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The epidemiological declining in the human fertility rate in the arab world for 10 years period 2011–2021

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Abstract

Recently, there has been worldwide growing interest on profiling the human fertility of populations because there has been a noticeable global decline in fertility rate, leading to increased attention toward reproductive health and fertility.

The decline in fertility of population of the Arab World was investigated for the 10 years period between 2011–2021. The Arab World was classified into three regional blocks; Block-1 Arabian Peninsula countries: Bahrain, Kuwait, Saudi Arabia, Oman, Qatar, United Arab Emirates (UAE), Yemen. Block-2 Fertile Crescent Arab countries: Iraq, Jordan, Lebanon, Syria, West Bank and Gaza. Block-3 African Arab countries: Algeria, Comoros, Djibouti, Egypt, Libya, Mauritania, Morocco, Somalia, Sudan, Tunisia. Data on fertility rates for the 10 years period between 2011–2021 were collected from the World Bank for Arab countries. Statistical analysis along with decline in the fertility rates were determined. Results: Fertility rates varied across Arab countries in 2011 and 2021, with notable decline ranging from 24.3% to 3.8%, except for Algeria, with zero decline. Countries that exhibited significant decline were Jordan (24.3%) followed by Iraq (22.2%) then Yemen (19.1%); Whereas, countries that exhibited slight fertility decline were Libya (3.8%), followed by Tunisia (4.5%), Lebanon (4.5%) and Kuwait (4.5%). On another note, lowest fertility rate was observed in UAE as maintained between 1.7% and 1.5% and the highest fertility rate was observed in Somalia as maintained between 7.3% and 6.3% for 2011 and 2021 respectively. Conclusion: The present study reveals the declining-trend in fertility rate across Arab countries, influenced by variable factors. Therefore, we recommend to the Council of the Health Ministries in the Arab-League to focus on investigating the fertility decline as an important parameter for public health in the Arab world to maintain natural balanced fertility rate.

As some non-biological factors surrounding the Arabian region, such as instability, war, migration, the present study did not aim to include the influence of war and migration on fertility because both war and migration are non-biological external factors and both are not among the WHO criteria for fertility determination which based of the population growth rate of population under normal living conditions.

Keywords Fertility, Fertility decline rates, Epidimiology, Arab World

Background:

In recent years, fertility rates and reproductive health have gained growing global attention as it has been published in the United Nations (UN). For instance, the latest report from the UN reveal that the global fertility rate declined from 3.2 to 2.5 live births per woman from 1990 to 2019 as almost half of the populations' lifetime fertility is under 2.1 live births per woman [1]. Also, several

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authors have presented the profiling of the fertility rate decline such as China [2], India [3], Europe [4], United States [5] and Africa [6]. Whilst the decline of fertility can be influenced by the modern lifestyle choices of the couple, infertility remains a major health complication affecting one sixth of adults worldwide, which leads to profound social and emotional complications extending beyond initial challenges of just a disease [7]. As per World Health Organization (WHO), infertility is defined as “a disease of the male or female reproductive system characterized by the failure to achieve a pregnancy after 12 months or more of regular unprotected intercourse” [8]. Infertility arises due to female factors, male factors, combination of both factors together and in some cases due to unexplained causes [9].

The importance of maintaining the fertility rate at its natural profile is vital issue for human healthcare, well-being, and race continuity; otherwise, any fertility decline will have negative impact on both current and future healthcare, socioeconomic balance and hence pose a threat for human race existence [1, 10]. Providing insights and addressing the changes in fertility rate guide the policymakers, demographers, and researchers to understand the underlying reasons and demographic trends, plan healthcare, and promote sustainable development across the Arab World.

According to the World Bank, the Arab world is composed of 22 countries as members of the Arab League international organization and a total population of 464,684,914 million inhabitants in 2022 [11]. From reproductive genomics and human fertility perspectives, Arab world has unique importance due to its location as a connecting bridge between the three main continents: Asia, Africa and Europe. This provides a natural demographic and geographical landscape for the admixture of multi-genomic resources representing the flow of human genomics through different civilization over history and millennia to come.

In the literature, apart from limited and sporadic studies on the infertility [12, 13], there is a gap in the information on fertility profiling in the Arab World, which is essential and critical for the governmental bodies and decision-making officials. Therefore, the aim of this study is to determine the profile of the fertility rate in the Arab World and to provide a solid and comprehensive baseline reference dataset to be compared and integrated with the global data for better understanding of the regional as well as the global fertility rate. This will bridge scientific gaps and facilitate a better management of current human healthcare and the wellbeing of human's race existence in the future. In the present study, we report the fertility rate and fertility rate decline of the Arab countries spanning a decade period for 2011 and 2021.

