Original Article

Determinants of Waiting Time to Conception (WTC) in Manipuri Women

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ABSTRACT

Objective: To investigate the significant determinants of waiting time to conception (WTC) in Indian Manipuri women.
Design: Cross sectional study.
Setting: Rural area of Manipur valley.
Subjects: Currently married woman during their effective reproductive period.
Main outcome measures: Proportional hazards model.
Results: Among the twelve variables of interest, death of the previous child during infancy, desired number of sons by wife, duration of breast feeding and sex of the previous child have high significance ($p < 0.01$). Religion has a significant ($p < 0.05$) impact on the dynamics of WTC.
Conclusion: The variation in WTC can be thought to be caused mainly by son preference, lactation, infant mortality and religious differentials in the study population. However, the study was conducted within the rural valley area of Manipur state. It is therefore, suggested that such a study may be taken up on a large scale covering entire state. This will help to asses the causal effects on the duration - the major component of birth interval through which the states' high fertility level may somewhat be checked.

KEYWORDS: duration of breast feeding, educational level, relative risk, religious differential, son preference

INTRODUCTION

Natural fertility is defined by Henry[1] as fertility that exists in the absence of deliberate birth control. It depends on the duration of effective reproductive span and length of birth interval[2]. The birth interval, especially closed birth interval, is composed of three major components, *viz*, postpartum amenorrhoea (PPA), waiting time to conception (WTC) and gestation. The gestation is treated to be a constant duration in various analyses while PPA is in fact a physiological process which varies in a complex fashion[3,4]. But the second component - WTC, defined to be time interval between the resumption of menses after a pregnancy until the beginning of the next pregnancy, is highly influenced by socio-economic, cultural, demographic and behavioural factors[3,5,6]. Keeping this in view, the present study was initiated empirically to analyse the effects of some demographic and behavioural factors which are expected to cause variation in the WTC in eligible women. The main focus of this analysis was to explore the relationship between the duration of WTC of women and the twelve explanatory variables of interest. It has also to produce a more precise estimate of the hazard or risk of shortened WTC caused by any influencing variable after adjustment for other explanatory ones.

In this study, the duration of WTC was taken to be response variable. Twelve main explanatory variables are taken into account out of which seven are quantitative in nature and the remaining five are categorical ones. They are; age at marriage, availability of separate room in the household, age at delivery, death of previous child during infancy, desired number of sons, educational level, family income, lactation, parity, sex of previous child, religion and use of contraceptive devices.

SUBJECTS AND METHODS

The study is conducted within the rural valley area of Manipur which is one of the tiny states of North-East India inhabited mainly by the Mongoloid race. It comprises of 740 eligible women, selected from various constituencies covering the entire rural area of Manipur valley. The sample size is determined on the basis of past findings of Narendra[5] (mean ± S.D of closed birth interval is 27.98 ± 13.61) under 95% degree precision with 3% permissible error to the mean. The currently married Manipuri women in age group 15-50 years residing within rural valley area of the state constitute the study population.

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Stratified random sampling with proportional allocation in each constituency is adopted as sampling technique. The sampling frame is defined to be the list of eligible couples selected from the last electoral roll published by the Government of Manipur. The eligible women are taken into account after excluding the women who did not meet two criteria - (1) she must have had at least two pregnancies in her life and (2) her most recent pregnancies must have resulted in two live births. The tool of the survey is a pre-tested semi structural interview schedule and data is collected through the personal interview method. The survey was conducted from October 2004 to January 2005 with the reference date of 1st October 2004. Thus the information on the predictor variables are collected subject to that of the reference date despite the survey of an individual conducted at any point of time during the survey period. For the purpose of analysis, a well recognized statistical technique namely Proportional Hazards Model [$h(t, Z) = h_0(t) \exp(B/Z)$] introduced by Cox[7] in 1972 has been carried out through SPSS. The results are expressed in terms of ß-coefficient, standard error (S.E), p-value and relative risk (exp-ß) with 95% confidence interval (CI). Since the present primary data is of complete type (no censoring), the length of time to conception was recorded for each eligible women. Thus, the single value is utilized as status variable in the analysis. Interpreting the model involves examining the coefficient for each explanatory covariate. For continuous co-variate, the parameter ß denotes the effect of a unit change in the independent co-variate on the log of the hazard rate, after adjustment of the other co-variates. For categorical co-variates, b represents deviation of a specified group from the hazard of the reference group of the co-variates. The exponential of the coefficient, exp (ß) also allows us to express the hazard of a specific group as a proportion of the baseline hazard.

