

Risk Factors of Primary Infertility among Women in Bangladesh: A Study through Multilevel Poisson Regression

Authors: Tapan Kumar Roy, Professor, Department of Population Science and Human Resource Development, Rajshahi University, Bangladesh

Introduction

In global perspectives, the health community has had great success in improving maternal and child health in the past decade, partly due to a focus on reproductive health (Cousens et al., 2011 and WHO, 2012). Surprisingly, even though infertility is a critical component of reproductive health, it has often been neglected in these efforts (Cui, 2010) and the inability to have children affects men and women across the globe. Infertility can lead to distress and depression, as well as discrimination and ostracism (Chachamovich et al., 2010). In Bangladesh, infertility issue is ignored in country's reproductive health policy; instead, the prominence has always been on the problem of overpopulation. As a result the dominant state ideology in Bangladesh is related to controlling fertility, and the implementation of family planning programs has become a success story for the country (Ahmed and Chowdhury, 1999; Country Report, 2006). However, in Bangladesh a very few studies have been conducted on primary infertility. This was based on medical perspectives and analyses were limited to chi-square test only. Considering the above situation, as far as it is known that this is the first attempt to know the risk factors of infertility among married women in Bangladesh through Poisson regression analysis to rare count data. It is worthwhile to mention that women are nested with community (data hierarchy) in Bangladesh Demographic and Health Survey (BDHS). To take consideration of data hierarchy, the multilevel poisson regression analysis has been applied to find out community effect on risk factors of primary infertility. This study will help demographers, population scientists and researchers to give an idea about the risk factors and infertility condition in Bangladesh.

Data, Conceptual Framework and Methods:

The study exploits the data extracted from the recent Bangladesh Demographic Health Survey (BDHS) 2014, which was a nationally representative cross-sectional survey based on 17,863 ever-married women aged 15-49 years. Gurunath et al. (2011) highlighted the lack of consistency in definition of infertility through their systematic review of literature on prevalence studies measuring infertility. The largest disparity lies between the clinical and the demographic definitions. Mascarenhas et al. (2012) used a conceptual framework and is considered primary infertility as the absence of a live birth for women who desire a child and have been in a union for at least five years, during which they have not used any contraceptives. The World Health Organization also adds that 'women whose pregnancy spontaneously miscarries, or whose pregnancy results in a still born child, without ever having had a live birth would present with primarily infertility' (WHO, 2013). Thus, primary infertility is defined as the absence of a live birth for couples that have been in a union for at least five years, during which neither partner used contraception, currently not pregnant and where the female partner expresses a desire for a child. In this study, modifying the conceptual framework, a subsample of size 13,577 ever married women of aged 20-49 years have been considered for analysis among them 248 women are found to be primary infertile who have desire for a child and not using any contraceptive methods five or more years preceding the survey. In bivariate analysis, Chi-square test is used to know the association between primary infertility and selected covariates. Poisson regression is used to rare counts data and to know the risk factors of primary infertility in Bangladesh. Again to know the community effect, the multilevel poisson regression model has been applied.

Results and Discussion:

Table 1 presents the prevalence estimates of primary infertility among women aged 20-49 years according to some selected demographic, socio-economic and health characteristics. The bivariate analysis depicts that women's age, division, place of residence, wealth index, age at marriage, BMI, regular menstruation and cooking fuel are significantly associated with primary infertility. In this study, three poisson regression model models have been used (Model-1, Model-2, and Model-3) to control the characteristics to know the dominant factor of primary infertility. Table 2 represents the results of Poisson regression analysis of the primary infertility in Bangladesh. The result shows that each stages significant level has been changed. In full model (Model-3) it is shown that the Incidence

Rate Ratio (IRR) is significant for division, religion, education level, wealth index, cooking fuel, age, age at marriage, BMI, regular menstruation and genital diseases. To identify community effects and the risk factors of primary considering data hierarchy, Multilevel Poisson regression model have been employed to primary infertility data. In this study both unadjusted and adjusted models have been considered. The result indicates that women's age, age at marriage and BMI are significant when considering community effects. IRR represents that it is associated with lower risk of women age 35 years and above. It is 60 percent (95% CI: 0.56 to 2.29) lower than women's aged 20-34 years. Age at marriage has its strong influence on primary infertility. It is observed that it is associated with higher risk of women with the comparison group. It is found that the IRR among the women who marry greater than equal to 18 years is 2.07 times (95% CI: 1.44 to 2.98) higher than that of women who marry at an early ages.. Most of all the women whose marriage age is greater than 18 years are higher risk of primary infertility than the women whose marriage age is less than 18 years. IRR presents that obese women are 35 percent (95% CI: 0.95 to 1.89) higher than that of the women who belong standard BMI.