By presenting the regional variations across the Arab world, we seek to contribute not only to bridge scientific gaps but also to assist in the well-being of the Arab communities.

Data and methods

Data collection

In the present study we used the fertility rate definition by WHO (2024) [14], expressed as average number of children per woman during her lifetime. The fertility rates for each Arab country were retrieved from the DataBank of The World Bank for years 2011 and 2021 based on the official registered data available publicly in the World Bank [15], which provides reliable and up to date statistics including fertility rates, for countries around the world. The selection of countries exclusively depended on their inclusion within the Arab World as defined in the World Bank [11]. In this study, the Arab countries were classified into three regional blocks; these are:

1. Block-1 including seven countries within the Arabian Peninsula that include Bahrain, Kuwait, Saudi Arabia, Oman, Qatar, UAE, Yemen.
2. Block-2 including five countries within the Fertile Crescent that include Iraq, Jordan, Lebanon, Syria, West Bank and Gaza.
3. Block-3 including ten countries within Africa that include Algeria, Comoros, Djibouti, Egypt, Libya, Mauritania, Morocco, Somalia, Sudan, Tunisia.

Statistical analysis

Statistical analysis was conducted and the fertility rate decline (%) was calculated for each Arab country using the following formula: Fertility rate decline (%) = $[(\text{Fertility rate in 2011} - \text{Fertility rate in 2021}) / \text{Fertility rate in 2011}] * 100$. This formula enabled the determination of the percentage change and notable variations in the fertility rate of the Arab world over a decade.

Results

The fertility rate of the Arab countries in 2011 and 2021 are given in Fig. 1. The fertility rate of the Arab countries in 2011 ranges between a minimum of 1.7 and a maximum of 7.3 for the UAE and Somalia respectively; whereas in 2021, the fertility rate of the Arab countries ranges between a minimum of 1.5 and a maximum of 6.3 for the UAE and Somalia respectively. The fertility rate decline (%) of the Arab countries for 2011 and 2021 are given in Fig. 2. The fertility rate decline (%) across Arab countries for 2011 and 2021 ranges between a minimum of 0% and a maximum of 24.3% for Algeria and Jordan respectively. The mean values (\pm SD) of the fertility rate

