 to 13% in 2013; from 0% to 12% in the House of Representatives; and from 0.5% to 24.8% in 2013 in municipal councils. Moreover, women’s presence in the government at ministerial level shows a growing trend, from a share below 5% in 1990-2000 to 12.3% in 2013. However, in many countries women’s organisations are critical, claiming that quotas are too low and are not systematically observed in electoral lists. In Palestine the Elections Law of 2005 for both local councils and general elections stipulated a minimum quota of 12% of women in the electoral lists whilst many Palestinian women’s organisations are calling for a minimum quota of 20%. Besides, the quota was not observed in many electoral lists in the local council elections of 2012, showing that there is no law enforcement to ensure compliance with the quota.

Some countries (Syria and Tunisia) have adhered to CEDAW target of 30% of women in decision-making positions, implementing for this purpose non-quota measures. In Tunisia, the joint circular of the Ministry of the Interior and the Ministry of Women’s Affairs and the Family (1998) invited the governors of the regions to systematically appoint at least two women among the members of regional councils. As a result, women currently represent 32% of all members in these councils. These women are virtually the only women in Tunisia’s interior regions to take part in decision-making at the regional level. In Syria, specific targets for women’s presence in decision-making positions were for the first time clearly incorporated in the country’s five-year planning in the early 2000s. The Ninth Five Year Plan established specific goals to strengthen the participation of women in economic development and the executive, legislative and judicial branches of government, as well as different decision-making positions. The Syrian Commission for Family Affairs developed a strategy for this, with 30% representation set as the target.

However, developments in the field of political participation so far have had no impact on scientific and research structures. Despite women’s severe underrepresentation, there is no official engagement on gender balance for the boards of academic institutions and other research structures.

6.2.3 Statistics and indicators

The availability of sex-disaggregated statistics is essential to raise awareness and encourage sound evidence-based policy making in the field of gender and science. In many EU countries, where such data were absent or not publicly disseminated before, the EC’s decision to publish She Figures in 2003 finally made it possible to measure the extent of gender imbalances in science and design policies to reduce them. Since then, She Figures has been regularly issued every three years to monitor gender equality in the field. One of the basic recommendations of the UN is to improve and systematize the collection, analysis and dissemination of data and develop gender-sensitive indicators to support legislative development and policy-making on education, training and science and technology.

Sex-disaggregated statistics in education, employment and other fields are available and regularly published in all the AMC{s}, although with great variety as regards the scope and refinement of data provided.

The situation also differs as regards the level of official engagement. Some countries (Lebanon, Syria have been publishing sex-disaggregated statistics since the early 2000s, although there is no official commitment to this. On the contrary, other countries are making substantial efforts to improve the set of available sex-disaggregated statistics. This is particularly the case in Algeria, Egypt, Jordan and Palestine.

Algeria created in 2013 “EL INSAF” database. This database gathers all sex-disaggregated statistics for measuring achievements in human development at national, regional and local levels. Eleven ministries are already involved, including the Ministry of Higher Education and Scientific Research. A file for researchers and experts in gender has been developed for the purposes of the programme to promote gender equality and the empowerment of women in Algeria. In Egypt, the National Council for
Women, in cooperation with the central statistical agency, is involved in the GEMS project (Gender Equality Measured through Disaggregated Statistics), which aims to support policy-making through the provision of accurate statistical information on the extent of gender gaps. The Jordanian National Employment Strategy (2011-2020) includes a set of indicators for measuring progress as regards women’s employment, including: percentage of women's participation in the labour force, number of beneficiaries of maternity insurance, number of professional licenses issued to women working at home, number of female beneficiaries of the training programmes at worksites funded by the government and number of women enrolled in social security. In Palestine, the Central Bureau of Statistics has also shown a strong commitment to improving the set of sex-disaggregated statistics over recent years.

Yet the sets of available statistics are not sufficiently refined to evaluate and monitor the situation of women in science. An R&D survey exists and is regularly conducted only in two AMCs: Palestine and Syria. LFS surveys are also not systematically carried out in the AMCs as they are in Europe, where not only has each country its LFS survey but also national data are systematically harmonised at the European level. There is a pressing need for the AMCs to elaborate statistical data following the example of what is being done in Europe (R&D surveys, Labour Force surveys, data on wages, and so forth). The experience of collecting data in SHEMERA shows that not only are key data missing but available data are often of lower reliability, comparability and quality. Further efforts are needed in all the AMCs.

**Box 6: Chair "Women in science and technology"**

**University Science and Technology Houari Boumediene / Algiers, Algeria**  
Chair: Prof. Farida Khammar

**Objectives**

- This is a framework for sharing in the areas of academic training and research specifically related to women (especially in the Arab and African world) with expertise in science and technology.
- The activities of the Chair should help generate interdisciplinary innovative projects based on research and reflection.
- It should be a centre of excellence organised around the fields of education, exact and natural sciences with a regional and international dimension.
- It will help to promote and disseminate scientific and technological research to enhance socio-economic development raising the population’s awareness and mobilizing resources from the private and public sectors.

