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Original Article

Rapid fertility decline in Oman: Understanding the role of proximate determinants

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ABSTRACT

Background: Oman sees one of the fastest decline in fertility in recent time, which is largely remained unexplored. This paper analyzes fertility transition in Oman focusing on the relative contributions of the major proximate determinants of fertility.

Methods: Data were extracted from national level surveys and the annual report of the Ministry of Health. Bongaarts aggregate model has been used for analyzing the role of the major proximate determinants of declining fertility.

Results: Empirical analysis reveals that fertility in Oman has declined from 8.6 births per woman in 1988 to 3.3 births per woman in 2008, a decline of 5.3 births per woman or 62% decline within a short period of 20 years. Fertility has declined mainly due to synchronization of 'delaying and spacing of birth' among the younger cohorts of women and the tradition of prolonged duration of postpartum infecundability. The analysis indicates that marriage pattern has the largest fertility inhibiting effect followed by postpartum infecundability and contraception. Modernization, educational development of women and their participation in workforce are the likely factors that affect the reproductive behavior of women and thus help reduce fertility in Oman.

Conclusion: Under the prevailing social and cultural norms in Oman, the prospect of further decline in fertility seems to be very slim in the near future unless the couples are strongly motivated to have smaller family size and adopt necessary actions to that effect.

1. Introduction

In late 2011, Eberstadt and Shah [1], the two researchers of the American Enterprise Institute published a report on fertility decline in the Muslim World. The report is interesting because it highlighted the views that the World's Muslim population is undergoing a fertility collapse which is not in line with the existing popular perception, particularly among the people in the West, that Muslim Arab World is resistant to "demographic transition" and modernity [2–4]. The report also pointed out that the demographic change in the Muslim world has been broadly unnoticed as compared to the fertility declines in Europe, US and other developed world. As Eberstadt and Shah [1] observed:

> "There remains a widely perceived notion—still commonly held within intellectual, academic, and policy circles in the West and elsewhere—that 'Muslim' societies are especially resistant to embarking upon the path of demographic and familial change that has transformed population profiles in Europe, North America, and other 'more developed' areas (UN terminology). But such notions speak to a bygone era; they are utterly uninformed by the important new demographic realities that reflect today's life patterns within the Arab world, and the grater Islamic world as well."

Using data from 49 Muslim-majority countries and territories, Eberstadt and Shah [1] found that fertility rates declined on an average of 41% between 1975–80 and 2005–10, which is a greater drop than the 33% decline for the world as a whole over that same period. The authors also estimated that twenty-two Muslim countries have undergone fertility declines of 50% or more, ten of them by 60% or more. For example, an astonishing 70% fertility decline occurred in Iran and 64% in Oman within just two decades [1]. In absolute term, half of these "top ten" fertility declining countries had experienced a decline of over 4.5 births per woman in just 20 years which is unprecedented in the human history. Oman tops the list of these top five countries with more than five births

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decline per woman within just 20 years period. Eberstadt and Shah [1] termed Oman as "world record-breaker" in the history of fertility decline.

In Oman, fertility has declined from 8.6 births per woman in 1988 [5] to 3.3 births per woman in 2008 [6]; an unprecedented decline of 5.3 births per woman in just 20 years, which Europe took centuries to go from 5 to 2 children per woman [2]. This is quite stunning for a traditional Muslim country like Oman which was believed to have the third-highest fertility rate in the World with more than 8 children per woman, after Rwanda and Yemen at the top, during early 1980s [7]. The country was under extreme poverty and isolation until oil and gas production began in the early 1970s [8]. By the late 1980s, Oman is transformed into a modern state, with all the modern facilities and infrastructures. The standard of living and health status have improved enormously since the mid-1970s. The Sultanate of Oman has well-organized universal free health care system assuring universal free access to health care services. The country has made impressive gains in the achievement of key millennium development goals (MDGs) [9], and almost all health indicators show tremendous improvement. It is interesting to note that such a 'sea-change' in the total fertility rate (TFR) has occurred in Oman in the midst of low level of contraceptive use rate and in the absence of any official population control program.

The rapid decline in fertility by 5.3 births per woman in just 20 years period in a traditional Muslim country like Oman, might be an interesting subject for other countries with similar demographic conditions, particularly other Arab countries, to know what factors have been responsible for such rapid fertility decline. Thus, the main objective of this study was to analyze the fertility transition in Oman over the last two decades and identify the most important factors determining the rapid decline in fertility in Oman.