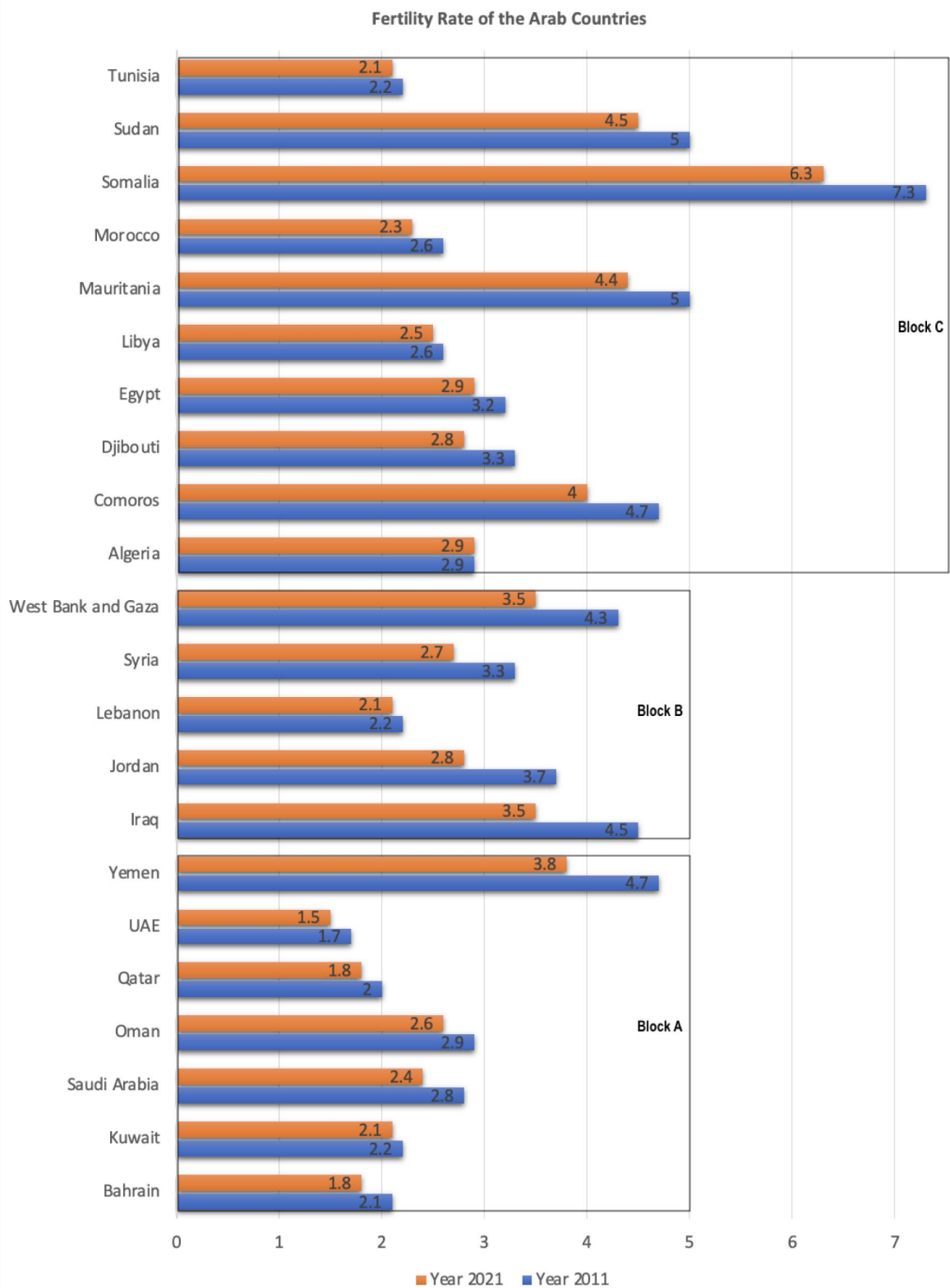


Fig. 1 A decade comparison of fertility rates across the Arab countries

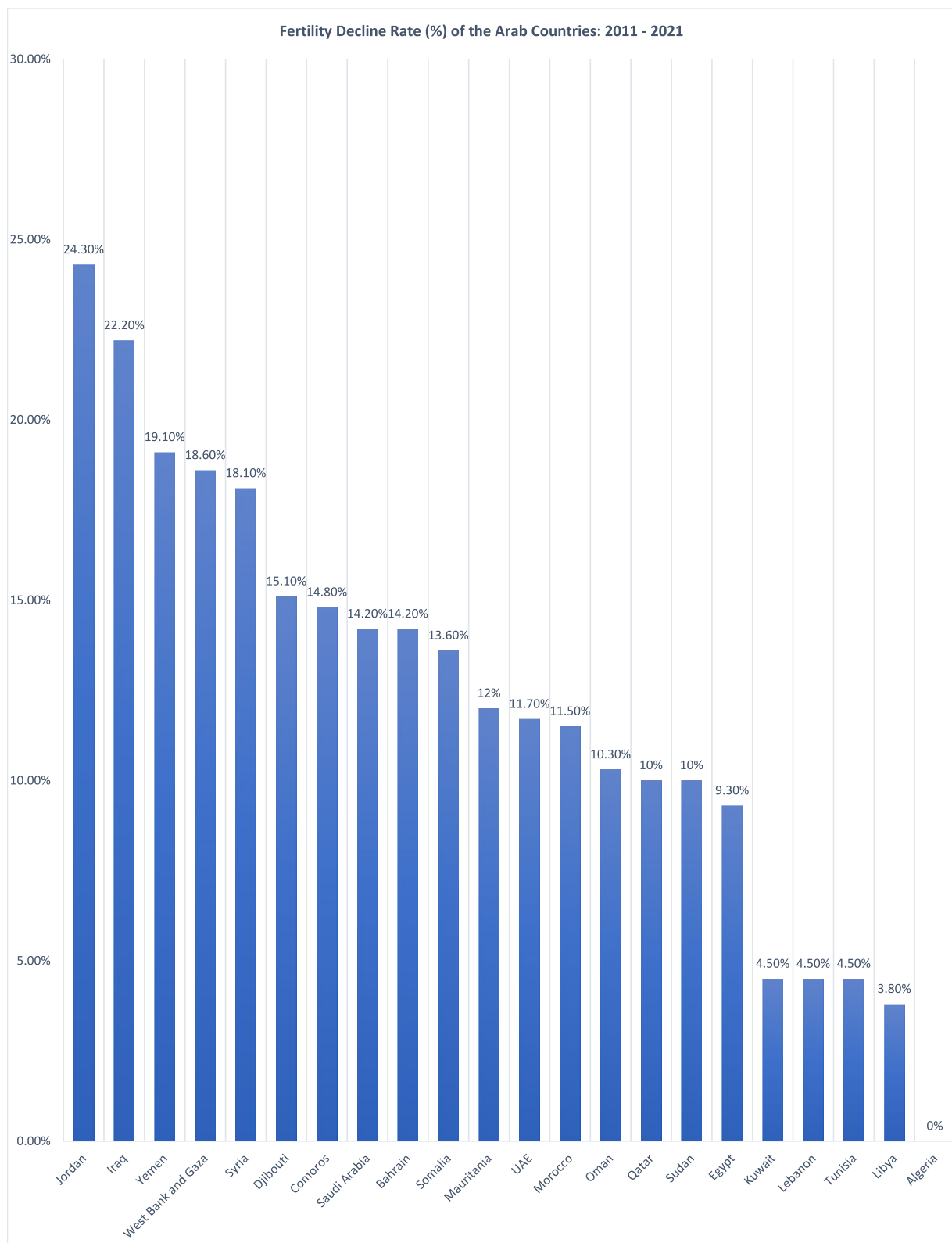


Fig. 2 Descending depiction of fertility decline rate (%) across the Arab countries

across the Arab countries is 3.4 (± 1.32), and 2.9 (± 1.90) for the year 2011 and 2021 respectively.

As for Block-1, the Arabian Peninsula countries, the fertility rate in 2011 ranges between a minimum of 1.7 and a maximum of 4.7 for UAE and Yemen respectively; whereas in 2021, the fertility rate ranges between a minimum of 1.5 and a maximum of 3.8 for the UAE and Yemen respectively. Also, the fertility rate decline (%) for 2011 and 2021 ranges between a minimum of 4.5% and a maximum of 19.1% for Kuwait and Yemen respectively. In the year 2011, the Mean value (\pm SD) of the fertility rate across the Arabian Peninsula countries is 2.6 (± 0.93), whereas in the year 2021, the Mean value (\pm SD) of the fertility rate across the Arabian Peninsula Countries is 2.2 (± 0.70).

As for Block-2, the Fertile Crescent Arab countries, the fertility rate in 2011 ranges between a minimum of 2.2 and a maximum of 4.5 for Lebanon and Iraq respectively; whereas in 2021, the fertility rate ranges between a minimum of 2.1 and a maximum of 3.5 for Lebanon and Iraq and West Bank and Gaza respectively. The fertility rate decline (%) for 2011 and 2021 ranges between a minimum of 4.5% and a maximum of 24.3% for