Journal of Pharmaceutical Care & Health Systems

Ibrahim, J Pharma Care Health Sys 2015, 2:5
DOI: 10.4172/2376-0419.1000e137

Editorial Open Access

Health Care Research in Arab Countries: Where Do We Stand? A Summary for Previously Published Reports

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Received date: December 09, 2015; **Accepted date:** December 14, 2015; **Published date:** December 17, 2015

Abstract

Scientific research is considered as a tool to assess the growth and development in national and regional health care. Successful research community requires innovative environment, resources and funds. Funds might be through government, industries, universities, research organizations and private sectors.

Regional and national expenditures on scientific research are indicators to study the knowledge system that relies on the use of science, technology, and innovation (STI). In developed countries the expenditures in scientific research is about 4-6% from the national income growth domestic product (GDP) compared to 0.2-0.4% in Arab countries.

Recent reports indicated that Arab countries took counted steps to develop their research and experimental development (R&D) to stay competitive with global markets, but a lot still to be done. The Gulf States and Egypt are the most proactive at promotion of their science among Arab countries.

In Saudi Arabia, they established the King Abdulaziz City for Science and Technology (KACST) and King Abdullah University for Science and Technology (KAUST). In Qatar they established the Qatar Science and Technology Park. While in Egypt they established the Zewail City of Science and Technology.

In conclusion, although research in Arab countries is progressively moving towards improvement of STI, it is still far behind the developed countries. Several key points need to be considered by decision makers to the actual need of Arab communities.

Editorial

Scientific research is the actual tool for development and improvement of society's health care. It brings together knowledge, information, data and observations to solve problems, invent solutions and develop new products. Scientific know-how helps us to make decisions about health regulations, health policy, health standards and health programs. Long term investment in science and technology is essential to promote education, development and to support the innovation required for economic growth.

Research might be basic or applied. Basic or pure research means scientists try to understand the underlying principles of existence. This type of research often has indirect benefits which can contribute greatly to the advancement of health care. For example researches about the atom led to x-ray, nuclear power and silicon chips. While in applied research scientists look for answer to a specific problem. They might test theories generated by pure science and apply them to real life. For example test of new drug or new device about its safety and efficacy when used for patients.

Scientific research takes a long time with an average of 5 years. Achievement of successful research requires availability of certain factors such as reasonable funds, resources, encouragement and innovative environment. Fund resources include government, foundations, other federal, national institutes of health, industry, and other private sectors.

Hamilton M and colleagues compared science investment in US to other developed countries. From year 1994-2004 total US public funding increased by 6% per year, but from year 2004-2012 this rate declined to 0.8% per year, reaching $117 billion. While private sources increased from 46% in 1994 to 58% in 2012. The global share of US in research funding (public and private) declined from 57% in 2004 to 44% in 2012. Asia, China tripled science investment from $2.6 billion in 2004 to $9.7 billion in 2012. In Japan growth rate increased to $27.6 billion in 2012. Arab's expenditures on scientific research are about 0.2-0.4% of the national income growth domestic product (GDP), while it is around 4-6% in developed countries. The number of researches per million inhabitants is 450 in the Arab countries, while in developed countries the number is more than 5000 per million [1-4].

Regional and national expenditures on scientific research are indicators to study the knowledge system that relies on the use of science, technology, and innovation (STI). Such indicators are used to establish cross national comparisons and follow the evolution over time. Research and experimental development (R&D) is an important component of a country's national innovation system (NIS). R&D is conventionally measured as the ratio of gross domestic expenditure on R&D (GERD) to GDP expressed as percentage. The methodology to measure R&D is presented in the Frascati Manual (FM).

The Frascati Manual was originally written by and for the experts in the Organization for Economic Co-operation and Development (OECD) member countries who collect and issue national data on R&D. Over the years, Frascati Manual has become the standard of conduct for R&D surveys and data collection also in several non-member economics. The Technical Paper created to help developing countries use the guidelines and standards of the FM to fulfil their own contextual needs [4-6].

