Local Factors Affecting Fertility of Women in Sri Lanka

R.P.G. Amithani[1*], D.S. Rodrigo[1] and C.L. Jayasinghe [2]

[1]*Department of Mathematics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Sri Lanka*
[2]*Department of Statistics, Faculty of Applied Sciences, University of Sri Jayewardenepura, Sri Lanka*

***Abstract*: Human fertility is a function of various factors that contribute to population dynamics. It may be defined as the actual reproductive performance of a woman. Fertility is a major public health concern because it affects economic productivity, growth of the population and other social facilities. This study aims to find the demographic, socio economic, cultural and health related factors that affect the fertility of reproductive aged women in Sri Lanka. The study was based on a Sri Lankan demographic and health survey (SLDHS) conducted in 2016. The sample consisted of 11, 201 ever married women within reproductive ages ranging from 15 to 49 years. Among the considered social, demographic, cultural and health-related factors, the statistical analysis which was conducted employing chi-square tests and logistic regression models revealed that, socio-demographic factors such as the woman's residential district, ethnicity, wealth index, education level, occupation, and partner's education level and working status were found to have a significant effect on odds of having at least the required fertility level for her age at 5% level of significance. The odds of having at least the required fertility level for her age of a woman belonging to the lowest quintile of wealth index was 48.1% more than that of a woman belonging to the highest quintile of wealth index. The results revealed by this study will be beneficial for relevant authorities when organizing awareness programs on fertility for ever married women in Sri Lanka.**

***Key words*: Binary logistic regression model, Ever married woman, Fertility**

I. INTRODUCTION

Fertility is the ability of a woman to bear a child in her childbearing age. Human fertility is one of the major elements in population dynamics that determine the size and the structure of the population and it is one of the major components among the three principal components of a population. The other two components are mortality and migration ("Department of Census and Statistics," 2020). "Total Fertility Rate (TFR)" is the average number of children a woman is expected to give birth to by the end of her childbearing years ("World Health Organization," 2020).

Although the universal population increases from time to time in a considerable manner, according to the 2015 United Nations world fertility report, the world fertility rate has started to decrease in the 1970's and it has become considerably low in 2010-2015. In the period 1970-1975 approximately 50% of the countries in the world had a total fertility rate above 5.5 births per woman. In the period of 2010-2015 however, it has declined to a median fertility rate of 2.3 births per woman ("United Nations," 2015). Fertility transition is obviously on in Sub-Saharan Africa although fertility rates in the region are still considerably higher than any other region of the world. Total fertility rate was also high for the group of countries named by the United Nations as the least developed countries.

As residents of a developing country Sri Lankans are lower middle income earners. Therefore, they have several types of lifestyles. These lifestyle behaviors have led to a considerable change in the socio-economic of the development of the country. From 1963 to 1975 the total fertility rate dropped from 5.0 births per woman to 3.4 births per woman. In 1975 and 1987 total fertility rate appears to have significantly increased, however then again declined to 2.8 births per woman in 1987. During the period of 1987 to 2000 the total fertility rate was 1.9 births per woman. As the investigation of the total fertility rate it was shown relatively stable during the period of 2000-2016. This is mainly due to the socio-economic and cultural background which is mainly focusing towards fertility ("Department of Census and Statistics," 2020).

I.I Statement of The Problem

In the Sri Lankan society, one can observe two types of family structures: nuclear family and extended family. In any society children are considered as the most precious gift that humans can ever receive. During the first half of the 20th century, there was a larger number of children in a family. Hence in general the total fertility rate of women was above 5.

In 1939 at the latter part of World War II, industrialization began all over the world. Machineries became a major part of the workplaces and led to reduce the usage of manpower. This indirectly affected people's attitudes towards the extended family in society were gradually decreased. In Sri Lanka it occurred in 1970, after the involvement of the government sector. Through this concept the quality of a family concept was increased but the numerical aspect of family was reduced. Furthermore, in the middle part of the 20th century most of the countries adopted a family planning concept. Hence South Asian countries and the East part of the Asian countries, family planning concept was developed in the end of the middle part of the 20th century. This ultimately resulted in two or less children in a family on average.

Considering the fertility patterns, it can be observed that it is varying between countries and over time. Fertility is

dependent upon various etiological factors. These factors can be classified mainly into direct factors and indirect factors. The direct factors are known as etiological factors which concern the female reproductive system. Indirect determinants or the distal factors are factors which consist of socio-economic, socio-cultural and demographic factors that affect fertility indirectly through affecting etiological factors (Dana, 2018). Human fertility is complex because of involvement of multiple etiological factors. Some of the factors are difficult to measure because their measurement involves subjectivity.

