The Relationship between Migration and Timing of Birth in Nang Rong, Thailand

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Introduction

Several scholars note that four concepts can help explain the effect of migration on fertility, namely selectivity, disruption, adaptation and socialization (Goldstein, 1973; Goldstein and Goldstein, 1981; Goldstein, Goldstein and Limanonda, 1981; Goldstein and Goldstein, 1983; White, 1995; Lindstrom and Saucedo, 2002; Kulu, 2004; Chattopadhyay and White, 2005; Edmeades, 2006). *Selectivity* explains any fertility difference between migrants and non-migrants as a result of the ways in which individuals are selected by the process of migration based on a number of social, demographic, or psychological characteristics that are associated with higher or lower levels of fertility (Hervitz, 1985; Lindstrom and Saucedo, 2002; Singley and Landale, 1998). *Disruption* as a result of migration may interrupt or temporarily postpone childbearing (Goldstein and Goldstein, 1983; Stephen and Bean, 1992; White, Moreno and Guo 1995; Reed, Andrzejewski and White, 2005). The disruption effect contributes to a later age of childbearing and longer birth intervals for migrants. Two reasons for low fertility for a short period following a change of residence are the physiological consequences of the stressful situation typically associated with movement and the separation of spouses resulting in reduce fecundity (Hervitz, 1985; You, 2005). *Adaptation* refers to an adjustment in fertility behavior that occurs in response to economic opportunities and constraints present at the destination (Limanonda, 1983; Gyimah, 2004). The fertility of migrants will converge to the fertility level of those at the destination fairly rapidly, usually in less than 10 years (Hervitz, 1985; Stephen and Bean, 1992; You, 2005). Furthermore, migration may bring migrants into a cash economy and expose them to modernization effects, including adaptation of new attitudes toward children, family, knowledge and use of modern contraception, contributing to low fertility. *Socialization* emphasizes the role of the social environment during childhood. Values and norms dominant during childhood are related to behavior in later life. People who move from one social environment to another show fertility levels similar to those who stay at their original residence during childhood, while contrasting fertility levels at the destination occur in the next generation (Hervitz, 1985; Kulu, 2004).

Previous research in Thailand has found that migration can have both positive or negative effects on fertility (Goldstein, 1973; Goldstein and Goldstein, 1981; Goldstein, Goldstein and Limanonda, 1981; NSO, 1990; Edmeades, 2006). Edmeades (2006) studied rural to urban migration and fertility in Nang Rong. Results did not clearly explain the relationship between migration and fertility in terms of the adaptation and disruption hypothesis. Effects of migration on fertility were not conclusive due to the research design used, sample selection, methods of data analysis, migration definition, and migration or fertility measurement differences. Macro level analysis based on census and surveys usually measures cumulative fertility using children ever born. Therefore, it can not directly assess the timing of birth in relation to migration except for providing information regarding the fertility behavior of women in the years just before and after migration. The study of changes in fertility in relation to migration requires the use of both fertility histories and migration histories. Event histories can examine the timing of

births and temporary migration as well as assess the actual ordering of migration and fertility events and hence impute cause and effects.

This study uses longitudinal data and event history analysis with time varying data recording changes in status year by year. This allows us to know exactly who never moved or ever moved in the sample. Migrants can be compared to non-migrants in the sample using the same respondents in Nang Rong district. Retrospective event history data are essential in examining influences of long and short-term migration on fertility.

Because a woman experiences more than one birth during her reproductive life, we choose a statistical model proposed by Anderson and Gill (AG) (Ezell, Land and Cohen, 2003) to analyze our data. We use the Anderson-Gill proportional intensity regression model to examine the factors associated with recurrent births to women. This method allows us to compute "Marital Duration-Specific Fertility Rates" using event history data. The AG model is a generalization of the well known Cox proportional hazards model to analyze recurrent events. The AG model assumes that the risk of an event for a given subject is not affected by any previous events that occurred to the same subject. This model has an advantage for analyzing repeated events in which subsequent events are assumed to be conditionally independent. The model estimation can take into account both time varying and time invariant covariates. If the covariates in this model are invariant, then the model would be the same as specifying a model of expected cumulative events. The AG model is an approximation of Poisson regression with the recurrence times estimating a time-varying Poisson process (Box-Steffensmeier and Zorn 2002; Ezell, Land and Cohen, 2003). Because intensity functions of birth events are not assumed to be constant over time (marital duration) the AG model will estimate marital birth intensity functions which are analogous to marital duration specific fertility rates. In order to take into account intra-subject correlation due to the repeated events for individuals we obtain robust standard errors for the estimated model parameters.