Challenges to measure R&D in developing countries were addressed in the UNESCO Institute Statistics 2010 report and summarized as follows [4,7,8]:

1. 1. Developing countries are considered as a heterogeneous group. Consequently, there is a wide variety both internally and internationally among their innovation systems and associated

R&D measurement system. In addition to lack of demand for STI indicators from policy makers in this region. There are significant problems with compiling the data that might be related to lack of coordination and cooperation at the national level between research institutions, universities, industrial, and business as well as weak statistical system in the country.

2. 2. The way R&D is organized is reflected by the lower emphasis on R&D in the business sector. Business enterprises that cater mainly to the local market might lead to reduction in competitive pressure, making systematic R&D the exception rather than the rule.
3. 3. In the higher education sector it is important to track where most research is carried out. Increasing the number of private universities makes it useful to distinguish between public and private higher education.
4. 4. The landscape of R&D expenditure is changing. This affects the collection of data. FM recommends the collection of primary data through direct surveys. Using budget data which is widely adopted practice for obtaining a rough estimate of R&D expenditure may not reflect true R&D expenditure due to the risk of double counting.
5. 5. Challenges in tallying the number of researchers. There is a lack of information and resources to accurately identify researchers and the time spend on research. In certain cases underestimation or overestimation might be generated. An example scenario academic staff that have full time contract and holding a part time contract in other universities.
6. 6. Identification of research personnel in the extended clinical trials value chain may be difficult as their involvement is occasional and lead to risk of double counting. In addition identification of researchers is essential based on their qualifications.
7. 7. Some special types of activities warrant attention when measuring R&D as they set on the borderline of what is considered R&D, e.g., establishment of interface between traditional knowledge and R&D.
8. 8. It might be useful to create a foreign institutions sub-sector within each major sector of performance.
9. 9. Weakness of the STI statistical systems due to lack of institutional R&D statistics, registration, support and documentation survey procedures.

Other concerns as social protection policy and research in Arab States are reported and published by UNESCO Regional Bureau – Beirut. They concluded the need for stronger research policy linkage to address the challenges of social protection. The linkage between research and social policy makers remains weak and not systemic. There is lack of people centered development policies that undermine human security. The social packages as safety nets and targeted social services are designed in isolation of the state's economic and development process and the concept of the social protection is rather new in the Arab region [9].

In view of publications from Arab countries the percentage of world contribution for scientific articles presented in UNESCO report 2009, Egypt 0.3%, Saudi Arabia 0.1%, Lebanon 0.04%, Moroco, Algeria, Libya, Tunisia 0.03% each, Jordon, Syria 0.02 each, Bahrain 0.01. While the scientific articles published in the Arab world in 2008 Institute of Scientific Information (ISI) were as follows Egypt 3459, Saudi Arabia 1715, Lebanon 1563, Jordan 959, Syria 224, Qatar 138, Iraq 100, Libya 81, and Palestinian Authority 63 [4].

Number of Arab patents registered in USA over 10 years (2009) were as follows: Saudi Arabia 147, Kuwait 118, Egypt 116, Lebanon 73, Morocco 71, United Arab Emirates 66, Tunisia 23, Jordan 22, Syria 20, Algeria 13, Iraq 10, Oman 8, Sudan 7, Qatar 6, Bahrain 4, Libya 4, Yemen 3 [4].

Other indicators for published research are the Knowledge Economy Indicator (KEI) developed by the World Bank and the Global Innovation Index (GII). Arab countries were listed along with their global ranking in published research in 2012, KEI and GII as follows:

The highest rank was for Algeria 54 publications, KEI 93; GII 138 followed by Egypt 37 publications, KEI 83, GII 108 [10].

Citations of the publications measure influence. They are related to the distribution of prestige and reputation in the scientific community and not necessarily measure the quality. The production & H-index (1996-2010) were reported as follows: H index Egypt 115, Saudi Arabia 106, Tunisia 75 and Morocco 84 [11].

Research sites in Arab countries

In Saudi Arabia, the King Abdulaziz City for Science and Technology (KACST) was directed by its chapter of 1986 to propose a national policy for the development of science and technology and device the strategy and plans necessary to implement them. KACST launched a comprehensive effort in collaboration with the Ministry of Economy and Planning (MoEP), to develop a long term national policy on science and technology. The Council of Ministries approved the national policy for science and technology, entitled "The Comperhensive, Long – Term, National Science and Technology Policy" in July 2002.

