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Estimating the Fecundability and Average Conception Wait of Women among Low Contraceptive Tribal Community of Southern Ethiopia

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ABSTRACT This article is an empirical study aimed at examining the fecundability of women in low contraceptive communities in Southern Ethiopia. The data were collected from 1467 ever-married women who were selected from one of the most populous zones of Southern Ethiopia (the Sidama tribe) through the multistage stratified sampling technique. In order to provide a comparative picture, secondary data collected at national level were used. The study examined the fecundability distribution by age of women using last closed birth interval analysis, and found out that the probability of conception in a month among women of the reproductive age in the study population is about 0.072 with implied average conception wait of 13.88 months. Finally, the study has come up with some policy implications of the findings especially from the viewpoint of fertility decline.

I. INTRODUCTION

Human fertility involves both biological process (intercourse, conception and gestation, and parturition) and individual choice. While the former is modified by cultural patterns, the later is strongly influenced by economic, social and demographic factors. Demographers usually express the human fertility phenomena using three concepts: Potential fertility or fecundity (**F**), Natural fertility (**N**) and Actual or Controlled fertility (**C**). Potential fertility (F) represents the number of children that would be born, given the most favourable reproductive conditions; Natural fertility (N) refers to a situation in which no deliberate control of birth is attempted by cohabiting couples i.e, contraception and abortion are absent and other fertility inhibiting factors such as prolonged breast feeding, intercourse taboos or prolonged separation of spouses are not practiced as deliberate control to limit birth (UN, 1993; Coale 1974). The difference between F and N expresses the fact that at any given moment and in every society physiological and cultural restrictions such as sterility, sexual abstinence, breast feeding and the like prevents fertility from reaching its biological maximum, even in the absence of deliberate control.While potential fertility remains constant, however, natural fertility can actually increases with modernization, as a consequence of the breakdown of taboos, the shortening of the duration of breast feeding and the improvement of child survival. The actual or controlled fertility (C) refers to a situation where couples deliberately control birth through contraception and other methods. The gap between N and C indicates the extent of birth control, that is, birth averted.

One of the important proximate determinants of natural fertility is fecundability which was originally defined by Gini (1924) as the probability that a married woman in susceptible state will conceive during a month of exposure to unprotected intercourse (i.e. a susceptible state is one which a woman can potentially conceive as a result of unprotected intercourse.) This state thus excludes such conditions as pregnancy, lactation and pathological sterility.

Fecundability of a woman is determined by her fecundity and her coitus practices which are regulated by socio economic, demographic and cultural factors prevailing in the population. The fecundity of a woman is affected by physiological factors such as nutrition, health status, genetic composition and the like. It is therefore logical to assume fecundability of women to vary with her age. It is thus important to know the magnitude and change in fecundability with the age of women. This study tries to estimate the levels of fecundability and average conception

wait of women among low contraceptive tribal group of southern Ethiopia.

II. COUNTRY PROFILE

Ethiopia is located in the horn of East Africa between 3 and 15 degrees north latitude and 33-48 degrees east longitude. It is an ancient country with a rich diversity of peoples and cultures. Covering a total area of some 1,130,000 square kilometer, Ethiopia is a country of great geographical diversity with rugged mountains, flat-topped plateaus, deep gorges, and rolling plains. The country is bordered by Djibouti, Eritrea, Sudan, Kenya, and Somalia (CSA, 2000).

With an estimated population of about 71 million, Ethiopia is the third populous country of Africa, next to Nigeria and Egypt. Fuelled by a high level of fertility rate, the country is experiencing high annual population growth rate of about 2.9 percent. The population increased over the decades from 42.6 million in 1984 to 71 million in 2004 (NOP, 2000; CSA, 2000).

Ethiopia is an agrarian country where agriculture accounts for more than sixty percent of the GDP, employing about 85 percent of the population, and accounts for about 90 percent of the export (CSA, 2000). The country is one of the least developed in the world, with a per capita Gross National Product (GNP) in year 2004 of US $ 98 .