Lebanon and Jordan respectively. In the year 2011, the Mean (\pm SD) of the fertility rate across the Fertile Crescent Arab Countries is 3.3 (± 0.91), whereas in the year 2021, the mean (\pm SD) of the fertility rate across the Fertile Crescent Arab Countries is 2.7 (± 0.57).

As for Block-2, the African Arab countries, the fertility rate in 2011 ranges between a minimum of 2.2 and a maximum of 7.3 for Tunisia and Somalia respectively, whereas in 2021, the fertility rate ranges between a minimum of 2.1 and a maximum of 6.3 for Tunisia and Somalia respectively. The fertility rate decline (%) for 2011 and 2021 ranges between a minimum of 0% and a maximum of 15.1% for Algeria and Djibouti respectively. In the year 2011, the Mean value (\pm SD) of the fertility rate across the African Arab Countries is 3.8 (± 1.50) whereas in the year 2021, the Mean value (\pm SD) of the fertility rate across the African Arab Countries is 3.4 (± 1.24).

Discussion

The descending order of the fertility rates declining profile in the Arab countries were (24.3%), (22.2%), (19.1%), (18.6%), (18.1%), (15.1%), (14.8%), (14.2%), (14.2%), (13.6%), (12%), (11.7%), (11.5%), (10.3%), (10%), (10%), (9.3%), (4.5%), (4.5%), (4.5%), (3.8%) and (0%) for Jordan, Iraq, Yemen, West bank and Gaza, Syria, Djibouti, Comoros, Saudi Arabia, Bahrain, Somalia, Mauritania, UAE, Morocco, Oman, Qatar, Sudan, Egypt, Kuwait, Lebanon, Tunisia, Libya and Algeria respectively.