Sri Lanka is a developing country and studies related to most developing countries deal with socio- economic, demographic and cultural factors in determining differences in fertility levels. Though the nature of determining fertility is complicated, fertility behavior influences growth of population, which significantly involves resources the country has such as employment state, health and other social facilities and saving investment and consequences of such have greatly affect socio-economic variables that affect fertility behavior. Most socio-economic factors are affected by demographic factors. These factors proximally or distally affect the interaction process. Though socio-economic factors, cultural factors and demographic factors may not directly involve fertility but they may influence fertility behavior distally. Some of these factors could be education, occupation, religion, ethnicity, wealth index, place of residence & district etc. This study attempts to examine the effect of some selected demographic socio-economic and cultural factors on fertility behavior of reproductive aged women (15-49 years) in the Sri Lankan context.

I.II Literature Review

Various factors can affect fertility. Infertility is the inability of a sexually active, non-contraception couple to achieve pregnancy in one year ("World Health Organization", 2020). Infertility is a significant global public health problem affecting couples from every human population around the world. It is estimated that at least 10% of the global reproductive age population are affected by infertility of some description and the majority of those who suffer live in a developing country (Siddiqui, 1996). For couples in the developing country, infertility can have far- reaching negative health consequences. In countries without well-developed social welfare infrastructure, families may also depend on children as a crucial source of economic support in old age or during times of sickness.

Researchers have identified that the proportion married, contraception, postpartum infecundability, and induced abortions were the most important factors which lead to decline the fertility rate in Sri Lanka (Wijesekere & Arunachalam, 2015). According to them, increment in those who engage in higher educational attainment of women was the reason for the reduction of the mean age at marriage, thus contributing to a decline in the total fertility rate. Furthermore, higher education increases the opportunities in the labor market and the value of a woman's time, ultimately has resulted in reducing their time spent raising children. Further to the intense usage of contraceptive methods TFR has declined. In 2000, usage of contraceptive methods had increased, therefore women may have been allowed a chance to avoid unwanted pregnancies. Induced abortions are illegal in Sri Lanka, even though data related to abortion were less, they were highly observant among married women with low education levels (Wijesekere & Arunachalam, 2015).

History of the modern world, fertility declines throughout the transition from an age of economic stagnation to an age of sustained growth driven by technological development. During this evolutionary development, demographic amendment is additionally characterized by higher investments in human capital and increased life anticipation. These unreal factors arise from the history of the advanced countries wherever the onset of the demographic transition occurred in between the late 19^{th} century and therefore the 1^{st} decades of the 20^{th} century. During the period of World War II, decline of fertility rate may occur in most of the developing countries in the world.

A study of expected family size and excess fertility in East Africa, focusing on the results obtained from descriptive statistics, focusing on excessive fertility, and excluding demographic factors such as actual fertility and mortality (Muhoza, Broekhuis, & Hooimeijer, 2014). It is evident that Eastern children, such as Kenya, Uganda, Tanzania and Rwanda do not have the same attitudes about fertility and that different communities have different aspirations for family size within the same country. Of the East African countries mentioned above, Rwanda has the lowest diversity and Kenya has the highest diversity of fertility preferences, depending on the socio-economic or socio-cultural factors that determine the communities of interest, mainly education level and religion. When it comes to religion, Christians desire nearly half of children than the Muslims desire children (Dana, 2018).

A percentage of 2.7 of women in Moshi, Tanzania and Multiethnic countries in Africa never had a child. Further 6.1 per cent of those women are infertile (Larsen & Hollos, 2005). 23 (17.2%) out of women of India khairwars community were found as infertile. In non-Khairwars it was about 10%. So the prevalence was higher in Khairwars than non Khairwars (Kumar, 2007).

Obesity is defined by the National Institutes of Health (NIH) as body mass index (BMI) is $30kgm^{-2}$ or more. Obesity is one of the risk factors for many non-communicable diseases. It has been proved that obesity is associated with female fertility. Obesity is known to cause an ovulation, sub fertility, increase risk of fetal anomalies and miscarriage. Sathya et al. concluded that pre-conceptual counselling for obese women is must for reducing the risk pregnancy (Sathya, Balasubramanyam, Gupta, & Verma, 2010). Associated with women with normal weight, live birth was declined by 14 and 15% in overweight and obese anovulatory women. For the ovulatory women it was reduced respectively by 22 and 24%. Thus, it concluded that overweight and obese sub fertile

women have less chance for successful fertility. (Koning et al., 2010). The relationship between subfertility and overweight women shows the chance of spontaneous conception and conception after ovulation induction and assisted reproduction are lower in obese women. Chance of miscarriages and still birth are more in obese than the normal weight women. They conclude sub fertile women have a chance to increase their conceptions by reducing weight of 5-15%. It can be achieved through a low calorie diet, increased exercise and behavior modification (Sangeetha, 2014).