Majority of Ethiopians have little or no education; 62 percent of males and 77 percent of females have no education, 27 percent of males and 17 percent of females have only some primary education, less than 3 percent of males and 1 percent of females have attended (but not completed) secondary level education. Only less than 4 percent of the population completed secondary or higher education. The main occupation of the settled population is farming while about 25 percent of the total land is left for pastoralists. Christian and Islam are the two main religions of the country; 51 percent of the population is orthodox Christian, 33 percent Muslims, 10 percent Protestants and the rest are following diversity of faiths. The country is a home to about 80 ethnic groups that vary in population size from more than 30 million to less than 100 (CSA, 1998; 2000).

It is estimated that about 75 percent of the population suffers from some type of communicable diseases and malnutrition. It is estimated that about 50-60 percent of the population is chronically food insecure and more than half of the children below the age of five are stunted; 11 percent of the children are moderately wasted and 1 percent of these children are severely wasted (CSA, 2000). Life expectancy at birth, as an indicator of the health status of the population, is estimated to be about 42 years (PRB, 2003) and the more sensitive indicator, infant mortality rate is 107 per 1000 births, whereas the average sub Saharan Africa IMR is less than 100 per 1000 live births (PRB, 2003). On top of these, maternal mortality ratio in the year 2003 was above 895 per 100,000 births, which is one of the highest in the world (PRB, 2003; CSA, 2000).

Among the nine federal states of the country (Amhara, Oromia, Tigrai, Afar, Somalia, Gambella, Benishangul, Region 14, and SNNPR), the Southern Nations ,Nationalities and Peoples Region (SNNPR) , which is the concern of this study, is located in the southern part of the country. With an area of 113,539 square kilometers, it accounts for about 10 percent of the total area of the country. The region is constitute of twelve sub-regional administrative areas called 'Zones' classified on the basis of ethnicity (Sidama , Guraghe, Hadya , Wolaita , Bench Maji, Semen Omo, Debub Omo, Gedeo , Keficho , Kembatta, Alaba Tembaro, and Silti ,).In the year 2000, the population of the region was estimated at about 12.5 million, of which 6.2 million male and 6.3 million were female population. The region's population accounts for 20 percent of the total population of the country, which makes it the third populous region in the country next to Oromia and Amhara federal states (SNNPR, 2000; CSA, 2000).

The population profile of the region is characterized by large number of children under 15 (46.7 percent) while those in the age group 15-64 and above 64 accounts for 50 and 3.3 percent respectively. The median age of the population in the year 2001 was estimated to be about 17 years, which again indicates high prevalence of dependency and high population momentum in the years to come. Out of the total population of the region, women in the reproductive age (15-49) account for about 2,970,650 in the year 2000 (47.3 percent of the total female population of the region). Out of these, only 8 percent live in urban areas while 92 percent reside in rural areas of the region.

The crude birth rates and Total Fertility Rate

of the region in recent years was 48.6 and 7 respectively (CSA, 1998). The region is experiencing one of the highest Infant Mortality Rate (113.4 per 1000 live births), under five mortality of 191.5 for both sexes and maternal mortality rate of above 850 per 100,000 live births (CSA, 2000). About 53.9 percent of children are stunted, 12 percent are severely wasted and 52.5 percent are under weight (CSA, 2000). On top of these, the region exhibits one of the lowest health service coverage in the country (CSA, 1998). Lack of good antenatal delivery, poor postpartum care, malnutrition, anemia, high fertility and the like contributed to the high regional maternal mortality rate. Moreover, sexually transmitted diseases are among the major health concern of the region. Currently, the HIV cases are increasing very alarmingly and threatening the health status of the citizens and thereby bringing about serious socioeconomic consequences in the region.

Sidama zone is one of the 13 zones found in SNNPRG. It is found in the northeastern part of the region and it is bordered by Oromiya federal state in the north, east and southeast, with Gedeo zone in the South, and North Omo zone in the west.

