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Factors Influencing Women's Fertility Rates in Jordan: The Impact of Marriage Age, Education, and Employment

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Abstract

Objectives: This paper examines the causal impact of women's marriage age, education level, and employment status on fertility rates in Jordan from 1991 to 2023.

Methods: A mixed-method approach was employed, utilizing quantitative data from the World Bank and the Jordanian Department of Statistics (DoS), along with qualitative data collected through two semi-structured Focus Group Discussions (FGDs) and a questionnaire. Various simple and multiple linear regression models were applied to analyze the relationship between four independent variables (secondary education, tertiary education, employment, and marriage age) and one dependent variable (fertility rate) over 33 years. The qualitative data were analyzed to complement the quantitative findings, enhancing their reliability and providing a deeper understanding of the trends.

Results: The analysis revealed strong statistical evidence of a significant impact of women's education, employment, and marriage age on fertility rates, with variations observed for each factor. However, challenges persist in balancing fertility rates among women who are unemployed, less empowered, living in camps or rural areas, married early, working in private or non-profit sectors, and those employed in the public sector.

Conclusions: The study recommends that the Jordanian government target its efforts to regulate fertility rates more effectively, focusing on women in rural and camp areas. It suggests enhancing women's empowerment through vocational education and economic participation opportunities and launching campaigns to raise awareness of modern family planning methods.

Keywords: Women Empowerment, Education, Employment, Early Marriage, Fertility Rate.

العوامل المؤثرة على معدلات الخصوبة لدى النساء في الأردن: دراسة حول تأثير سن الزواج والتعليم والتوظيف

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ملخّص

الأهداف: تتناول هذه الورقة البحثية التأثير السببي لسن المرأة عند الزواج، ومستواها التعليمي، وحالتها الوظيفية على معدل الخصوبة في الأردن في الفترة ما بين عامي 1991 و2023.

المنهجية: تطبق الدراسة منهجية مدمجةً باستخدام بيانات كمية من قاعدة بيانات البنك الدولي، وقاعدة بيانات دائرة الإحصاءات العامة الأردنية، وبيانات نوعية تم جمعها من خلال حلقتين نقاشيتين مركزتين شبه منظمتين واستبيان. وقد طبقت الدراسة عدة نماذج انحدار خطي بسيطة، ومتعددة للمتغيرات الأربعة المستقلة والمتعلقة بـ (التعليم الثانوي والتعليم العالي وحالة العمل وسن الزواج) لدى المرأة مع متغير تابع واحد هو (معدل الخصوبة) على مدار 33 عاماً. كما قامت بتحليل البيانات النوعية التي تم جمعها لإثراء هذه المنهجيات الكمية، وزيادة موثوقية النتائج وتحقيق فهم أعمق للاتجاهات الكمية.

النتائج: كشفت نتائج الدراسة عن وجود أدلة إحصائية قوية تبين الأثر القوي لكل من تعليم المرأة، وعملها، وعمرها عند الزواج على معدل الخصوبة الذي يختلف بدرجة تأثيره لكل مؤشر. ومع ذلك، فإن تحقيق التوازن في معدلات الخصوبة بين النساء غير العاملات والنساء الأقل تمكيناً، واللواتي يعشن في المخيمات والمناطق الأقل تنميةً، والمتزوجات في سن مبكرة، والعاملات في القطاع العام وخارجه، ينبغي أن يكون موضع اهتمام في الأردن.

خلاصة الدراسة: تشير الدراسة إلى أن جهود الحكومة الأردنية لتنظيم معدل الخصوبة ينبغي أن يكون أكثر استهدافاً لتحقيق هذا التوازن، بدلاً من العمل على تنظيمه بشكل عام. ينبغي بذل المزيد من الجهد لتمكين النساء في المخيمات والمناطق النائية من خلال توفير فرص التعليم المهني والمشاركة الاقتصادية، فضلاً عن إطلاق المزيد من الحملات لرفع مستوى الوعي بأهمية استخدام الوسائل الحديثة والمناسبة لتنظيم الأسرة.

الكلمات الدالة: تمكين المرأة، التعليم، العمل، الزواج المبكر، معدل الخصوبة

1. Introduction

Although birth rates in Jordan have been decreasing steadily throughout the last two decades, Jordan still needs to commit more efforts to regulate the heterogeneous fertility rate to reduce the pressure on the country's resources and to achieve the desired economic growth which is challenged by two main formidable problems (poverty and unemployment). Even though the fertility rate depends on many factors, women's empowerment and early marriage remain the most important. Family planning also became one of the key issues at stake in Jordan, especially after the arrival of Syrian refugees. In Jordan, 60% of currently married women are using a method of family planning. Although contraceptive prevalence rose from 35% in 1990 to 60% in 2023, spacing between pregnancies is still an issue (DoS, 2023).

The aim of this paper is to investigate the causal impact of increasing women's education and employment and decreasing marriage age on their fertility rate[1] in Jordan from 1990 to 2023. The study applies a mixed method approach using quantitative and qualitative methodologies. More specifically, the study carried out different simple and multiple linear regression models for one dependent variable (fertility rate) and four independent variables of women (secondary education, tertiary education, employment, and marriage age) over the 32-year period using quantitative data obtained from the databases of the World Bank and Jordan DoS (The World Bank, 2023; DoS, 2023). Plus, it carried out two semi-structured FGDs with a pool of women who are experts in the topic, and a questionnaire with a pool of women of different heterogeneous demographic characteristics.

The study findings revealed a statistically positive impact of increasing women's education and employment on reducing the fertility rate and a stronger positive impact of decreasing early marriage on its reduction over the study period. The qualitative findings showed that the impact of education on fertility rate was very high for women with high education levels and the impact of employment was higher for women employed in non-public sectors. However, the marriage age remains the strongest indicator of all women's fertility rate, and the fertility rate balance in Jordan should be the priority. Accordingly,

The government of Jordan should work to regulate the fertility rate qualitatively and provide specific interventions to reduce it in camps, remote areas, and marginalized rural areas. Qualitative women empowerment strategies and activities, especially in these areas are necessary through providing more educational opportunities (formal and informal) and income-generating activities. They should also establish initiatives and campaigns to increase women's awareness and access to modern family planning methods and services since these services are free in many places and centers. The concerned national bodies should also cooperate and have a legal and institutional framework to reduce early marriage and its consequences on women's empowerment, mainly in terms of health and education. Furthermore, they should also support girls of early marriage cases qualitatively by providing awareness of the impact of high fertility rate on their empowerment and establishing alternative education opportunities and income-generating activities for them. Further qualitative research on women's early marriage impacts on their empowerment, particularly education is recommended too. This paper is structured as follows: section two has a background and literature review discussing the fertility rate and its relationship with women's marriage age, education, and employment. Section three presents the data and methodologies. Section 4 discusses the main quantitative and qualitative findings, and section five is dedicated to the conclusion and the study's recommendations.