The response variable is WTC denoted by WTC in the analysis. Thus WTC is defined as the time interval between the resumption of menses after the last but one pregnancy until the beginning of the last pregnancy subject to considered closed interval. In the study population (Manipur) irrespective of rural and urban areas, there is a traditional norm (for the last one and half centuries) that just after a birth, the male spouse or a senior member of the family records the accurate timing of birth. Thereafter, he or she goes to a nearest astrologer to make “Birth Record” (locally called KUSTHI) which consists of many birth-related facts like the exact time of birth (fractional time with day, month & year), sex, position of stars, *etc*. Using the birth record, the exact duration of the last closed birth interval is observed. The duration of post-partum amenorrhoea is determined by the exact date of menses after the last but one birth reported by the concerned eligible women. Thus, subtracting the total of the duration of post-partum amenorrhoea and gestation period (9.3 months) from the last closed birth interval, the dependent (response) variable, say, WTC is defined. In order to control the recall error, only the last closed birth interval is considered to be of account here. This time to conception is a continuous variable measured in terms of months as its unit. The explanatory variables are age at marriage of husband - AMH, age at marriage of wife - AMW, availability of separate room - ASR (1, if yes and 0 if otherwise), age at delivery of previous child - DA, death of previous child during infancy - DPC (1, if dead and 0 if otherwise *i.e.*, alive), desired number of sons by husband - DSH, desired number of sons by wife - DSW, educational level of husband - EDH (number of completed years of education), educational level of wife - EDW (number of completed years of education), family income - INC, status of lactation - LAC (duration of breast feeding in months), parity - PT, sex of the previous child - SEX, (1, if male and 0 if otherwise i.e., female), religion - RELH (1, if Hindu and 0 if otherwise *i.e.* Islam and Christian), religion - RELI (1, if Islam and 0 if otherwise, *i.e.* Hindu and Christian), and use of contraceptive devices - UCD (1, if used and 0 if otherwise). The contraceptive use is meant for the use during the last closed interval only subject to WTC. The types of methods used were oral pills, condom, IUD, *etc*.

RESULTS

Applying Enter method, we had sixteen classified regression coefficients (ß) out of the twelve explanatory variables with their proper classifications which were quantified by p-value of test statistic and Adjusted Odds Ratio (Adjusted OR defined by exp(ß)) or so called relative risk). Two statistically significant and four highly significant coefficients (adjusted) were found in the analysis shown in Table 1. The death of previous child during infancy gives highly significant contribution in reducing WTC after adjustment of the effects of other explanatory variables (ß = 0.9092, p = 0.0001). This mortality status explores that the death of previous child during infancy has more risk of shortening WTC than that of the child alive till one year. This risk marks 148 per cent (exp (ß) = 2.4823, 95% CI = 1.5563-3.9592).

Most studies conducted in developing countries like India show that son preference plays a non-trivial role in fertility regulation in the sense that a higher degree of son preference affects the policy of reducing fertility level. This pattern of social ill also

