ORIGINAL RESEARCH ARTICLE

Time-to-Pregnancy and Associated Factors among Couples with Natural Planned Conception in Addis Ababa, Ethiopia

Eyasu Mesfin Kassa* and Eskinder Kebede

Department of Obstetrics and Gynecology, School of Medicine, CHS, Addis Ababa University, Addis Ababa, Ethiopia

*For Correspondence: Email: *eyasumk@gmail.com*; Phone: +251 911407962

Abstract

Waiting time-to-pregnancy (TTP) of couples is closely related to fecundability. Knowledge on TTP helps clinicians to individualize care for sub-fertility/infertility. Published studies on TTP are very limited in African setting. This cross-sectional study assessed TTP and associated factors among couples with natural planned conception in Addis Ababa, Ethiopia. Data was collected interviewing a representative sample of 1150 pregnant women. The mean and median TTPs were 6.4 (±9.4) and 3.0 months respectively. Only 11.8% (136/1,150) achieved pregnancy in the first month of attempt. Majority, 81.7% (938/1,150), achieved pregnancy by 12 months. The odds of sub-fecundity (TTP more than 12 months) was lowest in age group of 25-29 years (AOR 0.37; 95% CI 0.20-0.70). Women working more than 60 hours/week (AOR 1.87; 95% CI 1.02-3.42), who drink more than 3 cups of coffee/day (AOR 1.87; 95% CI 1.02-3.42), and whose partners chew khat (AOR 1.66; 95% CI 1.06-2.60) had significantly higher odds of sub-fecundity. Use of contraceptive implants (AOR 0.28; 95% CI 0.15-0.51) and pills (AOR 0.53; 95% CI 0.32-0.89) before the index pregnancy had significantly lower odds of sub-fecundity. This study did not consider amount, duration and frequency of khat chewing, hence its dose dependent effect on fecundability/TTP needs further investigation. *(Afr J Reprod Health 2018; 22[3]: 33-42).*

Keywords: Time-to-pregnancy, TTP, Fecundability, Sub-fecundity, Khat

Résumé

Le temps d'attente avant la grossesse (TAG) des couples est étroitement lié à la fécondité. Les connaissances sur le TAG aident les cliniciens à individualiser les soins en cas de sous-fécondité / infertilité. Les études publiées sur le TAG sont très limitées dans le contexte africain. Cette étude transversale a évalué le TAG et les facteurs associés chez les couples ayant une conception naturelle planifiée à Addis-Abeba, en Éthiopie. Les données ont été recueillies en interrogeant un échantillon représentatif de 1150 femmes enceintes. Les TAG moyens et médians étaient respectivement de 6,4 (± 9,4) et 3,0 mois. Seulement 11,8% (136/1 135) ont eu une grossesse au cours du premier mois d'essai. La majorité, 81,7% (938/1 150), a atteint une grossesse de 12 mois. Les probabilités de sous-fécondité (TAG de plus de 12 mois) étaient les plus faibles dans le groupe d'âge des 25-29 ans (AOR 0,37; IC 95% 0,20-0,70). Les femmes qui travaillent pour plus de 60 heures / semaine (AOR 1,87; IC 95% 1,02-3,42), qui boivent plus de 3 tasses de café / jour (AOR 1,87; IC 95% 1,02-3,42) et dont les partenaires mâchent du khat (AOR 1,66 95% IC 1,06-2,60) avaient plus de chances d'une sous-fécondité significativement plus élevée. L'utilisation des implants contraceptifs (AOR 0,28; IC à 95% 0,15-0,51) et des pilules (AOR 0,53; IC à 95% 0,32-0,89) avant la grossesse indexée avait des chances de fécondité nettement inférieures. Cette étude n'a pas tenu compte de la quantité, de la durée et de la fréquence de la mastication du khat, ainsi, il faut des études plus approfondies sur sa dépendance de la dose pour son efficacité/ TAG. *(Afr J Reprod Health 2018; 22[3]: 33-42).*

Mots-clés: Temps de grossesse, TTP, Fécondabilité, Sous-fécondité, Khat

Introduction

The likelihood of conception in subsequent menstrual cycles is of major interest to clinicians and epidemiologists to measure human fertility and balance the management of infertility, thereby avoiding over- and under-treatment[1]. The monthly or cycle-wise probability of conception in couples

is known as fecundability[1]. Fecundability is a fundamental measure of reproduction, but has proven very difficult to measure. For this reason many studies report apparent fecundability using the fecund waiting time-to-pregnancy (TTP)[2]. TTP is widely used as a measure of couple fecundity in epidemiologic studies[3]. TTP measures how long a couple takes to conceive and provides an estimate of the per cycle probability of conceiving a clinically detectable pregnancy[4]. The TTP distribution in a population describes its degree of fertility[5].

