Below Replacement-Level Fertility: The Global and Local Perspectives

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ABSTRACT

The rapid and continuous decline of fertility in many parts of the world, in both developed and less-developed countries, has never ever been found in human history. Causes, patterns and consequences of such decline are different in each spatial location as well as social settings. However, little research has been done on the overall picture of the world fertility. Therefore, the aims of this study are: firstly, to analyse the global fertility distribution; and secondly, to investigate the change of the Thai fertility, and Chiang Mai in particular, in order to provide a better understanding on the ongoing process of population change at the local level. This qualitative and quantitative study has been done by using aggregate data from several official sources as well as books, journals, articles and websites involved. This study uses the total fertility rate (TFR) which is divided into three categories: above the replacement level (>2.1); at the replacement level (2.1); and below the replacement level (<2.1). Results show that 69 of the 205 studied countries have TFRs below the replacement level, and 8 countries have TFRs at the replacement level. Among these countries, the lowest TFR (1.2) are found in 14 countries. However, if these two special administrative regions have not been considered as parts of Mainland China, Hong Kong and Macao would have been the lowest TFR regions, with the TFRs of 0.9 and 0.8 respectively. Globally, below replacement-level fertility is found in every developed country, except Albania in Europe that has TFR at the replacement level. About 15 per cent of the less-developed countries has TFRs below the replacement level, including Thailand. The Thai total fertility rate has not just declined to below replacement level recently but had reached such level since the late 1980s. For almost two decades since then, the Thai TFR has slowly declined to the current level of 1.7. Moreover, Thailand is one of the very few countries that have the shortest period of fertility transition. It took less than three decades for the TFR to decline to the replacement level. Even in an age of rapid fertility transitions, as Hirschman et al. (1994) argued, the Thai case is exceptional as the country remained overwhelmingly poor, agricultural and rural. However, the decline of fertility in Chiang Mai was even more dramatic and took place before any province in the country, apart from Bangkok. Between 1960 and 1975, the Chiang Mai TFR declined by almost 50 per cent, and reached the replacement level by 1980 (Pardthaisong, 1994). Such rapid decline of fertility has affected the population momentum and the age structure of the population which have led to several socio-economic and political consequences.

Key words: Below-replacement fertility, Total fertility rate, Thai population, Chiang Mai population

INTRODUCTION

Perhaps the most universally-accepted generalization in population studies is that human fertility is high in traditional, pre-industrial, rural, high-mortality societies, and low in economically-diversified, modernized, low-mortality societies. What is not universally accepted, however, are the mechanisms which bring about this fertility transition. Initially, demographic transition theory (Thompson, 1929; Notestein, 1953) seemed to provide adequate general explanation. Central to this theory was the view that socio-economic conditions shape the normative context for family formation and childbearing. In particular, as socio-economic change impacts on tranditional societies, the rising costs and declining economic value of children are seen, together with increased child survival, as driving fertility declines. At the macro-level, this transition in the economic costs and benefits of children forms the basis of Caldwell's (1982) influential theory of inter-generational wealth flows. Caldwell identifies the fertility transition as occurring when there is a major change in the next direction of lifetime wealth flows, from children-to-parents to parents-to-children – a change that he identifies particularly with the onset of universal primary schooling. Similarly, at the micro-level, transition theory has been bolstered by the application of micro-economic theory to the costs and benefits of childbearing under different structural conditions (Becker, 1960).

However, classical demographic transition theory, with its emphasis on socio-economic change as the driving engine, has been regarded as inadequate explanation for the world's fertility transitions. In particular, the Princeton European Fertility Project on the fertility declines of the late nineteenth and early twentieth centuries in Europe concluded that the regional pattern of fertility decline was only loosely related to the temporal and spatial pattern of socio-economic change (Coale and Watkins, 1986). The Project identified an important additional element – that of cultural and ideational factors – in the emergence and diffusion of family limitation (both the legitimation of the innovative concept and the means of achieving it). Similar conclusions have also been drawn from analyses of the modern fertility transitions in less-developed countries (Cleland and Wilson, 1987; Bongaarts and Watkins, 1996; Reed *et al.*, 1999). For example, there is not a particularly high negative correlation between fertility rates and development level (as measured by the Human Development Index incorporating life expectancy, literacy and GDP per capita) for sixty nine developing countries over the 1960-65 to 1985-90 period (Bongaarts and Watkins, 1996).