**Programme and action plan (3 years)**

- Organising the chair and embedding it in existing initiatives.
- Launching a communication flow (website, leaflets ...) to strengthen links between academic women and the education system (including the institutions to which they belong) on the one hand and development agencies (agriculture, energy, industry ...) on the other.
- Capacity-building by holding national and regional thematic workshops.
- Making all results visible through publications and immediate releases on the website.
- Implementing Research-Action Programs.
- Developing innovative strategies for involving women scientists in the promotion of natural resource management, health (some diseases affect women in a more devastating way than men) and food programs for the people as well as in disaster risk management (differentiated effects and application of gender-sensitive tools).
- Developing women’s technical skills.
- Working on the meaningful integration of "gender" by improving knowledge and communication to break down barriers between isolated populations and provide them with the information they need.
- Focus on information and knowledge to empower women in all environments, urban, suburban, rural, and enable them to contribute to social change.
- Provide training programs for farmers to help them better understand and improve their farming practices and integrate climate change.
- Allow the creation of a dynamic group by performing several interactive workshops.
6.2.4 Gender and university curricula

All over the world, gender research has had an enormous impact in the humanities and social sciences over the past thirty years and is increasingly being integrated into medicine and the life sciences, although it is far less developed in natural sciences, engineering and technology. The emergence and consolidation of gender research centres at the universities is a consistent international trend which has allowed many universities to offer degrees in women’s and gender studies as well as optional modules in undergraduate and postgraduate gender courses. However, a systematic integration of the gender dimension into university curricula is far from being achieved. The UN explicitly encourages “the integration of a gender perspective in the science and technology curricula throughout all stages of education and continuous learning, and the use of gender-based analysis and gender impact assessments in research and development in science and technology, and in the promotion of a user-driven approach to technology development in order to increase the relevance and usefulness of advancements in science and technology for both women and men”.

In the AMCs, degrees in women’s and gender studies are mostly offered in Morocco. Women’s and gender studies research centres have been created in many universities over recent decades and several of these centres have developed postgraduate programmes (the first one being created at the University of Fez in 2000), producing the first cohorts of MA and later PhD students in gender studies starting from the early 2000s.

Degrees in women’s and gender studies are also conferred in public universities in Jordan and Palestine and private universities in Egypt and Lebanon. In Jordan, the Centre for Women's Studies at the University of Jordan grants a Masters degree in Women's Studies. As regards Palestine, there is a Masters program in gender and development at Birzeit University since 1996 and another in Al-Quds University since 2002. In addition Birzeit University has a Women's Studies’ Programme which has been offering optional courses for undergraduate studies since 1994 and minors since 2012. In Lebanon, the Women’s Studies Diploma was launched in 2010 at the Beirut Arab University. It is a one-year interdisciplinary program that combines the humanities, law and public health. A Master's degree in Women and Gender Studies will be launched in the fall 2014-2015 at the Lebanese American University in Lebanon. This M.A. degree is seeking to prepare graduates for professional employment and further higher studies. This degree integrates gender, class, race, religion, culture, ethnicity, and sexuality and enables students to generate interdisciplinary and quality research in the field of women and gender. The M.A. degree in Women and Gender Studies is vital not solely for the production of knowledge about women’s lives and status globally, but also as a platform to address women's problems within the contemporary cultural, social, and political environment and challenge professed wrongs and abuses through academic research and intellectual rigor. Finally, the American University in Cairo, Egypt hosts the Cynthia Nelson Institute for Gender and Women's Studies (IGWS). It is an academic research institute and a graduate teaching centre for scholars, researchers and graduate students interested in gender issues in the Middle East, Africa and South Asia.

The Institute for Women’s Studies in the Arab World IWSAW, established in Lebanon in 1973, is committed to academic research on women in the Arab world. The institute seeks to empower women through development programmes and education, and to serve as a catalyst for policy change regarding women's rights in the region. IWSAW has established a master’s degree in Women and Gender Studies, which the Lebanese American University will launch in the autumn of 2014-2015. Al-Raida, IWSAW’s flagship interdisciplinary journal, has addressed gender in historical and contemporary contexts since 1976. Al-Raida has recently evolved into a biannual, double-blind, peer-reviewed journal.
Women’s and gender research centres are present in many universities in the region, and several offer specialised gender courses, namely in the social sciences and humanities. In Jordan, special attention is paid to raising awareness on gender-based violence, with specialised courses in three universities. This is also a trend in Syria, where the Ministry of Higher Education in collaboration with the Syrian Commission for Family Affairs and other entities are committed to revising the school curricula to raise gender sensitivity and include concepts of gender-based violence. To the best of our knowledge, there have not been other initiatives aimed at integrating the gender dimension into university curricula. University reforms and legislative development do not address this subject.

There are three UNESCO Chairs on women’s issues in the region: the Chair on Women’s Rights, established in 1999 at the University Mohammed V, Rabat- Souissi - University IbnToufail, Kénitra, Morocco; the Chair on Women’s Studies, established in 1999 at the Centre de recherches, d’études, de documentation et d’information sur la femme (CREDIF), El-Manar II, Tunisia; and the Chair for Women, Science, and Technology, established in 2009 at Ain Shams University, Egypt. In Algiers, Algeria, the University Houari Boumediene holds the Chair on Women in science and technology in partnership with the National Commission UNESCO – ISESCO23 – ALESCO24 and the High Islamic Council (cfr Box 6).