The zone has a total area of 7200 km^2 divided into ten sub-zones , locally called '*woredas*' and two administrative towns. These ten woredas are ; Awassa, Shebedino, Dalle, Aleta Wondo, Darra, Hagere-selam, Arorresa, Bensa, Arbegona, and Boricha wordas and the two towns administrations of Yirgalem and Aleta wondo. Among all *woredas* , Dale is the largest with a total area of 1494.630 km^2 while the smallest is Darra with 263.360 km^2. The zone has different landform characteristics varied from high mountains to low lands as it is true for different parts of the country. According to the recent estimate, the zone's total population is about 3 million with an average density of 386 persons per km^2 , making it one of the densely populated zone in the region. There is high variation in the population growth rate of rural and urban areas, which is 4.11 and 2.23 percent per annum respectively. Protestant chirstians account for the majority followed by orthodox Christian, catholic and Islam.

The zone is one of the least developed areas of the country with very closed and rigid social system, and exhibiting very low level of literacy, high infant and child mortality, very low prevalence of contraceptive use (less than 4 percent), high level of maternal and child malnourishment (54 and 50 percent respectively) and very low status of women.

III. OBJECTIVES OF THE STUDY

The major objective of this study is to estimate the age distribution of fecundability and average conception wait of women among low contraceptive communities of southern Ethiopia (Sidama Tribe)

IV. DATA AND METHOD

4.1 Data Source: The input data for this study was generated through primary source. The study population is ever married women in the conventional age group 15-49 who were selected from the population of one district (Administrative zones) of the southern regional government, with higher variation of living and environmental condition. In order to substantiate the findings, national level secondary data were used to estimate the level of fertility and fecundability.

4.2 Sampling Design: In order to make generalization and any estimation of fertility parameters of the region possible, a total sample size of 1140 is statistically significant (i.e. 1140 is minimum required sample size statistically estimated). However, in order to further increase the reliability and generalizability of the findings of the study, about 1500 sample units were planned to be taken through the sampling procedures given below.

As indicated in section one, there are twelve zones in the southern region, almost all having similar level of natural fertility (TFR of about 7). In order to understand the variations in the level of fecundability and average conception wait, a tribal district which better represents variations in living and environmental condition of the region was selected. Generation of sampling of ever-married women (age 15-49) begun with the listing of all village segments or locally known as "Kebeles" where each village was categorized under high, medium and low environmental stress zone using the information from the regional office of environmental protection. Then, two stages proportionate stratified sampling technique was used to ensure that the different groups of the population are adequately represented in the sample. At the first stage of sampling, a total of twenty-four area segments were selected from a

total of 110 segments using systematic sampling technique so as to represent the high, medium and low environmental zones. At the second stage of sampling, a total of 1140 households were selected using systematic sampling technique and all eligible women were interviewed. The ultimate total number of eligible women interviewed was 1467.

4.3 Data Collection, processing and Analysis: Two Questionnaires were developed to collect data for the study; the household and individual questionnaire. In addition to the quantitative data, qualitative data (Focus group discussion) was used to further investigate the socio economic and cultural impediments of natural fertility experience of the people. Once the recruitment and training of data collectors was completed, the data were collected from the sample households for four consecutive months (January to April 2005).The data were coded and four experienced data entry operators carried out the data entry. Data re-coding and cleaning were performed following data entry. The quantitative data were analyzed using computer software called Statistical Package for Social Sciences (SPSS). The estimation of the levels of fecundability and conception wait was done by applying the last closed birth interval techniques.

V. BACKGROUND CHARACTERISTICS OF THE RESPONDENTS

Information on the respondent's background characteristics, such as age, marital status, educational status, religious status and the like was collected. The percentage distributions of these background characteristics are given in table 1 below.