The purpose of this study is to examine the fertility of married women migrants versus non-migrants in Nang Rong district. We hypothesize that migrants have lower fertility than non-migrants.

Data

This study uses the secondary data from the Nang Rong Projects carried out by the Institute for Population and Social Research (IPSR), Mahidol University, Thailand, and the Carolina Population Center, University of North Carolina at Chapel Hill. The Nang Rong project is a longitudinal study that documents demographic and sociological changes occurring over time in an economically and socially changing environment in Nang Rong District, Buriram, Thailand. The project began in 1984, with follow-ups in 1994 and again in 2000. In 1984, the census was conducted in 51 villages. The number of villages expanded to 76 villages in 1994 and to 92 villages in 2000 due to the villages being divided for administrative purposes. Follow-up surveys of migrants were conducted in 1994 and 2000 in 22 villages (split to 32 villages in 1994 and to 40 villages in 2000). Migrants were followed when they moved from Nang Rong to the most popular four destinations, i.e. Bangkok and peripheral provinces (Samut Prakan, Samut Sakhon,

Nakhon Pathom, Nonthaburi, and Patumtani), the Eastern Seaboard (Rayong, Chonburi, Chachoengsao), Nakhon Ratchasima (Korat), and Buriram provinces.

This study uses multilevel data including individual, household, and community data collected in the household, migrant follow-up, and community surveys. The household and migrant follow-up surveys have similar questionnaires and both include the life history calendar data and household data, which were merged. The life history data, collected from respondents aged 18-41 years, have information about migration and fertility history for individuals since age 13 to current age at the time of the survey. The time varying data are a continuous record from age 13 to the current age, though only information starting from age at marriage to current age in the year 2000 was used. The data collected include basic demographic data but also migration experience, fertility behavior and socioeconomic status such as education and occupation on a year-by-year basis. The life history of non-migrants and return migrants was recorded from household surveys, while the life history of current migrants was reported by the migrants themselves in migrant follow-up surveys. Individual characteristics are based on information varying year-by-year, while household and community characteristics are based on data collected in the 1984 and 1994 waves of data collection, and while time-varying is not recorded year-by-year.

The definition of migration used in this study is movement away from Nang Rong district for at least 2 months. Two measures of migration are used. The first measure of migration is migration experience ever moved or never moved. A person is considered ever moved if she/he ever moved away from Nang Rong district for at least 2 months, and is considered never moved if she/he never moved from Nang Rong district for 2 or more months in a given year. Change of residence within Nang Rong district is not considered migration in this study.

The other measure of migration is migration status. Migration status in a given year is determined by using the residence in a given year. The migration status is divided into three categories, including non-migrant, return migrant and current migrant. Non-migrants are persons who never moved from Nang Rong district in a given year, current migrants are persons who are currently residing outside Nang Rong district in a given year, and return migrants are persons who had ever moved from Nang Rong district for at least 2 months and returned to live in Nang Rong district in a given year.

Results

The total number of observations of married women is 10,944 person-years (a total of 1,163 persons; 327 who never moved and 836 who ever moved, including current and returned migrants). The average education level of women is primary school level. More than fifty percent of the women work in agriculture. The average age at first marriage is twenty years old, while age at first marriage of migrants is slightly higher than for non-migrants. The average number of births is 1.7 children per woman. Migrants have lower fertility than non-migrants, at 1.6 and 2.0 children per woman, respectively.