Conclusions:

Based on our findings, there are several risk factors for infertility. Women's age is at risk of infertility should be identified and high quality counseling has to be given to minimize the implications of infertility for women. Women

Table 1: Prevalence of primary infertility among women aged 20-49 years by selected Socio-demographic Characteristics in Bangladesh.

Socio-demographic Characteristics	Sample Size (N)	Prevalence (%)	P-Value
Age			
20-34	183	2.30	
35+	65	1.15	0.000 ^a
Division			
Barisal	16	0.99	
Chittagong	32	1.52	
Dhaka	56	2.40	0.000 ^a
Khulna	42	2.09	
Rajshahi	45	2.26	
Rangpur	19	0.97	
Sylhet	38	2.46	
Place of residence			
Urban	101	2.19	
Rural	147	1.64	0.021 ^b
Religion			
Muslim	223	1.82	0.920
Non-Muslim	25	1.86	
Education level			
Literate	55	1.55	
Illiterate	193	1.93	0.150
Wealth Index			
Poor	77	1.49	
Middle	51	1.85	0.072 ^c
Rich	120	2.10	
Age at marriage			
Less than 18	195	1.62	
Greater than 18	53	3.41	0.000 ^a
BMI			
Standard	164	1.68	0.038 ^b
Obese	84	2.21	
Regular Menstruation			
No			
Yes	43	1.01	0.000 ^a
	205	2.19	
Genital disease			
No	217	1.88	0.281
Yes	31	1.53	
Cooking fuel			
Unsafe	48	2.46	
Safe	200	1.72	0.024 ^b

Note: ®= The reference category. ; a=p<0.01; b=<0.05; c=<0.10

should maintain their standard BMI to avoid infertility complexity. Legal age at marriage should follow every Bangladeshi woman when they will marry. This is the right time to consider infertility as an emerging issue simultaneously executing SDG agenda in Bangladesh. Infertility is not merely an individual concern; it is a public health problem and issue.

Table 2: Results of Poisson regression to assess impact of primary infertility controlling socio-economic, demographic and health characteristics of women in Bangladesh, BDHS 2014

Socio-demographic characteristics	Model-1 (Socio-economic characteristics)			Model-2 (Socio-economic and demographic characteristics)			Model-3 (Socio-economic, demographic and health related characteristics)		
	IRR	S.E	P-Value	IRR	S.E	P-Value	IRR	S.E	P-Value
Division									
Barisal®									
Chittagong	0.874	0.0171	0.000 ^a	0.962	0.0091	0.000 ^a	0.966	0.0090	0.000 ^a
Dhaka	0.884	0.0170	0.000 ^a	0.975	0.0088	0.005 ^b	0.986	0.0090	0.134
Khulna	0.998	0.0169	0.502	1.016	0.0085	0.055 ^c	1.020	0.0080	0.012 ^b
Rajshahi	0.951	0.0172	0.005 ^b	1.005	0.0090	0.563	1.011	0.0087	0.187
Rangpur	0.948	0.0145	0.001 ^a	1.011	0.0084	0.155	1.021	0.0083	0.010 ^b
Sylhet	0.836	0.0170	0.000 ^a	0.942	0.0089	0.000 ^a	0.954	0.0084	0.000 ^a
Place of residence									
Urban®									
Rural	1.007	0.0154	0.659	1.002	0.0066	0.763	1.004	0.0070	0.594
Religion									
Muslim®									
Non-Muslim	0.990	0.0243	0.689	0.985	0.0099	0.125	0.976	0.0100	0.017 ^b
Education level									
Literate®									
Illiterate	0.695	0.0083	0.000 ^a	0.901	0.0063	0.000 ^a	0.906	0.0064	0.000 ^a
Wealth Index									
Poor®									
Middle	1.119	0.0155	0.000 ^a	1.032	0.0073	0.000 ^a	1.031	0.0073	0.000 ^a
Rich	1.176	0.0192	0.000 ^a	1.047	0.0089	0.000 ^a	1.047	0.0095	0.000 ^a
Cooking fuel									
Unsafe ®									
Safe	1.036	0.0224	0.107	1.004	0.0093	0.638	1.006	0.0093	0.000 ^a
Age									
20-34®									
35+				2.111	0.0152	0.000 ^a	2.028	0.0164	0.000 ^a
Age at marriage									
Less than 18®									
Greater than 18				0.741	0.0070	0.000 ^a	0.751	0.0066	0.000 ^a
Recent sexual activity									
Never had sex®									
Active sex							0.973	0.0067	0.000 ^a
BMI									
Standard®									
Obese							1.041	0.0076	0.000 ^a
Regular menstruation									
No®									
Yes							0.931	0.0050	0.000 ^a
Genital disease									
No®									
Yes							1.014	0.0066	0.032 ^b

