

# Early Marriage and Less Education as Independent Predictors for High Fertility in Yemen

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## Abstract

**Background:** It is widely acknowledged that demographic variables have a major effect on high fertility, which classified as five or more ( $\geq 5$ ) births per woman. In Yemen, the association of gender-sensitive demographic variables with high fertility is inadequately reported. **Aim:** This study was aimed to investigate the independent predictors of  $\geq 5$  living children among Yemeni mothers, according to their age at first marriage, residence, educational status, and occupation. **Subjects and Methods:** A cross-sectional study of a pretested semi-structured questionnaire was carried out among 400 mothers visiting the reproductive health centres in Dhamar governorate during the study time. Prevalence of  $\geq 5$  living children were examined among the study subjected demographic groups. Estimates of prevalence risk (PR) for predicting high fertility were developed using Poisson regression model incorporating the robust estimator and Log link function. Results: Outcomes of the multivariate model indicated that 10 – 14 and 15 – 19 ages at first marriage, illiteracy, and simple literacy were confirmed as independent predictors for high fertility level. Place of residence and occupation, however, emerged as dependent predictors. **Conclusion:** Early marriage and less education are the major factors underlying high fertility among the study population. These findings further confirm the need for serious interventions towards the community's attitude devastating girls' marriage and education.

**Keywords:** Early marriage; Woman's education; Fertility; Predictors; Yemen

## Introduction

Republic of Yemen, recently attacked by a coalition of 10 Arab countries, is one of the poorest countries in the world [1]. This beyond border airstrike with civil conflicts and global terrorism have compelled the basic needs of life to a serious failure. In contrast with those high-economic GCC neighbours, the neglected Yemen has limited natural resources, GDP of 530 USD per capita, and almost one-third of workforce are unemployed [2]. According to the United Nations World Food Program, Yemen has one of the highest rates of malnutrition in the world and almost half of the population is food insecure [3].

The population of Yemen rapidly increased from 8.1 million in 1980 to 26.8 million in 2015 [4]. The current total fertility rate (TFR) is reported to be around 4.5 percent [5]. If this rate is continued, the population will be around 47 million in 25 years [4]. Therefore, it is serious to moderate this extra burden implicating this broken country.

In Yemeni culture, woman's role as wife and mother is an imperative [6]. Her age at marriage, residence, education, and occupation can play a significant part in the persistence of high fertility, classified as five or more births per woman [7]. These and other potential risk factors of high fertility are descriptively reported by the Yemen's demographic and health surveys [5,8-9]. However, the lack of inferential statistics in these primarily surveys tends to place limits on developing conclusions of the probability that the reported differences are significant

[10]. Therefore, the present study was aimed to investigate the independent effect of age at marriage, residence, education, and occupation as potential predictors for five or more living children among Yemeni mothers residing the central area of the north-south mountain range.

## Subjects and Methods

### Study subjects and study area

The present study was conducted in Dhamar governorate, which centrally sits among the north-south mountain range of Yemen. Dhamar governorate contains 1.3 million people and comprises 12 districts; one demonstrative city and 11 catchment areas. The economy is almost agriculture and the Arab traditions are the dominant perspectives. The study sitting was the main health provisions in Dhamar city: Dhamar General Hospital, Maternal and Child Health Centre, Yemen Red Crescent, Al-Wehdh Health Centre, Al-Gadad Health Centre, and Al-Homeat Hospital. The study subjects were Yemeni mothers of reproductive age (15 – 49 years) visiting these health centres obstetric care during the study time. A clear description about

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the aim of the study was given to the participants and informed that their participation is totally voluntary. A verbal consent was obtained from all the participants. The study protocol has been approved by the TU Medical Ethics Committee (TUMEC).

### Study design

It was a cross-sectional study that carried out between June 2013 and March 2014. The total number of the target population in Dhamar government is about 447,300. The sample size was estimated using a single population formula [ $1.962 \times P(P-1)/d^2$ ], with a 95% confidence level (at 5% type one error it is 1.96), 50% expected proportion (P), 5% absolute precision (d) and 80% expected response rate [11]. The calculations indicated that the study needs a minimum sample size of 385 and an initial sample size of 480. The study subjects were randomly selected using a systematic sampling method.