**Box 7: Database "Who Is She in Lebanon?"

"Who Is She in Lebanon?" is an online database with profiles of prominent contemporary Lebanese women. This project started in 2008 following a bilateral partnership between the Institute for Women’s Studies in the Arab World (IWSAW) at the Lebanese American University (LAU) and KVINFO, the Danish Centre for Information on Women and Gender; a grant-maintained self-governing institution under the jurisdiction of the Ministry of Culture in Denmark.

The aim behind this project is to provide the public with easy access to biographical information on a large number of contemporary women in one of the following categories: opinion leaders, senior managers, politicians, professionals, artists, researchers and experts within a wide range of subjects. A similar online database with a list of thousands of names of prominent Danish women has been available to the public since 1995.

The Institute for Women’s Studies in the Arab World (IWSAW) aims to make the “Who Is She in Lebanon” online database: 1) as comprehensive as possible and 2) as representative as possible of Lebanese women’s achievements in the various fields of specialization/occupations. At the same time, the list will be duly selective to reflect a high level of achievement by every woman included, depending on her field.

Find out more about this database at: [http://whoisshe.lau.edu.lb/](http://whoisshe.lau.edu.lb/)

6.2.5 Mentoring

Mentoring schemes link senior scientists to junior colleagues for advice and support. Action to develop career advisory, networking and mentoring programmes is one of the UN recommendations for increasing retention and progression of women in science. The presence of women as senior scientists in mentoring schemes contributes to the visibility and recognition of women in science. Where mentoring is a relatively institutionalised practice, as in the US, there is evidence that a satisfactory mentoring relationship has a clearly positive impact on the career outcomes of women and minority groups, with this effect with regard to men being less significant. Formalised mentoring relationships may provide, for those who do not conform to the implicit academic ‘norm’ – women, minority groups – the kind of built-in support that most men get inadvertently through informal relationships (UN 2011).

As stated by Prof. Rana Dajani: “Men mentor each other and spend time together after work, fostering the men’s club. Women rush home to take care of children, not because they have to but because they want to. This is a major obstacle for women scientists in terms of opportunities, learning and support. That is why mentoring projects — something we lack in the Arab world — are important” (Dajani 2012). Prof. Rana Dajani is now in charge of the first mentoring programme for women in academia in Jordan, which launched the pilot phase in November 2013 under the auspices of the Jordan TEMPUS office and the Hashemite University.

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23 ISESCO: Islamic Educational, Scientific and Cultural Organization.

24 ALESCO: Arab League Educational, Scientific and Cultural Organization.
Overall, mentoring is not an institutionalised practice in the AMC$s as regards junior scientists of both sexes. Specific mentoring programmes for women are usually linked to international initiatives, such those of the Embassy of the United States of America, TechGirl, TechWomen, IVLP WISE (Women’s Innovation in Science and Engineering). In Egypt, the Cynthia Nelson Institute for Gender and Women’s Studies (IGWS) at the American University El Cairo has a mentoring programme. Similarly, the “Female mentoring project” was launched recently at Cairo University. It is a joint project between the Centre for the Study of Developing Countries (CSDC) at the Faculty of Economics and Political Sciences, Cairo University, the Association for Women’s Total Advancement and Development (AWTAD) and the regional programme “Economic Integration of Women – MENA” (EconoWin). EconoWin is supported by the “Deutsche Gesellschaft für Internationale Zusammenarbeit” (GIZ) GmbH and commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ). The mentoring project is carried out as part of the Ana Hunna initiative.

**Box 8: L’OREAL-UNESCO Regional programme for young women in life sciences**

With the support of CNRS-Lebanon, l’Oréal-UNESCO For Women in Science Levant and Egypt’s regional fellowships program aims to promote the participation of young women in science from Egypt, Iraq, Jordan, Lebanon, Palestine and Syria. This programme identifies and rewards talented young female scientists in the fields of life sciences (such as biology, biochemistry, biophysics, genetics, physiology, neurosciences, biotechnologies, ecology and ethology) as well as physical sciences (such as physics, chemistry, petroleum engineering, mathematics, engineering sciences, information sciences, earth and universe sciences).

The Programme honours 5 talented young Arab women researchers for the quality of their research work and encourages them to pursue a brilliant career in science in the Levant Countries and Egypt. Thus 5 fellowships amounting to € 10,000 (ten thousand Euros, or equivalent in current currency) each will be granted to Arab postdoctoral researchers working in a laboratory or research institute hosted in one of the following countries: Egypt, Iraq, Jordan, Lebanon, Palestine and Syria.

Applicants must meet the following general criteria:

- Have obtained a PhD in one of the science fields mentioned above.
- Be Iraqi, Jordanian, Lebanese, Palestinian, Syrian or Egyptian nationality.
- Work in a Research Laboratory, Institute, or University in one of the countries mentioned above.
- Be no more than 40 years old by the end of the application period. This age limit will be extended by one or more years (maximum 45 years old) if the candidate has one or several children.

