

## **Fertility Histories: With and Without Restrictions — An Analysis of PLM Data\***

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During the last decade, a large number of countries participated in the World Fertility Survey but few of them collected fertility histories that were not partially restricted. In a majority of the cases information on the duration of breast-feeding and contraceptive use was restricted to the last closed and the open intervals only. These restrictions on the fertility histories have raised many questions about the possibility of sample selection bias in the results. A number of researchers in the developed countries have used these surveys for analyzing the effects of breast-feeding and contraception on the length of birth intervals. They have acknowledged the possibility of a bias in the results and have taken measures to minimize these potential biases.

In this paper we will initially discuss the ways in which biased histories produce a biased sample of births. Later we will evaluate the effects of the restrictions by using the fertility data from the Population Labour Force and Migration (PLM) Survey. This data contains detailed reproductive histories of 9416 currently married women having 38,746 children selected from 11,000 households sampled in the PLM survey.

There are two distinct issues in this regard. The first is the extent to which the selection of the last closed and open interval leads to biased estimates of the duration of breast-feeding and the levels of contraceptive use.

The second is whether such restrictions bias the findings regarding the structure of relationships between the variables of interest.

The selective nature of using last closed and open birth intervals can best be seen by considering cohorts of birth intervals begun various years preceding the interview. Figure 1 shows the percentage of births in each year that began the last closed or open birth intervals.

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Fig. 1. Percentage of Births in each Year that Initiated a Last Closed or Open Interval: PLM Survey (1979).

Two facts are obvious:

- (1) The production of births is very small during the initial year before the survey but it becomes quite substantial prior to 5 years before the data of survey; and
- (2) The presumption that the last closed and the open interval represent very recent experience is wrong.

It is evident from Figure 1 that the last closed or open intervals reach far back in time. 14 percent of these intervals were initiated 10 years before the survey and 9 percent 19 years before. It would clearly be a mistake to base estimates of current breast-feeding or contraception on data for all births for which they were restricted to the last closed and open intervals only.

Now we will talk about bias in the estimated relations. As our dependent variable is binary, the least-squares approach or other standard econometric procedures yields biased results. Thus, the logistic model is applied.

We are interested in relating differences in fertility to intermediate and socio-economic variables like contraception, breast-feeding, abortion, infant mortality, age at first birth, education, place of residence, and son preference. This last variable is of particular interest because some studies suggest that women who do not have at least one son may intentionally curtail breast-feeding in order to hasten the birth of the next child.

The intervals that began 2 years before the survey were not included in the analysis because these would not have had sufficient time to be closed. To analyse birth history completely, we have chosen the 2–12 years period prior to the survey as our final model for analysis. Later, the durations before the interview were varied to see whether there was any systematic variation associated with decreasing selectivity. We restricted the universe to birth intervals begun 2–6 years, 2–5 years and 2–4 years preceding the interview. We estimated these models with and without WFS restrictions. The original results, i.e. the estimates based on intervals began 2–12 years before the interview and without WFS restrictions, were compared with other sets of estimates. Since the structure of the process differs with parity, birth intervals 2, 3 and 4–8 were examined separately.

The approach used a large number of logistic regression estimates. There are:

- 3 sets of birth order intervals (2, 3 and 4–8);
- 4 sets of segments months (17–22, 23–28, 29, 34 and 35–40);
- 4 sets of time period (2–12, 2–6, 2–5 and 2–4) years; and
- 2 sets of restrictions (with and without WFS restrictions).

This yields 96 logistic regression runs.<sup>1</sup>

Taking the estimates based on intervals begun 2–12 years before the interview as a comparison point, we then established a confidence interval around the betas from this restricted model that is equal to plus or minus twice the standard error of the betas. We examined the corresponding betas from the other models to see whether they fell within this interval or not.

Table 1 summarises the results. We have taken socio-economic and intermediate variables separately as well as combined in the four time periods under study.

Table 1

*Percentage of  $B_s$  Falling within the Confidence Interval for  $B_s$  in the 2–12 Years Unrestricted Model, by Type of Restrictions, Type of Variables, and Number of Years Preceding the Survey\**

Type of Variables and Restrictions	Number of Years Preceding the Survey			
	2–12	2–6	2–5	2–4
<b>Socio-economic Variables</b>				
WFS Restriction	65	48	50	25
No Restriction	100	96	85	81
<b>Intermediate Variables</b>				
WFS Restriction	82	57	49	29
No Restriction	100	94	94	78
<b>All Variables</b>				
WFS Restriction	74	53	49	27
No Restriction	100	95	90	80

\*Confidence interval equal to plus or minus twice the standard error of beta for analogous no-restriction 2–12 model.

One thing is obvious, that the longer the period preceding the survey in the unrestricted sample the higher the proportion of unbiased results. In this table 85 to 96 percent of the results are unbiased. But when we restricted the fertility history to the last closed and open interval the results are biased with only 25 to 57 percent of the betas lying within the confidence interval, the rest of the results are significantly different. The estimates for the levels of the duration of breast-feeding and contraceptive use are biased upto 75 percent.

<sup>1</sup>The detailed results can be had from the author on request.