It should be noted, however, that under the different social, economic, cultural and political settings, factors affecting fertility transitions are varied – from country to country, and society to society. Whatever reasons that have affected fertility, the fertility rates have declined quite rapidly and continuously in many parts of the world, in both developed and less-developed countries. More importantly, this phenomenon has never ever been found in human history. The clear and impressive description of this remarkable fertility change is done by Wattenberg (2004), he remarks that: "…never have birth and fertility rates fallen so far, so fast, so low, for so long, in so many places, so surprisingly…" (Wattenberg, 2004).

As little has been studied on how 'low' fertility is and how the 'low fertility' has distributed worldwide, this paper aims to: firstly, analyse the global fertility distribution; and secondly, investigate the change of the Thai fertility, and Chiang Mai in particular, in order to provide a better understanding on the ongoing process of population change at the local level. Findings from this study may suggest hypotheses for further necessary research into the implications of population change, and provide some suggestions for population planning and the overall development policy.

RESEARCH METHODOLOGY

This qualitative and quantitative study has been done by using aggregate data from several official sources as well as books, journals, articles and websites involved. This study uses the total fertility rate[1] (TFR) which is one of the most valuable rates for comparing fertility among countries and tracking changes over time. The TFRs, based on data from the 2004 World Population Data Sheet (Population Reference Bureau, 2004), are divided into three categories based on the replacement-level fertility[2]. However, it should be noted that the requirement of TFR varies between countries, depending on the mortality levels. For example: in a country with low mortality, a TFR of 2.1 produces replacement-level fertility; in a high-mortality country, on the other hand, replacement-level fertility would require a TFR greater than 3. The three categories used in this study, based on the developed countries' TFR requirement of 2.1, are as follow: TFR above the replacement level (>2.1); TFR at the replacement level (2.1); and TFR below the replacement level (<2.1). Each category is grouped and analysed by using the Geographic Information Systems.

RESEARCH FINDINGS

The Global Distribution of the Below Replacement-level Fertility

It was found that 69 of the 205 studied countries have TFRs below the replacement level (Figure 1). It indicates that the below replacement-level fertility is found in every developed country, except Albania in Europe, and about 15 per cent of the less-developed countries is now having the TFRs below the replacement level. Figure 1 also shows that there are 8 countries that have TFRs just about the replacement level. These replacement-level fertility countries are: Albania; Vietnam; St. Vincent and the Grenadines; St. Kitts-Nevis; Netherlands Antilles; Grenada; Bahamas; and Costa Rica.

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[1]The average number of children that would be born alive to a hypothetical woman if, throughout her reproductive years, the age-specific fertility rates for the specified year remained unchanged.

[2]The level of childbearing at which couples have – to replace themselves in the population. A replacement-level fertility requires a TFR slightly above 2.0, primarily because some children will die before they grow up to have their own children.

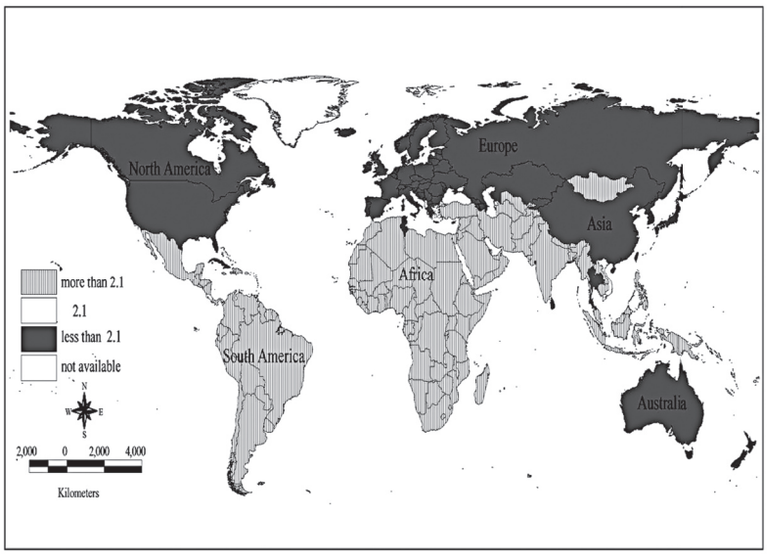

Figure 1. World Total Fertility Rates, by country, 2004.
Source: TFR data from the Population Reference Bureau, 2004.