Cigarette smoking, cocaine, marijuana and alcohol use, exercise, caffeine consumption and ever use of thyroid medications were possible lifestyle factors for infertility. Furthermore, advancing age, history of a sexually transmitted infection are potential risk factors for lowering fertility. Studies proved individual counselling, education and community-wide education can be used for lifestyle risk factor management (Kelly-Weeder & O'Connor, 2006).

Stress and infertility are directly related. Psychological problems including anxiety, depression and social phobias can lead to lower fertility. But problems related to personality contribute in a more complicated manner towards fertility (Cortes, Hunt, & McHale, 2014). Fertility problem stress has a direct relationship with increased marital conflict and decreased sexual self-esteem, satisfaction with own sexual performance and frequency of sexual intercourse may lead to occurrence of psychological stress and finally lead to lower fertility.

Secondary infertility women had more risk of HIV/AIDS than primary infertility or fertile women. Researchers prove that the HIV prevalence and risky sexual behavior is high among infertile population (Muvunyi et al., 2011). Infertile married women are more prone to have HIV/AIDS than fertile women. Because infertile married women are more likely to have extra-marital affairs than the fertile women (Rhodwell, 2016).

Gender based violence (GBV) and infertility has no clear association towards primary infertility. However 21% of women have been reported to have experienced partner violence in intimate situations. Study reported that 26% of cases reported GBV at any time. Researches proved that 73.2% of infertile married women are likely to GBV & 47% in Zambia. However women with primary education mostly suffer from GBV than the women with secondary education (Rhodwell, 2016).

I.III Objectives of the Research

- The main objective of this study was to identify the demographic, socio-economic and cultural factors that affect the fertility of reproductive aged women in Sri Lanka.
- We also aimed to identify the factors which have a significant positive effect on the fertility of a Sri Lankan woman in the childbearing age.

II. METHODOLOGY

In this Section we give details regarding the research methodology of this study which involves utilized research design, variables and measures considered, and methods used in the analysis of the data.

II.I Research Design

This study was carried out utilizing secondary data extracted from the database of the Sri Lanka Demographic and Health Survey (SLDHS) 2016 conducted by the Department of Census and Statistics, Sri Lanka. Study design is observational, specifically speaking it is a retrospective study. The target population is all the women within reproductive age range from 15 to 49 years who were either permanent residents of the households in the 2016 SLDHS sample present in the household on the night before the survey were eligible to be interviewed. Sample of this study is the ever-married women (11,201) in Sri Lanka whose age ranges from 15 to 49 years.

II.II Variables Considered in the Study

The variables were identified through a thorough review of the SLDHS questionnaire to satisfy the aims of the study. The following specific sections on the SLDHS questionnaire were specifically reviewed in the process:

- Respondent's Background
- Reproduction,
- Fertility Preferences, and
- Husband's Background and Woman's Work.
- Weight, height and hemoglobin measurement for women aged 15-49

II.II.I Response Variable

The dependent or the response variable is a binary/dichotomous variable and is defined as the "attainment of at least the required fertility level for a woman's age". The selection of this variable is based on its proximity to the concept of individual fertility. Hence, the response variable Y is defined as follows:

$$Y = \begin{cases} 1 & \text{When a woman has at least the required fertility level for her age.} \\ 0 & \text{when a woman does not Have the required fertility level for her age.} \end{cases}$$

Table 1. Age Specific Fertility Rate (Asfr) Per Woman

Age Group	ASFR	5*ASFR	Cumulative 5*ASFR
15-19	0.021	0.105	0.105
20-24	0.086	0.43	0.535
25-29	0.143	0.715	1.250
30-34	0.115	0.575	1.825
35-39	0.055	0.275	2.100
40-44	0.010	0.05	2.15
45-49	0.001	0.005	2.155

The required fertility level for a woman's age (Z) is computed based on Age Specific Fertility Rates (ASFR) per woman (refer to Table 1) as follows:

Required Fertility level (Z) = Cumulative sum of ASFRs of ages<= woman's current age. The response variable was measured as a binary variable as follows:

Y=1 If Total number of births at present $\geq$ Z

Y=0 If Total number of births at present < Z

II.II.II Explanatory Variables/Factors

Various demographic, socio-economic, cultural and health-related factors were identified as factors that could potentially affect the fertility level of a woman from the DHS database. These included woman's educational achievement, age, occupational category, religion, wealth index, ethnicity, district, type of residence, partner's education achievement and working status, history of natural abortions, passive smoking allowed inside the home, BMI category and utilization of a family planning method.