The age distribution of the respondents given on table 1. reveals that majority of them are represented from the age group 25-29 (26.8%) followed by age group 30-34 (26.3 %) and age group 35-39 (22.2%). Small proportions, 2.8 and 2.1 percent, represent respondents from very young and older age group, 15-19 and 45-49 respectively. With regards to the marital status distribution of respondents, it can be observed that the majority of women (93.9%) are currently in union while the divorced, separated and widowed women account for very small proportion of the sample population. The divorced, separated, and widowed women altogether account for only 6.1 percent of the total sample women.

Table 1: Percentage distributions of respondents by background characteristics, Sidama zone, SNNNPRG, 2005

Characteristics	*Frequency (n=1467)*	*Percent*
Age of Respondent		
15-19	41	2.8
20-24	149	10.2
25-29	393	26.8
30-34	386	26.3
35-39	326	22.2
40-44	141	9.6
45-49	31	2.1
Current Marital Status		
Divorced	12	0.8
Separated	9	0.6
Widowed	69	4.7
Currently married	1377	93.9
Religious Status of the Respondent		
Orthodox Christian	72	4.8
Catholic	73	5.0
Protestant	1282	87.4
lslam	39	2.7
Traditional	1	0.1
Educational Status of Respondent		
Primary (1-6)	323	22.0
Junior secondary (7-8)	75	5.1
High school (9-12)	34	2.3
Diploma (12^{+2})	1	0.1
Illiterate	1034	70.5
Husband's Level of Education		
Elementary (1-6)	452	30.7
Junior secondary (7-8)	345	23.5
Secondary (9-10)	229	15.6
College diploma	7	0.6
Illiterate	434	29.6
Marital Form		
Polygamous	224	15.3
Monogamous	1243	84.7
Age at First Marriage		
Less than 15	339	23.1
15-19	973	66.3
20-24	132	9.0
25 and above	23	1.6
Current Use of Family Planning Methods		
Currently using	91	6.2
Currently not using	1376	93.8
Future Plan (intention) to Use Family Planning		
Yes	1114	75.9
No	353	24.1
Work Status of the Respondent		
Self employed	148	10.1
Civil servant	38	2.6
Farmer	1036	70.6
Petty trader	156	10.6
Others	89	6.1
Standard of Living Index (SLI)		
Low	1247	85.0
Medium	207	14.1
High	13	0.9

Another background variable shown in table 1 is religion. The majority of the respondents are protestant Christians (87.4%) followed by Catholic (5.0%) and Orthodox Christians (4.5%) while Islam and Traditional religions account for very small proportion of the respondents. The religious distribution of the sample women is quite different from the distributions at national level. If one looks into the national population data for the year 2000, the Orthodox Christians accounts for about 51 percent of the total population of the country followed by Islam (35%). Contrary to this, the Southern part of Ethiopia is predominantly of Protestant Christians where missionary activities have been very strong and existed for the last many decades, and also accounts for the bulk of the proportion of Protestant religion in the national census

As expected, majority of the respondents fall under illiterate category (70.5%), about 22.0% have attained primary level of education and very small proportions are reported to have gone higher than primary level. The percentage distribution of the husbands by educational status reveals better picture compared to that of the respondents. Relatively larger number of the husbands attained primary and junior high school while still the proportion of illiterate husbands accounts the majority. Respondents were also asked to indicate whether their husband has another wife or not, and the rank they own among the wives. This simple and direct forward question helped in identifying whether the respondent is in monogamous or polygamous union. Accordingly, 15.3 percent of the respondents reported that their husband has another wife. This proportion is almost exactly the same as the proportion (14%) of polygamous women at regional level survey of year 2000.

Age at first marriage of respondents is presented in table 1. In many societies; age at marriage marks the point in women's life when childbearing becomes socially acceptable. This is also to mean that women who marry early will on average have a longer exposure to the risk of pregnancy resulting in higher level of fertility in the absence of effective contraceptive use. In this study, information on age at first marriage was obtained by asking all ever-married respondents the month and year they started living together with their first spouse. It is seen from the table that the majority of the sample women (66.3%) got married between age 15-19, which is very early compared to many other populations in fertility transition. The proportion reported to get married before age 15 is also very high (23.1 %). Table 1 also shows the work status of respondents during the last 12 months preceding the survey. The majority of the respondents (70.6%) reported to spend most of their time in direct agricultural activities. The fact that the input data for this study were collected from the rural districts only, it is natural to expect the majority of the respondents to be engaged in direct agricultural activities.