2. Background and Literature Review

Although birth rates in Jordan have been decreasing steadily throughout the last two decades, the population in Jordan has witnessed a mass increase, particularly following the influx of Syrian refugees to the country, which impacted the social development in Jordan negatively (Alshoubaki and Harris, 2017). In developing countries, the population increase is more likely to have negative impacts on economic development. The unplanned and random population increase in Jordan hindered economic growth and exacerbated the two formidable challenges in the country - poverty and unemployment.

[1] Total Fertility Rate is the average number of children a woman would have by the end of her childbearing years if she bore children at the current age-specific fertility rates.

Ultimately, women's empowerment and education can reduce undesired population growth, in turn, positive economic development results (Chowdhury and Hossain, 2018).

However, the population growth ratio in Jordan has been decreasing steadily in the last two decades, it would still take Jordan almost three decades to regulate birth rates to be similar to those of Lebanon and Tunisia[2], if this trajectory continues, regardless of the refugee crisis (Bardak, 2005). The total fertility rates in Jordan, Iraq, Egypt, Bahrain, Iran, and the United Arab Emirates are listed in **Figure 1** below. However, this ratio seems good in comparison with the other countries in the Middle East, but the percentage of unmarried or divorced women in Jordan is very high. For example, 63972 marriages were registered in Jordan in 2022, while 26,756 divorces were registered in the same year. For women aged 15–49 in Jordan, only 53% are married, 42% have been never married, and the rest are either divorced or widowed (DoS, 2023).

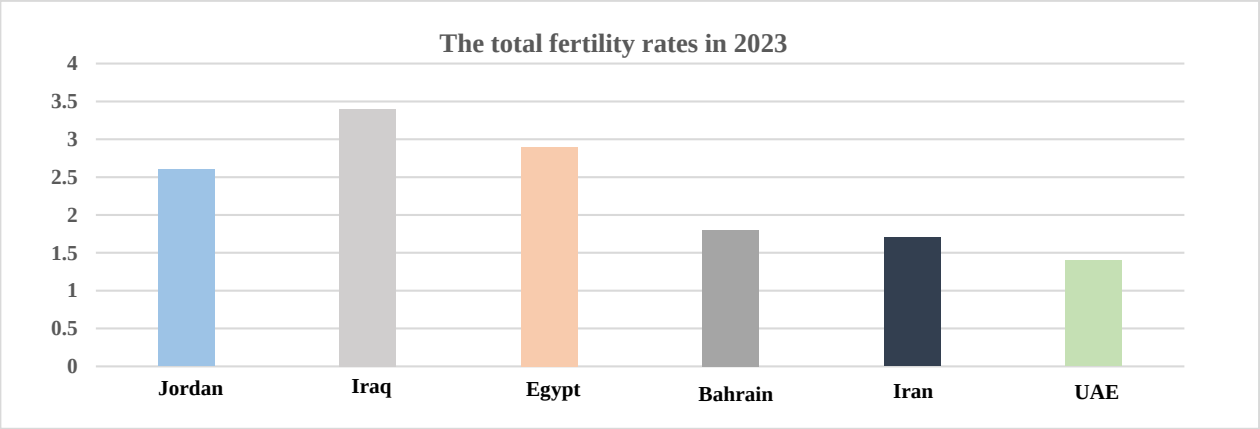

Figure 1. The total fatality rates in Jordan, Iraq, Egypt, Bahrain, Iran, and UAE in 2023

Source: (DoS, 2023; The World Bank, 2023)

A study conducted to describe the epidemiological decline in fertility rate in the Arab world between 2011-2021 showed that 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%) (Mahasneh and Ebrahim, 2024).

In Jordan, there is a strong correlation between fertility rates and women's empowerment indicators, such as education. The fertility trends within the context of changing gender dynamics are potentially influenced by shifts in fertility choices (Bani Salameh and Al-Saleem, 2024). The total fertility rate in Jordan declined rapidly from 5.6 in 1990 to 3.5 in 2012 then fluctuated in the following years reaching the lowest point at 2.6 in 2023. Meanwhile, the fertility rate for Syrian refugee women living in camps is 4.9, and for those who lives in non-camp settings in Jordan is 3.9. This creates fears of having a snowballing[3] effect on Jordan women's fertility rates. The total fertility rate is also linked to the use of family planning methods. Only 60% of currently married women in Jordan are using family planning methods, with 38 % of that group using modern contraceptives and 22 % are using traditional methods. Although contraceptive prevalence rose from 35% in 1990 to 60% in 2023, spacing between pregnancies is still an issue, as 27 % of births happened after less than two years from the previous birth by the same mothers. Dependence on traditional family planning methods only is also another issue as they are not effective in preventing pregnancy (DoS, 2023).

According to a study that was conducted to determine the causes of the fertility rate increase in Jordan, Egypt, and Syria

[2] Both countries have similar HDI and resources to those in Jordan.

[3] A situation in which one action or a trend to some people or an area causes many other similar actions or trends that affect others in the same or nearby areas.

by examining different variables,[4] women's tertiary education and employment can affect their fertility rates strongly. They form an inverse relationship with reproduction, in addition, they can raise human capital within the region and achieve demographic goals (Rashad and Zaky, 2013). Even though girls often outperform boys in tertiary educational achievements, Jordanian women have one of the lowest employment rates in the region. This also means that the higher educational achievements obtained by females have not translated into women successful economic participation in Jordan's labor market. As of 2016, Jordan had the third lowest female labor force participation rate in the world (WDI, 2019). This becomes puzzling when we look at women's educational attainment, health, and fertility rate (Boustati, 2020).