TTP can be studied by use of either prospective or retrospective designs[5]. Prospective studies are more sophisticated and expensive[6]. Literature, as a result, contains very little prospective data on TTP. One prospective study observed a maximal conception rate of ~30% per cycle and cumulative pregnancy rate of 82% after 12 menstrual cycles[7]. And other studies on TTP using retrospective data reported a 12-months pregnancy rate of ~80% which was similar to that reported by prospective studies[7-9]. As data on TTP is mostly significantly skewed most studies report median than mean TTP to better describe the result. A comprehensive population-based study done in South Africa revealed a median TTP of 6 months[10]. The proportion of women who were pregnant after 3, 6, 12 and 24 months was 33%, 50%, 68% and 83% respectively[10]. A study in low contraceptive communities in Southern Ethiopia reported an average conception wait time of 13.88 months[11].

Several socio-demographic and reproductive factors affect TTP of couples. Studies have consistently shown that increasing age is associated with increased TTP and decreased pregnancy rates[12, 13]. In one study involving 221 presumably fertile couples planning to conceive, the highest cycle fecundability (37% per-cycle) was associated with daily intercourse during a six-day interval ending with the day of ovulation[14]. Several studies have also reported association between consumption of recreational substances and delayed TTP mainly in a dose dependent fashion. Caffeine intake was reported by several studies to delay TTP at high levels of consumption[15]. According to a European multicenter study, high levels of caffeine consumption (>5 cups of coffee/day or its equivalent; 500 mg) is associated with decreased fertility (OR 1.45; 95% CI, 1.03–2.04)[16]. Moderate coffee and alcohol consumptions (one-to-two drinks per day) have no demonstrable adverse effect on fertility. Similarly, smoking has substantial adverse effect on fertility[17]. The effects of marijuana and other recreational drugs, however, are difficult to determine as their use is illegal[17].

Sub-fecundity is a frequent problem globally with psychological and social implications to couples involved. Proper information given early during pre-conception counseling is likely to reduce time-to-conception, unnecessary intervention and cost for many couples[18]. Hence, it is important to identify preventable determinants of sub-fecundity. Clinicians who provide counseling to women for preconception concerns are in a favorable position to give appropriate advice to couples regarding the time it may take and ways to improve their chances to achieve pregnancy.

In low income countries' setup, however, there is still very limited published information on TTP and its determinants. The objective of the current study was to assess fecundability measured as waiting time-to-pregnancy (TTP) and its determining factors in Ethiopian set-up. This may help clinicians in Ethiopia and similar settings to provide better guidance for couples on improving their chances of conception and individualize the time to start investigation for sub-fertility/infertility. It also provides base line information for future/further studies on the issue.

Methods

This is a facility based cross sectional study that retrospectively assessed TTP and associated factors among pregnant women in Addis Ababa (AA), Ethiopia. Data was collected from April–to-June 2017 interviewing a representative sample of 1150 pregnant women using a pretested structured questionnaire. Addis Ababa has 10 sub-cities and a

total of 75 public health facilities. One health facility which provides antenatal care (ANC) service was selected randomly from each sub-city. All pregnant women with natural and planned conception who are married or cohabiting with a partner and visiting the selected target facilities during the study period for ANC follow-up were included in the study. Data was collected by trained health professionals (Midwives, Health Officers, General Practitioners and Obstetricians). To assure data quality a study supervisor and the principal investigator supervised the data collection process daily checking for data quality and completeness.

The collected data was coded, cleaned and analyzed using SPSS version 23 statistical software. Chi-square test of independence was done between the independent (socio-demographic and reproductive variables) and dependent variables. The tested independent variables were age, marital status, occupation, education, family income, personal habits (coffee, smoking, alcohol and khat consumption), pre-pregnancy menstrual pattern, gravidity and parity, frequency and timing of sexual intercourse, types of contraception used just before the current pregnancy, and partner variables (age, occupation and use of recreational drugs) while the dependent variable was waiting time to pregnancy (TTP).