Note: ®= The reference category. ; a= $p<0.01$; b= <0.05 ; c= <0.10

Table 3: Results of multilevel Poisson regression model among infertile women in Bangladesh, BDHS 2014

Socio-demographic Characteristics	Unadjusted Model				Adjusted Model			
	IRR	P-Value	95% CI		IRR	P-Value	95% CI	
			Lower	Upper			Lower	Upper
Age 20-34 [®] 35+	0.419	0.000 ^a	0.301	0.584	0.401	0.000 ^a	0.285	0.565
Place of residence Urban [®] Rural	0.673	0.014 ^b	0.492	0.922	0.774	0.205	0.521	1.150
Religion Muslim [®] Non-Muslim	1.049	0.843	0.655	1.680	0.986	0.953	0.617	1.575
Education level Literate [®] Illiterate	1.626	0.005 ^a	1.156	2.286	1.077	0.694	0.744	1.560
Wealth Index Poor [®] Middle Rich	1.228 1.459	0.308 0.024 ^b	0.828 1.052	1.822 2.022	1.132 1.108	0.551 0.624	0.753 0.737	1.700 1.665
Age at marriage Less than 18 [®] Greater than 18	2.191	0.000 ^a	1.526	3.144	2.069	0.000 ^a	1.435	2.984
BMI Mini. Weight [®] Obese	1.421	0.032 ^b	1.031	1.958	1.345	0.087 ^c	0.958	1.890
Genital disease No [®] Yes	0.856	0.503	0.544	1.349	0.858	0.513	0.543	1.356
Cooking fuel Unsafe [®] Safe	0.717	0.062 ^c	0.506	1.017	1.031	0.882	0.685	1.553

Note: [®]= Reference category. ; a= $p<0.01$; b= <0.05 ; c= <0.10

References:

1. Cousens S, Blencowe H, Stanton C, Chou D, Ahmed S, et al. (2011) National, regional, and worldwide estimates of stillbirth rates in 2009 with trends since 1995: a systematic analysis. *Lancet* 377: 1319–1330.
2. Cui W (2010) Mother or nothing: the agony of infertility. *Bull World Health Organ* 88: 881–882. doi:10.2471/BLT.10.011210.
3. Chachamovich JR, Chachamovich E, Ezer H, Fleck MP, Knauth D, et al. (2010) Investigating quality of life and health-related quality of life in infertility: a systematic review. *J PsychosomObstetGynaecol* 31: 101–110. doi:10.3109/0167482X.2010.481337.
4. Gurunath S, Pandian Z, Anderson RA, Bhattacharya S (2011). "Defining infertility--a systematic review of prevalence studies". *Human Reproduction Update* 17 (5): 575–88. doi:10.1093/humupd/dmr015. PMID 21493634
5. Mascarenhas M.N., Cheung H., Mathers C. D. and Stevens G.A. (2012). Measuring infertility in populations: constructing a standard definition for use with demographic and reproductive health surveys, *Population Health Metrics, BioMed Central*, 10 (17), 1-11.
6. Ahmed, SM and Chowdhury Mr. (1999). Health scenario. in: Ahmed M.(ed.) *Bangladesh Towards 21st Century*. Dhaka: Community Development Library. 1999:55-78.
7. Country Report (2006). *Bangladesh Population Statistics 2006*, (www.unicef.org/infobycountry/bangladeshbangladesh_statistics.html)
8. WHO (2012). *Trends in maternal mortality: 1990 to 2010*. Geneva: World Health Organization.
9. WHO (2013) *Infertility*". *Who.int*. 2013-03-19. Retrieved 2013-06-17.