Finally, the table presents the standard of living index (SLI) as an alternative method of measuring economic status of households in a situation where information on household income is very difficult to get. Here, it is focused on the traditional practice of using proxy variables to measure economic status, owing to the fact that report on household income is unreliable. Montgomery et al. (2000) assumed that ownership of durable goods and housing quality are proxies for the preferred measure of household economy. They derived 17 consumer durable goods such as sewing machine, stove, refrigerator or freezer, air conditioner, fan, radio, cassette player, photograph, stereo equipment, washing matching, black and white television, color television, bicycle, motorbike, car, and camera (Montgomery, 2000) .In this study, by composing the household ownership of selected items (land, bike, Bullock, Cattle, and the like), an index ranging 0 to 100 was developed. Accordingly, 85% of the households fall under low SIL category while only 14.1 and 9.9 percent are reported to fall under average and high level of SLI respectively.

VI. OVERVIEW OF FERTILTY LEVELS AND TRENDS

For a better understanding of the estimation of fecundability and conception wait, it is important to review the national level and trends of fertility during the recent past. One of the difficulties of studying fertility trends and differentials is that detailed and complete data are lacking except that the country has recently conducted the first DHS in the year 2000 and the second in the 2005, which are considered as the first comprehensive and national representative data with better quality and quantity of fertility related information. However, it is true that a great deal of attempt was made to examine the trends

of fertility in the country using both small micro level and macro level data. As most of these endeavours based their analysis on inadequate data set, it has become difficult to confidently describe both the fertility trends and historical fertility transitions. Despite these difficulties, this study tried to summarize the trends using the available four major data (1990 NFFS, 1994 Census, 2000 DHS and 2005 DHS).

Table 2: National level fertility trends

	Age Specific Fertility Rates			
Age group	*NFFS 1990*	*DHS 2000*	*DHS 2005*	*Current data*
15-19	95	100	104	56
20-24	275	235	228	231
25-29	289	251	241	294
30-34	257	243	231	285
35-39	199	168	160	228
40-44	105	89	84	110
45-49	56	19	34	16
TFR	6.4	5.5	5.4	6.1

The figures are computed per 1000 women TFR: is the average number of children a woman would have during her reproductive Period. ASFRs is expressed as the number of births occurring in specific age group of women divided by the total number of women of the same age group.

Table 3: Reported mean children ever born from Ethiopian national level data (1990, 1994, 2000 and 2005).

Age group	*1990 Survey*	*1994 Census*	*2000 DHS*	*2005 DHS*
15-19	0.3	0.2	0.15	0.18
20-24	1.7	1.3	1.20	1.01
25-29	3.3	2.8	2.65	2.50
30-34	4.9	4.4	4.57	3.81
35-39	5.9	5.4	5.66	4.74
40-44	6.6	5.9	6.74	5.25
45-49	6.9	6.1	7.23	5.50

The figures are computed from the nationally representative data.

Some evidences suggest that that the Ethiopian Fertility has started increasing rapidly starting early 1970's reached a peak of TFR of 7.7-8.0 in the 1980's and once again showed slight decline in the early 1990's. It is evident from table 1 below that fertility (as measured by the Total Fertility Rate) is said to be very high across all the survey period. However, there seems to exist substantial fall in fertility among all age groups over the last fifteen years, with the largest decline observed among the younger cohort. Looking at the TFRs given at the bottom of the table, it is noted that the TFR has declined from 6.4 births per woman n the 1990 to 5.4 births per woman in the year 2005.

VII. ESTIMATION OF FECUNDABILITY AND AVERAGE CONCEPTION WAIT

The concept of fecundability was originally defined by Gini (1924) as the probability that a married women in susceptible state will conceive during a month of exposure to unprotected intercourse (i.e. a susceptible state is one which a women can potentially conceive as a result of unprotected intercourse.) This state thus excludes such conditions as pregnancy, lactation and pathological sterility.