A stepwise analysis was conducted to explore for presence and strength of association between the independent variables and TTP. Initially, descriptive and cross tabulation (Vs. TTP) analysis of all independent variables was done for descriptive statistics and test of independence. To explore and determine the relationship between the risk of sub-fecundity and the independent variables two steps (bivariate and multivariate) regression analysis was implemented using TTP as a dichotomous variable (≤ 12 and >12 months). Sub-fecundity refers to TTP of >12 months. Bivariate regression analysis was conducted for each independent variable with chi-square value of <0.2 on cross tabulation for test of independence. Multiple regression analysis was then employed to those with significant association ($P<0.05$) on bivariate analysis to control the confounding effect amongst the variables. Odds ratio (OR) with their 95% confidence intervals were computed to identify the presence and strength of association, and statistical significance was declared if $p < 0.05$. Descriptive statistics was used to describe the study findings. Summary tables were used for describing data to assist data presentation.

Ethical clearance was obtained from the Research and Publication Committee (RPC) of the Department of Gynecology and Obstetrics, and IRB of College of Health Sciences, Addis Ababa University. Permission was also obtained from the study facilities to collect data. Participation in the study was completely voluntary and informed consent was acquired from every participant before participation. The study did not involve vulnerable populations.

Result

A total of 1,150 eligible pregnant women participated in the present study. The age range for the participants and their partners were 18-43 and 20-51 years respectively. The mean and median ages of the women were 27.1 (± 4.5) and 27 (IQR 6) respectively. The mean and median ages at the time of start to attempt for pregnancy, however, were 26.2 (± 4.5) and 26 (IQR 6) respectively. The mean and median ages of the study participants' partners were 26.2 (± 4.5) and 26 (IQR 7) respectively.

The socio-demographic characteristics of the participants and their partners are shown in Table 1. Majority of the cases were married and house wives with proportions of 94% (1081/1,150) and 52.8% (607/1,150) respectively. Most, 71.8% (826/1,150), were drinking 1-3 cups of coffee each day while attempting for the current pregnancy. Khat is a mild stimulant herb consumed by part of the population in many parts of the country. In the current study it was consumed by 1.5% (17/1,150) of the study participants and 11.5% (135/1,150) of the partners.

Table 2 demonstrates reproductive characteristics of participants and their partners by

TTP of ≤12 and >12 months. About two third   of the cases, 63.5% (730/1,150), had history of

Table 1: Socio-demographic characteristics of women with natural and planned pregnancy at health facilities by TTP, Addis Ababa, Ethiopia, April-June 2017 GC (n=1150)

Characteristics	TTP > 12 months n (%)	TTP ≤ 12 months n (%)	Total Frequency n (%)	Mean difference (95% CI) – P-value
Current age in years				0.055
< 20	5 (26.3)	14 (73.7)	19 (1.7)	
20-24	53 (16.3)	272 (83.7)	325 (28.3)	
25-29	74 (15.8)	393 (84.2)	467 (40.6)	
30-34	55 (22)	195 (78)	250 (21.7)	
≥ 35	23 (25.8)	66 (74.2)	89 (7.7)	
Age at attempt in years				0.006
< 20	21 (35)	39 (65)	60 (5.2)	
20-24	68 (18.1)	308 (81.9)	376 (32.7)	
25-29	70 (15.4)	385 (84.6)	455 (39.6)	
30-34	38 (19.1)	161 (80.9)	199 (17.3)	
≥ 35	13 (21.7)	47 (78.3)	60 (5.2)	
Partner age				0.183
≤ 25	17 (18.7)	74 (81.3)	91 (7.9)	
26-30	75 (17.3)	358 (82.7)	433 (37.7)	
31-35	49 (15.6)	265 (84.4)	314 (27.3)	
>35	69 (22.1)	243 (77.9)	312 (27.1)	
Marital status				0.441
Married	195 (18)	886 (82)	1081 (94)	
Non-married	15 (21.7)	54 (78.3)	69 (6)	
Education				0.331
College	39 (14.9)	222 (85.1)	261 (22.7)	
High school	65 (17.9)	298 (82.1)	363 (31.6)	
Elementary	89 (20.5)	345 (79.5)	434 (37.7)	
Not educated	17 (18.5)	75 (81.5)	92 (8)	
Average working hours				0.001
House wife	107 (17.6)	500 (82.4)	607 (52.8)	
≤ 40	43 (19.5)	177 (80.5)	220 (19.1)	
41-60	32 (13.4)	207 (86.6)	239 (20.8)	
>60	28 (33.3)	56 (66.7)	84 (7.3)	
Family monthly income (Ethiopian Birr)*				0.356
≤ 2000	68 (20,7)	261 (79.3)	329 (28.6)	
2001-4000	77 (18.9)	330 (81.1)	407 (35.4)	
4001-6000	36 (16)	189 (84)	225 (19.6)	
>6000	29 (15.3)	160 (84.7)	189 (16.4)	
Coffee drink (cups/day)				0.016
0	43 (18.2)	193 (81.8)	236 (20.5)	
1-3	141 (17.1)	685 (82.9)	826 (71.8)	
>3	26 (29.5)	62 (70.5)	88 (7.7)	
Chew khat				0.014
No	203 (17.9)	930 (82.1)	1133 (98.5)	
Yes	7 (41.2)	10 (58.8)	17 (1.5)	
Partner chews khat				0.002
No	172 (16.9)	843 (83.1)	1015 (88.3)	
Yes	38 (28.1)	97 (71.9)	135 (11.7)	