It is well known that woman's age at marriage, place of residence, education, and occupation are important risk factors for high fertility, identified as five or more ( $\geq 5$ ) births per woman [7,12]. Therefore, this study was aimed to investigate the association between these demographic variables as the potential predictors and  $\geq 5$  living children as the dependent variables. Multivariate analysis was used to compute for the between-variables and within-variables influences. Moreover, the independent effect of these variables in predicting high fertility was also adjusted by age groups of the respondents (15 – 24, 25 – 34, and 35 – 49), on average, the fertility pattern shows a general low at 15, reaches a maximum between 25 – 34 ages, and then gradually declines [13]. The present study followed the recent recommendations concerning the statistical models that are most practical for this population-based cross-sectional study [14].

### Data collection

The selected mothers were interviewed, in their obstetric care clinics settings, using a semi-structured questionnaire constructed in English and translated into Arabic, the local language. The questions were considered to gather information on mothers' obstetric history. The questionnaire was qualitatively tested for validity and reliability using qualitative reviews such as content validity. The questionnaire was administered to the participants by trained medical staffs from the health centres through face-to-face interviews.

### Data analysis

SPSS statistical software of version 22.0 (IBM Corporation) was used in this analysis. The general characteristics and distribution of mothers by number of living children were presented as a percentage (%). Number of living children per woman was dichotomously evaluated ( $\geq 5$  living children = 2, 1 – 4 living children = 1). However, the potential predictors were coded in the following potential groups: age at marriage (10-14 = 4, 15-19 = 3, 20-24 = 2, 25-29 = 1); place of residence (rural = 2, urban = 1); education (illiterate = 4, literate = 3, primary = 2, more than primary = 1); and occupation (housewife = 3, student = 2, working = 1). For the purpose of the inferential statistic, Poisson regression model incorporating the robust estimator and Log as the link function was used to develop the prevalence risk (PR) of  $\geq 5$  living children. Univariate regression was used

to assess the association of the potential predictors. As well, multivariate regression was used to assess the independency of the potential predictors in producing high fertility. In this study, the level of significance (P value) was  $\leq 0.05$ .

## Results

### General characteristics of subjects

A total of 400 mothers were successfully recruited for this study. Table 1 shows the general characteristics of the study's subjects. Thirty-seven percent (37%) of the respondents were between 15 and 25 years old. Almost half of them had married younger than twenty years (10-14 years = 15.5% and 15-19 years = 31.5%), while only 4% (15/400) between the ages 25 to 29 years old. Mothers of rural residence represented about half of the study subjects. Regarding educational status, almost one-third of the subjects were illiterate (unable to read and write) and 15% (60/400) had simple literacy (can read or/and write a simple message). Table 1 also shows that the majority of the respondents were housewives and almost one-quarter of all interviewed subjects were working mothers.

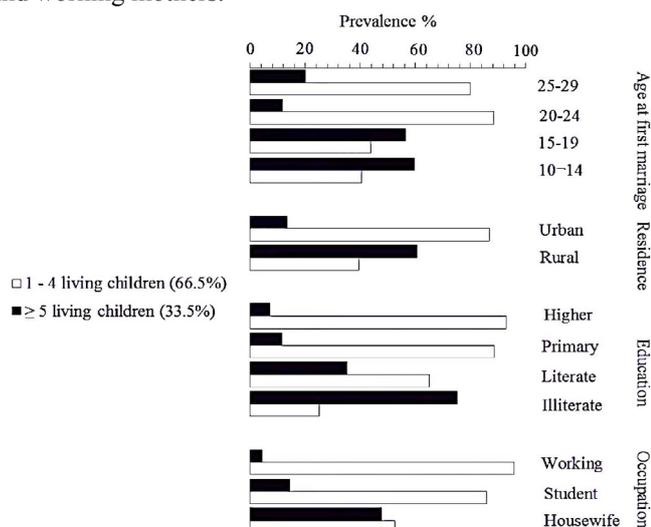
**Table 1: General characteristics of the 400 Yemeni mothers participating in the study.**

General characteristics	Frequency n (%)
15-24	147 (36.8)
25-34	204 (51.0)
35-49	49 (12.2)
<b>Age at first marriage</b>	
10-14	62 (15.5)
15-19	126 (31.5)
20-24	197 (49.2)
25-29	15 (3.8)
<b>Residence</b>	
Rural	172 (43)
Urban	228 (57)
<b>Education</b>	
Illiterate	124 (31.0)
Literate	60 (15.0)
Primary	104 (26.0)
More than primary	112 (28.0)
<b>Occupation</b>	
Housewife	259 (64.8)
Student	49 (12.2)
Working	92 (23.0)

