The Pharma Innovation Journal 2018; 7(4): 848-852

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2018; 7(4): 848-852

www.thepharmajournal.com
Received: 26-02-2018
Accepted: 27-03-2018

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Fertility and mortality estimation of medium status of women and impact of socio-economic factors on fertility by separating age groups

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Abstract
The present investigation was conducted to demographic estimation consists of the attempt to measure values of basic demographic parameters, such as the birth rate, the death rate or the level of total fertility and mortality in terms of size and age structure of over time. Though birth is a biological process and fertility is a current important issue in our country. Data were collected from 212 respondents with a questionnaire to estimate the levels and trends of naming fertility and mortality. A systematic and comprehensive exposition technique was used by Brass Method. The highest total fertility rate was in age group '25-29' and birth rate was 0.00155 and the overall total fertility rate was 3.068. The probability of surviving was highest in age group '25-29' for both sexes. All others factors were affected for higher fertility in age group '25-29', there will be needed for further policy making. The present findings would be helpful for the social and government planners and policy makers.

Keywords: Fertility, mortality, brass method, children ever born, average parity per women, Coale and Trussel

Introduction
According to Riley (1997) [1] "power to" refers to the ability to act and often requires access to social resources such as education, money, land and time. In most societies, women usually have less "power over" compared to men in all spheres of life. Zeghal and Ahmed (1990)[2] noted that a great number of barriers (for women) are rooted in social values, customs, beliefs and assumption about the nature of a woman and her capability. Males are generally referred to as the head of the home. Kennedy *et al.* (1996) [3] mentioned that women's status can be assessed by four composite indices measuring women's political participation, economic autonomy, employment and earnings, and reproductive rights. Women's status is an important determinant of fertility and all of its dimensions can play a crucial role in influencing their fertility. Hollos *et al.* (2009) [4] reported that declining fertility in Tanzania was associated with the factors that are related to the status of women. Above mentioned literature revealed that women's status play an important role in influencing fertility. So there is needed to estimate fertility by category wise i.e., (low, medium and high) status.
Bangladesh gained independence on March 26, 1971 after a war of liberation from Pakistan. Though this country is very small in terms of area only 147570 in square kilometer. It has been experiencing accelerated population growth 1.48 percent (preliminary census report-1974) in recent decades. Sex ratio was 104.100 and household size was 4.5 (census 2001) and known as the 9th most populous country in the world. The people of the Bangladesh are mostly poor and it is well known for its rapid population growth. Just over 25% of its total population lives in urban areas and the rest (75%) lives in rural areas. According to census data fertility rate has been declining since 1975. For instance, the total fertility rate (TFR) has declined dramatically from 6.3 children per woman in 1971-1975 to 3.3 in 1997-1999, a decline of 48% over a 25-year period. Recent declines in the TFR have been driven by declines in fertility at older ages, while adolescent fertility remains relatively high. Bangladesh is characterized by high fertility and comparatively high child mortality (Afzal, 1967; Alauddin and Faruque, 1983) [5, 6]. Life expectancy at birth was 61 years for male and 62 for female. There have been numerous studies on fertility and child mortality in Bangladesh. A number of studies have been done in order to estimate the trends of fertility and level of child mortality. A review of works has already conducted related to the present study reveals a wide range of socio-economic and demographic factors, which affects fertility and adult mortality.