Among the below replacement-level fertility countries, 42 countries are in Europe (all European countries, except Albania); 6 in the Caribbean (Barbados, Cuba, Dominica, Martinique, Puerto Rico, and Trinidad and Tobago); 5 in East Asia (China, Japan, North Korea, South Korea, and Taiwan); 4 in Western Asia (Armenia, Azerbaijan, Cyprus, and Georgia); 3 in Oceania (Australia, New Zealand, and Palau); 2 in North America (United States and Canada); 2 in Southeast Asia (Singapore and Thailand); 2 in Eastern Africa (Mauritius and Seychelles); and one in each of these regions: South Asia (Sri Lanka); South Central Asia (Kazakhstan); and Northern Africa (Tunisia) – as can be seen from Figures 2-9.

Figure 2. Total Fertility Rates in Europe, by country, 2004.
Source: TFR data from the Population Reference Bureau, 2004.

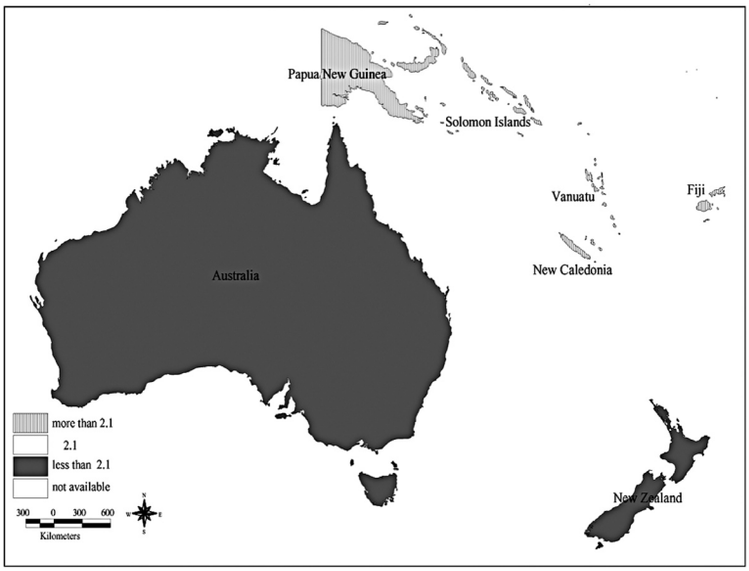

Figure 3. Total Fertility Rates in Oceania, by country, 2004.
Source: TFR data from the Population Reference Bureau, 2004.