Find out more about the “For Women in Science” community, the juries, the laureates and the fellows in the social media:

- [http://www.facebook.com/forwomeninscience](http://www.facebook.com/forwomeninscience)
- Twitter @4womeninscience
- [http://www.youtube.com/user/forwomeninscience](http://www.youtube.com/user/forwomeninscience)

### 6.2.6 Equal access to funding

Ensuring equal access to research funding is one of the basic means of advancing gender equality in science. Evidence shows that unconscious gender bias is in place in the process of allocating grants, fellowships and other funds. Influential studies show that in general men fare better than women in the assessment process (EC 2012). The UN recommends incorporating a gender perspective into budgetary policies at all levels to ensure that public resources in education and science equally benefit women and men.

Early measures in the EU adopted an affirmative action approach. Earmarking resources for women in science can take the form of professorial chairs, research funds and scientific prizes for women or girls. Overall, such measures proved to be contentious and sometimes attracted criticism for being, allegedly, a way of patronising women. However experience also showed that it was only by explicitly making it known that women applicants were especially welcome that more women started to apply (Rees 2002; Caprile et al. 2012). This kind of initiative may be useful for encouraging women and helping them to gain experience. Nevertheless, current developments in Europe have mostly shifted to ensure equal access to research funding by integrating gender requirements for allocating research funds on the basis of a meritocratic approach. This may include an explicit preference for women when applicants show equal performance as well as other measures to avoid gender bias in assessment procedures like transparent decision-making and making sure that decision-makers and evaluators have the appropriate training to avoid gender bias. The same applies to the consideration
of sex and gender analysis in research content and the allocation of funding to support gender research specifically.

Overall, this line of action has not been developed in the AMCs. Funding allocation in research is based on a merit-based approach without any gender-related criteria for enhancing equal access to funding. Special funds or prizes for women are also scarce in the region and linked to international activities, such as the fellowships for women provided by UNESCO-L’OREAL, Agence Universitaire de la Francophonie (AUF) or Schlumberger.

6.2.7 Work life balance in scientific careers

Family and career tensions disproportionately affect women in science as compared with their male colleagues. These tensions are especially acute in the early stages of the academic career, where intense productivity and mobility demands coincide with women’s childbearing years and social expectations about the right moment to establish a family. In the framework of unequal gender relations, the wish to enjoy a family life deters some women from engaging in research, makes them withdraw from science or stops their progress, whereas other women choose to postpone motherhood to a later age or not to have children. Work/life balance measures for both women and men are considered essential for addressing gender imbalances in scientific careers. In addition to legislative development, a change in institutional practices is required because family and career tensions are usually exacerbated by institutional constraints and implicit academic norms, values and expectations that take the traditional male life-course as the norm.

The UN calls for legislation and policies to promote the reconciliation and equal sharing of employment and family responsibilities between women and men. Essential aspects are maternity and paternity leaves that promote co-responsibility of father and mother in parenting and affordable, accessible and quality care services for children and other dependent persons. On the other hand, the UN encourages research institutions and funding agencies “to establish flexible and non-discriminatory work policies and arrangements for both women and men, such as time extension on research grants for pregnant researchers, leave schemes, quality care services and social protection policies, in order to improve the retention and progression of women in science and technology” (UN 2011). Advances in the EU are not widespread but usually stem from a combination of legislation, employment and social policies and equality plans at research institutions.

Overall, this is a field which clearly requires further action in the AMCs. Maternity leave conditions vary greatly in AMCs. It is shortest in Tunisia, with only 30 days, and longest in Syria, with 120 days for the first child, 90 for the second and 70 for the third. In all other countries, it ranges from 70 to 98 days (Lebanon extended maternity leave from 49 days to 70 in April 2014). Maternity leave is 100% paid except in Tunisia, where benefit is only 66.7% of the average daily wage. In most countries, paid hours of breastfeeding are granted, usually one hour per day within a year of the delivery date. In some cases, women are entitled to maternity leave under certain conditions: for example, in Egypt women can benefit from this leave only three times during their time of service to the employer.

In several countries, maternity leave is longer for women working in the public sector. The contrast is especially marked in Tunisia, the country with the worst maternity leave conditions in the private sector (30 days paid 66.7%) whilst the public sector provides two-months fully paid maternity leave, which can be extended to four months paid at 50%.

Other work-life balance measures have proven to be less popular, as they entail a substantial loss of salary. In Tunisia, women working in the public sector with children under 16 or with a handicapped child are entitled to work part-time while receiving two-thirds of their salary for a period of three years, twice renewable. In Algeria women are entitled, on request, to a leave ranging from 0 to 5 years to raise a young child. Although the law guarantees reincorporation in work, the leave taken is unpaid.

Paternity leave is almost absent in the area, with only Algeria and Tunisia granting a few days (3 days in Algeria; 1 day in the private sector and 2 days in the public sector in Tunisia). The need to establish or extend such leave is not discussed in current policy debates, although the women’s movement is actively claiming such leave in Lebanon. Deep-rooted cultural reasons are behind this fact, according to many SHEMERA experts. However, it is worth noting that several NGOs are working to introduce
such leave in Jordan, where the National Council for Family Affairs (NCFA) recently introduced a three-day paternity leave for its male employees.

Additional major concerns are the lack of adequate care services for children and dependent adults and employment conditions unsupportive to motherhood and family life (UNDP 2006).