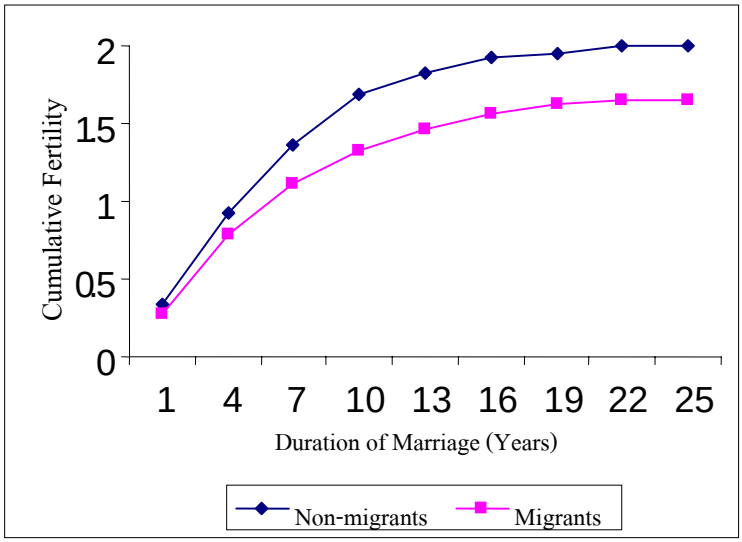
Cumulative Fertility and Migration Status

This study takes into account the fertility of marriage cohorts by using marital duration-specific fertility rates calculated with the AG model. Education and occupation factors are powerful effects on timing of birth. Cumulative fertility of migrants is lower than that of non-migrants by duration of marriage (Table 1, Figure 1).

Table 1: Cumulative Fertility by Duration of Marriage and Migration Status

Duration of Marriage (Years)	Never moved	Ever Moved
1	0.3356	0.2721
4	0.9259	0.7830
7	1.3621	1.1115
10	1.6923	1.3233
13	1.8250	1.4664
16	1.9285	1.5665
19	1.9526	1.6267
22	2.0004	1.6500
25	2.0004	1.6500

Figure 1 Cumulative Fertility Classified by Duration of Marriage and Migration Status



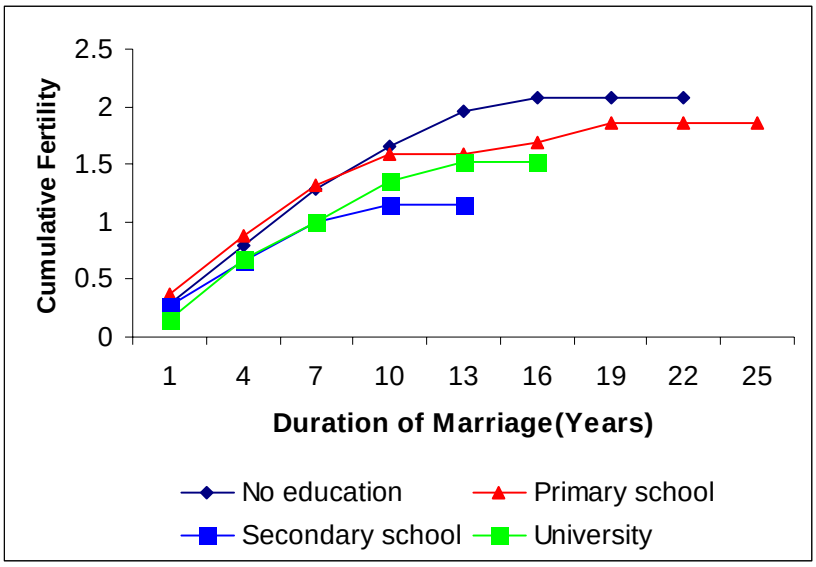
Cumulative Fertility and Education

The marital duration-specific fertility rate estimated with the AG model shows that the cumulative fertility of educated women is lower than that of non-educated women classified by duration of marriage. After 10 years of marriage the cumulative fertility of university-educated women is higher than that of secondary school educated women, which can be related to socioeconomic support (Table 2, Figure 2).