Educating girls and young women has always been considered an effective means to reduce fertility. Early studies have shown that there is a significant negative correlation between women's education and fertility (e.g., Cochrane et al., 1990; Lam and Duryea, 1999; Handa, 2000). Estimates show that an additional year of female education significantly reduces the number of births by 24% (Chen and Guo, 2022). The necessary condition of fertility decline may require a client-oriented affordable but persuasive 'planned' family-planning program, coupled with few years of schooling, particularly female, firmly supported by the political and social elite at all levels of that society, and also adapted to the socio-cultural realities of the vast masses of the people of that country (Alam, Ahmed, and Butt, 2003).

The relationship between female higher education and lower fertility rates has been confirmed by many studies. An examination study of the Demographic and Health Surveys was conducted by collecting data from 26 countries including Egypt, Morocco, and Tunisia. Its findings indicate a strong relationship between higher education and women's ability at making reproductive choices through the enhancement of their selection of contraception method and family size preference. The results also indicate that higher education has an impact on early marriage, as educated women are getting married at more advanced ages than uneducated ones (Martin, 1995). The findings of another study analyzed fertility rates in reference to education in Jordan revealed that higher rates of female education lead to lower fertility rates among Jordanian women and Syrian refugee women in Jordan. The median age for marriage has a strong correlation with higher education, where higher education can mitigate early marriage and in turn reduce fertility rates. Furthermore, female education can achieve more positive results for women and their children in terms of health and human capital (Krafft, Sieverding, and Berri, 2018). In 2022, among 44,933 cases of marriage registered in Jordan, 8,156 of them were for young women aged between 15- 19 years old, representing 18% of the total marriages (Civil Status Department, 2022).

The socio-economic situation in Jordan is characterized by high unemployment rates, particularly for women. The proportion of men in the labor force is 62.5% compared to only 14.7% for women. Women frequently face limitations on the types of jobs available to them, which often leads them to work in the public sector as teachers and nurses. These roles offer more acceptable working hours and higher safety but come with lower pay (USAID, 2024). Globally, the strong relationship between women's participation in the labor force and birth rates is confirmed. The findings of an analysis of eight countries in metropolitan areas imply that the increase of women's labor force participation contributes to fertility rate decline (Collver, 1968). In the Middle East and North Africa (MENA) region, there is a strong correlation between fertility rates and women's labor force participation (Krafft, 2016). A study assessed the impact of different variables[5] on fertility rates in the MENA region showed that higher education for women can reduce fertility rates, but the enhancement of their access to the labor market can do much more (Zalak and Goujon, 2017).

The relationship between economic development and the rate of female participation in the MENA region is u-shaped. Unemployment and high fertility rates can reduce the female participation rate in the labor market (Elmi and Shalmani, 2014). Actually, there is a bidirectional relationship between women's empowerment and economic growth. Women's empowerment enhances development, and economic growth leads to women empowerment through reducing inequality and providing better opportunities that enable females. Women's empowerment also has an important role in social development. The increase in women's education and income lead to positive effects on fertility rates, health, and children's welfare (Duflo, 2012).

[4] The variables are contraception methods, education level, wealth, desired family size, employment, and socio-economic conditions.
[5] The variables are marriage age, education, labor force participation, family-size preference, and contraceptive method patterns.

On the other hand, even though most studies confirmed that women's tertiary education & economic participation can lower fertility rates, some studies show the contrary. There is a positive association between women's level of education and lifetime fertility intentions, in which highly educated women tend to have large families. Women of reproductive ages are more prone to make investments in family size because these choices are not seen as incompatible alternatives (Testa, 2014). Another study indicated that fertility rates and women's empowerment were positively associated for only a short period of time in Western countries and that the relationship turned negative again in recent years. These findings indicate that the negative relationship between fertility rates and women's empowerment do not apply in every context (Buyukkececi and Engelhardt, 2021).

3. Data and Methodologies

Women's fertility rates depend on many factors, mainly their education level, employment status, marriage age, and family planning methods used. This study aims to investigate the impact of women's marriage age and access to education and employment on the fertility rate in Jordan from 1991 to 2023. Women's education and participation in the labor force have a bidirectional relationship with marriage age. They can delay the marriage age, thereby reducing the fertility rate. At the same time, delaying marriage age can also give women more chances to pursue their tertiary education and enhance their access to proper work opportunities. This defensibly can have a positive impact on the fertility rate. Moreover, the increase in women's education and income can expand their choices of modern family planning methods.

To achieve its aims, this study uses quantitative methods that are usually based on the analysis of numerical data to answer scientific research questions to make predictions and test causal associations. They allow us to quantify impact sizes, determine the strength of associations, and weigh the strength of evidence of effectiveness (Rana, Gutierrez, and Oldroyd, 2021). The quantitative data used in this study is obtained from the 2023 databases of the World Bank and the Jordanian DoS. The study uses simple and multiple linear regression methodologies to analyze the data. They are statistical predictive analysis tools that tell whether one independent variable or more is effective in predicting an outcome (dependent variable), and to what extent these independent variables can predict the outcome. The simple linear regression equation of one dependent variable and one independent variable is defined by the formula $Y = a + bX + e$, and the multiple linear regression equation of one dependent variable and four independent variables is defined by the formula $Y = a + b1X1 + b2X2 + b3X3 + b4X4 + e$. Where Y is an observed score on the dependent variable, a is the intercept, b is the slope, X is the observed score on the independent variable, and e is an error or residual.

More specifically, the study carried out four simple linear regression models for one dependent variable (Fertility rate, total (births per woman)) with each one of the four independent variables used (School enrollment, secondary, female (% gross)), (School enrollment, tertiary, female (% gross)), Labor force participation rate, female (% of female population ages 15+) and women's marriage age (% of females 15-19 years old marriages) over 33 years (1991-2023). Plus, it carried out a multiple linear regression model for the dependent variable (Fertility rate, total (births per woman)) with the four independent variables together over the same period. **Table 1A** in the appendix has more details about the quantitative data that has been used to carry out the regression.

Additionally, the study used qualitative methodologies to complement the quantitative ones and better triangulate and validate the findings, because they can solve any inherited limitations of the quantitative methods (Flick, 2010). Therefore, two semi-structured FGDs with a pool of women who are experts in the topics were carried out, plus the same questions of the focus groups were used as a questionnaire that was sent to many women to fill out. In detail, the study ran two FGDs, one with 9 females enrolled in tertiary education and the other with 7 females working in the gender empowerment projects field to touch base on academic and professional experiences of the topics.