II.III Methodo Of Data Analysis

After identification of the collected data, it is necessary to analyze the data by using appropriate statistical tools to fulfill the aims of the study. In Sections II.III.I –II.III.IV we present the statistical techniques that were used in the analysis of data.

II.III.I Descriptive Statistics

Descriptive statistical analyses were performed on all variables concerned to investigate the composition of the sample with respect to demographic and socio-economic variables. Descriptive statistics were utilized to describe and summarize data in a meaningful manner in order to observe hidden patterns that might emerge from the data. For categorical variables, frequency tables, pie charts and bar charts used to determine the distribution of each category.

II.III.II Chi Square Tests for Testing Association

The Chi Square tests were used to test whether there is an association or not between attainment of at least the required fertility level for a woman's age and predictor variables considered in study.

The Chi Square test statistic is,

$$\chi^2 = \sum_{i=1}^{R}\sum_{j=1}^{C}\frac{(O_{ij}-E_{ij})^2}{E_{ij}} \qquad (1)$$

where $i = 1,2,\dots R \quad j = 1,2,\dots C$

O_{ij} - observed frequency

E_{ij} - expected frequency

with degrees of freedom equal to numbers of categories minus one i.e.$(R-1)(C-1)$ where R is the total number of rows and C is the total number of columns .

II.III.III Odds Ratio

The odds of an event happening is defined as the ratio of the probability that the event will occur divided by the probability that the event will not occur. The odd of event *A* occurrence is given by:

$$Odds = \frac{P(A)}{1-P(A)} \qquad (2)$$

Where $P(A)$ is the probability of occurrence of event A.

The Odds Ratio (OR) measures how strongly an event is associated with a certain group compared to another in a retrospective study. Hence, the Odds Ratio is a ratio of two odds:

$$Odds\ Ratio\ (OR) = \frac{Odds\ of\ the\ event\ in\ the\ first\ group}{Odds\ of\ the\ event\ in\ the\ second\ group} \qquad (3)$$

When the

- $OR > 1$ indicates higher odds of event occurrence in group 1 compared to that in group 2.
- $OR < 1$ it indicates decreased odds of event occurrence in group 1 compared to that in group 2.

II.III.IV Binary Logistic Regression Model

Logistic regression is a regression model which is used in situations in which the outcome variable is categorical. Logistic regression analysis is used to examine the influence of various factors on a dichotomous variable by predicting the probability of an event, given a set of predictor variables. Binary logistic regression model is used to predict the relationship between independent variables and a predicted variable (the dependent variable) where the dependent variable is dichotomous (Hosmer Jr, Lemeshow, & Sturdivant, 2013). The explanatory variables may be continuous, or discrete categorical.

II.III.IV.I Simple Binary Logistic Regression Model

Simple binary logistic regression analysis refers to the regression application with one dichotomous outcome and one independent variable (can be a categorical random variable with two levels or a quantitative random variable). The binary/dichotomous response variable can take the value 1 with probability of success π or value 0 with probability of

failure$1-\pi$. It is denoted by Y_i and explanatory variable is denoted by X_i , $i = 1, \dots, n$ where n is the sample size. We can write the simple binary logistic regression model as given below:

$$logit(\pi_i) = log\left(\frac{\pi i}{1-\pi i}\right) = \beta_0 + \beta_1 x_i \qquad (4)$$

Here for a quantitative explanatory variable the parameter β_1 determines the rate of increase or decrease of with a unit increase/decrease in the exploratory variables on the log of odds that $Y = 1$whereas for a binary variable (a categorical variable coded as binary) the parameter β_1 measures the increment/decrement factor of $X = 1$when compared to $X = 0$ on the log of odds that $Y = 1$ (Hosmer, Taber, & Lemeshow, 1991).

II.III.IV.II Multiple Binary Logistic Regression Model

Multiple logistic regression analysis applies when there is a single dichotomous outcome and more than one independent variable. The binary/dichotomous response variable can take the value 1 with probability of success π or value 0 with probability of failure$1-\pi$. It is denoted by Y_j and quantitative explanatory variables are denoted by X_{ij} , $i = 1,2, \dots m$ and $j = 1,2, \dots n$. We can write the binary logistic regression model as given below:

$$logit(\pi_j) = log\left(\frac{\pi j}{1-\pi j}\right) = \beta_0 + \beta_1 x_{1j} + \beta_2 x_{2j} + \beta_3 x_{3j} + \dots\dots\dots + \beta_i x_{ij} \qquad (5)$$

Here also the interpretation of a coefficient depends on the type of the random variable associated with the coefficient; e.g. the parameter β_i determines the rate of increase or decrease of a quantitative random variable on the log of odds that $Y = 1$, controlling for other independent random variables (Hosmer, Taber, & Lemeshow, 1991).