Specific work/life schemes for scientists are almost inexistent. Women in academia may benefit from better working conditions than those offered in the private sector, but work-life balance continues to be a women’s issue and there are no specific arrangements for scientific careers. There are no specific laws or official recommendations in the field and research institutions follow the prevailing trend in the region, where work/life measures are not prominent in human resource management. On the positive side, it is worth noting that Syria removed gender-discriminatory regulation concerning mobility support to PhD students in 2008. The old regulation provided economic support for the family (spouse and children) of male PhD students studying abroad and was amended in order to give women the same rights as men. Syria is also the only country having some measure in place to support scientists willing to re-launch their careers after a career break. Returnees may benefit from financial support, provided the career break is limited to 3-4 years. This measure is addressed to graduate students of both sexes and addresses career breaks due to family reasons or other circumstances such as mobility or military service.

6.2.8 Equality plans and related gender equality measures

As previously stated, none of the AM countries have enacted legislation or implemented measures concerning this point. Universities and research centres are not encouraged to set up gender equality plans or develop the institutional framework of gender equality through gender units or gender observatories. Moreover, to the best of our knowledge, bottom-up initiatives are almost inexistent. If equality plans exist, they are not publicly presented. The only good practice identified in this field concerns the Birzeit University in Palestine, where the Institute of Women’s Studies, after exerting serious pressure on the university administration, is starting a gender task force to address existing disparities. Yet action at universities and research centres is considered essential to remove obstacles to women’s professional careers. In Europe, research has shown the effectiveness of equality plans and equality officers for advancing gender issues in research institutions (Castaño et al 2010). In order to increase retention and the promotion of women in science the UN calls for a modernisation of research institutions, making them more gender-aware. Among other things, it states the need to “encourage the use of clear and transparent criteria for, and to promote the achievement of gender balance in, recruitment, promotion and recognition in science and technology, both in the public and private sectors, to train and sensitize leadership and staff, at all levels, in gender mainstreaming and gender equality issues and prevent direct and indirect discrimination against women, and to support the building of leadership skills for women”.

CONCLUSIONS AND POLICY RECOMMENDATIONS

Despite impressive progress in the AMCs towards gender equality in education and health, women’s political and economic participation has not improved at the same pace. This trend is also applicable to science. Women are more present than ever in higher education and research, but remain severely underrepresented at the top of scientific careers.

Data limitations

Building statistical indicators on women in science for the AMCs is an exercise that is hindered by severe data limitations. The analysis of women in research in the AMCs is highly dependent on the existence of R&D surveys similar to the European ones. Unfortunately, an R&D survey exists and is regularly conducted only in two AMCs: Palestine and Syria. LFS surveys are also not systematically carried out in the AMCs, as they are in Europe where not only has each country its LFS survey but also national data are systematically harmonised at the European level.

The data the SHEMERA experts were able to gather from diverse international and national data sources proved sufficient to draw up an interesting picture of how female researchers compare with male researchers in the AMCs but unfortunately they do not allow for a systematic comparison with the whole set of European indicators analysed in She Figures.

Women in research

The scarce statistics available to map research and the research population show that the proportion of women is quite comparable in the AMCs and the EU. In Europe, one in three researchers is a woman, whilst in the AMCs this proportion ranges from 22% (Jordan) to 39% (Egypt). As in Europe, the presence of women in research is the lowest in the private sector and the highest in the government and higher education sectors. Patterns of horizontal segregation are present, although they are less marked in the AMCs than in Europe. Overall, the share of researchers in the labour force is very small in Europe (0.99%) and even smaller in the AMCs. Only in Lebanon (1.13%) is this share larger than (on average) in Europe.

Women in academia

In the AMCs female enrolment rates in higher education come close or, as in EU countries, surpass male rates, although enrolment rates for both women and men are lower in the AMCs. In EU countries, women represent 46% of all PhD graduates, with great variation across countries - from 26% to 62%. A similar trend is found in the AMCs, with percentages ranging from 33% in Syria to 56% in Tunisia. The distribution of women and men across scientific fields shows a high level of horizontal segregation in the AMCs, even though this type of segregation remains a less salient problem than in EU countries.

In both Europe and the AMCs, women in academia are underrepresented at the top of the academic ladder. In the EU, the proportion of women among academics at the highest grade (Grade A) stands at 20% on average, ranging from 9% in Luxembourg to 36% in Romania. In the AMCs, female representation at grade A ranges between 3% in Palestine and 35% in Egypt. Comparisons in this field have to take into account that the exclusivity, status and prestige associated with grade A differ significantly across the AMCs. However, even in those countries where female representation at grade A is comparatively high, the presence of women is always greater at the lower levels of the academic career.

Women in scientific decision-making positions

A similar trend marks access to scientific decision-making positions. Whereas the average proportion of women among grade A academics stands at 20% in the EU, just 15.5% of higher education institutions are headed by women. The higher we climb up the academic ladder, the fewer women we find. The situation is similar in the AMCs, where the share of higher education institutions headed by women ranges from 4% in Jordan to 11% in Egypt. In all the AMCs, the share of women among heads
of higher education institutions is always lower than the share of women among grade A academics, although it is worth noting that in Tunisia these proportions are rather similar (10% and 13% respectively).