On the other hand, the questionnaire was shared with a random sample of women with heterogeneous demographic profiles (women with different levels of education, various ages, unemployed, and those employed in public, private, and nonprofit sectors), with more focus on women who are experts on the topics of the study. Many key questions are asked more than once using different ways to control and increase the reliability of findings. After a week, it was completed by

68 women and all their answers were valuable and have been taken into consideration. The qualitative methodologies respected the scientific research ethics and applied the no-harm standards and the informed consent was taken from all participants[6] and respondents[7] appropriately. Privacy and data security were respected, as the questionnaire forms were anonymous and no information that might lead to the participants'/respondents' identity was collected such as names, mobile numbers, or emails. Furthermore, they were free to answer or skip any question in the FGDs/questionnaire. **Table 2A** in the appendix has the questions used in the FGDs and questionnaire.

Finally, more information about the dependent and independent indicators used in the study is below:

- **The Dependent Variable – Fertility rate total (births per woman):** It represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with age-specific fertility rates of the specified year.
- **The Independent Variable – School enrollment, secondary, female (% gross):** Gross enrollment ratio is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education shown.
- **The Independent Variable – School enrollment, tertiary, female (% gross):** Tertiary education, normally requires as a minimum condition of admission, the successful completion of education at the secondary level.
- **The Independent Variable – Labor force participation rate, female (% of female population ages 15+) (modeled ILO estimate):** It is the proportion of the population ages 15 and older that is economically active, as in all people who supply labor for the production of goods and services during a specified period.
- **The Independent Variable – Women's early marriage rate (percentage of marriages among females aged 15-19 years old)**: it is the proportion of marriages for females between 15-19 years old registered in Islamic courts and churches in Jordan.

4. Results and Discussions

This section aims to discuss all the relationships and causal impacts between the dependent variable (fertility rate) and the other four independent variables that are related to marriage age, education level, and employment status. To this end, the study carried out four simple linear regression models for the study's dependent variable with each one of the four independent variables and a multiple linear regression for the dependent variable with the four independent variables together over the same period (1991-2023). Plus, two semi-structured FGDs and a questionnaire with a pool of mostly expert women on the topic were carried out. Hence, all the findings below are extracted from the analysis of the study data and methodologies (either quantitative or qualitative).

Before carrying out the simple and multiple linear regressions, the correlation of the independent and dependent variables with time (1991-2023) should be significant. Plus, the correlation of each independent variable with the dependent variable should be significant too. The correlation coefficient (R-value) explains the strength of the relationship between an independent and dependent variable, while R-squared (R^2) explains to what extent the variance of the independent variable explains the variance of the dependent variable. The correlation coefficient values for each variable in the study with time are all significant and listed in **Table 3A** in the appendix, and the R^2 values of each independent variable with the dependent variable in the study are significant too and listed in **Figures 1A, 2A, 3A, and 4A** in the appendix.

After carrying out four simple linear regression models for the dependent variable with each one of the four independent variables for the years (1991-2023), the study reveals the following. There is statistical evidence that the increase in women's enrollment ratios in secondary and tertiary education and the increase in their access to the labor market significantly reduce the fertility rate in Jordan. Also, the decrease in early marriage rates is associated with a significant decrease in women's fertility rate. The ANOVA test results also confirm the above-mentioned results, as the Significance F. test value in each simple linear regression model is less than 0.05. This means that the study can reject the null hypothesis,

[6] Refers to the 16 women who participated in the two FGDs.
[7] Refers to the 68 women who filled out the questionnaire.

and prove that the independent variables (secondary education, tertiary education, employment, and early marriage) for women can affect the outcome (their fertility rate). The strength of relationships with the fertility rate is higher for the independent indicator of early marriage, followed by tertiary education, then secondary education, and finally employment. The R^2 values for them are (89%, 50%, 49%, and 48%) respectively. See **Table 4A, 5A, 6A, and 7A** in the appendix for more details about the statistical results of the four simple linear regression models of the dependent variable with each one of the four independent variables.

On the other hand, when carrying out a multiple linear regression for the dependent variable and the four independent variables together over the same years, there is statistical evidence that there are relationships between the independent variables and the dependent one, except for women's employment. In the ANOVA test results, the Significance F. test value for the whole model is (0.000), which is less than 0.05. The (P-value) for each one of the three independent variables (female's secondary education, female's tertiary education, and marriage age) is less than 0.05, and it is 0.33 for the independent variable of women's employment (higher than 0.05). According to the R^2 value for the whole model, about 97% of the value of fertility rate depends on these independent variables. This means that the study can reject the null hypothesis, and prove that the independent variables (secondary education, tertiary education, and marriage age) for women can affect the outcome (their fertility rate).

Surprisingly in the same model, there is no statistical evidence that the increase in women's employment has a significant impact on reducing the fertility rate in Jordan from 1991 to 2023. Even though the Significance F. test value is (0.000) for the whole model (less than 0.05) and the same independent variable has a strong relationship with the fertility rate in the simple linear regression model. The strength of relationships with the fertility rate in this model remained in the same order as in the four simple linear regression models (higher for the marriage age, followed by tertiary education, then secondary education). To double check, the study carried out a multiple linear regression for only three independent variables (removed women's employment) with the fertility rate and the value of R^2 for the whole model remained almost the same (0.966). See **Table 8A** for more details about the statistical results of the multiple linear regression of the dependent variable with the three independent variables. This means that other independent variables such as marriage age are much stronger than women's employment in quantitatively affecting the fertility rate and waved its impact away. The qualitative methodologies' findings also justified this result, as in the case of worker women, work can affect their fertility rate, especially after the first one or two births. The fact is that women access to the labor market has increased slightly over the years from 11% in 1991 to 14% in 2023. This insignificant increase for sure would reduce or neglect the quantitative impact of women's employment on the fertility rate, in case of having other stronger determinants such as marriage age and education in the same regression model. See **Table 9A** for more details about the statistical results of the multiple linear regression of the dependent variable with the four independent variables.

The qualitative methodologies' findings below came to prove the quantitative methodologies' findings and provide more insights and a deeper understanding of the determinants and consequences of fertility rate.