II.III.IV.III Assessing The Goodness of Fit Of The Model

Hosmer-Lemeshow test is the standard method used to check the goodness of fit of a logistic regression model. The method proposed by Hosmer and Lemeshow (1982) can be briefly explained as below. The goodness of the fit test Hosmer-Lemeshow divides the subjects into decimal bases based on the predicted probabilities. The Hosmer-Lemeshow goodness fit of statistic C is obtained by calculating the formula (Hosmer Jr et al., 2013):

$$C = \sum_{i=1}^{n} \frac{(O_k - n_k \pi_k)^2}{n_k \pi_k (1-\pi_k)} \qquad (6)$$

where the n is the number of groups, n_k is the number of observation in the k[th] group and O_k is the sum of the y values for the k[th] group.

Hosmer and Lemeshow (1980) demonstrated that the null hypothesis that the fitted logistic regression model is the correct model, the distribution of statistics "C" well approximated by the Chi-Squared distribution with n-2 degrees of freedom, $x^2(n-2)$.

III. RESULT AND DISCUSSION

The sample considered in the study consisted of 11, 201 women; i.e. all the ever married women whose age ranges from 15 to 49 years and participated in 2016 DHS. The descriptive analysis of data revealed that among these, a large portion of women in the sample were residents of rural areas and urban and estate became the second and third respectively which is in line with the general composition of Sri Lanka when place of residence is considered. Among those women 68.55% belonged to Sinhala ethnic group, 22.4% were Tamil and the remaining 9.05% were Muslim women. The majority of individuals 69.2% were unemployed and the 30.8% of respondents were currently working. Furthermore, 1.51% of women in the sample were uneducated, 7.19% of them were primary educated, 60.89% were secondary educated, 25.66% were collegiate level educated and 4.75% were tertiary educated. Percentage belonging to poorest and poor categories created based on the percentiles of wealth index was greater than 20%. Percentages corresponding to middle and rich quartiles of the wealth index were approximately equal and 17.82% of women in the sample belonged to the richest category. Among those women 17.1%vallowed smoking inside the home, 82.9% not allowed smoking inside the home. 16.9% of women in the sample had a history of natural abortions. Furthermore 9.1% of women in the sample were underweight, 46.7% of them were Normal weight, 31.6% were overweight and 12.7% were obese. 78.5% of women used family planning methods and 21.5% of them were not used family planning methods.

As the initial step a series of Chi-square tests were conducted and based on the Chi-square test, district, religion, ethnicity, wealth index, woman's education level, woman's occupation category, partner's education level, partner's working status, type of residence all the variables considered in the analysis were identified as having a significant association with the response variable under 0.05 significance level. Furthermore, history of natural abortions, passive smoking allowed inside the home, BMI category, Use of family planning method were identified as not having a significant association with the response variable under 0.05 significance level. Then, quantify the association through odds ratios binary logistic regression models were fitted for each variable separately. The analysis indicated that the women who lived in rural hubs were likely to have at least the required fertility level for her age than urban women. The similar study conducted in Nepal revealed that rural women wish to have more children than urban women (Adhikari, 2010). Furthermore a similar observation was made in an Ethiopian study (Dana, 2018). Our analysis also indicated that there is a significant difference in the likelihood attainment of at least the required fertility level for a woman's age among different ethnic groups. In Nepal, Muslim women were revealed to be more likely to have more children than the number of children Hindu women would have (Adhikari, 2010). The analysis further indicated that the likelihood of a woman belonging to the poorest wealth index category to have at least required

fertility level for her age is higher than that of a woman belonging to any other wealth index quintile. Wealth is a major factor affecting fertility in Ghana even with other socio-economic factors and it was revealed that the poor women have more children than the rich women (McFalls Jr, 1991). In India also it was found that a relationship between wealth and fertility rates (Highland, 2014). However it was revealed that economic conditions have no effect on fertility in Saudi Arabia (Salam, 2013). The analysis indicated that women educated up to the secondary level have at least the required fertility level for her age than women belonging to any other level of education. In Zambia, women with less education were found to be more likely to be infertile (Rhodwell, 2016). The analysis also indicated that the women with secondary level educated partners had least required fertility level for her age than women with partners who have primary collegiate and tertiary educational levels. By the study conducted in Ethiopia it was revealed that women married to husbands with no education, primary and secondary education were likely to have five or more children ever born than those married to husbands with higher educational levels (Dana, 2018). The analysis further indicated that unemployed women had at least the required fertility level for her age than women who are currently working. This finding corresponds with the result of a study in Ethiopia where it was observed that respondents currently not working are more likely to have greater than or equal to five children than individuals who are working.