Differences between the EU and the AMCs are more marked when the presence of women on scientific boards is analysed. Boards are not restricted to higher education. They also cover research and scientific activities in other sectors and their coverage varies a great deal across countries. In the EU, on average, 36% of board members are women. In the Nordic countries, where quotas apply, the proportion of women ranges between 45% and 49%. This contrasts with the situation in the AMCs, where women represent only between 6% and 23% of board members. Lebanon stands out as the country with the highest share (23%).

**Women in employment**

The situation of women in science in the AMCs has many similarities with the EU countries. This is a remarkable fact, as women’s access to higher education is a more recent trend and gender inequalities in employment are more pronounced in the AMCs.

In fact, research shows the sharp contrast in the MENA region between the employment situation of the minority of highly-educated women and that of all others. The female participation rate in the labour force is the world’s lowest, although it is widely acknowledged that standard statistics do not reflect the high share of women in informal activities, i.e., family workers in agriculture and informal service jobs.

The employment situation of women with low education levels is marked by very low rates of female participation in the formal labour market and concentration in low paid occupations and informal activities. Participation rates are far higher for well-educated women, but so are unemployment rates, particularly for young women. In turn, employment tends to be concentrated in a narrow set of jobs, especially at the lower end of the occupational ladder (health, education) in the public sector.

**Root causes of gender segregation in employment**

In Europe, gender segregation in employment persists in spite of significant changes over recent decades: impressive advances of women in education, the reduced importance of physical attributes for productivity, the enforcement of equality legislation, changes in family roles and the stance taken by feminism in defiance of traditional gender norms. In order to explain the persistence of gender segregation, research focuses on four sets of factors: gender stereotypes, choice of study field, gender division of labour and time constraints and covert barriers and biases in organisational practices. In spite of legal equality, subtle discrimination against women persists.

Our analysis shows that these factors are also relevant in the AMCs, obviously coupled with others more directly related to the specificity of the political, social and economic context. Overt legal restrictions combine with traditional gender norms and covert discriminatory practices, education disparities are more relevant as the progress of women in education is still recent, and women’s employment opportunities appear to be disproportionally hindered by slow economic growth and the contraction of the public sector.

Research has paid special attention to the very low level of women’s labour force participation, a major challenge facing all AM countries. Traditional gender norms are probably one of the most important causes, although it is acknowledged that there is no single factor behind this pattern but rather a complex set of economic, social and legal determinants.

**Gender segregation in science**

In Europe, research on gender segregation in scientific careers is a relatively recent field which has developed in close connection with political debates and initiatives to foster women’s advancement in science. In the 1980s, the focus was on gendered socialization – how from an early age individuals internalise ‘feminine’ and ‘masculine’ roles that shape their educational and professional choices. Women were said to be less professionally ambitious than men and to give priority to their family over their career. Criticism of this position emerged gradually since the late 1990s when it was claimed that
it was not enough to ask women to ‘fit in’ to science: the manner of teaching science and how scientific jobs were organised also needed to be changed. The focus thus moved from women to science, placing emphasis on subtle discrimination in scientific practices and gender bias in scientific knowledge.

In the AMCs, policy debates and initiatives to foster women’s advancement in science are just emerging whilst research in this field is scarce. Research nevertheless suggests that many of the problems faced by women scientists are the same as those faced by women around the world. Gender imbalance across study fields is related to gendered socialisation and reinforced through the education system. Family and career tensions help to explain why fewer women than men engage in a scientific career and more women than men leave academia at an early stage in the scientific career. Obstacles to women’s promotion are related to subtle discrimination and cumulative disadvantages in career advancement. The lack of transparency in decision-making processes and the persistence of unconscious gender bias in assessing scientific performance are major factors at play. However research also stresses that there are other social factors, specific to the AMCs, that limit women’s career prospects. More research in this field is certainly needed.

Policy context

Employment opportunities and career prospects for well educated women in the AMCs, and in particular for women who want to pursue a scientific career, are shaped by a policy context that is marked by specific distinguishing trends as compared to the policy context in EU countries. This includes both the research and innovation system and the equality climate.

R&D expenditure, outputs and recognition

The AMCs lag behind compared with Europe and North America in terms of R&D expenditure, outputs and recognition. In the Arab countries, private sector investment in science, technology and innovation is reported as ‘minimal’.

Brain drain is a major issue in Arab countries. It depresses investment in S&T capacity as the rewards of this investment are lost as soon as the trained population moves abroad. Current data indicate that about one third of qualified scientists and engineers, born in developing countries, move to developed nations to work.

The ‘Arab regional strategy for science, technology and innovation’ (March 2014) urges Arab states to increase financial support for research and development to 3% of Gross Domestic Product, with the private sector contributing 30% to 40%. The strategy aims to target some long-term weaknesses in the R&D systems in the Arab World. It seeks, inter alia, to improve the attractiveness of research careers in order to tackle the brain drain and to strengthen university-industry linkages in order to promote innovation.

Equality climate

Women’s legal status shows a clear divide between the AMCs and the EU countries, although indirect, subtle forms of discrimination are found to varying degrees in both sets of countries.

All AMCs have constitutional clauses that set out the equality of citizens and all have ratified international conventions that affirm gender equality, such as the Convention on the Elimination of all Forms of Discrimination against Women (CEDAW). Nevertheless, there are laws that differentiate between the sexes in all AMCs and all maintain reservations to CEDAW.