### Prevalence of mothers with $\geq 5$ living children

Figure 1 shows prevalence and distribution of mothers by number of living children, according to demographic characteristics. Overall, 33.5 % (134/400) of the mothers had  $\geq 5$  living children. The distribution of mothers with  $\geq 5$  living children mostly increased with decreasing age at first marriage. The 10 – 14 and 15 – 19 groups showed almost similar prevalence (59.7% compared to 56.3%, respectively). As well, mothers of rural residence developed higher prevalence of  $\geq 5$  living children than those of urban residence (60.5% compared to 13.2%, respectively). The distribution of mothers with  $\geq 5$  living children increased steadily with decreasing educational status. The prevalence of  $\geq 5$  living children reached a peak among illiterate mothers and then considerably declined among those of primary and more education. Housewives also showed

higher prevalence of  $\geq 5$  living children compared to students and working mothers.



**Figure 1:** Prevalence and distribution of five or more living children among Yemeni mothers in Dhamar governorate (n=400).

### Predictors of mothers with $\geq 5$ living children

Table 2 shows the univariate analysis results for the association of the potential demographic predictors of  $\geq 5$  living children. The results showed that ages at first marriage of 10 – 14 ( $P < 0.01$ ; PR = 1.3; 95% C.I. = 1.1, 1.6) and 15 – 19 years old ( $P < 0.01$ ; PR 1.3; 95% C.I. = 1.1, 1.6); rural residence ( $P < 0.001$ ; PR = 1.4; 95% C.I. = 1.3, 1.5); educational statuses of illiterate ( $P < 0.001$ ; PR = 1.6; 95% C.I. = 1.5, 1.7) and literate ( $P < 0.001$ ; PR = 1.3; 95% C.I. = 1.1, 1.4); and housewife occupation ( $P < 0.001$ ; PR = 1.4; 95% C.I. = 1.3, 1.5) were significantly associated with  $\geq 5$  living children.

**Table 2: Associations of potential predictors with five or more living children among Yemeni mothers in Dhamar governorate (n=400)**

Potential predictors	PR	95% C.I.	P
<b>Age at first marriage</b>			
10-14	1.33	1.11, 1.60	< 0.01
15-19	1.30	1.09, 1.56	< 0.01
20-24	0.93	0.78, 1.11	0.42
25-29	Ref		
<b>Residence</b>			
Rural	1.42	1.34, 1.51	< 0.001
Urban	Ref		
<b>Education</b>			
Illiterate	1.63	1.54, 1.74	< 0.001
Literate	1.26	1.14, 1.39	< 0.001
Primary	1.04	0.97, 1.12	0.27
More than primary	Ref		
<b>Occupation</b>			
Housewife	1.41	1.34, 1.50	< 0.001
Student	1.10	1.00, 1.20	0.06
Working	Ref		

PR: prevalence risk; C.I.: confidence interval; P: level of significance

Multivariate analysis using Poisson regression confirmed the following groups of age at first marriage and education status variables as independent predictors for  $\geq 5$  living children among the study population: 10 – 19 ( $P = 0.02$ ; PR = 1.2; 95% C.I. = 1.04, 1.4) and 15 – 19 ages ( $P = 0.03$ ; PR = 1.2; 95% C.I. = 1.01, 1.3); and illiteracy ( $P < 0.001$ ; PR = 1.3; 95% C.I. = 1.2,

1.4) and literacy ( $P < 0.001$ ; PR = 1.2; 95% C.I. = 1.03, 1.3), respectively. However, as appeared in Table 3, the result of the adjusted multivariate model indicated that insignificant groups of demographic variables were dropped.

**Table 3: Results of multivariate analysis of potential predictors for five or more living children among Yemeni mothers in Dhamar governorate (n=400)**

Potential predictors	PR	95% C.I.	P
<b>Age at first marriage</b>			
10-14	1.19	1.04, 1.38	0.02
15-19	1.16	1.01, 1.33	0.03
25-29	Ref		
<b>Education</b>			
Illiterate	1.29	1.16, 1.44	< 0.001
Literate	1.16	1.03, 1.30	0.01
More than primary	Ref		

PR: Prevalence Risk; C.I.: Confidence Interval; P: Level of Significance

## Discussion

This present survey is the first to study the association of demographic characteristics and number of living children among Yemeni mothers, which is important in augmenting the community awareness about the predictors of high fertility rate. The results revealed significant differences in the number of living children between mothers in terms of their demographic characteristics. But only early marriage ages, illiterate and literate were confirmed as independent risk factors for predicting high fertility rate among the study population.