For comparison of Block-1; The Arabian Peninsula Countries block showed almost similar fertility rate

decline, ranging between 14.2% to 10.3% for all of the countries with the exception of Yemen and Kuwait. Despite Yemen's historical reputation for high fertility, it exhibited highest decline rate reaching 19.1% across Arabian Peninsula block. Meanwhile, it still maintains highest fertility rate comparing to countries in the same block [16]. It is assumed that the significant fertility rate decline seems to be mainly contributed to the increase of educational level of women and increased use of contraception along with other factors [16–18]. In addition other specific factors in UAE such as situation of late marriages, high level of female education and also marriage of Emirati males from non-Emirati women's.

which exhibited the lowest fertility rate (1.7) and (1.5) during 2011 and 2021 respectively. As per a recent study, the current fertility rate in the UAE contrasts with the desired number of children, being significantly higher, which seem to be contributed to gender roles [19]. Also, more recently, Ebrahim and Mahasneh have reported the prevalence and characterization of infertility among Emirati males in a 10 year period of 2011 to 2021 [12], followed by diagnostic screening for microdeletion of the AZF gene cluster among the Emirati males [13]. Our results show that with the exception of Yemen, most countries of Arabian Peninsula block-1 exhibit low fertility rates comparing to other countries across the Arab world.

For comparison of Block-2; The Fertile Crescent Arab Countries block showed most significant fertility rate decline for all countries with the exception of Lebanon. Jordan has the highest fertility rate decline in the Arab world, with a decline rate reaching 24.3%; apparently due to the fact that it was the first country in Middle East and North Africa region to exhibit fertility stall from the late of 1990's followed by a resume in declining fertility from 2012 [20, 21]. During the fertility stall period, Spindler et al. [21] presented the average desired number of children to be around four. At the same period, Rutstein and Shah [22] presented rate of 3.5% and 13.5% for primary infertility and secondary infertility respectively among Jordanians. While the proximate-determinants decomposition reported by Krafft et al. [20] did not clearly identify the factor for the fertility decline that was observed across age groups and education levels, rising age of marriage and decline in contraceptive use were noticed. This contrasts with Yemen of which high prevalence of contraceptive use has been observed in the recent years [18]. After Jordan, Iraq is the second Arab country across the Arab world with significant fertility decline rate.

For comparison of Block-3; The African Arab Countries block also showed fertility decline for all of the countries with the exception of Algeria, having zero fertility decline rate. Courbage [23] presented marginalization

of women in job market along with improved living conditions and increase of marriages as important factors associated with fertility in Algeria. In fact, Algeria shares geographical borders with Libya and Tunisia, which also have shown to have reduced fertility decline rate. On another note, Somalia exhibits the highest fertility rate across the Arab world being maintained between 7.3% and 6.3% for 2011 and 2021 respectively. Somalia continues to maintain elevated fertility, despite the noticeable fertility decline. Mohamud [24] recommended implementing female employment in education and workforce, which can contribute to a reduction in fertility rates thus maintaining balanced fertility rate while improving living standards and enhancing healthcare in Somalia.

As some non-biological factors surrounding the Arabian region, such as instability, war, migration, the present study did not aim to include the influence of war and migration on fertility because both war and migration are non-biological external factors and both are not among the WHO criteria for fertility determination which based of the population growth rate of population under normal living conditions.

Conclusion

The epidemiological analysis of fertility rates in the Arab world exhibits varying patterns across different countries over the decade (2011–2021), in which fertility rates showed diverse trends in each country. For instance, for Fertile Crescent block-2, the highest fertility decline was in Jordan followed by Iraq, Palestine, Syria and Lebanon respectively. Whereas for the Arabian Peninsula block-1, the highest fertility decline was in Yemen followed by Saudi Arabia, Bahrain, UNA, Oman and Qatar respectively. In contrast, fertility decline of the African Arab countries block-3 with exception of Algeria has no decline, the highest fertility decline was in Djibouti, Camaros, Mauritania, Morocco, Sudan, Egypt, Tunisia, Libya respectively.

Therefore, we recommend special attention given by the Council of the Health Ministries in the Arab-League followed by further research with special emphasis on the causes of such factors and threats associated with the fertility decline as an important parameter for the public health reproduction in the Arab world.

Abbreviations

UAE	United Arab Emirates
UN	United Nations
WHO	World Health Organization

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Authors' contributions

IM: Conceptualization and design; Project administration and supervision; Investigation and methodology; Definition of intellectual content; Manuscript writing, reviewing and editing. FE: Investigation and methodology; Definition of intellectual content; Manuscript writing, reviewing and editing. The authors have read and approved the final manuscript.

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Availability of data and materials

The data as deposited by each country are available on the public Open Data site of the World Health Organization (WHO) (<https://www.who.int>) as Available on: <https://www.who.int/data/gho/indicator-metadata-registry/imr-details/123>. Also, the data as deposited by each country are available on the public Open Data site of the World Bank Open Data site: (<https://data.worldbank.org>).

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interest

The authors declare that they have no conflict of interest as well as no competing interests what so ever.

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