Fecundability of a woman is determined by her fecundity and her coitus practices which are regulated by socio economic, demographic and cultural factors prevailing in the population. The fecundity of a woman is affected by physiological factors such as nutrition, health status, genetic composition and the like. It is therefore logical to assume fecundability of women to vary with her age. It is thus important to know the magnitude and change in fecundability with the age of women.

Though different approaches regarding fecundability estimates have been developed to date, the following two approaches are commonly used: In the first approach, fecundability is assumed to be constant for a woman over a period of observation but varies for different women in the population (Potter and Parker, 1964).In the second approach, woman is supposed to belong to a homogeneous group with respect to fecundability. It is assumed that fecundability varies for each women over the period of observation by her age.

Many studies indicate that the fecundability parameter is estimated by the following three methods: i) Fecundability model based on first conception delays (first birth interval); ii) Fecundability model based on inter live birth interval and; iii) Fecundability estimation based on open birth interval.Estimation of fecundability based on the first birth interval was originally developed by Italian statstician Corrado Gini (1924) He estimated fecundability from the data on first conception time on the assumption that fecundability remains constant among women before first conception in month follows the geometric distribution. Henry (1953) attempted to study the natural fertility of women and

analyzed the data on the interval between two confinements. Henry modified his earlier model by including the fetal losses and the non susceptible periods associated to these pregnancies before first birth conception .He considered fecundabiility to be a function of age in non contraception society. Usually, fecundability of a woman is estimated by first conception delays. Being the first event in the reproductive life of a woman, it has been argued, first birth is less subjected to recall lapse, and is free from errors usually associated with amenorrhea period common to the closed birth intervals. However, first conception times are having a number of problems-

a) The time when cohabitation starts after marriage is difficult to ascertain
b) The time when the adolescent female becomes biologically mature and therefore susceptible to conception is difficult to ascertain.
c) It is difficult to assess the fecundability of women who are pregnant at the time of marriage. If they are excluded from the analysis fecundability will be underestimated almost certainly they are characterized by a higher fecundability than average.
d) It is impossible to exclude those who experienced pre-nuptial pregnancy since they report themselves as having conceived with short interval after marriage.

In this study, attempt is made to study the potentials of fertility of women in terms of fecundability using last closed birth interval model as described below.

The study of closed birth interval analysis is often used for estimating the probability of monthly conception (fecundability). However, the estimation of this parameter through closed birth interval fails to exhibit the changes in the parity progression ratios or suppose if woman limits her family size after the birth of i^{th} child through permanent method of family planning or if it is the last birth to her.

In many retrospective surveys, information on complete maternity history particularly at the older ages suffer from recall lapse Because of this constraints, the collection of fertility data has been confined to the interval between last but one births and the last birth (Srinivasan, 1980;).This is the major reason as to why the fecundability of women in this study was computed using the last closed birth interval.

Let x be a random variable denoting respectively the length of last closed birth interval of a women who is in the steady state of reproduction. We can then have the following three important assumptions: -

a. There is a constant monthly risk of conception "p" i.e. fecudability is constant
b. There is a one to one correspondence between a conception and a live birth i.e. all pregnancies end in live births
c. A constant period of non susceptibility "k" is the sum of P.P.A (post partum amenorrea measured by breast feeding duration and gestation) The waiting time for conception following a negative exponential distribution with parameter "p" and probability density function (P.d.f) of closed birth interval is given by:

$$f(x) = \begin{cases} P\, e^{-p(x-k)} & X>K \\ 0 & \end{cases}$$

Then, the mean closed birth interval is given by

$$E(x) = k + 1/p$$
$$P = 1/E(x) - k$$

While analyzing or estimating the fecundability through the last closed birth interval (i.e. interval between the last but one birth and the last birth), one should bear in mind that the last closed birth interval consists of the following four mutually exclusive components:

a. The period of post partum ammenorrhea following the live births.
b. The total duration of menstruation interval between two births where a women is susceptible for pregnancy
c. The period of pregnancy and abortion or still births (if any) intervening the two live births, and
d. The period of pregnancy associated with the later live births.