The final fitted multiple binary logistic regression model was then fitted including the variables that were selected from the previously fitted binary regression models for each variable separately. A summary of the fitted multiple binary logistic regression model is given in Table 2 (refer to the Appendix). According to the final model fitted it was concluded that odds of a woman to have achieved at least the required fertility level for her age belonging to the Muslim ethnicity is 2.065 compared to odds of that of a woman belonging to the Sinhala ethnicity group when other variables were held constant. Further the analysis also revealed that, the odds of having at least the required fertility level for her age of a woman belonging to the poorer wealth index is 48.1% more than that of a woman belonging to the richest wealth index. The odds of a woman to have achieved at least the required fertility for her age with no education is 2.611 and with primary education is 2.709 compared to odds of that of a woman belonging to the tertiary educated group. Hence the odds of having at least the required fertility level for her age of a woman belonging to the partners with collegiate education level is 36.2% less than that of a partner belonging to no education. The odds of having at least the required fertility level for her age of a woman with an unemployed partner was 35.2% less than that of a woman with a currently employed partner woman with a currently employed partner. Similarly, it was also concluded that the odds of a woman to have achieved at least the required fertility for her age belonging to the manager is 47.2% less than that of a woman unemployed. Further, the odds of a woman to have achieved at least the required fertility for her age belonging to the professional job category was 38.9% and the same for a woman who are technicians and associate professional was 45.3% less than that of a woman who's unemployed. Furthermore, the odds of having at least the required fertility level for her age of a woman whose dwelling is Hambantota 30.1%, Galle 32.4%, Jaffna 21%, Mulative 45.2%, Polonnaruwa 40.8%, Batticaloa 31.2%, Nuwara Eliya 41.5%, Trincomalee 73.8%, Ampara 38.5% and Moneragale 62% times greater than that of a woman residing in the Colombo district.

Table 2. A Summary Of The Final Multiple Binary Logistic Regression Model

	Estimate	Odds Ratio	Std. Err.	Z	P>|z|	Lower	Upper
Intercept	-0.346	0.707	0.228	-1.516	0.129	0.454	1.113
Ethnicity – Sinhala is reference							
Muslim	0.725	2.065	0.073	9.918	0	1.791	2.386
Tamil	0.289	1.336	0.069	4.168	0	1.166	1.532
Wealth index- Richest is reference							
Poorer	0.393	1.481	0.073	5.385	0	1.284	1.71
Poorest	0.16	1.174	0.065	2.442	0.014	1.032	1.335
Middle	0.111	1.117	0.063	1.767	0.077	0.987	1.265
Richer	0.016	1.016	0.06	0.268	0.788	0.902	1.143
Women Education Level- Tertiary is reference							
No Education	0.959	2.611	0.198	4.832	0	1.776	3.873
Primary	0.996	2.709	0.133	7.452	0	2.086	3.525
Secondary	0.817	2.264	0.108	7.504	0	1.83	2.806
Collegiate	0.446	1.563	0.103	4.302	0	1.276	1.918
Partner Education Level- No education is reference							

Primary	-0.19	0.826	0.19	-0.997	0.318	0.563	1.192
Secondary	-0.814	0.831	0.188	-0.979	0.327	0.563	1.193
Collegiate	-0.448	0.638	0.193	-2.316	0.02	0.432	0.926
Tertiary	-0.397	0.672	0.217	-1.828	0.067	0.436	1.023
Partner working status – Employee is reference							
Not Employee	-0.432	0.648	0.101	-4.242	0	0.531	0.792
Women Occupation – Not employee is references							
Clerical support workers	-0.7	0.496	0.114	-6.111	0	0.395	0.62
Craft & related trades worker	-0.681	0.505	0.109	-6.222	0	0.407	0.626
Elementary occupations	-0.145	0.864	0.061	-2.383	0.017	0.767	0.974
Managers	-0.637	0.528	0.184	-3.452	0	0.366	0.755
Plant and machine operators assemblers	-0.896	0.408	0.227	-3.935	0	0.259	0.635
Professional	-0.492	0.611	0.084	-5.843	0	0.517	0.72
Service and sales workers	-0.435	0.646	0.08	-5.402	0	0.552	0.757
Skilled agricultural forestry and fishery workers	-0.13	0.878	0.148	-0.875	0.3818	0.658	1.179
Technicians and associate professionals	-0.603	0.547	0.173	-3.469	0	0.387	0.766