Table 1: Cox Regression analysis of WTC by Enter method

Variables	ß-coefficient (S.E.)	p-value	Adjusted OR with 95% CI
AMH	0.0110 (0.0095)	0.2456	1.0110: 0.9925-1.0300
AMW	7.019E-04(0.0194)	0.9711	1.0007: 0.9634-1.0395
ASR	-0.0187(0.0836)	0.8226	0.9814: 0.8331-1.1562
DA	0.0033(0.0171)	0.8470	1.0033: 0.9702-1.0376
DPC	0.9092**(0.2382)	0.0001	2.4823: 1.5563-3.9592
DSH	-0.0721(0.1022)	0.4806	0.9304: 0.7615-1.1369
DSW	0.2839**(0.1064)	0.0076	1.3283: 1.0784-1.6362
EDH	-0.0036(0.0115)	0.7550	0.9964: 0.9742-1.0192
EDW	0.0199(0.0104)	0.0550	1.0201: 0.9996-1.0411
INC	-0.0045**(0.0017)	0.0084	0.9956: 0.9923-0.9989
LAC	-0.0309**(0.0026)	0.0000	0.9696: 0.9646-0.9746
PT	0.0022(0.0485)	0.9636	1.0022: 0.9113-1.1022
RELH	-0.2575*(0.1228)	0.0337	0.7730: 0.6095-0.9804
RELI	0.0097(0.1767)	0.9562	1.0098: 0.7142-1.4276
SEX	-0.2281*(0.0876)	0.0107	0.7969: 0.6679-0.9485
UCD	-0.1319(0.0809)	0.1031	0.8765: 0.7380-1.0270

OR = odds ratio; S.E = standard error; CI = confidence interval
* Significance at 0.05 probability level, ** Significance at 0.01 probability level

Table 2: Cox Regression analysis of WTC by Stepwise method

Steps	Variable	ß-coefficient (S.E)	p-value	Adjusted OR with 95% CI
1	LAC	-0.0301**(0.0025)	0.0000	0.9703: 0.9656-9751
2	DPC	0.9816**(0.2293)	0.0000	2.6687: 1.7026-4.1831
	LAC	-0.0303**(0.0025)	0.0000	0.9702: 0.9654-0.9749
3	DPC	0.9463**(0.2298)	0.0000	2.5761: 1.6418-4.0420
	DSW	0.2414**(0.0928)	0.0093	1.2731: 1.0613-1.5271
	LAC	-0.0304**(0.0025)	0.0000	0.9701: 0.9653-0.9749
4	DPC	0.9077**(0.2301)	0.0001	2.4786: 1.5789-3.8908
	DSW	0.2746**(0.0919)	0.0028	1.3160: 1.0992-1.5757
	LAC	-0.0301**(0.0025)	0.0000	0.9703: 0.9655-0.9751
	SEX	-0.1919*(0.0755)	0.0110	0.8254: 0.7118-0.9571
5	DPC	0.9286**(0.2304)	0.0001	2.5301: 1.6113-3.9756
	DSW	0.2498**(0.0924)	0.0068	1.2838: 1.0712-1.5385
	LAC	-0.0303**(0.0025)	0.0000	0.9701: 0.9653-0.9749
	RELH	-0.2100*(0.0926)	0.0234	0.8106: 0.6760-0.9719
	SEX	-0.2067**(0.0758)	0.0064	0.8133: 0.7010-0.9437

OR = odds ratio; S.E = standard error; CI = confidence interval
* Significance at 0.05 probability level, ** Significance at 0.01 probability level

persisted in this study. Notwithstanding, the desired number of sons by wife has more contribution to a short duration of WTC than that of her husband counterpart (ßDSW = 0.2839, p = 0.0076 and ßDSH = -0.0721, p = 0.4806). Such contribution is highly significant at 0.01 probability level. The value of exp (ß) say 1.3283 with 95% CI, 1.0784-1.6362 generates the fact that a one number increase in desired number of sons causes a 32.8 per cent decrease in the duration of WTC leading to a high fertility level. Higher educational level of the husband is associated with higher length of the duration in the study population, but it is found to be statistically insignificant. On the contrary, educational level of wife has some impact on WTC in such a way that higher educational level is associated with lower duration of WTC.