Raising the minimum age at marriage to 18 and 21 years respectively could produce these reductions. Islam and Abedin (2001) [7] estimates the fertility inhabiting effect of the three most important proximate determinants: marriage, contraception and factional infecundability. The analysis shows that although the fertility level of Bangladesh is declining, it is still very high (around 5 births per women). They suggest that fertility reducing effect of the marriage variable is also increasing but at a very slow rate. In fact, the fertility inhabiting effect of marriage and lactional infacundability are compensating each other. Recently, the Bangladesh Fertility surveys attempted to estimate the effect of age at marriage on fertility (Huq and Cleland, 1990) [8]. Chowdhury *et al*. (1992) [9] estimate the effect of age at marriage on fertility using Matlab data. They suggest that most of the girls who married before 12 or 13 were not fecund at marriage and their age specific fecund ability, at least for first 10 years of married life, is not different from that of woman married at a higher age. They also suggested that the monthly risk of a birth during 20-24 years of life and up to 25 years of life did not vary with age at marriage could potentially affect fertility, because the age specific fecund ability in this population, has not effect by age at marriage, which in turn produce a higher total fertility for woman married at a young age. Islam and Abedin (2001) [7] reported that the effect of selected socio-economic and demographic factors on fertility in rural area of Bangladesh. It has been revealed that age at first marriage total effects of wife's education and age at first marriage on fertility are found to be negative. Bangladesh have been used in this study to examine the differentials in fertility by selected socio-economic and demographic factors. They found that age at first marriage, education of spouses and availability of electricity in the household have (an) inverse relationship with fertility. Higher fertility is observed for Muslim women than for non-Muslims. It has also been found that fertility is the lowest to those women whose husbands are service holders and the highest for those engaged in agriculture.

Fertility is one of the most important component of population growth and determinants of age sex distribution of a population in our country. The demographic pattern of the countries is characterized by the co-existence of high fertility. There are two groups of factors that affect fertility. The first group consists of socioeconomic variables, which are termed as indirect determinants. The economic and cultural factors are included in this group. The direct known as intermediate determinants are biological and behavioral factors through which the indirect determinants must affect fertility. Fertility control like most other family decisions is not always an individual affair but involves co-operation, discussion and joint decision making among couples. The nature of relationship existing among the couples affects the decision on family size. Fertility decisions at a given time depend to a large extent on current situations within the family. In many societies, women are brought up to be dependent on the men in their families to the extent that they are incapable of changing the situation of male dominance. What seems unfortunate is that the woman forms the major source and force of socialization in the family, which reinforces these traditional beliefs that women must be submissive to the men. The current women empowerment programmers are geared towards improving the status of women.

Women's status is multidimensional which can be indicated by education, occupation/employment, respondent's discussion of family planning with their partners, decision making, freedom of movement, age at marriage, political representation and legal rights. This study is provided on impact of socio-economic factors on fertility by separating age groups of medium status of women.

Materials and Methods

Materials: In the present investigation, the data extracted from 25 no. Ward (Mohalla: Talaimary and Raninagar) of Boalia Thana in Rajshahi Metropolitan City from the females (age 15-49 years), Bangladesh as respondent help for estimation of fertility and mortality, and determinants of fertility by separating age group. The extracted data were used as materials for the present investigation.

Methods: The present investigation was performed by Brass (Brass, 1964) [10] method.

Table 1: List of variables for estimation of fertility and mortality

Dependent	Independent
Children ever born(CEB)	Educational qualification
	Occupation
	Age at marriage
	Contraceptive use
	Family size

Calculation procedure

Table 2: Estimation of total fertility rate (TFR), birth rate (b) and general fertility rate (GFR) by Brass Method.

Age group of women	Index(i)	No. of women W(i)	Children ever born	Births in past year B(i)	Average parity/ women P(i)=CEB(i) / W(i)
15-19	1	13	7	4	0.538462
20-24	2	30	21	6	0.7
25-29	3	56	94	14	1.678571
30-34	4	38	91	8	2.394737
35-39	5	36	84	3	2.333333
40-44	6	21	68	0	3.238095
45-49	7	18	67	0	3.722222

Preliminary period fertility rate, f(i)=B(i)/W(i)	5*f(i)	Cumulative fertility schedule, φ(i)	a(i)	b(i)	c(i)
0.307692	1.538462	1.538462	2.531	-0.18	0.0024
0.2	1	2.538462	3.321	-0.754	0.0161
0.25	1.25	3.788462	3.265	-0.627	0.0145
0.210526	1.052632	4.841094	3.442	-0.563	0.0029
0.083333	0.416667	5.25776	3.518	-0.763	0.0006
0	0	5.25776	3.862	-2.481	-0.0001
0	0	5.25776	3.828	0.016	-0.0002