	Estimate	**Odds Ratio**	**Std. Err.**	**Z**	**P>|z|**	**Lower**	**Upper**
District – Colombo is references							
Ampara	0.326	1.385	0.116	2.789	0.005	1.102	1.744
Anuradhapura	-0.078	0.624	0.105	-0.743	0.457	0.752	1.136
Badulla	0.232	1.261	0.114	2.038	0.041	1.009	1.579
Batticaloa	0.272	1.312	0.136	1.999	0.045	1.006	1.717
Galle	0.281	1.324	0.103	2.724	0.006	1.082	1.622
Gampaha	-0.085	0.918	0.089	-0.954	0.339	0.77	1.094
Hambantota	0.263	1.301	0.118	2.219	0.026	1.031	1.645
Jaffna	0.191	1.21	0.142	1.344	0.179	0.916	1.602
Kaluthara	0.306	1.359	0.107	2.843	0.004	1.1	1.679
Kandy	0.087	1.091	0.097	0.9	0.368	0.901	1.322
Kegalle	0.092	1.096	0.107	0.856	0.391	0.888	1.354
Kilinochchi	0.316	1.372	0.165	1.917	0.055	0.996	1.904
Kurunegala	-0.002	0.997	0.094	-0.03	0.975	0.828	1.199
Mannar	0.141	1.152	0.145	0.976	0.329	0.868	1.535
Matale	0.249	1.282	0.133	1.862	0.062	0.988	1.669
Matara	0.206	1.229	0.113	1.818	0.069	0.984	1.537
Monaragala	0.482	1.62	0.123	3.901	0	1.273	2.067
Mullaitivu	0.373	1.452	0.159	2.335	0.019	1.065	1.993
N'Eliya	0.347	1.415	0.125	2.763	0.005	1.107	1.813
Polonnaruwa	0.342	1.408	0.131	2.594	0.009	1.088	1.826
Puttalam	0.133	1.142	0.112	1.192	0.233	0.917	1.424
Ratnapura	0.059	1.061	0.098	0.604	0.546	0.874	1.288
Trincomalee	0.552	1.738	0.146	3.774	0	1.308	2.324
Vavuniya	0.244	1.277	0.143	1.713	0.086	0.966	1.694

The result of the Hosmer-Lemeshow test conducted is shown in Table 3 (refer to the Appendix) was used to evaluate the goodness of fit of the fitted model. Hosmer-Lemeshow test p-value was 0.8775. This p-value is greater than that 5 % level of significance which indicated that there is no difference between the observed and the model predicted values and hence, we can conclude that estimates f the model fit the data at an acceptable level.

Table 3. Hosmer-Lemeshow Test

Chi-square	Df	P-value
3.7669	8	0.8775

IV. CONCLUSION

This study was undertaken to identify demographic, socio-economic and cultural factors affecting the fertility of women in Sri Lanka.

The descriptive analysis of the sample of ever married women belonging to the 15 - 49 age group revealed that the majority of the ever married women in the sample lived in a rural area. Among them most were Sinhala Buddhists. Majority of the women in the sample belonged to the "poorest" category of the wealth index. It was also observed that the majority of the women in the sample and their partner's have had an education up to secondary level. Also women were 66.2% less employed than their partners.

The research revealed that district, religion, ethnicity, wealth index, woman's education level, woman's occupation category, partner's education level, partner's working status have statistically significant association between attainment of at least the required fertility level for a woman's age at 5% level of significance. history of natural abortions, passive smoking allowed inside the home, BMI category, Use of family planning method have not statistically significant association between attainment of at least the required fertility level for a woman's age at 5% level of significant. Woman's place of residence was revealed as statistically insignificant and hence was not included in the final model.

The odds of having at least the required fertility level for her age of a woman belonging to the primary education level was higher when compared to odds of that of a woman who has had a tertiary education. The odds of having at least the required fertility level for her age of a woman belonging to the lowest wealth index was also found to be higher than that of a woman belonging to the highest wealth index. From the analysis it was concluded that the odds of a Muslim woman to have achieved at least the required fertility for her age was higher when compared to odds of that of a woman belonging to the Sinhala ethnicity. The odds of having at least the required fertility level for her age of a woman with unemployed partners is less than that of a woman whose partner is currently employed. Furthermore, it was also concluded that odds of having achieved at least the required fertility for her age of a woman belonging clerical support worker, manager and technician and associate professional job categories were less than that of an unemployed woman. The odds of having at least the required fertility level for her age of a woman dwelling in the Trincomalee district is higher than that of a woman residing in the Colombo district.