Gender norms tend to be in line with the traditional male breadwinner model which confines women to the home and limits access to economic and political power to men. Traditional gender norms are also present in the EU and other Western countries, but they appear to be more pronounced in the AMCs. The persistence of patriarchal attitudes and strong stereotypes about the roles and responsibilities of women and men in family and society is a major obstacle to the advancement of women in society.

Prospects for women’s rights in the AMCs are uncertain. The political climate in the region is turbulent, marked by the so-called Arab spring, the increasing influence of ultra-conservative Islamist parties, the
persistence of the Palestinian-Israeli conflict and the war in Syria. Whilst military conflict seriously undermines any progress in this field, there is also pessimism in the aftermath of the revolutions in Tunisia and Egypt. Both secular and Islamic women’s movements in the region consider ultra-conservative Islamism to be a serious risk for the prospects of women’s rights.

**Women in science: Time for action**

Initiatives to promote gender equality in science have developed worldwide over recent decades. Ensuring equal opportunities in education has been a common international concern since the Beijing Platform for Action in 1995 called on governments to eliminate disparities between women and men in both access to education and educational outcomes. Significant advances in women’s equal access to education have paralleled a growing concern about the underrepresentation of women in scientific careers and especially in decision-making positions. Evidence from all over the world shows that progress in this field is at best slow and cannot be taken for granted. Gender equality is one of the eight United Nations Millennium Development Goals and this clearly calls for action in the field of science, technology and gender.

In the AMCs, the issue of women in science has attracted attention in recent years. Significant steps, among others, are the launching of the Women’s Initiative at the Arab Science and Technology Foundation (ASTF), the activities carried out by the Organization for Women in Science for the Developing World (OWSD), and the establishment of women in science associations in some AMCs. International initiatives and foreign grants are also playing a relevant role, providing support to women’s scientific careers and contributing to increasing gender awareness in scientific research.

In spite of this, policy initiatives are scarce. More systematic efforts are needed at different levels and involving a variety of actors in order to strengthen women’s situation in science and promote gender equality in the field.

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**Box 9: Women in science: Time to recognise the obvious**

Prof. Ismail Serageldin, Director of the Bibliotheca Alexandrina

Address to the Annual Meeting of the Academy of Sciences for the Developing World, held in Egypt in 2005

“The battle for women in science is a battle for the whole of society, for all humankind. We must not only mobilize women, we must also educate men. We must hold up mirrors that show them society as it really is, and open windows through which they can see the world as it can be. We cannot focus on building and empowering the women of tomorrow without worrying about re-educating the men of yesterday.

The obstacles are large, but they are not insurmountable. The journey is long, but women have already come a long way, and men are increasingly recognizing their responsibilities to help remove the many obstacles that still prevent women scientists from rising to their full potential and giving society the full measure of their talent.”

Policy recommendations

1. Enhancing political will and increasing cooperation between key actors

The advancement of women in science requires political will and cooperation between different actors: government, scientific institutions (academic, educational, research and funding institutions), private companies, professional associations, employers’ organisations and trade unions and women’s and other relevant non-governmental associations. Political will and cooperation should be firmly rooted in the view that promoting gender equality in science is not a women’s issue. It concerns and should fully engage men as well as women. Wasting women’s talent is unfair to women but also bad for science and society.

2. Supporting policy-making through data gathering and research

Governments should implement the necessary measures to strengthen the evidence base for sound policy making in the field of gender and science. There is a pressing need for the AMCs to elaborate statistical data as is being done in Europe (R&D surveys, Labour Force surveys, data on wages, and so forth). Not only are key data lacking but available data are often of lower reliability, comparability and quality. Further research is needed in order to identify the set of constraints, barriers and biases that undermine women’s access, retention and promotion in science on equal terms with men. Such research is only possible when good data are collected regularly.

3. Establishing appropriate governmental structures for promoting gender equality in science

Governments should establish gender and science units at the highest possible governmental level with appropriate resources of staff, expertise and funding. These units should act as focal points for preparing and monitoring national strategies for gender equality in science with the involvement of all key actors.

4. Encouraging scientific institutions to adopt gender equality plans

Governments should enact legislation and implement measures to encourage and support scientific institutions to adopt gender equality plans. At the institutional level, basic prerequisites are: getting the support of persons in high-level responsibility positions, carrying out a sound audit of the institution (data and indicators), establishing a gender equality unit in charge of monitoring gender equality and implementation of preventive and corrective measures. Gender equality plans should address a wide range of policies, including:

- gender balance in committees
- gender-neutral criteria for promoting equal access to scientific positions and funding
- transparency in decision-making
- mentoring, networking, role models
- work-life balance measures for both women and men
- gender-sensitive measures to promote mobility and dual careers
- measures for enhancing gender awareness and removing gender bias
- gender impact assessment of procedures and practices

5. Deepening the gender dimension of education policies

The education system (primary, secondary and tertiary education) should adopt a more proactive role to fight gender stereotypes. It should carry out gender proofing of curricula and of pedagogical and counselling practices in order to remove gender bias. Measures are needed to promote a gender mix in all primary and secondary school study fields in order to favour a more gender-balanced distribution across study fields at later stages of the educational and professional career. The gender dimension should be integrated into university curricula in all study fields, including natural sciences and technology. High quality degrees in gender studies are needed for achieving a critical mass of gender experts at the national level.
6. Strengthening R&D as a precondition for improving women's opportunities and prospects in science

Increasing public and private R&D expenditure is a challenge common to all AMC. It is also a precondition for improving employment opportunities and career prospects for young women in science, both in academia and the private sector. Specific measures to facilitate women’s access to research positions in the private sector are required. Strengthening R&D also entails improving the quality of R&D outputs. Measures are also needed in order to foster the integration of the gender dimension in research content in order to better align R&D on societal needs and improve the lives of both men and women.