Although the legal age at marriage is 15 in Yemen, the present survey found that some of the subjects are still married at a younger age. Early marriage is believed as the most important risk factor of Yemen's high fertility. Evidences from previous reports in developing world confirmed such association.<sup>[15-16]</sup> For instance, in India; women married at a younger age were reported to have shorter second and higher order birth intervals than those married late<sup>[17]</sup>. A recent survey about knowledge, attitude, and practice of Yemeni people on early marriage revealed that the majority of the households indicated 18 to 24 as an ideal age for girl's marriage, but that was not consistent with their practices that about two-third of their daughters are married younger than 15<sup>[18]</sup>. In Yemen, cultural values and Islamic educations have important consequences on age at marriage practices as well as fertility preferences. Cultural attitudes toward family's honour, marriage, and gender confine female to a protected sphere. Determined ethics are placed on role of women as mothers and obedient housewives<sup>[6]</sup>. Similar to most of Middle Eastern and African traditions, men marry to become parents, and marriage commonly commended once a living baby is born, especially sons<sup>[19]</sup>. In fact, it is viewed as concern if childbirth is delayed for more than two years after marriage. Furthermore, Qur'an teaching completely prohibits sexual activity outside marriage or killing offspring for fear of poverty. It attributes parents' fear of want to Satan and abundance to Allah (God). The Qur'an states:

*Do not kill your children for the fear of penury: We will provide for them and for you. Killing them is indeed a great iniquity (Part 15; verse 31). Do not approach fornication. It is indeed an indecency and an evil way (Part 15; verse 32). Satan frightens*

*you of poverty and prompts you to [commit]. indecent acts. But Allah promises you His forgiveness and grace, and Allah is all-bounteous, all-knowing (Part 3; verse 268) [20].*

Therefore, reduction of marital fertility should be the focus of family planning programmers. Enlightening the community about the negative health outcomes of early marriage on mother and child is a meaningful channel for controlling this public issue.

Considering the strongly-significant association between education and number of living children, less education in this community may play a key role in the continuance of high fertility rate in Yemen. A strong inverse effect for education on fertility has been confirmed worldwide, the higher the educational level the lower is the fertility rate [21,22]. In Yemen, education of girls is considered by many families as serving no useful purpose being the girl will go to her right household of husband. However, the present study showed an actual difference between illiterate and schooled women in term of living children outcome. This finding is in line with the previous studies revealed that the knowledge of women towards childbearing rather than their socioeconomic status strongly triggers their low reproductive performance [23,24]. Woman's education has also been found to increase the age at marriage [23]. Despite social background, the association of modernization with fertility is well-known and this may further explain the impact of education on fertility decline.

Education plays an important role in developing the personal skill of women necessary to access to the modern world. Increased access to modern-day physical infrastructure has been reported to decline the ideal family size [25]. The indicator of fertility and education derived from the Yemen's demographic and health surveys confirmed this suggestion; the 7.7 to 4.4 decrease in the total fertility rate has parallelize a 19.1% to 57.9% increase in primary-to-more education between the 1991-1992 and 2011-2013 surveys, respectively [5,8]. Studies conducted in Latin America revealed that education can affect the reproductive performance through its strong association with a greater social and occupational development [26]. Among the advanced fertility transition countries of Latin America, the chief contribution in fertility decline was by women having primary education [12]. Although our previous findings from this community found that using oral contraceptive is higher among less educated women, this part of a community has been widely reported with a significant unmet need [5,9,27]. In Yemen, education is valuable in providing autonomy to women to attain attractive social and economic positions. Thus, improvement of woman's education is imperative for controlling Yemen's rapid population growth.

In this study, the univariate model revealed that residence and occupation were significantly associated with five or more living children. However, the adjusted multivariate model could not confirm this association. This is in good agreement with those obtained on Yemeni women by Pillai and Sunil, who used the 1991-1992 and 1995-1997 demographic and health data to investigate the roles of modernization theory on ideal family size and use of modern contraceptives [28]. They found that the occupation of Yemeni wives has not an important impact on

fertility-related variables compared to education. However, rural residence may play a mediating role in predicting high fertility among this community being poorly educated.

## Conclusion

This study confirms that early marriage and less education are the most important risk factors in predicting high fertility rate in Yemen. It is an important call to associate effectual community-based measures through the family planning programmers. These measures should focus on reducing illiteracy as well as the provision of pertinent community education about the adverse health problems of early marriage on mother and her child.

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## Conflict of Interest

The authors declare no conflict of interest.

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