* 1 USD ~28 Ethiopian Birr

previous pregnancy. Regular menses before the current pregnancy, defined as menses coming every 24-38 days with inter-menstrual cycle range in duration of ≤20 days, was reported by 85.0%

(977/1,150) of the participants. About a third,   35.4% (407/1,150), had coitus ≤1 day per week

Table 2: Reproductive characteristics of women with natural and planned pregnancy at health facilities by TTP, Addis Ababa, Ethiopia, April-June 2017 GC (n=1150)

Characteristics	TTP >12 months n (%)	TTP ≤12 months n (%)	Total n (%)	Mean difference (95% CI) – P-value
Gravidity				0.715
1	79 (18.8)	341 (81.2)	420 (36.5)	
>1	131 (17.9)	599 (82.1)	730 (63.5)	
Gestational age during interview (weeks)				0.074
≤12	16 (23.9)	51 (76.1)	67 (5.8)	
13-27	62 (18.8)	268 (81.2)	330 (28.7)	
28-36	102 (19.7)	416 (80.3)	518 (45)	
≥ 37	30 (12.8)	205 (87.2)	235 (20.4)	
Menses regular				0.002
No	46 (26.6)	127 (73.4)	173 (15)	
Yes	164 (16.8)	813 (83.2)	977 (85)	
Coital frequency (per week)				0.669
≤ 1	77 (18.9)	330 (81.1)	407 (35.4)	
>1	133 (17.9)	610 (82.1)	743 (64.6)	
Coital timing during menstrual cycle				0.032
No specific	172 (19.9)	691 (80.1)	863 (75)	
Middle third	30 (14.2)	182 (85.8)	75 (6.5)	
First and last third	8 (10.7)	67 (89.3)	121 (10.5)	
Contraception use				<0.001
None	93 (23.1)	310 (76.9)	403 (35)	
Condom	8 (27.6)	21 (72.4)	29 (2.5)	
OCP	23 (13.1)	152 (86.9)	175 (15.2)	
Implants	14 (8.5)	151 (91.5)	165 (14.3)	
IUD	6 (12)	44 (88)	50 (4.3)	
Injection	60 (19.4)	250 (80.6)	310 (27)	
Other	6 (33.3)	12 (66.7)	18 (1.6)	
HIV status				0.012
Negative	195 (17.8)	902 (82.2)	1097 (95.4)	
Positive	15 (33.3)	30 (66.7)	45 (3.9)	
Unknown	0	8 (100)	8 (0.7)	
Partner HIV status				< 0.001
Negative	152 (16.2)	786 (83.8)	938 (81.6)	
Positive	12 (35.3)	22 (64.7)	34 (3)	
Unknown	46 (25.8)	132 (74.2)	178 (15.5)	

Table 3: TTP of women with natural and planned pregnancy at health facilities, Addis Ababa, Ethiopia, April-June 2017 GC (n=1150)

TTP (Months)	Frequency	Percent	Cumulative Percent
≤ 1	136	11.8	11.8
2-3	336	29.2	41
4-6	283	24.6	65.7
7-12	185	16.1	81.7
13-24	133	11.6	93.3
>24	77	6.7	100

while 75% (863/1,150) had no specific timing for coitus during the menstrual cycles. No form of contraceptive was used in the time before start of attempt for pregnancy by 35% (403/1,150) while OCPs were the commonest form of contraceptive used by 15.2% (175/1,150). The prevalence of HIV positivity were 3.9% (45/1,150) and 3% (34/1,150) in the participants and partners respectively.