7. Enhancing south-south and north-south cooperation on gender and science

Many of the problems faced by women in science are common all over the world; others are specific to certain regions or countries. International initiatives and foreign grants are playing an important role in AM countries – giving support to women’s careers and enhancing gender awareness. SHEMERA has demonstrated the effectiveness of south-south and north-south cooperation for promoting research and policy debate around gender and science issues. The project has also paved the way for a further strengthening of Euro-Mediterranean cooperation in this field.

8. Adopting an effective strategy for inclusive development and gender equality

The issue of gender equality in science cannot be disentangled from the wide range of gender inequalities in society at large. Legal, social and economic factors that undermine women’s status in AM countries have to be addressed in order to prevent any form of gender discrimination. Only an inclusive development strategy can ensure citizens’ equal access to socioeconomic and political rights and opportunities, irrespective of class, religion, ethnic affiliation and gender.

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**Box 10: Inclusive development and gender equality**

Inclusive development is a comprehensive process that deals with society as a whole, with its economic, social, political and cultural structures, as interconnected and mutually interactive. The objectives of inclusive development are to enhance and mobilize society’s human, material and cultural resources and put them to the optimal use for the benefit of all citizens. It should be noted that human resources are the most important factor, as human beings are the creators of material and cultural resources which they endow with social value. Thus, inclusive, people-centred development is a viable strategy in which all citizens can participate to realize its goals, as well as to benefit equitably from the product of their work. This should entail the adoption of participatory democracy and social justice as a necessary condition for inclusive development.

How can this definition of development affect women’s right to gender equality? The assumption one can reach, herein, is that:

Women's position would move towards gender equality when the adopted development strategy is based on the full mobilization of resources, especially human resources, i.e., when it is geared towards mobilizing, empowering, and employing human resources up to their optimal potentialities. In this context, human productive labour, including women's labour, will be needed, valued, and respected. Therefore, developing human potential, as a goal, would entail citizens’ equal access to socio-economic and political rights and opportunities, indiscriminately. In this context, socially and economically useful human labour becomes the criterion for evaluating citizens, irrespective of their gender, religion, class or ethnic affiliation.

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All over the world significant advances in women’s education have paralleled a growing concern about the underrepresentation of women in research careers and especially top positions in research. The percentage of women at higher levels of scientific careers is not increasing at the same speed as the number of women with the age and qualifications to reach these levels. This is not only an unfair situation. It is also a waste of talent and a source of bias that neither science nor the economy can afford.

Fifteen years of data-gathering, research and comparative analysis in the European countries has significantly improved knowledge on gender and science issues and enhanced policy debate and action.

The overall objective of SHEMAERA, a project funded by the European Commission under the Science and Society programme of the FP7, was to enhance research cooperation on gender and science between the European Union and the Arab Mediterranean countries: Algeria, Egypt, Jordan, Morocco, Lebanon, Palestine, Syria and Tunisia.

The project aimed at increasing knowledge about gender and science issues in these countries allowing for further development of Euro-Mediterranean research cooperation in this field. This report presents the results of our work.

Our work has been based on the premise that gender equality in science is not a women’s issue. It concerns and should fully engage men as well as women. We hope the results of our work not only serve to increase knowledge, but also to support and encourage evidence-based policymaking. There is a pressing need for this. Increased awareness and networking around gender and science issues in the Arab Mediterranean countries needs to be channelled into effective policy action.

It is also our firm tenet that gender inequality in science cannot be dissociated from the wider context of gender inequalities in society at large. In a time when prospects for women’s rights are uncertain in many Arab Mediterranean countries, we can only hope that our work, alongside other gender studies, will help to push policy change towards strengthening women’s social, economic and political rights and supporting equal participation in all spheres of life.
All over the world significant advances in women’s education have paralleled a growing concern about the underrepresentation of women in research careers and especially top positions in research. The percentage of women at higher levels of scientific careers is not increasing at the same speed as the number of women with the age and qualifications to reach these levels. This is not only an unfair situation. It is also a waste of talent and a source of bias that neither science nor the economy can afford.

Fifteen years of data-gathering, research and comparative analysis in the European countries has significantly improved knowledge on gender and science issues and enhanced policy debate and action.

The overall objective of SHEMEA, a project funded by the European Commission under the Science and Society programme of the FP7, was to enhance research cooperation on gender and science between the European Union and the Arab Mediterranean countries: Algeria, Egypt, Jordan, Morocco, Lebanon, Palestine, Syria and Tunisia.

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