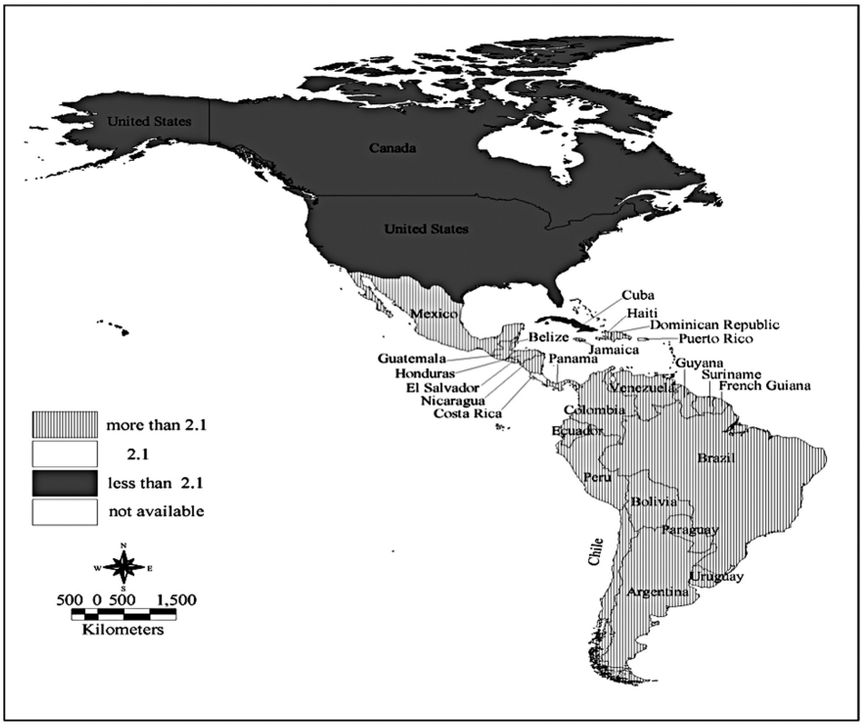

Figure 4. Total Fertility Rates in North America, Latin America and the Caribbean, by country, 2004.
Source: TFR data from the Population Reference Bureau, 2004.

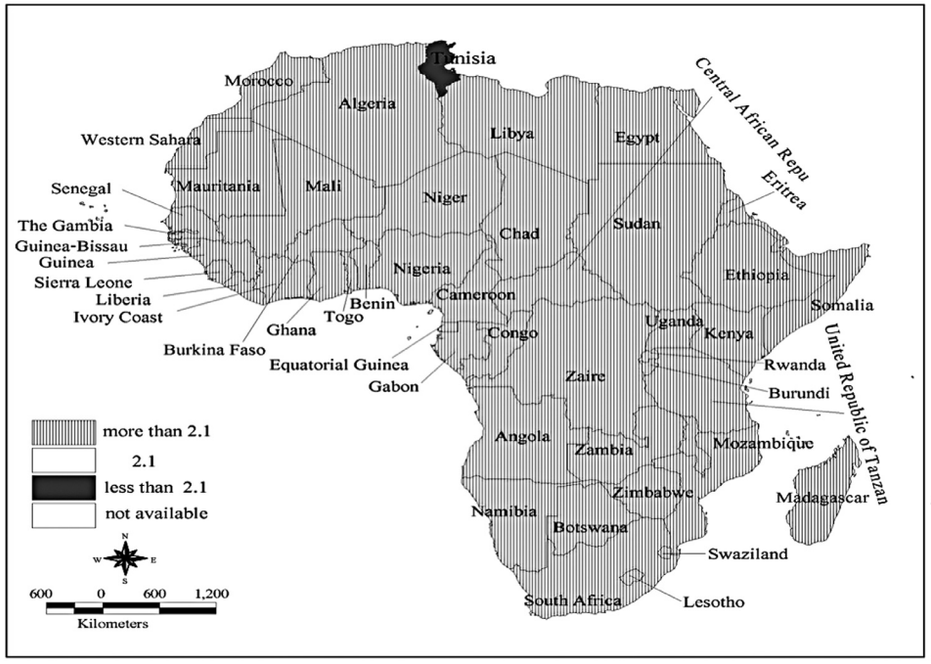

Figure 5. Total Fertility Rates in Africa, by country, 2004.
Source: TFR data from the Population Reference Bureau, 2004.