Most participants/respondents confirmed that early marriage, women's education and employment, and modern use of family planning methods are the most general and important determinants of the fertility rate in Jordan. Other factors were mentioned such as socioeconomic characteristics of fathers, birth spacing but without delaying the first child, women's health, balancing family members with more preference to have males in case not, economic conditions, misunderstanding of the religious view of family planning, and family's culture and mentality. In the FGDs, early marriage was the most important determinant of the fertility rate, followed by tertiary education, especially higher education (more educated women tend to have fewer children and regulate pregnancy spacing better). After that was employment, and finally less weight was given to secondary education. Most questionnaire respondents who are employed in private and nonprofit sectors revealed that work is the strongest determinant of their fertility rates, especially after the first one or two births, and worker women in the public sector showed a bigger tendency to have more births. Also, many participants and respondents revealed that social pressure and the lack of awareness of the use of modern methods of family planning are some of the strongest determinants of the fertility rate, especially for unemployed women and those who live in camps and less developed rural areas.

The majority of respondents and participants stated that education should be women's priority, as it equips them with the skills and knowledge not only to access the labor market but also to be more successful in all aspects of their lives. Without it, they cannot be well-empowered and have access only to low-paid jobs in the informal market, in turn, having a negative impact on their families' socioeconomic characteristics and economic growth in the country. Moreover, women's education level has a direct impact on their health and their children's education level. Early marriage has been viewed as a big barrier for women to pursue their secondary education and even bigger in the case of attending tertiary education. In addition, the lower participation of women in Jordan's labor market has impacted their access to formal education negatively, which can lead to a decrease in women's marriage age and increase their fertility rate.

Unfortunately, the non-public sector working environments and the expensive childcare services might also impact balancing fertility rates negatively for all women in Jordan (unemployed and employed in the public sector with those who work outside the public sector). Balancing women's fertility rate is much more important than reducing it, as many women in Jordan are single, which is why the total fertility rate seems to be moderate. Mothers who work in the public sector tend to have at least four children, while those employed in non-public sector jobs tend to have one or two at most. Educated and unemployed women (older than 30 years old) tend to have more children, especially those who lost hope in securing jobs in the public sector. The fertility rate should be reduced for refugees and women in camps, unemployed, and less empowered women; as the high fertility rate imposes heavy economic burdens on their families. They added that the fertility rate itself is not a concern unless it has negative effects on women's health, empowerment, and providing adequate care and attention to each child. Early marriage has increased in Jordan after the influx of Syrian refugees to the country, especially in camps, but its snowballing impact on Jordanian women is not very significant, except in some rural areas that host high numbers of refugees. However, it causes more negative impact on women's education than on the fertility rate, as many girls drop out of school if they marry early. This even maximizes the negative impacts in the case of having poor family economic conditions that could lead to more GBV cases or a high divorce rate.

5. Conclusion and Recommendations

Population growth in Jordan has become an alarming issue, particularly following the influx of Syrian refugees to the country. Women's fertility rate in the country varies widely. Although the total fertility rate in Jordan is considered moderate, it is still remarkably high in camps, rural, and remote areas, taking into consideration that only 53% of women in Jordan are married, while about half have never been married, divorced, or widowed. Moreover, female enrollment in secondary education has been decreasing in the last decade and there is an increase in early marriage, especially in camps and less developed areas. This study investigates the impact of women's marriage age and access to education and employment on the fertility rate in Jordan from 1991 to 2023. To this end, the study used a mixed-method approach, combining appropriate quantitative and qualitative methodologies, such as simple and multiple linear regressions, FGDs, and questionnaires.

Overall, the quantitative methodologies findings revealed statistical evidence where the increase in women's education and employment significantly reduce the fertility rate in Jordan. At the same time, the decrease in early marriage rates is associated with a more significant decrease in women's fertility rate. The qualitative data and methodologies confirmed the quantitative methods results of the study and added that the balance of fertility rate should be the real concern in Jordan. Fertility rates vary significantly in Jordan among women who are unemployed, less empowered, live in camps and less developed areas, married at early ages, employed in private and non-profit sectors, and those in the public sector. In the research it was found that women's marriage age was the strongest determinant of women's fertility rate. Education was the strongest determinant in the case of women with high education and work was the strongest determinant in the case of women employed in the private and nonprofit sectors.

The study suggests carrying out specific qualitative interventions to regulate the fertility rate in camps, remote areas, and marginalized rural areas. More women empowerment initiatives are needed, particularly those related to vocational and entrepreneurship education and income-generating activities. Modern family planning methods should be promoted and women's awareness and access to the services centers should be increased, as many women do not know that the

services are free in many places and centers in the country. Early marriage should be tackled through an institutional and legal framework that prioritizes women's empowerment, mainly in terms of health and education. Coordination between the different actors should be enforced and monitored by the government of Jordan to ensure that each actor is doing his tasks well and find a common platform to share the different actors' progress and data.

Furthermore, increasing women's awareness of the negative impacts of early marriage on their health and empowerment in the areas that have high cases of early marriage may mitigate these figures. Also, qualitatively assisting women of early marriage cases by providing awareness of the impact of high fertility rate on their empowerment and establishing alternative education opportunities and income-generating activities for them may have desirable outcomes. Nevertheless, the government of Jordan should also help women employed in the private and non-profit sectors to sustain their fertility rate and maintain their jobs. These sectors' employers should provide more supportive working environments to women, increase their maternity leave periods and access to free or less expensive childcare and nursery centers that provide higher standard services.

Appendix

Table 1A. The values of the fertility rate, secondary education, tertiary education, employment and early marriage for women in Jordan from 1991 to 2023