It is worthwhile to mention in the analysis that lactation, measured by duration of breast feeding, has less hazard in the sense that the increase in lactation lengthens the duration of WTC. It is noted to be very highly significant as evidenced by its coefficient, -0.0309 with p-value (< 0.001). The exp (ß)-value, say 0.9696, also suggests that a one month increase in duration of breast feeding can push up 3.1 per cent increase in the duration with 95% CI, 0.9646-0.9746. The duration is found to vary significantly according to different categories of religion in the present analysis. It is more significantly larger in the Hindu category than that of Islam and Christian faith as quantified by ß-value (-0.2575, p = 0.0337). A 22.7 per cent more risk on the hazard of being short duration can also be observed in Islam and Christian religious group than that of Hindu religion (exp (ß) = 0.7730 with 95% CI = 0.6095-0.09804) after adjustment of the other explanatory variables under study.

The sex of previous child also plays significant role in the variation of WTC. If the sex of previous child is male the duration of WTC has always an increasing tendency. It is significant at 0.05 probability level (ß = -0.2281, p = 0.0107). The finding also suggests that we have 20.41 per cent more risk of a short duration of WTC if the sex of previous child is female than that of its male counterpart (exp (ß) = 0.7969 with 95% CI = 0.6679-0.9485). The sign of the b-coefficient of UCD also highlights that the use of contraceptive devices can lengthen WTC but it is not statistically significant.

To identify the most important determinants contributing to a high risk of short WTC, a Stepwise method of the same model were again employed (Table 2). Five variables *viz*., DPC, DSW, LAC, RELH and SEX were identified to be such determinants. In the first step, duration of breast feeding *i.e.*, lactation (LAC) has a very high impact on WTC (ß = -0.0301, p < 0.0001) in such a way that it has a 16 per cent risk of shortening WTC with every six months decrease in the duration of mothers breast feeding practice (for one month, exp (ß) = 0.9703 with 95% CI = 0.9656-0.9751). Next to LAC, the death of previous child (DPC) becomes a high risk factor for WTC in the second step. The chance of risk is approximately between 2 to 3 times higher for the previous child death during infancy than for the child alive. In a crude sense, we have 167% more hazard of shortening WTC in death of previous child than those alive during infancy (exp (ß) = 2.6687 with 95% CI = 1.7026-4.1831).

Proceeding in this way, DSW (ß = 0.2498, p = 0.0068), SEX (b = -0.1267, p = 0.0064) and RELH

(ß = -0.2100, p = 0.0234) were gradually found to be high risk indicators of WTC in addition to LAC and DPC in the last step. The desired number of sons by the wife has a direct linkage with a short WTC which is highly significant at 0.01 probability level. It marks 28.4 per cent more risk in son than that of daughter as exp (ß) is 1.2838 (95% CI = 1.0712-1.5385). This ill-behavior hazard was not seen in the case of husbands in the study population. The couples having at least one son could have longer successive duration of WTC. The finding was again quantified by the fact that the couples having at least one daughter have 18.7 per cent more hazard of shorter successive duration (WTC) than those having at least one son (exp (ß) = 0.8133 with 95% CI = 0.7010-0.9437). In this stepwise analysis, the religious differential was also a significant contributor in the dynamics of WTC. A group consisting of Hindu and similar category had, at a glance, longer WTC than that of Islam and Christian faith. Exp (ß)-value, 0.8106 with 95% CI, 0.6760-0.9719, indicates that there is a 19 per cent increased risk of short WTC is in Islam and Christian people in comparison with Hindus. It may be noted that among the excluded variables in the last step, Islamic religion and educational level of wife are still significant. No doubt, Islamic religion is the reference category for Hindu and similarly situated groups so that it cannot be isolated from the interpretation of Hindu and religious groups and again varied significantly with the educational level of the wife. Thus these two significant factors do not affect the conceptualization on the effects of co-variates in the last step.