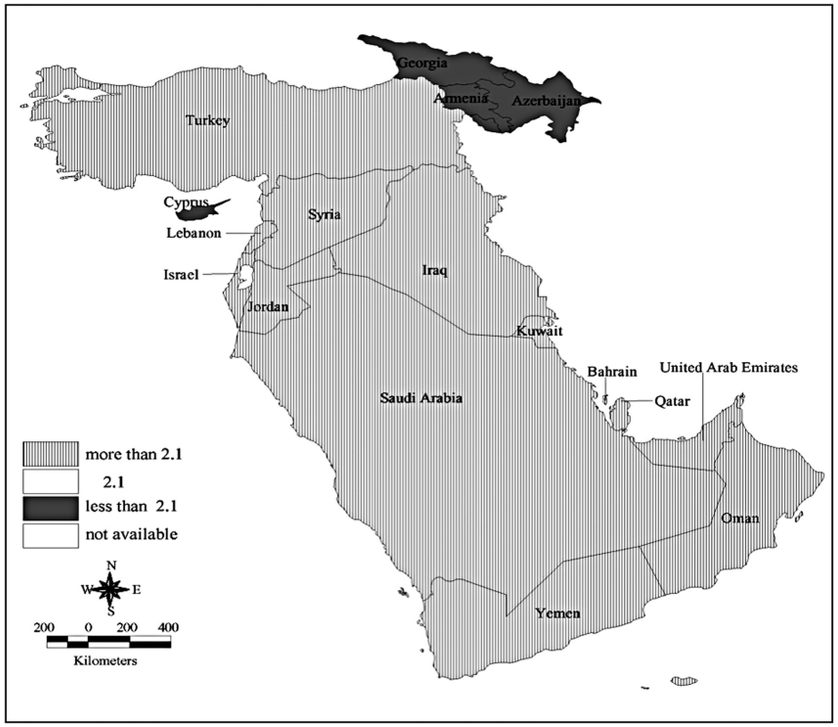

Figure 6. Total Fertility Rates in Western Asia, by country, 2004.
Source: TFR data from the Population Reference Bureau, 2004.

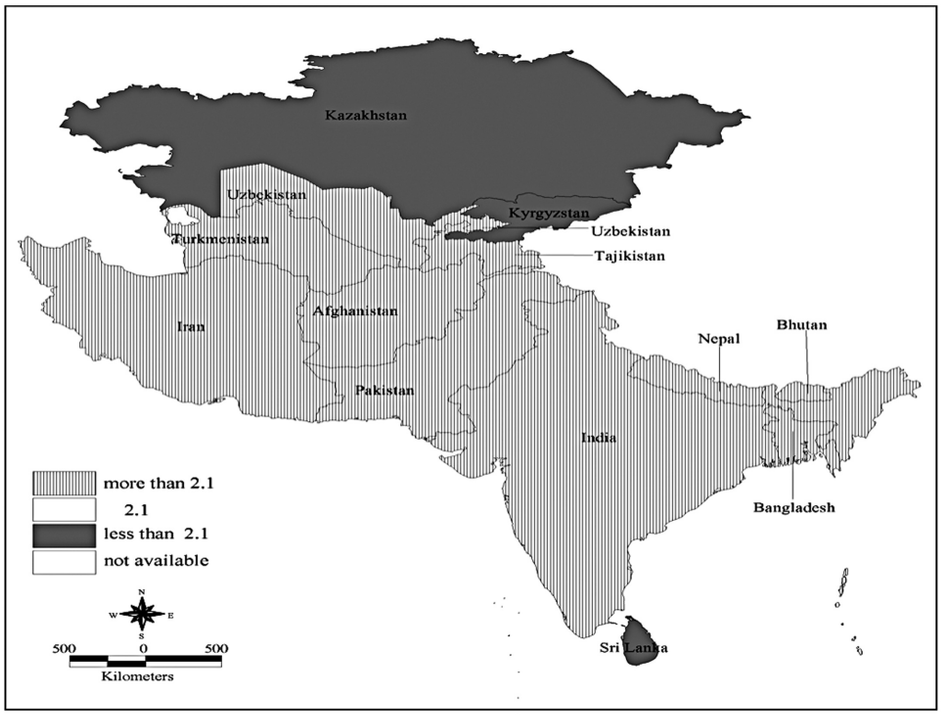

Figure 7. Total Fertility Rates in South Central Asia, by country, 2004.
Source: TFR data from the Population Reference Bureau, 2004.