Year	Fertility rate, total (births per woman)	School enrollment secondary, female (% gross)	School enrollment tertiary, female (% gross)	Labor force participation rate, female (% of female population ages 15+)	Early marriage, female aged 15-19 years old out of total marriages,
1991	5.285	76.9700	21.7229	11.056	38.70%
1992	5.107	81.9008	21.5591	11.177	37.72%
1993	4.955	83.3263	21.7250	11.284	36.73%
1994	4.807	85.2308	19.6778	11.42	35.74%
1995	4.662	86.8400	20.0543	11.602	34.76%
1996	4.512	88.4512	20.4309	11.625	33.77%
1997	4.337	89.0714	23.3013	11.692	32.79%
1998	4.164	89.3815	27.1603	11.783	31.80%
1999	4.037	89.6917	29.0898	11.874	30.82%
2000	3.921	88.2969	31.0193	11.96	31.80%
2001	3.853	87.8500	31.7782	11.397	30.90%
2002	3.832	87.3971	32.5370	11.999	28.04%
2003	3.838	86.4371	37.9571	10.95	29.08%
2004	3.801	84.3985	42.6895	11.211	29.07%
2005	3.779	83.5589	41.2888	11.475	29.29%
2006	3.802	84.5073	41.5715	11.669	28.41%
2007	3.847	78.0860	38.9456	14.466	27.45%
2008	3.892	79.3615	41.8823	14.032	27.11%
2009	3.842	78.3629	42.8630	14.68	26.56%
2010	3.778	77.3643	39.6321	14.55	26.01%
2011	3.681	77.3388	39.8821	14.506	26.04%
2012	3.559	77.0714	46.9674	13.94	25.49%
2013	3.436	79.3827	41.7851	12.986	26.89%
2014	3.31	75.1035	39.1940	12.273	19.97%
2015	3.175	69.7371	36.6029	13.568	19.69%
2016	3.077	67.0538	34.3475	15.02	13.41%
2017	3.027	64.3706	31.5483	16.58	13.43%
2018	2.973	64.7993	36.1511	14.615	11.63%
2019	2.918	66.5335	34.9571	13.645	10.67%
2020	2.873	67.9438	36.4724	14.942	11.82%
2021	2.83	70.0691	38.2594	13.926	10.66%
2022	2.786	70.9684	41.3307	13.634	9.12%
2023	2.6	71.87	41.3307	14.047	9.12%

Table 2A. The questions used in the FGDs and questionnaire

Focus Group & Qualitative Survey Questions				
This questionnaire is part of scientific research that studies the relationship between women's fertility rates and their enrollment in education, especially at the university level, the labor market in Jordan, and early marriage. The questionnaire includes a number of questions through which we aim to know your views on the topic, and it takes about 10-15 minutes to answer them. The target group of the questionnaire is adult women of childbearing age, aged 18-49 years only.				
Consent				
I agree to participate in this questionnaire, and I know that the information in it is for research purposes only, and will be anonymous, without referring to any information that may identify the questionnaire filler later in the research.				
□ Yes	□ No			
Important note: *some questions might not apply to you, please do not answer them and just add (Not Applicable) in the answer space. If you selected to answer these questions, please make sure that you answer them based on your opinion of the general situation of a Jordanian woman*				
Demographic information:				
Age	□ 18-	□ 18-24	□ 25-29	□ 30-34
	□ 35-39	□ 40-44	□ 45-49	□ 49+
Marital Status	□ Single	□ Married	□ Divorced	□ Widow
If married, for how long have you been married? (in years)				
□ 5-	□ 5-10	□ 11-15	□ 16-20	□ +20
Highest level of education				
□ Basic Education	□ Secondary Education	□ Diploma	□ Bachelors	□ Higher Diploma
□ Masters	□ Ph.D.			
Employment status				
□ working in the public sector		□ working in the private sector	□ working in NGOs, CBOs, or similar jobs	
□ Retired	□ Don't work			
For how many years have you been working? (in years)				
□ 5-	□ 5-10	□ 11-15	□ 15+	
Introductory questions				
A. How many children do you have? Which factors did you consider when you planned to get pregnant? *(Please consider health, social, and economic, and any other factors/determinants).* If they can be arranged from the most important to least important is better.				
B. In your opinion, what are the main reasons for the high fertility rate in Jordan? if they can be arranged from most important to least important is better.				
Core Questions				
1.	**In your opinion, what is the importance of education to women in Jordan? How it can contribute to her quality of life?**			
2.	**What are the barriers that prevent women from completing their secondary and/ or tertiary education? How this can affect their participation in the labor market and their ability to get good work opportunities?**			
3.	**What are the other factors that can limit women's participation in the labor market? Do you think multiple pregnancies are one of these factors? How? Do you think that woman's participation in the labor market influences her decision to get pregnant or not? How?**			
4.	**What are the main factors that might limelight or reduce the fertility rate in Jordan? if they can be arranged from most important to least important is better**			
5.	**Do you think tertiary education for women can reduce the fertility rate? How?**			
6.	**Do you think a woman's employment / economic participation can reduce her fertility rate? How?**			
7.	**Do you think it is good for women to have a high fertility rate without being economically or educationally empowered? why?**			
8.	**For you (personally), what are the main things that might encourage or discourage you from getting more children**			
9.	**Do you think that the existing family planning practices in Jordan are enough to regulate the fertility rate? If not,Why? Or what are the practices that we should use/foster in this concern? What are the shortcomings in our family planning practices in Jordan?**			
10.	**Do you think that early marriage is rising again in Jordan after the Syrian crisis? why/how?**			
11.	**In your opinion, how early marriage can affect the fertility rate in Jordan?**			
12.	**What are the main ideas/factors that can undermine or eliminate early marriage?**			
Closing Questions				
13.	**Do you think that fertility is one of the main causes of women's withdrawal from the labor market in Jordan? How?**			
14.	**Do you have any other facts or information/comments related to the topics: family planning, fertility rate, women's education or employment, early marriage that you want to share?**			
End of the Questionnaire				

Table 3A. The correlation coefficients for the independent and dependent variables with time

	"Fertility rate, total (births per woman)"	"School enrollment secondary, female (% gross)"	"School enrollment tertiary, female (% gross)"	"Labor force participation rate, female (% of female population ages 15+)"	Early marriage, females aged 15-19 years old out of total marriages, courts
correlation coefficient	-0.964869555	-0.820174565	0.736086879	0.782249569	-0.956567623

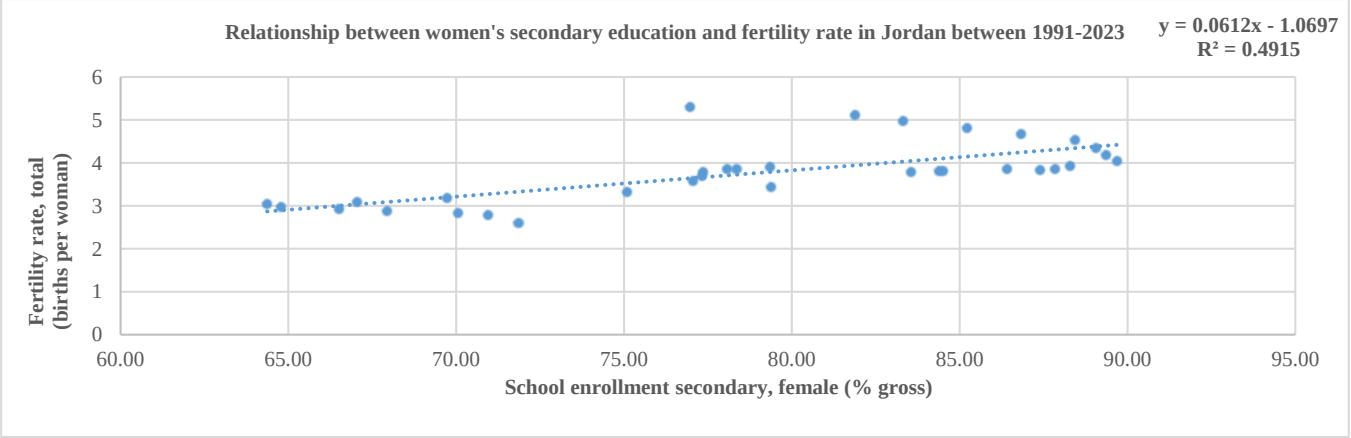

Figure 1A. women's secondary education and fertility rate relationship over 1991-2023