The reported TTP in the present study ranged from 0-to-96 months. The mean and median TTPs were 6.4 (±9.4) and 3.0 months respectively. As shown in Table 3, only 11.8% (136/1,150) of the women were able to achieve pregnancy in the first month of attempt. The

cumulative percentages of women who achieved pregnancy by 3 and 6 months were 41% (472/1150) and 65.7% (755/1150) respectively. Majority, 81.7% (938/1,150), achieved pregnancy by 12 months of attempt while it took >24 months in 6.7% (77/1,150) of the cases. (Table 3)

Bivariate regression analysis implemented using TTP as a dichotomous variable (≤12 months and >12 months) revealed association between the risk of sub-fecundity (TTP of >12 months) and selected independent variables. On multivariate analysis; age at start of attempt to achieve pregnancy, working time duration, coffee drinking, chewing khat by partners, menstrual cycle regularity and use of contraceptives before the index pregnancy remained to be significantly associated (P<0.05) with TTP. Table 4 shows adjusted prevalence, COR and AOR of variables with significant association on bivariate analysis.

Ages of the women and their partners at the time of inclusion to the study were not significantly associated with TTP on bivariate analysis. As demonstrated in Table 4 age of the women at start of attempt for pregnancy, however, was significantly associated with TTP. The lowest odds of sub-fecundity (TTP > 12 months) compared to age group of <20 years was observed in age group of 25-29 years (AOR 0.37; 95% CI 0.20-0.70). The odds of sub-fecundity were 2.5 times higher among women who were employed with weekly working time of >60 hours compared to house wives (AOR 2.53; 95% CI 1.49-4.29). No significant association was observed in those employed but with ≤60 hours per week working time. (Table 4)

As shown in Table 4 participants' coffee drinking and partners' khat chewing habits were the other variables significantly associated with TTP. The odds of sub-fecundity were about twice higher among women who were drinking >3 cups of coffee per day during attempt for current pregnancy compared to those who were not drinking (AOR 1.87; 95% CI 1.02-3.42). No significant association was observed in those who were drinking ≤3 cups of coffee per day. Participants whose partners were chewing khat had significantly higher odds of sub-fecundity

compared to those who do not chew (AOR 1.66; 95% CI 1.06-2.60). Information on the amount, duration and frequency of khat chewing was not collected; hence dose dependent effect of khat chewing on couple fecundability/ TTP was not investigated. Khat chewing by the participants had significant association with TTP in bivariate analysis while the association was lost in multiple regression model (AOR 0.45; 95% CI 0.15-1.33). Similarly, the significant association observed in bivariate analysis between HIV status of participants and TTP (P<0.05) was lost in multivariable analysis. TTP was also observed to be significantly associated with participants' pre-pregnancy menstrual cycle pattern and type of contraceptive used just before start of attempt for the present pregnancy (P<0.05). Those with regular menstrual cycles had significantly lower odds of sub-fecundity (AOR 0.57; 95% CI 0.38-0.85) (Table 4). Use of contraceptive implants (AOR 0.28; 95% CI 0.15-0.51) and OCPs (AOR 0.53; 95% CI 0.32-0.89) significantly reduced the odds of sub-fecundity compared to women who were not using any form of contraceptive. Use of condom, IUDs, injectables and other forms of contraceptives didn't show any statistically significant effect on TTP. (Table 4)

Discussion

The current study determined the median TTP and investigated multiple male and female factors associated with TTP in African setting. To the best of our knowledge this is the first study to investigate the association between TTP and khat chewing habit in any setting. Several explanatory factors were investigated for possible association with TTP of couples. However, age at start of attempt to achieve pregnancy, working time duration, coffee drinking, partner's chewing khat, menstrual cycle regularity and use of contraceptives before the index pregnancy remained to be significantly associated with TTP of couples in multivariate models.