Average parity equivalent F(i)	P/F ratio P(i) / F(i)	x(i)	y(i)	z(i)	Weighting factor w(i)
0.75538786	0.712828	0.031	2.287	0.114	0.169175
1.4757	0.474351	0.068	0.999	-0.233	0.094922
2.68425	0.625341	0.094	1.219	-0.977	0.112842
3.67771491	0.651148	0.12	1.139	-1.531	0.141341
4.29316667	0.543499	0.162	1.739	-3.592	0.306916
5	0.647619	0.27	3.454	-21.497	0.27
6	0.62037	0	0	0	0

Computational procedure

- P(i) = CEB(i)/W(i)
- f (i) = B(i)/W(i)
- φ (i) = 5 ×∑ f (j)
- F(i) = φ(i-1) + a(i) f(i) + b(i) f(i+1) + c(i) φ(7)
- f +(i) =[1- w(i-1)] f(i) + w(i) f(i+1)
- w(i) = x(i) + y(i) f(i)/ φ(7) + z(i) f(i+1))/φ(7)
- f*(i) = k.f+(i)
- b(i) = f*(i) W(i)

Here,
b =∑b(i)/ P; P is the total population
= 20/12906
= 0.00155
And finally, the general fertility rate, (GFR) is obtained by
GFR=∑b(i)/W(15-49)
Where, b(i) is the total no. of births
So, General fertility rate, (GFR) = 20/212
= 0.09434
Total fertility rate, TFR=5×∑f*(i)
= 3.068405

Table 3: Estimation of probabilities of dying and surviving by sex, derived from child survival data classified by age of mother

Age group of women	Index(i)	No of women W(i)	Male dead child	Male child ever born	Female dead child	Female child ever born	Sex ratio of child ever born
15-19	1	13	0	1	0	6	0.16667
20-24	2	30	0	13	1	8	1.625
25-29	3	56	1	52	1	42	1.23809
30-34	4	38	4	49	4	42	1.16667
35-39	5	36	1	42	6	42	1
40-44	6	21	3	40	4	28	1.42858
45-49	7	18	1	35	4	32	1.09375
Total		212	10	232	20	200	1.16

Average parity per women			Proportion of children dead		
Males Pm(i)	Females Pf(i)	Both sexes P(i)	Males Dm(i)	Females Df(i)	Both sexes D(i)
0.07693	0.46154	0.53846	0	0	0
0.43333	0.26667	0.7	0	0.125	0.047619
0.92858	0.75	1.67857	0.019231	0.02381	0.021277
1.28948	1.10527	2.39474	0.081633	0.095238	0.087912
1.16667	1.16667	2.3333	0.02381	0.142857	0.08333
1.90477	1.33333	3.2381	0.075	0.142857	0.102941
1.94444	1.77778	3.7222	0.028571	0.125	0.074627

a(i)	b(i)	c(i)	Multipliers k(i) for		
			Males	Females	Both sexes
1.1415	-2.7070	0.7663	1.01859	-3.27118	-0.62124
1.2563	-0.5381	-0.2637	1.03773	0.23122	0.732409
1.1851	0.0633	-0.4177	1.00141	1.14613	1.059602
1.1720	0.2341	-0.4272	1.01419	1.425274	1.173925
1.1865	0.3080	-0.4452	1.03341	1.561277	1.237764
1.1746	0.3314	-0.4537	1.0218	1.586854	1.24032
1.1639	0.3190	-0.4435	1.01356	1.558319	1.22436

Probability of dying, q(x) and of surviving, l(x)					
Males		Females		Both sexes	
q(x)	l(x)	q(x)	l(x)	q(x)	l(x)
0	1	0	1	0	1
0	1	0.028903	0.971097	0.034877	0.965123
0.019258	0.980742	0.02729	0.97271	0.022545	0.977455
0.08279	0.917208	0.13574	0.86426	0.103202	0.896798
0.024606	0.975394	0.223039	0.776961	0.103147	0.896853
0.07662	0.923372	0.226693	0.773307	0.12768	0.87232
0.02896	0.971042	0.19479	0.80521	0.091368	0.908632

Calculation procedure

The average parity P (i) per women in age group i is obtained by-

P (i) = CEB (i)/FP (i)

Where, CEB (i) denotes the number of children ever borne by women in age group i.