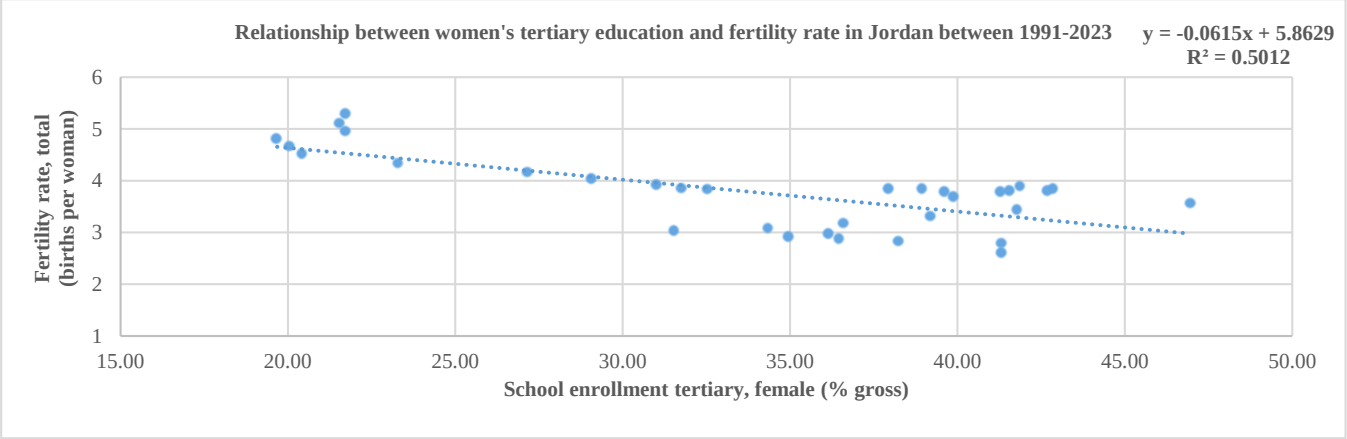

Figure 2A. women's tertiary education and fertility rate relationship over 1991-2023

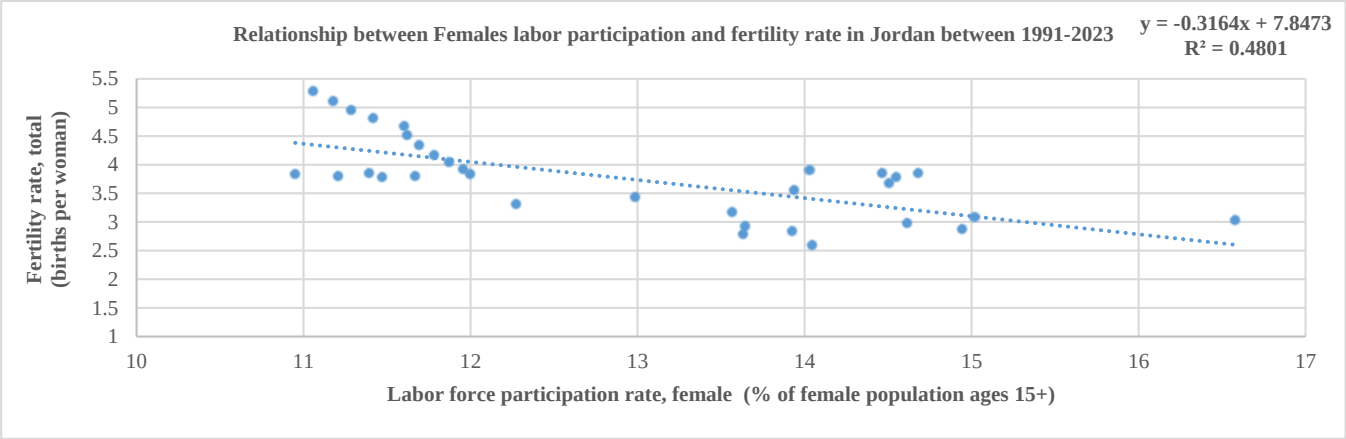

Figure 3A. Women's labor force participation and fertility rate relationship over 1991-2023

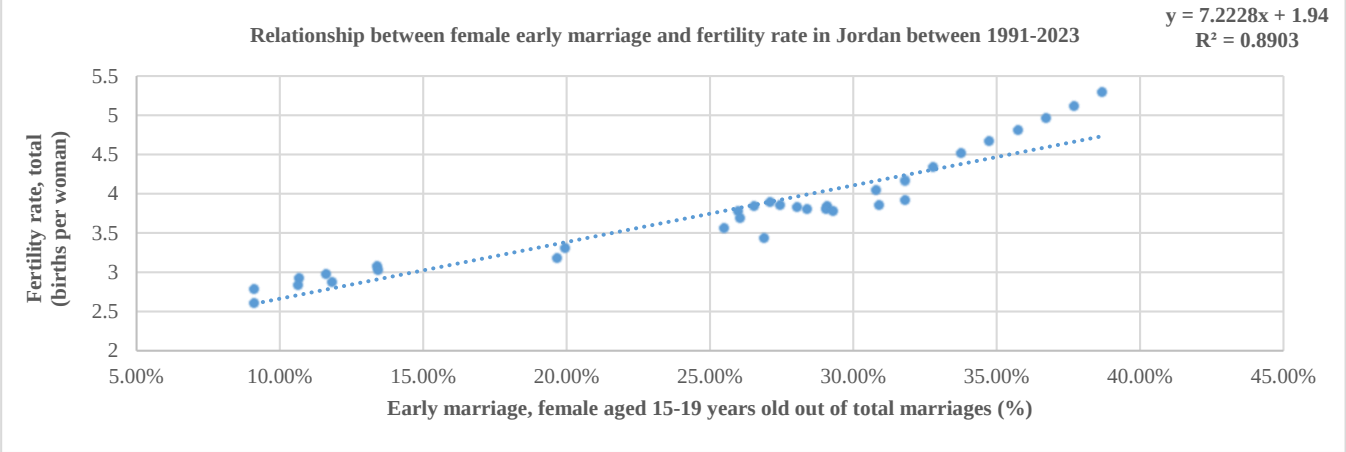

Figure 4A. Early marriage and fertility rate relationship over 1991-2023

Table 4A. The simple linear regression for secondary education with fertility rate results (Regression Statistics, ANOVA, and the Intercept)