Table 2: Cumulative Fertility by Duration of Marriage and Education

Duration of Marriage (Years)	No education	Primary school	Secondary school	University
1	0.2857	0.3750	0.2727	0.1600
4	0.7967	0.8750	0.6591	0.6799
7	1.2839	1.3125	0.9972	0.9897
10	1.6475	1.5894	1.1519	1.3533
13	1.9586	1.5894	1.1519	1.5200
16	2.0836	1.6894	1.1519	1.5200
19	2.0836	1.8561	1.1519	1.5200
22	2.0836	1.8561	1.1519	1.5200
25	2.0836	1.8561	1.1519	1.5200

Figure 2 Cumulative Fertility Classified by Duration of Marriage and Education



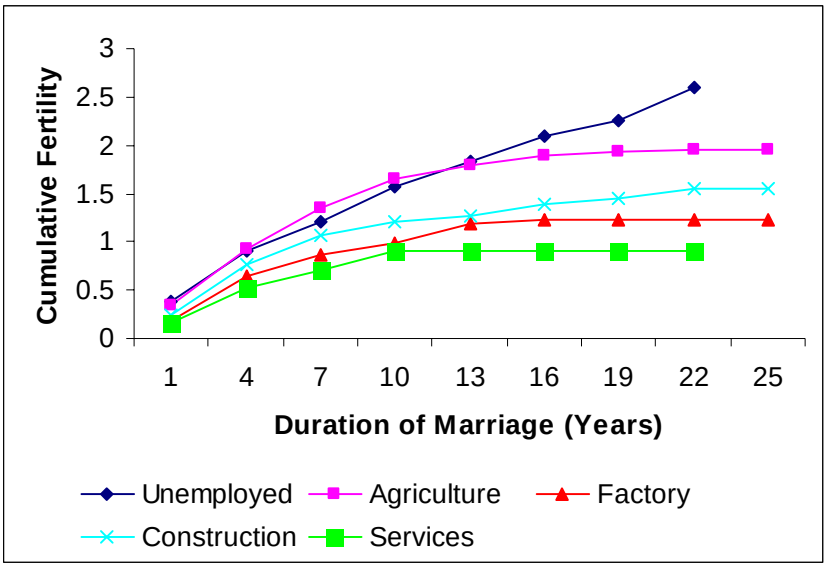
Cumulative Fertility and Occupation

The marital duration-specific fertility rate estimated with the AG model shows that the cumulative fertility of women who worked in factories and services are lower than that of unemployed women classified by duration of marriage (Table 3, Figure 3).

Table 3: Cumulative Fertility by Duration of Marriage and Education

Duration of Marriage (Years)	Unemployed	Agriculture	Factory	Construction	Services
1	0.3733	0.3479	0.1798	0.243	0.1667
4	0.9152	0.9195	0.6535	0.759	0.5299
7	1.2014	1.3535	0.8583	1.0687	0.7011
10	1.5695	1.6461	0.9928	1.2067	0.9155
13	1.8297	1.7884	1.1828	1.2723	0.9155
16	2.0873	1.8896	1.2304	1.3926	0.9155
19	2.2540	1.9245	1.2304	1.4593	0.9155
22	2.5873	1.9434	1.2304	1.5426	0.9155
25	2.5873	1.9434	1.2304	1.5426	0.9155