FP (i) is the total no. of women in that age group

And variable i represents age groups being coincide.

The complete sets of Pm (i) and Pf (i) values are shown in the table 3. The values of P (i) for both sexes combined are just the sum of Pm (i) and Pf(i), the mean number of male and female children, respectively, born to women of age group i.

The proportion of children dead, D(i), is defined as the ratio of reported children dead to reported children ever born, that is,

D (i) = CD (i) / CEB (i)

Where, CEB (i) denotes the number of children ever borne by women in age group i.

CD (i) is the number of children dead reported by women in age group i.

According to the Trussell variant of the original Brass method, a different set of coefficients is provided for west model life tables in the Coale and Trussell (1974)[11] Demeny system. K (i) is obtained as,

k(i) = a(i) + b(i) P(1)/P(2) + c(i) P(2)/P(3)

The probabilities of dying, q(x), is calculated by multiplying the k(i) values by the corresponding proportions dead, D(i), that is

q(x) = k(i) D(i)

The probability of surviving from birth to exact age x, is obtained as-

l(x) = 1.0- q(x)

Results

Trend of parity

In the present investigation, it is shown that average parity per women is highest in age group '45-49' and lowest in age group '15-19'. On the other hand it follows an upward pattern according to age group of women.

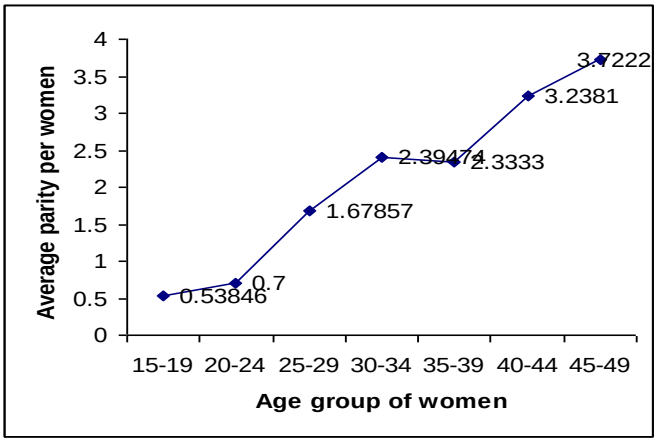

Fig 1: Trend of average parity per women with respect to age group of women.

Trend of birth

From the findings, it is shown that estimated number of births, b(i) with respect to age group of women is highest in age group '25-29' and lowest in age group'35-39'. But zero estimated no of births is in age group '40-44' and '45-49' with respect to age group of women.

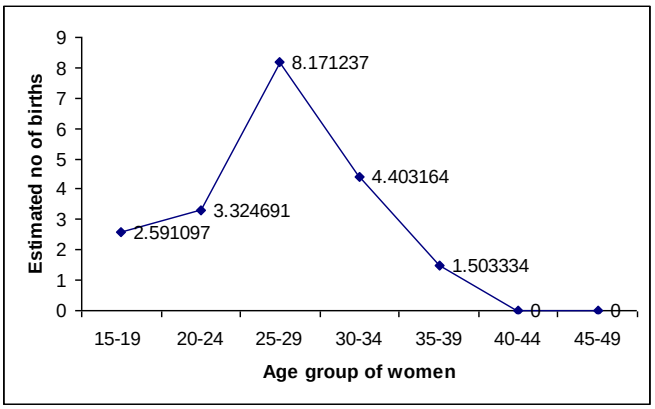

Fig 2: Trend of estimated no of births with respect to age group of women.