In the present study the median TTP was 3.0 months. This finding is comparable to a report

from the Dutch study but longer than the 2.0 months reported by a Swedish study[19,20]. In

Table 4: Regression analysis of selected socio-demographic and reproductive variables vs. TTP of women with natural and planned pregnancy at health facilities, Addis Ababa, Ethiopia, April-June 2017 GC (n=1150)

Characteristics	Adjusted prevalence of > 12 months	OR for Sub fertility (TTP >12 months)			
		COR**		AOR***	
		P-value	95% CI	P-value	95% CI
Age at attempt in years					
< 20	35.0		1		1
20-24	18.1	**0.003**	**0.41 (0.23-.74)**	**0.018**	**0.47 (0.25-0.88)***
25-29	15.4	**< 0.001**	**0.34 (0.19-0.61)**	**0.002**	**0.37 (0.20-0.70)***
30-34	19.1	**0.011**	**0.44 (0.23-0.83)**	**0.042**	**0.50 (0.26-0.98)***
≥ 35	21.7	0.108	0.51 (0.23-1.16)	0.129	0.52 (0.22-1.21)
Average working hours					
House Wife	17.6		1		1
≤ 40	19.5	0.527	1.14 (0.77-1.68)	0.39	1.20 (0.79-1.83)
41-60	13.4	0.135	0.72 (0.47-1.11)	0.239	0.77 (0.49-1.20)
>60	33.3	**0.001**	**2.34 (1.42-3.85)**	**0.001**	**2.53 (1.49-4.29)***
Coffee drink (cups/day)					
0	81.80		1		1
1-3	82.90	0.681	0.92 (0.63-1.35)	0.957	1.01 (0.68-1.50)
>3	70.50	**0.028**	**1.88 (1.07-3.31)**	**0.042**	**1.87 (1.02-3.42)***
Chew khat					
No	82.10		1		1
Yes	58.80	0.019	3.21 (1.21-8.53)	0.15	2.21 (0.75-6.51)
Partner chew khat					
No	83.10		1		1
Yes	71.90	**0.002**	**1.92 (1.28-2.89)**	**0.03**	**1.66 (1.06-2.60)***
Menses regular					
No	73.40		1		**1**
Yes	83.20	**0.002**	**0.56 (0.38-0.81)**	**0.006**	**0.57 (0.38-0.85)***
Contraception use					
None	76.90		1		1
Condom	72.40	0.58	1.27 (0.55-2.96)	0.546	1.32 (0.54-3.27)
OCP	86.90	**0.007**	**0.50 (0.31-0.83)**	**0.016**	**0.53 (0.32-0.89)***
Implants	91.50	**< 0.001**	**0.31 (0.17-0.56)**	**< 0.001**	**0.28 (0.15-0.51)***
IUD	88.00	0.08	0.46 (0.19-1.10)	0.122	0.49 (0.20-1.21)
Injection	80.60	0.231	0.8 (0.56-1.15)	0.076	0.70 (0.48-1.04)
Other	66.70	0.32	1.67 (0.61-4.56)	0.232	1.88 (0.67-5.30)
HIV status					
Negative	82.20		1		1
Positive	66.70	0.01	2.31 (1.22-4.38)	0.07	1.90 (0.95-3.79)
Unknown	100.00	0.999			

*Statistically significant at P<0.05, **COR: Crude Odds Ratio, ***AOR: Adjusted Odds Ratio*

contrast, it was much shorter than the median TTP of 6 months reported by a South African study[10]. This is due to inclusion of all pregnant mothers in the South African study while the current study included only planned pregnancies.

The pregnancy rate within 12 months of attempt in the current study was 81.7%. This is less than the 87% rate in couples with planned pregnancies reported for five European countries[21].

It was, however, much higher than the 68% proportion reported by a South African study[10]. This is again due to inclusion of all pregnant mothers in the South African study unlike the current study. Since no published previous study on TTP specifically for planned pregnancies in Africa was available; it was not possible to compare the current distribution to an African study finding.

Increased maternal age was associated with a longer TTP in our study. This finding agrees with the widely known effect of advancing age on fertility. Advancing age is associated with prolongation in the average time for achieving conception[19]. Increased paternal age, however, was not related to a longer TTP in the current study. This possibly is due to younger (20-51 years of age) partners in the study. Unlike the early fertility decline seen in women, male fertility does not decrease appreciably before approximately age 50[22].

An association was observed between TTP and women's weekly working hours. TTP was prolonged in employed women with weekly working time of >60 hours per week compared to house wives. This finding is in agreement with a prior Dutch study although prolonged working time in their study was only 32 h or more per week[19].