V. RECOMMENDATIONS AND FUTURE STUDY

The results revealed by this study will be beneficial for relevant authorities when organizing and conducting awareness programs on fertility for ever married women in Sri Lanka. Furthermore, the results can also become useful to identify areas/regions/districts that require establishment of new (or improved) medical facilities and infrastructure development.

For further study, involvement of concluded causative factors regarding fertility can be used to determine the prevalence towards the women who already pass the reproductive age or achieved their menopausal age.

ACKNOWLEDGEMENTS

The authors would like to thank the Department of Census and Statistics Sri Lanka for providing access to the relevant database.

REFERENCE

[1] Cortes, A., Hunt, N., & McHale, S. (2014). Development of the scale of perceived social support in HIV (PSS-HIV). *AIDS and Behavior*, *18*(12), 2274-2284.

[2] Department of Census and Statistics. (2020). *Health.* Retrieved November 3 2020, from http://www.statistics.gov.lk/Health/StaticalInformation

[3] Highland, V. (2014). Analysis Of Several Factors Contributing To Increased Fertility Rates In India: Religion As Compared To Education And Wealth.

[4] Hosmer, D. W., Taber, S., & Lemeshow, S. (1991). The importance of assessing the fit of logistic regression models: a case study. *American journal of public health*, *81*(12), 1630-1635.

[5] Hosmer Jr, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied logistic regression* (Vol. 398): John Wiley & Sons.

[6] Kelly-Weeder, S., & O'Connor, A. (2006). Modifiable risk factors for impaired fertility in women: what nurse practitioners need to know. *Journal of the American Academy of Nurse Practitioners*, *18*(6), 268-276.

[7] Koning, A., Kuchenbecker, W., Groen, H., Hoek, A., Land, J., Khan, K., & Mol, B. (2010). Economic consequences of overweight and obesity in infertility: a framework for evaluating the costs and outcomes of fertility care. *Human reproduction update*, *16*(3), 246-254.

[8] Larsen, U., & Hollos, M. (2005). *The importance of motherhood: a study of infertility in urban northern Tanzania*.

[9] Muhoza, D. N., Broekhuis, A., & Hooimeijer, P. (2014). Variations in desired family size and excess fertility in East Africa. *International journal of population research*, *2014*.

[10] Salam, A. A. (2013). Nuptiality and fertility in Saudi Arabia: An appraisal of census data. *Middle East Fertility Society Journal*, *18*(3), 147-153.

[11] Sangeetha, M. (2014). *A study to identify the risk factors associated with infertility among women attending Infertility Clinic at Sandhya Hospital, Vallalar, Vellore.* Arun College of Nursing, Vellore.

[12] Sathya, A., Balasubramanyam, S., Gupta, S., & Verma, T. (2010). Effect of body mass index on in vitro fertilization outcomes in women. *Journal of human reproductive sciences*, *3*(3), 135.

[13] Siddiqui, R. (1996). The impact of socio-economic factors on fertility behaviour: a cross-country analysis. *The Pakistan Development Review*, 107-128.
[14] Wijesekera, G., & Arunachalam, D. (2015). Explaining the fertility puzzle in Sri Lanka. *Journal of biosocial science*, *47*(6), 845-852.
[15] Adhikari, R. (2010). Demographic, socio-economic, and cultural factors affecting fertility differentials in Nepal. *BMC pregnancy and childbirth*, *10*(1), 10-19.
[16] Dana, D. D. (2018). Binary Logistic Regression Analysis of Identifying Demographic, Socioeconomic, and Cultural Factors that Affect Fertility Among Women of Child bearing Age in Ethiopia. *Science Journal of Applied Mathematics and Statistics*, *6*(3), 65-73.
[17] Kumar, D. (2007). Prevalence of female infertility and its socio-economic factors in tribal communities of Central India.
[18] McFalls Jr, J. A. (1991). Population: A Lively Introduction. *Population Bulletin*, *46*(2).
[19] Muvunyi, C. M., Dhont, N., Verhelst, R.,Crucitti, T., Reijans, M., Mulders, B., et al. (2011). Evaluation of a new multiplex polymerase chain reaction assay STDFinder for the simultaneous detection of 7 sexually transmitted disease pathogens. *Diagnostic microbiology and infectious disease*, *71*(1), 29-37.
[20] Rhodwell, C. (2016). *DEMOGRAPHIC AND SOCIO-ECONOMIC FACTORS ASSOCIATED WITH INFERTILITY AMONG MARRIED WOMEN IN ZAMBIA.* The University of Zambia.
[21] United Nations. (2015) *World Fertility Patterns 2015*.
[22] World Health Organization. (2020). *Sexual and reproductive health.* Retrieved January 10, 2020, from https://www.who.int/reproductivehealth/topics/infertility/definitions/en/