These components are influenced by socio-cultural as well as biological factors whose effects can only be studied through the closed birth interval.

Table 4 presents the average closed birth interval by the age of mother at last birth. The use of the age of the mothers at last birth rather than current age avoids the truncation bias from the data. The last column of the table reveals the ultimate computation of fecundability (P) across the different age groups obtained by using the model (Table 5, 6).

Fecundability is inversely related to the

Table 4: Average closed birth interval of the sample women by parity, Sidama zone, SNNPR, 2005

Parity	*No. of women*	*Average closed birth interval*
1	1	24.00
2	104	33.684
3	135	33.684
4	161	32.568
5	261	30.564
6	223	32.496
7	169	30.948
8	143	28.944
9	80	29.244
10	37	34.692
11^{+}	29	28.128

Table 5: Average close birth interval and estimates of fecundability "p" by the age of the mother, Sidama zone, SNNPRG, 2005

Age of mother at last birth	*No. of women*	*Average closed birth interval*	*Estimate of "p"*
20-24	290	31.356	0.077
25-29	494	31.404	0.077
30-34	336	32.208	0.073
35-39	165	33.444	0.067
40-44	23	33.912	0.065
Total			0.358

P= 1/E (x)-k; Where k = 18.5 months (taken from the previous estimates) Average 'P' = 0.072

duration of the conception wait; the higher the fecundability the shorter the conception waits and vice versa. , that is., W=1/f in a homogeneous population with nearly identical level of fecundability. In this study, it can be seen that the average conception wait is estimated as W= 1/ 0.072 which is 13.88 months. Similarly, the national level estimate is given as W= 1/ 0.077 yielding 13 months. Since frequency of inter course tends to decline with age and/or duration of marriage one can expect a rise in the average conception wait, as women grow older.

Table 6: Average close birth interval and estimates of fecundability "p" by the age of the mother for Ethiopia, 2005

Age of mother at last birth	*No. of women*	*Average closed birth interval*	*Estimate of "p"*
20-24	2547	29.447	0.090
25-29	2517	31.001	0.080
30-34	1808	31.289	0.078
35-39	1602	32.318	0.072
40-44	1187	33.446	0.066
Total			0.386

P= 1/E (x)-k; Where k = 18.5 months (taken from the previous estimates)Average 'P' = 0.077

VII. SUMMARY AND CONCLUSION

Based on the data collected from 1467 women and the aforementioned methodological considerations, the study has come up with the following conclusions and policy implications:

- The calculation of age patterns of fecundability using the last closed birth interval revealed that fecundability "P" has shown a decline as age increases particularly after age 35 .It was shown that fecundability is inversely related to the duration of the conception wait; the higher the fecundability the shorter the conception wait and vice versa, that is, W=1/f in a homogeneous population with nearly identical level of fecundability. In this study, it is seen that the conception waits for the Sidama zone and the nation as a whole are estimated as 13.88 and 13 months respectively. The finding on conception wait requires cautious interpretation as it has several policy implications. First, it is known that infant mortality rates are much higher among children who have been born after an interval of less than two years, and hence, suggests that use of contraception for spacing purposes is likely to have a sub-stantial impact on reducing child mortality. Secondly, for a population experiencing natural fertility ,like most communities in Ethiopia, and where the country strives to reduce fertility , average conception wait of 3-5 years is required to bring about fast decline in the Total Fertility Rate (TFR).
- It is also important to note that more important than mere estimation of the fecundability experience and conception wait of the population, the model proposed has brought out what has been fairly unknown about the fecundity status of women in Ethiopia. This perhaps opens the door for other researchers in Ethiopia to further investigate the socio biological forces working behind such fertility experience.

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