

Some Survival Models to Study the Human Reproduction Process in India

Arvind Pandey
Institute for Research in Medical Statistics, ICMR
New Delhi, India
arvindp55@hotmail.com

Ashutosh Ojha
Vital Statistics Division
Office of the Registrar General of India
New Delhi, India
ojha_ashutosh@hotmail.com

B.N. Bhattacharya
Population Studies Unit
Indian Statistical Institute
Kolkatta, India
bishwa@isical.ac.in

1. Background

Data on birth intervals collected under retrospective surveys are said to be useful for determining tempo and quantum aspects of human reproduction process. The observations on such duration variables under retrospective inquiries are, however, met with complete as well as incomplete observations due to the occurrence of the survey date before the end of the reproductive life span. In such a situation, the survival models, which encompass both the complete as well as censored observations, are considered to be an appropriate choice for analysis of data. [The basic survival model assesses the intensity and of childbearing by taking cumulative proportion of women achieving next parity within a specific period of time since previous birth (age at marriage/ age at cohabitation in case of first birth interval)]. As the childbearing process is not only biological in nature but is also affected by social, cultural and economical factors, the models are extended for sequential birth order analysis under multivariate set-up. Amongst them, the semi-parametric proportional hazard (PH) model has got more emphasis in the recent past. This, in addition to examining the effect of various covariates on the timing of different order of births, allows to include heterogeneity with respect to risk factor. It assumes that risk of conception varies from woman to woman and it is a function of various socio-economic-cultural-demographic factors and program components. In addition, a parametric allows correction for mis-specification by incorporating extra source of variations (i.e., unmeasured heterogeneity and omitted variables) in the model.

2. Objective

The aim of the present paper is to analyze the human reproduction process in India under a sequential framework of birth interval analysis using various survival models. It also analyses the effect of heterogeneity on the timing of births by using some parametric failure time models.

3. Data and Methods

Effect of heterogeneity on the timing of births has been examined using parametric failure time model. The Weibul survival models (with and without Gamma heterogeneity) have also

been used. Data has been taken from the India's National Family Health Survey, 1992-93 (NFHS-1). Results are demonstrated initially for Uttar Pradesh, the most populous state of India and subsequently for some other states.

4. Results

It is found that the factors, which affect the pace of second and subsequent births, are different than those, which affect the pace of first births. Factors like the age at which women consummate marriage, place of residence, caste, religion, are found to be the significant factors to influence the timing of first birth. Religion and caste of women and, sex and survival status of the previous birth are found to influence the timing of second and higher order of births. There is great amount of heterogeneity in the tempo of birth timings in the population. Results suggest that most of statistically significant covariates in the model, continue to be significant but with the changed strength after the incorporation of heterogeneity in the model.

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RESUME

The paper presents an analysis of human reproduction process in India under a sequential framework through birth interval analysis using survival models. Data for this come taken from the India's National Family Health Survey, 1992-93 (NFHS-1). It has estimated the intensity of child bearing by taking cumulative proportion of women achieving next parity within a specified period of time since previous birth (age at marriage/age at cohabitation in case of first birth interval) by various socio-economic, cultural and demographic factors. Effect of heterogeneity on the timing of births has been examined using parametric failure time model. The Weibull survival models (with and without Gamma heterogeneity) have also been used. Results are demonstrated initially for Uttar Pradesh, the most populous state of India and subsequently for some other states. It is found that the factors, which affect the pace of second and subsequent births, are different than those, which affect the pace of first births. Factors like the age at which women consummate marriage, place of residence, caste, religion, are found to be the significant factors to influence the timing of first birth. Religion and caste of women and, sex and survival status of the previous birth are found to influence the timing of second and higher order of births. There is great amount of heterogeneity in the tempo of birth timings in the population. Results suggest that most of statistically significant covariates in the model, continue to be significant but with the changed strength after the incorporation of heterogeneity in the model.