Coffee is a widely and routinely consumed stimulant beverage worldwide. Ethiopia is the origin of coffee and has a deep-rooted tradition of regular coffee drinking. Coffee contains caffeine which is a pharmacologically active substance. Although caffeine intake in general is considered harmless, several studies have reported association between caffeine intake and delayed TTP[16]. The prolonged TTP among those who consume >3 cups/day in the current study is in agreement to several prior studies[23].

Khat, also called chat in Ethiopia, refers to green leaves of the herb *Catha edulis* which is widely chewed as a stimulant mainly in East Africa and Arab countries. It contains the alkaloid cathinone, an amphetamine-like stimulant with low potential for abuse and dependence. Detailed studies on the effects of khat on human reproduction are lacking. However, the available data suggest that chronic use may cause spermatorrhoea and may lead to decreased sexual functioning and impotence[23,24]. In chronic chewers, sperm count, sperm volume and sperm motility decreases[24]. In the current study khat chewing by the partners of participants was observed to be associated with increased rate of sub-fecundity. This potentially is related to its

effect on sperm parameters. As published report on the association between khat chewing and TTP could not be found it was not possible to compare the finding with other studies.

Regular menstrual cycle and, use of contraceptive implants and OCPs just before start of attempt for the present pregnancy were significantly associated with reduced odds of sub-fecundity in the present study. The association of regular menses with fecundity is in agreement to similar reports from prior Swedish and European studies[8, 20]. Irregular periods are often associated with anovulation and hence affect fertility. Prior studies have reported conflicting effects of OCP use on TTP[25]. The variation in the findings is partly related to variation in study designs and duration of OCP use. The finding of this study supports prior studies which also reported improved fecundity with use of OCPs prior to the index pregnancy[25].

The present study was performed using a retrospective design, which is a useful tool to measure TTP[5]. Retrospective TTP studies are prone to various biases, including recall bias. Since the women in this study were included during the current pregnancy, recall bias was probably minimal. The methodology used to compare between the effects of different independent variables is TTP of 12 months which evaluates potential long-term effects of the exposure variables. Most prior studies compared the effects of different factors in terms of median TTP and monthly fecundability. Hence the present study offers findings on long term effects of several exposure variables.

The study provides important information for policy makers, clinicians and researchers in reproductive health in Ethiopia and similar settings. The findings are useful to clinicians in providing better counseling of couples to improve their chances of conception and in decision making to start workup for sub-fertility. The findings can also stimulate researchers to conduct further clinical studies on specific independent variables.

Conclusion

The mean and median TTPs in the present study were 6.4 (±9.4) and 3.0 months respectively; and, the pregnancy rate within 12 months of attempt was 81.7%. Furthermore, the study has identified age at attempt for pregnancy, prolonged working hours (>60 Hrs./week), coffee intake of >3cups/day, khat chewing by partners, pre-pregnancy menstrual pattern and types of contraception used prior to start to attempt for the current pregnancy as important explanatory factors that are significantly associated with TTP. This study did not consider amount, duration and frequency of khat chewing by the study participants and their partners; hence further controlled studies are recommended to investigate the dose dependent effect of khat chewing by women and their partners on couple fecundability/ TTP.

Acknowledgment

Contribution of Authors

The study was conceived and designed by Eyasu Mesfin. Both authors mentioned in the article participated in collection and analysis of data, write-up of the report, and approved the final manuscript.