Figure 3 Cumulative Fertility Classified by Duration of Marriage and Occupation



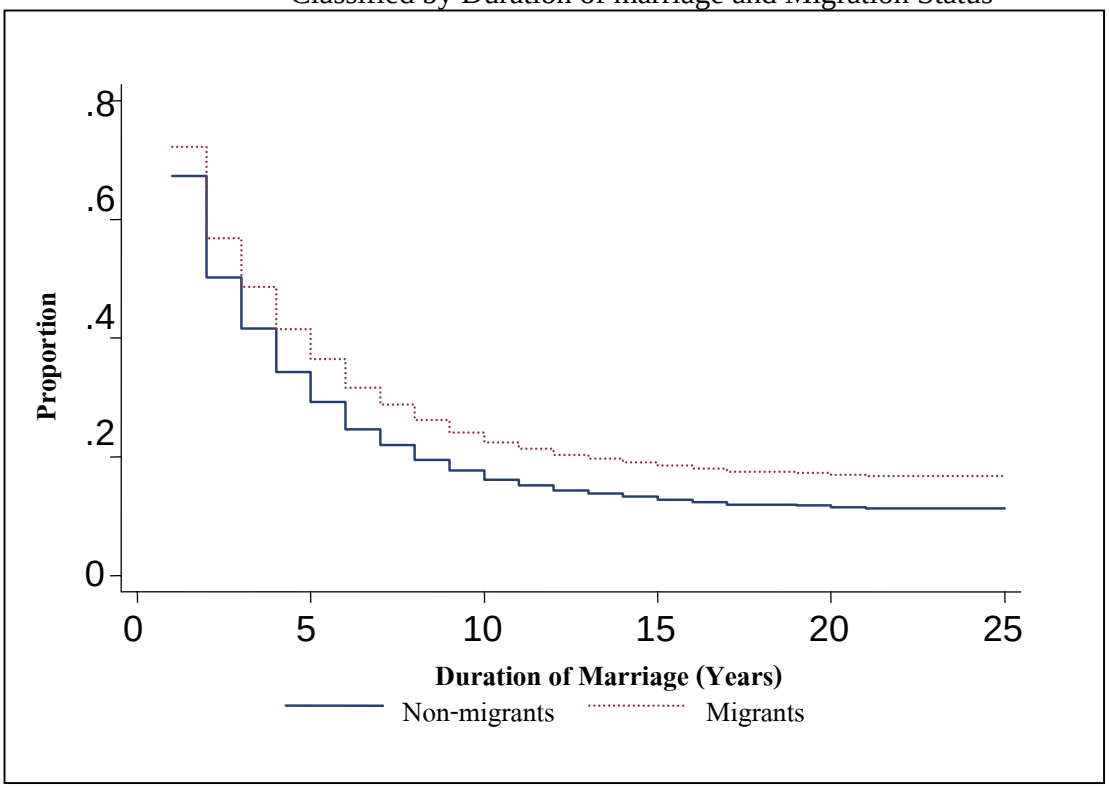
Timing of birth

We examine timing of birth information to determine the proportion of women who are childless by duration of marriage (labeled as survival function of birth). Because the AG model assumes that the survival function does not depend on birth order, we combine information from all births to estimate this survival function. The results show that after 21 years of marriage 17% of migrants had never given birth, whereas at the same time only 11% of non-migrants had never given birth. The median time to birth is 2.11 years for non-migrants and 2.77 years for migrants (Table 4, Figure 4). The median represents the average (interval) time to birth. The shorter the interval the higher the probability of having birth at any time interval. This means that migrants have lower probabilities of giving birth than do non-migrants.

Table 4: Survival Function of Birth (The Proportion Childless)
Classified by Duration of marriage and Migration Status

Duration of Marriage (Years)	Never Moved	Ever Moved
1	0.6644	0.7279
2	0.5094	0.5630
3	0.4236	0.4812
4	0.3437	0.4143
5	0.2954	0.3621
6	0.2458	0.3164
7	0.2144	0.2922
8	0.1888	0.2668
9	0.1700	0.2472
10	0.1511	0.2345
11	0.1411	0.2246
12	0.1362	0.2096
13	0.1319	0.2025
14	0.1271	0.1945
15	0.1231	0.1883
16	0.1187	0.1829
17	0.1175	0.1719
18	0.1175	0.1719
19	0.1158	0.1719
20	0.1135	0.1679
21	0.1104	0.1679

Figure 4 Survival Function of Birth (The Proportion Childless)
Classified by Duration of marriage and Migration Status



Ever Moved

Marital duration-specific fertility rates are estimated with the AG model. Table 5 presents the results using ever moved as a covariate. Model 1 includes only the ever moved variable, controlling for age at marriage, age at marriage square (curvilinear testing) and year of marriage. The findings show that the likelihood of having a birth was 47% greater for women who were married from 1976 to 1989 compared to women who were married from 1990 to 2000. Women who had ever moved are 10% less likely to have a birth than non-migrants, but the difference is not statistically significant at the 5% level of significance. Education and occupation variables were added into model 2. Only the year of marriage and occupation variables are statistically significant, which suggests that migration affects fertility due to its relationship with occupation. The positive selectivity of migrants by education and occupation explain the effects of migration on fertility. Compared to women who worked in agriculture, the chance of having a birth was 29% and 45% lower for women who worked in factories and services, respectively. When the household and community factors were added into model 3 as control variables, the year of marriage, education and occupation variables are statistically significant. The chance of having a birth was 35% greater for women who were married from 1976 to 1989 compared to women who were married from 1990 to 2000. Each increase of a year of education corresponds to a 3% decrease in the probability of having a birth at any given time. The probability of having a birth was much lower for women who worked in factories and services compared to women who worked in agriculture.