Regression Statistics	
Multiple R	0.701065153
R Square	0.491492349
Adjusted R Square	0.475088876
Standard Error	0.507008392
Observations	33

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	7.702137	7.702137	29.9627	0.0000055			
Residual	31	7.968783	0.257058					
Total	32	15.67092						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-1.069659091	0.887913	-1.20469	0.23744	-2.880569348	0.741251	-2.88057	0.741251
School enrollment secondary, female (% gross)	0.06117727	0.011176	5.47382	0.0000055	0.038382974	0.083972	0.038383	0.083972

Table 5A. The simple linear regression for tertiary education with fertility rate results (Regression Statistics, ANOVA, and the Intercept)

Regression Statistics	
Multiple R	0.707956468
R Square	0.50120236
Adjusted R Square	0.485112114
Standard Error	0.502144369
Observations	33

ANOVA

	df	***SS***	***MS***	***F***	***Significance F***			
Regression	1	7.854302	7.854302	31.14945	0.0000041			
Residual	31	7.816618	0.252149					
Total	32	15.67092						
	Coefficients	***Standard Error***	***t Stat***	***P-value***	***Lower 95%***	***Upper 95%***	***Lower 95.0%***	***Upper 95.0%***
Intercept	5.862859375	0.385642	15.20285	0.000000	5.076337125	6.649382	5.076337	6.649382
"School enrollment tertiary, female (% gross)"	-0.06145283	0.011011	-5.58117	0.0000041	-0.08390939	-0.039	-0.08391	-0.039

Table 6A. The simple linear regression for labor force participation with fertility rate results (Regression Statistics, ANOVA, and the Intercept)

Regression Statistics	
Multiple R	0.69286839
R Square	0.480066606
Adjusted R Square	0.463294561
Standard Error	0.512672779
Observations	33

ANOVA

	df	***SS***	***MS***	***F***	***Significance F***			
Regression	1	7.523085	7.523085	28.62302	0.0000079			
Residual	31	8.147835	0.262833					
Total	32	15.67092						
	Coefficients	***Standard Error***	***t Stat***	***P-value***	***Lower 95%***	***Upper 95%***	***Lower 95.0%***	***Upper 95.0%***
Intercept	7.847282811	0.767951	10.21847	0.0000000	6.281036478	9.413529	6.281036	9.413529
"Labor force participation rate, female (% of female population ages 15+)"	-0.316422452	0.059144	-5.35005	0.0000079	-0.43704711	-0.1958	-0.43705	-0.1958

Table 7A. The simple linear regression for women's marriage age with fertility rate results (Regression Statistics, ANOVA, and the Intercept)

Regression Statistics	
Multiple R	0.943552626
R Square	0.890291558
Adjusted R Square	0.886752576
Standard Error	0.235497568
Observations	33

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1	13.95169	13.95169	251.567133	0.00009957			
Residual	31	1.719232	0.055459					
Total	32	15.67092						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	1.940035383	0.122237	15.87103	0.000	1.690730366	2.18934	1.69073	2.18934
Early marriage, female aged 15-19 years old out of total marriages, Islamic courts & Churches records	7.222821071	0.455386	15.86087	0.000	6.294054705	8.151587	6.294055	8.151587

Table 8A. The multiple linear regression results for three independent variables with fertility rate results (Regression Statistics, ANOVA and the Intercept)

Regression Statistics	
Multiple R	0.983276191
R Square	0.966832067
Adjusted R Square	0.963400902
Standard Error	0.133877456
Observations	33

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	15.15115	5.050383	281.7795	0.000			
Residual	29	0.519772	0.017923					
Total	32	15.67092						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	4.416622094	0.358488	12.32015	0.000000	3.683432626	5.149812	3.683433	5.149812
School enrollment secondary, female (% gross)	-0.02424691	0.005576	-4.3485	0.000154	-0.035650953	-0.01284	-0.03565	-0.01284
School enrollment tertiary, female (% gross)	-0.02195857	0.00353	-6.22128	0.000001	-0.029177396	-0.01474	-0.02918	-0.01474
Early marriage, female aged 15-19 years old out of total marriages, Islamic courts & Churches records	7.971202886	0.535268	14.89197	0.000000	6.876456067	9.06595	6.876456	9.06595

Table 9A. The multiple linear regression results for 4 independent variables with fertility rate (Regression Statistics, ANOVA and the Intercept)

Regression Statistics	
Multiple R	0.983838
R Square	0.967937
Adjusted R Square	0.963357
Standard Error	0.133958
Observations	33

ANOVA

	Df	*SS*	*MS*	*F*	*Significance F*			
Regression	4	15.16847	3.792117	211.3218	0.000			
Residual	28	0.502453	0.017945					
Total	32	15.67092						

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	4.994017	0.688547	7.252977	0.000	3.583592	6.404442	3.583592	6.404442
School enrollment secondary, female (% gross)	-0.02749	0.006482	-4.24061	0.00022	-0.040768	-0.01421	-0.04077	-0.01421
School enrollment tertiary, female (% gross)	-0.021	0.003663	-5.73414	0.000004	-0.028507	-0.0135	-0.02851	-0.0135
Labor force participation rate, female (% of female population ages 15+)	-0.02657	0.027043	-0.98241	0.33431	-0.081963	0.028828	-0.08196	0.028828
Early marriage, female aged 15-19 years old out of total marriages, Islamic courts & Churches records	7.92766	0.537421	14.7513	0.0000	6.826802	9.028518	6.826802	9.028518

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