DISCUSSION

Irrespective of all co-variates, the couples who marry late have a tendency towards quick child-bearing and try to compensate their earlier lost reproductive period in order to have a desired number of children. Consequent upon their effective reproductive period being short, this directly results into a short WTC. This view is incorporated within the findings of Narendra[5], Nath *et al*[4], Clegg[8] and Singh[9]. On the contrary, when the effects of various co-variates are adjusted, the impact of age at marriage of both spouses is statistically insignificant in the study. This is thought to be caused by the educational levels of couples in the sense that the age at marriage is significantly associated with educational level achieved. This insignificant result is also incorporated in stepwise analysis even after adjustment of the effects of five important co-variates - death of previous child during infancy, desired number of sons by wife, duration of breast feeding, religion and sex of previous child. In this study, we also observe that the effects of availability of a separate room especially for the couple, age at delivery of previous child, desired number of daughters by both spouses and duration of marriage have no significant contribution on the regulation of WTC.

Perhaps, death of previous child during infancy limits the duration of WTC through emotional and psychological feeling of the couples. Irrespective of lactation, an infant death may exert a psychological pressure on the parents to make up the loss as early as practicable. In other words, the behavior of child replacement effect involves a deliberate decision by the couples to compensate the dead child leading to a short WTC. On the other hand, presence of an infant or young child and strain of rearing the child may reduce the desire for sexual relations which may result in reducing coital frequency and hence leading to longer WTC. This view is supported by the findings of Swenson[10], Trussel and Pebley[11], Lindstrom *et al*[12]. It is again witnessed in the present study in both methods *viz*. Enter (ß = 0.9092**) and Stepwise (ß = 0.9286**) that the death of previous child during infancy has a highly significant impact on the dynamics of WTC.

Indeed, couples have preference for male offsprings. This is not only true in the study population but in many other societies in the world since boys are preferred for long term benefits such as family fortune and perpetuation of family name. Consequently, sex preference has a strong bearing on birth interval dynamics, especially in its component - WTC. Couples prefer to go for number of children in order to achieve the desired number of sons. Possibly, whenever there is a female child and if the couple intends to go for more births it exerts a psychological and emotional pressure to have the next child of the desired sex quickly and hence leads to shorter duration of WTC. The present findings can justify the views of Khan[13] and Bumpass *et al*[14]. One of the crucial findings in the study is that the wife's desired number of sons has a more significant impact on the duration than that of their husband in both methods each at 0.01 probability level. Thus this factor could not be excluded to determine the nature and pattern of WTC in the study population. Educational level of husband has no impact on the duration but wife's educational level is found to be significant at 0.05 probability level only after adjustment of other factors under study. However, there is a chance of convincing the idea that those women having higher educational level meet the risk of short WTC. It may be thought to be caused by late age at marriage through which the duration also varies significantly. In fact, those women who marry late have a shorter effective reproductive period in

which they can have a child than those of early married women. This view is witnessed by the findings of Zheng[15] and Murphy[16]. In each method lactation has a high significant impact on the regulation of WTC (unadjusted-ß = -0.0301**, adjusted- ß = -0.0325**, step wise-ß = -0.0303**). On one hand, it might be thought to be caused by the fact that most breast-feeding mothers have lesser educational status leading to unemployment. These mothers are generally found to have offsprings close to their desired number of children so that the degree of eagerness for getting the excess number is reduced and hence the duration becomes to be significantly increased. On the other hand, employed mothers are usually educated and perform late marriages and practice less breast-feeding as well. Consequently they compensate the lost reproductive period by curtailing WTC to achieve their desired number of children.

Thus WTC plays a tremendous role in fertility regulation through birth interval. Among the variables of interest, duration of breast-feeding, death of previous child during infancy, desired number of sons by wife and sex of the previous child have highly significant impacts on the dynamics of WTC at 0.01 probability level of significance. The duration also varies with religious differentials, significant at 0.05 probability level. However, the present study is confined within the rural valley area of Manipur. It may therefore be suggested that such a study be taken up on a large scale covering the entire geographical area of the state. This will help to asses the causal effects on the variation of WTC - the major component of birth interval through which the state's high fertility level may somewhat be checked.

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