References

1. Evers JL. Female subfertility. *Lancet (London, England)* 2002; **360**(9327): 151-9.
2. Wilcox AJ, Weinberg CR, O'Connor JF, Baird DD, Schlatterer JP, Canfield RE, Armstrong EG and Nisula BC. Incidence of early loss of pregnancy. *The New England journal of medicine* 1988; **319**(4): 189-94.
3. Stanford JB and Dunson DB. Effects of sexual intercourse patterns in time to pregnancy studies. *American journal of epidemiology* 2007; **165**(9): 1088-95.
4. Bretveld R, Zielhuis GA and Roeleveld N. Time to pregnancy among female greenhouse workers. *Scandinavian journal of work, environment & health* 2006; **32**(5): 359-67.
5. Joffe M, Key J, Best N, Keiding N, Scheike T and Jensen TK. Studying time to pregnancy by use of a retrospective design. *American journal of epidemiology* 2005; **162**(2): 115-24.
6. Tingen C, Stanford JB and Dunson DB. Methodologic and statistical approaches to studying human fertility and environmental exposure. *Environmental health perspectives* 2004; **112**(1): 87-93.
7. Zinaman MJ, Clegg ED, Brown CC, O'Connor J and Selevan SG. Estimates of human fertility and pregnancy loss. *Fertility and sterility* 1996; **65**(3): 503-9.
8. Jensen TK, Slama R, Ducot B, Suominen J, Cawood EH, Andersen AG, Eustache F, Irvine S, Auger S, Jouannet P, Vierula M, Jorgensen N, Toppari J, Skakkebaek NE, Keiding N and Spira A. Regional differences in waiting time to pregnancy among fertile couples from four European cities. *Human reproduction (Oxford, England)* 2001; **16**(12): 2697-704.
9. S. Juul, W. Karmaus and J. Olsen. Regional differences in waiting time to pregnancy: pregnancy-based surveys from Denmark, France, Germany, Italy and Sweden. *Human Reproduction* 1999; **14**(5): 1250-4.
10. Bello B, Kielkowski D, Heederik D and Wilson K. Time-to-pregnancy and pregnancy outcomes in a South African population. *BMC public health* 2010; **10**: 565.
11. Regassa N. Estimating the Fecundability and Average Conception Wait of Women among Low Contraceptive Tribal Community of Southern Ethiopia. *Stud Tribes Tribals* 2007; **5**(2): 103-11.
12. Hassan MA and Killick SR. Effect of male age on fertility: evidence for the decline in male fertility with increasing age. *Fertility and sterility* 2003; **79 Suppl 3**: 1520-7.
13. Klonoff-Cohen HS and Natarajan L. The effect of advancing paternal age on pregnancy and live birth rates in couples undergoing in vitro fertilization or gamete intrafallopian transfer. *American journal of obstetrics and gynecology* 2004; **191**(2): 507-14.
14. Wilcox AJ, Weinberg CR and Baird DD. Timing of sexual intercourse in relation to ovulation. Effects on the probability of conception, survival of the pregnancy, and sex of the baby. *The New England journal of medicine* 1995; **333**(23): 1517-21.
15. Bolumar F, Olsen J, Rebagliato M and Bisanti L. Caffeine intake and delayed conception: a European multicenter study on infertility and subfecundity.

European Study Group on Infertility Subfecundity. *American journal of epidemiology* 1997; **145**(4): 324-34.

16. F. Bolumar JO, M. Rebagliato, L. Bisanti, and the European Study Group on Infertility and Subfecundity. Caffeine Intake and Delayed Conception: A European Multicenter Study on Infertility and Subfecundity. *American Journal of Epidemiology The Johns Hopkins University School of Hygiene and Public Health* 1997 **145**(4).

17. Augood C, Duckitt K and Templeton AA. Smoking and female infertility: a systematic review and meta-analysis. *Human reproduction (Oxford, England)* 1998; **13**(6): 1532-9.

18. Stanford JB, White GL and Hatasaka H. Timing intercourse to achieve pregnancy: current evidence. *Obstetrics and gynecology* 2002; **100**(6): 1333-41.

19. Mutsaerts MA, Groen H, Huiting HG, Kuchenbecker WK, Sauer PJ, Land JA, Stolk RP and Hoek,A. The influence of maternal and paternal factors on time to pregnancy--a Dutch population-based birth-cohort study: the GECKO Drenthe study. *Human reproduction (Oxford, England)* 2012; **27**(2): 583-93.

20. Axmon A, Rylander L, Albin M and Hagmar L. Factors affecting time to pregnancy. *Human reproduction (Oxford, England)* 2006; **21**(5): 1279-84.

21. Karmaus W and Juul S. Infertility and subfecundity in population-based samples from Denmark, Germany, Italy, Poland and Spain. . *Eur J Pub Health* 1999; **93**: 229-35.

22. Dunson DB, Baird DD and Colombo B. Increased infertility with age in men and women. *Obstetrics and gynecology* 2004; **103**(1): 51-6.

23. Mwenda JM, Arimi MM, Kyama MC and Langat DK. Effects of khat (Catha edulis) consumption on reproductive functions: a review. *East African medical journal* 2003; **80**(6): 318-23.

24. Hakim LY. Influence of khat on seminal fluid among presumed infertile couples. *East African medical journal* 2002; **79**(1): 22-8.

25. Farrow A, Hull MG, Northstone K, Taylor H, Ford WC and Golding J. Prolonged use of oral contraception before a planned pregnancy is associated with a decreased risk of delayed conception. *Human reproduction (Oxford, England)* 2002; **17**(10): 2754-61.