Occupation is one of the few influential factors that could be changed through programs and policies.

Table 5: Models predicting the effects of migration on the hazard of giving birth, controlling for selected factors

Variable	Model 1 Coef.	Model 2 Coef.	Model 3 Coef.
Age at marriage	0.068	0.078	0.074
Age at marriage^2	-0.002	-0.002	-0.002
Year of marriage (ref.1990-2000)			
1976-1989	0.386***	0.319***	0.298***
Ever moved (ref. never moved)	-0.096	0.028	0.026
Enrolled in school (ref. not enrolled)		0.072	0.065
Years of education		-0.024	-0.030*
Occupation (ref.agriculture)			
Not work		0.141	0.139
Factory		-0.349***	-0.345***
Construction		-0.184	-0.197
Services		-0.604***	-0.589***
Household Wealth (ref.poor)			
Middle			-0.020
Rich			0.176
Amount of land owned (Rai)			0.000
Distance to health center (km)			0.005
Distance to hospital (km)			-0.003
Primary school in village (ref. no primary school in village)			0.059
Log likelihood	-9616	-9597	-9594
N	10,944	10,944	10,944

Note: *** p<.001, ** p<.01, * p<.05

Hazard rate (HR) are calculated by formula exp (coefficient),
For examples, coefficient = 0.386, HR = exp (0.386) = 1.47, 47% increased hazard,
coefficient = -0.349, HR = exp (-0.349) = 0.71, (1-0.71)*100 = 29% decreased hazard

Migration Status

Table 6 shows the results when using migration status as the covariate variable to predict fertility. The migration status variable is divided into three categories including non-migrants (reference group), current migrants, and return migrants. In model 1 only the migration status variable was added, while controlling for age at marriage, age at marriage square (curvilinear testing) and year of marriage. Year of marriage influences fertility behavior such as contraceptive use methods and fertility preferences. The findings show that the odds of having a birth was 45% greater for women who were married from 1976 to 1989 compared to women who were married from 1990 to 2000. The odds of having a birth was 21% lower for current migrants compared to non-migrants. Previous studies show that current migration negatively affects fertility because most current migrants are living in urban areas, are exposed and adapted to new

environments, new jobs and different socioeconomic constraints (Lindstrom and Saucedo, 2002). When education and occupation variables were added into model 2, only the year at marriage and occupation variables are statistically significant. The statistical significance of the migration status variable disappears, which seems to indicate that migration affects fertility due to its relationship with occupation. The odds of having a birth decreased by 21% and 39% for women who worked in factories and services, respectively, compared to women who worked in agriculture. When the household and community factors were added into model 3 as control variables, only the year of marriage, education and occupation variables are statistically significant. The odds of having a birth was 36% greater for women who were married from 1976 to 1989 compared to women who were married from 1990 to 2000. Each increase of a year of education corresponds to a 3% decrease in the odds of having a birth at any given time. The odds of having a birth decreased for women who worked in factories and services compared to women who worked in agriculture. Occupation is the most important variable predicting fertility in this analysis.

Table 6: Models predicting the effects of migration status on the hazard of giving birth controlling for selected groups of factors

Variable	Model 1 Coef.	Model 2 Coef.	Model 3 Coef.
Age at marriage	0.071	0.077	0.073
Age at marriage^2	-0.002	-0.002	-0.002
Year of marriage (ref. 1990-2000)			
1976-1989	0.369***	0.324***	0.304***
Migration Status (ref.: non-migrants)			
Current migrants	-0.235***	-0.080	-0.077
Return migrants	0.069	0.078	0.076
Enrolled in school (ref. not enrolled)		0.095	0.086
Years of education		-0.025	-0.031*
Occupation (ref.agriculture)			
Not work		0.203	0.198
Factory		-0.240*	-0.241*
Construction		-0.113	-0.127
Services		-0.494**	-0.484**
Household Wealth (ref.poor)			
Middle			-0.027
Rich			0.167
Amount of land owned (Rai)			0.000
Distance to health center (km)			0.005
Distance to hospital (km)			-0.004
Primary school in village (ref. no primary school in village)			0.061
Log likelihood	-9606	-9595	-9592
N	10,944	10,944	10,944