There are many factors that are responsible directly and indirectly for changing the fertility level. These factors are called determinants of fertility. However, the relationship between fertility and its determinants is very complex, because human reproduction is an outcome of a number of biological, behavioral and cultural factors on the one hand and socioeconomic, demographic and environmental factors on the other [10,11]. The biological and behavioral factors influence fertility directly, while socioeconomic, demographic and environmental factors affect fertility through modification of one or more biological or behavioral factors. Bongaarts [10] in his ground-breaking paper termed the biological and behavioral factors as "proximate determinants of fertility", as these factors affect fertility directly; and all other social, economic and environmental factors affect fertility through these variables. Bongaarts and Potter [11] observed that 96% of the variability in the total fertility rates of any population could be explained by the four principal proximate determinants of fertility, which are marriage, contraceptive use, postpartum infecundability, and induced abortion. This observation make the analysis of the determinants of fertility more simplified by focusing just on these four principal proximate determinants of fertility. Bongaarts [10] developed an aggregate model for analyzing the fertility inhibiting effect of the four principal proximate determinants. In this study an attempt has been made to explore the relative contribution of the principal proximate determinants in rapid reduction of fertility in Oman using the Bongaarts aggregate model [10,11].

2. Data and methods

2.1. The data

There is paucity of demographic data for analyzing fertility transition in Oman. The country did not participate either in the World Fertility Survey (WFS) program or in the Contraceptive Prevalence Survey (CPS) that took place during 1970s and 1980s, nor the Demographic Health Survey (DHS) that begins in late 1980s. The 1988 Oman Child Health Survey (1988 OCHS) provided the first national-level data on health and population, followed by the 1995 Oman Family Health Survey (1995 OFHS), the 2000 Oman National Health Survey (2000 ONHS) and the latest one is the 2008 Oman National Reproductive Health Survey (2008 ONRHS). This study utilizes data extracted from these surveys and the official data from the National Center for Statistics and Information (NSCI) and the annual health report of the Ministry of Health (MoH). All the above mentioned surveys were conducted by the MoH. All these surveys considered ever-married women of Omani national only under 50 years of age as eligible respondents. All these surveys collected birth history data that allow fertility analysis. The history of population and housing census in Oman is also not very old as the first population census in Oman was conducted in 1993 and the third and the latest one is the 2010 census. According to the recent estimate of the National Center for Statistical Information (NCSI) of Oman, the total population of the country is 4.3 million in 2015, of which 2.4 million (56%) are Omani nationals and 1.9 million (44%) are expatriates [12].

2.2. The model

Bongaarts [10] observed that in the absence of inhibiting effects of all proximate determinants, the fertility level of a population could reach to a hypothetical maximum level, called total fecundity rate (TF), while in the presence of inhibiting effects of all the proximate determinants, the actual level of fertility of a population is the total fertility rate (TFR). For most populations, TF falls between 13 and 17 births per woman, with an average of 15.3 [10]. Thus, the observed level of fertility in a given population reflects the extent to which the proximate determinants reduce the TF.

To measure the extent of fertility inhibiting effect of the four principal proximate determinants of fertility namely marriage, contraception, postpartum infecundability and induced abortion, Bongaarts [10] and Bongaarts and Potter [11] developed an aggregate model by expressing the total fertility rate (TFR) as a multiplicative function of the four indices and the total fecundity rate (TF) such that

$$TFR = C_m \times C_c \times C_i \times C_a \times TF, \quad (1)$$

where C_m, C_c, C_i, and C_a are the indices measuring fertility inhibiting effects of marriage, contraception, postpartum infecundability and induced abortion respectively. The indices can only take values between 0 and 1, where zero denotes a complete fertility inhibiting effect and 1 means no fertility inhibiting effect. Thus the complement of the value of a given index is the proportionate reduction in fertility due to the inhibiting effect of that proximate variable. The indices are estimated as follows.

The index C_m is estimated as $C_m = \sum m(a) \times g(a) / \sum g(a)$, where m(a) is the age-specific proportion of currently married women, g(a) is the age-specific marital fertility rate and 'a' is the age or age group. Thus, C_m = TFR/TM, where TM is the total marital fertility rate.

The index of contraception, C_c, is estimated as $C_c = 1 - 1.08 \times u \times e$, where, 1.08 is an adjustment for the fact that women (couple) do not use contraception if they know or believe that they are sterile, 'u' is the current contraceptive prevalence rate (CPR) and 'e' is the average use-effectiveness of contraception which is calculated as the weighted average of the method-specific use-effectiveness levels (e_i). Thus, $e = (\sum u_i e_i)/u$, where $u = \sum_{u_i}$. Due to lack of data on e_i in Oman, in this study, the

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