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Supporting female scientists in Yemen

The contribution of Yemeni women to shaping the history and civilisation of ancient Arabia is well documented in the historical literature and the divine books of all the Abrahamic religions. The Sabaean Kingdom, which represents one of the oldest civilisations in South Arabia (modern day Yemen), was ruled by a powerful female monarch (Queen Sheba) who travelled to Jerusalem to meet with King Solmon and test his wisdom.

The Sabean scriptures reveal societies in which women played major parts in trade, government, and all aspects of life. In the Islamic era, Arwa Al-Sulayhi was the first Muslim queen in the Arabian Peninsula and she built different schools, improved the economy, and supported agriculture in Yemen.

Despite the outstanding historical achievements of women in Yemen, the reality of today reflects a very sad image about their situation. According to the latest report on gender equality published by the World Economic Forum, Yemen is ranked last in the global gender gap index (149/149) and has only managed to close less than 68% of its gender gap.[1] Today, Yemeni women are still underrepresented in science, technology, engineering, and mathematics (STEM) and face particular challenges because of their societies' cultures and institutional rules. Yemen has not achieved gender parity in primary education and the gender gap substantially expands at higher levels of education. Early marriage and familial commitments are the main obstacles that present to women and girls in Yemen.[2] Stereotyping, prejudices, and gender-based violence are also important issues that remain to be addressed.[3]

Many female scientists have reported experiencing some form of sexual harassment during their fieldwork and observations, ranging from inappropriate comments to undesirable physical contact. In addition, the absence of successful female role models in the field of science and engineering has also contributed to the low representation of female scientists in STEM.

The number of women graduating from universities with high degree classifications in STEM is increasing in big cities; however, it is clear that there are some barriers in the Yemeni and Arabic cultures preventing these women from pursuing research-oriented careers after graduation. The few career opportunities in research and scarcity of research-oriented graduate programmes are the most important obstacles.

In our opinion, Yemeni women are among the most resilient scientists in the world, and most of them are committed and dedicated to science and education despite the daily hardships without salaries and in conditions of dangerous conflict.

In 1996, the Prime Minister Abdul Aziz Abdul Ghani created the Women National Committee and different strategies were proposed to empower Yemeni women in different fields.[4] In 2004, Arwa Alrabea was the first woman appointed as the Deputy Minister in the Ministry of Health in Yemen. 1 year later, Fawzeeh Noaman was also appointed as the first female Deputy Minister of Education. Consequently, many Yemeni women were hired in different academic and scientific positions and many of them became leaders of different academic and health institutions.

Despite all the difficult living conditions and the scarcity of resources and research support, several outstanding Yemeni female scientists have managed to establish active competitive research programmes and achieve international recognition. Many of them built their own entities from the rubble and continued to battle against different obstacles. For example, the prize of the Organization for Women Scientists in Developing Countries (OWSD) was awarded for 4 consecutive years to Yemeni researchers in different fields: medical sciences, biology, chemistry, and mathematics. Several Yemeni female scientists are recipients of the Gro Bruntland award for women in sustainable development, The World Academy of Sciences (TWAS) prizes, and L'Oreal UNESCO fellowships.

For the great majority of female Yemeni scientists failure is not an option, and success is the only pathway to an independent and dignified life for themselves and their families. Dhekra Annuzaili is an exceptional Yemeni woman in the field of public health and has made an especially important contribution to the country's neglected tropical disease (NTD) control efforts in the 23 Governorates.[5] Annuzaili is the WHO NTD Coordinator and also served as an advisor on health and development concerns for the UN, USAID, World Bank, and local non-governmental organisations in Yemen. As a result, she was named as the first to receive the 2017 Focus Exceptional Service award in Geneva, Switzerland. As a vulnerable setting, Yemen became progressively politically and economically unstable and female health-care professionals are striving to respond to new catastrophic situations and face different challenges to achieve the minimum goals of sustainable development.

Therefore, new initiatives led by women to promote the role of female scientists and health professionals in their communities should be launched by international communities to overcome this dilemma, and to empower young female scientists to pursue their research and to work alongside men to rebuild the country.

We declare no competing interests.

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Strengthening the role of ethnic minority women in science and medicine in China

In the past 60 years, the quality of education for the female population has substantially improved, and there has been a robust increase of women involved in science and medicine in China. The number of female professional researchers has reached 31·46 million, accounting for 40·5% of the total number of scientific researchers in China.[1] However, women in science and medicine are largely under-represented at senior levels. For example, women comprise approximately 38% of assistant or associate professors and approximately 8% of full professors in universities and scientific institutes. Remarkably, women account for approximately 6% of the 798 academicians of the Chinese Academy of Sciences and only 5·1% of the 875 academicians of the Chinese Academy of Engineering.[2] Unfortunately, this absence of female professionals in senior positions is more prominent in the remote and underdeveloped areas of China.

Although rapid progress and considerable achievements have been made in the education of ethnic minority women in China since the 1980s, the participation of women in areas of science and medicine is lacking. In particular, there are few minority women who achieve the rank of full professor, senior investigator, clinical professor, senior physician, or full research professor in top universities, scientific institutes, and clinics in China. The reasons behind this situation are manifold, but primarily include low overall input level of education and medical services (figure), poor educational facilities, absence of high quality teaching, and traditional dual roles (responsibilities of family in addition to work) of ethnic minority women. Importantly, the rural education and medicine shortage is even more prominent in some rural areas than others because of a relatively underdeveloped economy. Moreover, attitudes that have persisted since feudal times are used to justify discrimination against women in some ethnic minority areas, resulting in loss of opportunity to receive higher education. Additionally, many children cannot pursue high quality education because they live in remote areas where educational opportunities are limited.

There are 55 ethnic minority groups in China, which account for about 8·5% of the total Chinese population.[3] Therefore, it is very important to strengthen the role of ethnic minority women in science and medicine in China. The Chinese Government has made attempts to improve the rights and to provide opportunities for ethnic minority women to contribute their talents.[4] For example, in medicine, a major government initiative involving large hospitals in the urban eastern provinces was launched in 2004 to support hospitals in rural western provinces.[5] In education, from 2012 to 2016, the state finance of education expenditure increased from ¥2314·8 billion to ¥3137·3 billion, which covered all provinces where ethnic minority groups live, including Guizhou, Yunnan, Jilin, Ningxia, and Sichuan.[6] Nevertheless, China still has a long way to go in promoting the role of ethnic minority women in science and medicine. Increased efforts are required to improve educational and medical facilities in the remote and underdeveloped minority areas and provide opportunities for medical

Figure: **Representative photograph of the poor facilities in some medical practices in the remote and underdeveloped areas of China**