Note: *** p<.001, ** p<.01, * p<.05

Conclusions and Discussion

This study explores differences in fertility between migrants and non-migrants. The results show that migrants have lower fertility than non-migrants before controlling for other variables. In the statistical model, year of marriage is a significant factor that influences fertility. Marriage cohorts reflect the impact of contraceptive use and family size preference and, especially, changing socio-economic constraints. The findings show that the probability of having a birth was greater for women who were married from 1976 to 1989 compared to women who were married from 1990 to 2000. In the late 1990s, contraceptive use in the Northeast among currently married women of reproductive age was over 70 percent. As a result of the successful implementation of the family planning program in the early 1970s, the contraceptive use rate increased from about 53.4% in 1978 to 72.2% in 1996 (Chamratrithirong, et al., 1997). The effect of migration is not significantly related to the timing of birth. After controlling for age at marriage, year of marriage, education, occupation, and household and community variables, it was concluded that migration affects fertility due to its relationship with other variables. Education and occupation are variables that have powerful effects on fertility. Education influences women to prefer a small family size, use contraception, and be more concerned about child quality (Cochrane, 1979; Panopoulou and Tsakloglou, 1999). Education tends to raise the perceived cost of children and to reduce the economic returns from them, as well as to raise the cost of time devoted to child care (Cochrane, 1979).

Occupation is associated with education. More educated women have a greater ability to make decisions to stop or space fertility when working in some occupations. Labor market participation also has independent effects on fertility. After controlling for education, employed women schedule children later in life and have fewer children compared to unemployed women (Kalwij, 2000). Fertility is negatively and significantly related to female labor force participation for women age 20-49 (Clark, York, and Anker, 2003). Type of work has a strong effect on fertility behavior, particularly for the women working in factory or service occupations favored by migrants, compared with women who worked in agriculture. It seems that migrants delay childbearing in order to take advantage of the opportunities available to them in the urban workforce. Pregnancy and having birth may interrupt or interfere with work, especially in some service work. The finding shows that individual characteristics influence the timing of birth more than do household and community factors.

This study partly supports the hypotheses regarding the relationship between migration and fertility (Goldstein, 1973; Goldstein and Goldstein, 1981; Goldstein, Goldstein and Limanonda, 1981; Chamratrithirong, et al., 1979; NSO, 1990; Lindstrom and Saucedo, 2002; Chattopadhyay and White, 2005). The relationship between migration and fertility in terms of selectivity, disruption and adaptation effects are not mutually exclusive. The relationship are complex. It is likely that a strong selectivity effect may facilitate adaptation. Many studies have explained that fertility differences among migrants compared to non-migrants were due to selectivity, disruption, and adaptation effects. Disruption and adaptation effects are measured by cumulative fertility (Chattopadhyay and White, 2005) as AG model in this study. Result shows that current migrants have adaptation and disruption effects. However, migration variables are not significantly

related to the timing of birth after controlling education, occupation, household, and community variables. Fertility behavior may be different between migrants and non-migrants in terms of birth spacing. Further analysis is examining issues of birth spacing by using the Prentice, Williams, and Peterson model (PWP model) (Box-Steffensmeier and Zorn, 2002; Ezell, Land and Cohen, 2003). The PWP model is suitable for independent within-subject events and is the best approach for the analysis of repeated events data. In a subsequent article we focus on the relationship between migration and birth spacing: Nang Rong, Thailand. This approach using a gap time model (PWP model) to analyze the same relationships using the same data as this study (Forthcoming).

Extensions of this research should use both quantitative and qualitative research to focus on education and occupation factors. The results suggest that these two variables are the most influential factors that could be changed through various policies or intervention.

This study examines the relationship between migration and fertility in Nang Rong district and focuses on rural to urban migration. The results may be generalized for other regions rural to urban migration. Rural to rural migration and socialization effect of migrants are interesting issues that could be studied.

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