Multiple regression

In the age group '15-49' the regression coefficient value of educational qualification -0.644 and the value of family size 1.106 are statistically significant. But the rest are not statistically significant. From the above findings, the coefficient of determination is 0.515, i.e. the explanatory variables educational qualification, age at marriage, contraceptive use, family size and occupation can affect 51.5% of the dependent variable children ever born. Table 4 represents the results of multiple regression analysis of children ever born. The table contains the explanatory (independent) variables included in the regression analysis, regression coefficient β, co-efficient of determination.

Table 4: Multiple regression analysis of dependent variable, children ever born

Age groups	Independent variables	Regression coefficient β	R square	Significant
15-49	Constant	3.334	0.515	0.005
	Educational qualification	-0.644		0.000
	Age at marriage	0.028		0.490
	Contraceptive use	0.312		0.334
	Family size	1.106		0.008
	Occupation	-0.347		0.091
25-29	Constant	3.617	0.510	0.001
	Educational qualification	-0.572		0.000
	Age at marriage	0.106		0.490
	Contraceptive use	0.335		0.296
	Family size	1.105		0.008
	Occupation	-0.338		0.096
30-34	Constant	4.075	0.499	0.000
	Educational qualification	-0.614		0.000
	Age at marriage	0.121		0.428
	Contraceptive use	0.120		0.296
	Family size	1.182		0.004
	Occupation	-0.332		0.103

Discussion

It was observed that most of the respondents are married (90.1%), 7.5% are widowed, 1.4% are divorced and 0.9% are separated. It was observed in most of the cases women use contraception 145 out of 212, on the other hand only 67 out of 212 women do not use contraception. It was also observed that 84.4% women express their opinion independently and 86.3% women give opinion in birth control. Moreover 31.6% women manage their family. Children ever born is

significantly positively correlated with contraceptive use at 1% level of significance and with occupation at 5% level of significance. Contraceptive use is significantly positively correlated with occupation at 1% level of significance. Educational qualification is significantly positively correlated with age at marriage at 1% level of significance. The average parity per women follows an upward pattern according to age group of women (15-49). The estimated no of births, b (i) with respect to age group of women is highest in age group '25-29'. Islam and Abedin (2001) [7] have studied that contraception is the second most important factor followed by the marriage, which plays the least role in the reduction of fertility. Contraception is responsible for substantial fall in fertility between 1975 and 1989 in Bangladesh. Their analysis suggests that the fertility reducing effect of contraception is steadily increasing, whereas the effect of lactation remains nearly constant. The fertility reducing effect of the marriage is also increasing but at a very slow rate. Gardner (2001) [12] observed that, why increasing contraceptive use don't always results in an immediate decline in total fertility rate. They show that other direct factors also affect fertility. The CBR is not only predictor of what will happen to fertility levels. The level of contraceptive use is one of the fertility strongest factors affecting the level of fertility linear regression of 105 counties comparing fertility levels and contraceptive use levels finds 77% of the variation in fertility is explained by variation in contraceptive use, and remaining 23% of the variation in total fertility are also important. Using Bongaarts (1987) [13] model they estimated that 8% increase in contraception use would be needed to bring drown TFR from 5.3 to 4.8 and 17% increase in contraception will be needed to bring down TFR from 5.3 to 4.3.

Conclusion

Although in my study the fertility rate is highest in the age group '25-29' and all of my respondents are in medium status, in age group '25-29' the explanatory variables educational qualification, age at marriage, contraceptive use, family size and occupation can effect only 51% of the dependent variable children ever born. In the age group '15-49' the explanatory variables educational qualification, age at marriage, contraceptive use, family size and occupation can affect 51.5% of the dependent variable children ever born.

Acknowledgement

The authors would like to express extreme gratefulness to respondents for giving necessary facilities and information during the research work. The authors are grateful to Mr. MF Hasan (Assistant Professor, GEB, RU) for his kind help, advice and inspiration during the manuscript preparation.

Authors' contribution

SA and MMR designed the experiments, developed the methodology and prepared the manuscript. SA, and MMR collected the data and carried out analysis. AHB assisted with data analysis and manuscript preparation.

Conflict of interest disclosure

The authors declare that they have no conflict of interest and there has been no significant financial support for this work that could have influenced its outcome.

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