KACST and MoEP embarked on a national effort in collaboration with stakeholders to develop the national plan for STI, which drew the future direction in the kingdom, considering the role of KACST, universities, government, industry and society at large. The plan consists of eight major programs. In February 2008, KACST and IBM agreed to establish the Nanotechnology Centre of Excellence at KACST [12].

In Egypt, a North African Nanotechnology Research Centre was set up in 2009 located at the "Smart Village" near Cairo. This is a joint initiative of IBM and Egyptian government. Another very recent report published in February 2015 at MIT Technology Review – Arab Edition by Laurene Veale to address the state of scientific development in the Arab world as some Arab countries started to take active steps to promote a "knowledge economy" [13].

Laurene summarized this important topic as follows:

1. Recently Arab states took counted steps to develop their R&D to stay competitive with global markets, but a lot still to be done.
2. The Gulf States are the most proactive at promotion of their science among Arab countries.

- In 2009 they established King Abdullah University for Science and Technology (KAUST) in Saudi Arabia and the Qatar Science and Technology Park. They are benefiting from the increased budgets by attracting renowned scientists from abroad and invest in state of the art facilities. Accordingly we can assume that the current ranking is much higher than the previously reported.
- The Qatar National Research Strategy launched in 2012 and implemented by the Qatar Foundation's R&D unit. Qatar spent over $130 million in 2014 (162 grants) on international research

programs. Qatar has leaded the way in investing in S&T and rose its spending on R&D to 2.8% of its GDP in 2014. According to the World Bank this percentage is higher than the world average of 2.1 % and the Arab world average of 0.3%.

- Saudi Arabia launched such strategies in 2010. About 2 months ago KAUST paid $80 million to acquire Shaheen 2, the best supercomputer in a number of fields. Saudi Arabia's ambitious 20 year plan predicts that Saudi will be a regional leader in STI by 2020 and in Asia by 2025 and by 2030 the country will be transferred to a knowledge based economy. The UAE launched such strategies in 2014.

1. In Egypt, in June 2011 the interim government announced the increase in spending on science by 10 folds up to 2014. They created up to 50,000 jobs in research, partially funded by a € 20 million grant from the European Commission. Also they voted that gross spending on research and development should be no less than 1% of the country's GDP compared to 0.43% in 2011. They established the Zewail City of Science and Technology, a $ 2 billion project named after Ahmed Zewail, the only Arab to have received a Nobel Prize in science. There has been noticeable change in the appreciation of scientific research as they were able to secure a $1.31 million grant to establish a Center of Excellence of Stem Cells and Regenerative Medicine at Zewail City.
2. In 2010 Tunisia launched a five year €436 million plan to promote scientific cooperation between 2 countries.
3. In 2011 Jordan launched a €30 million fund for research in renewable and alternative energy. In May 2013 they adapted a four year National Policy and Strategy for Science, Technology and Innovation.
4. In Algeria the budget of scientific research was raised from about $250 million to $340 million in 2013.
5. In Morocco, in 2011 the R&D sectors were announced. In the same year, three research funds were launched with a combined budget of $65 million for projects up to 2014.

In conclusion, although research in Arab countries is progressively moving towards improvement of STI, it is still far behind the developed countries. Several factors need to be considered by policy makers to improve the current situation including the following:

- Plan for long term strategy for education programs and scientific research outputs to the actual need of Arab communities and related development and improvement plans.
- Increasing research funding by increasing R&D.
- Involvement of private sectors.
- Increasing number of universities.
- Creation of new research centres and institutions.
- Strengthen and develop scientific cooperation between research centres in Arab countries and international centres.
- Improve the linkage between the policy makers, research centres, organizations, universities and industry. These links provide an appropriate atmosphere for collaboration, cooperation and integration between the concerned organizations.
- Ensure implementation of the created policy with periodic assessment and evaluation.
- Develop statistical systems, registration and documentation to help in periodic assessment for possible competition with the global market.
- Conduct pan Arab conferences and forums to encourage scientists of the region to exchange and work together.
- Consider pan Arab scientific institutions being important players in promoting and funding scientific progress.
- Encourage cooperation between Arab countries to develop a strong S&T sector.

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