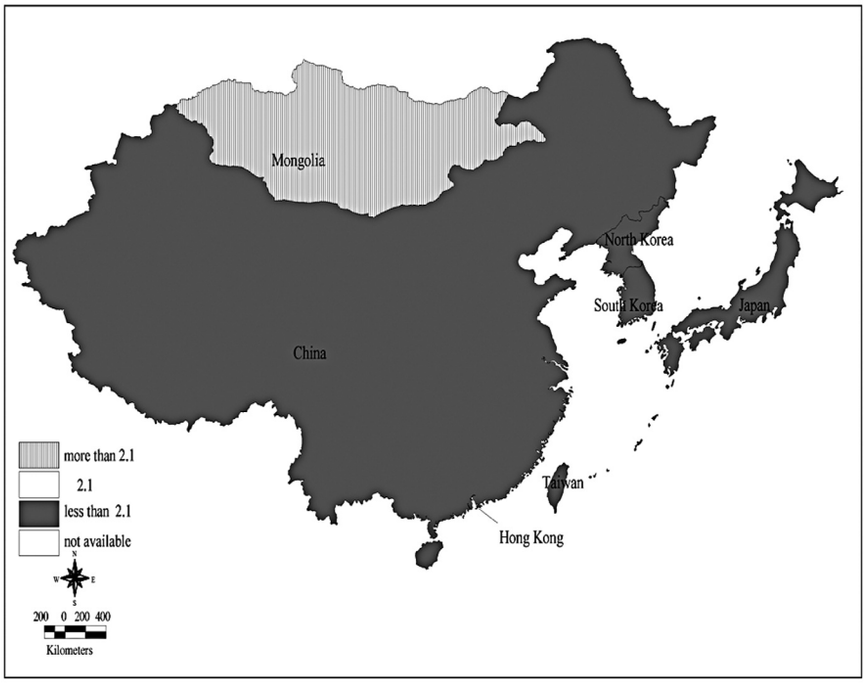

Figure 8. Total Fertility Rates in East Asia, by country, 2004.
Source: TFR data from the Population Reference Bureau, 2004.

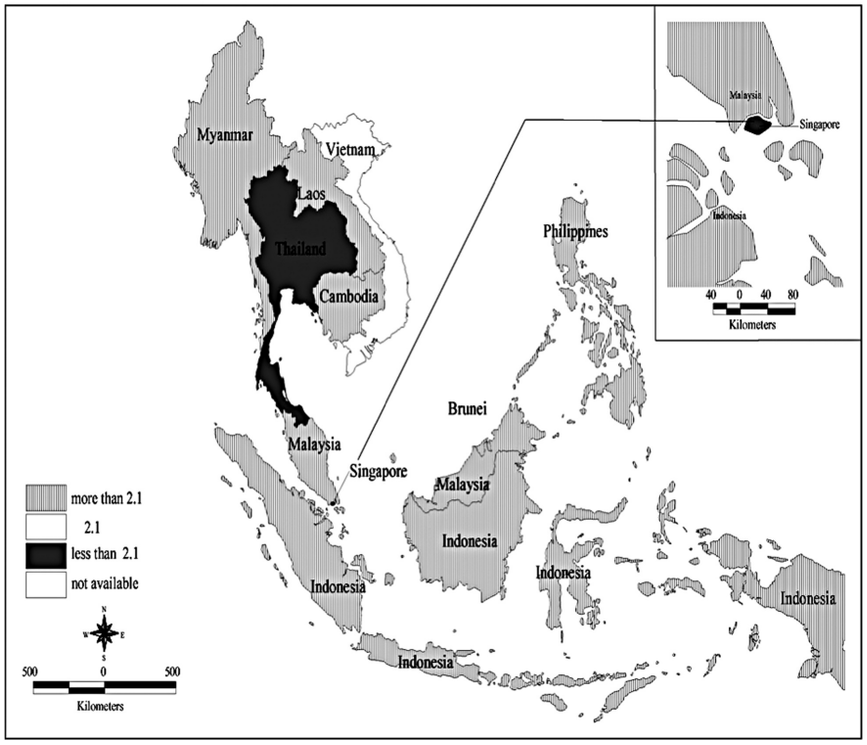

Figure 9. Total Fertility Rates in Southeast Asia, by country, 2004.
Source: TFR data from the Population Reference Bureau, 2004.

Among the below replacement-level fertility countries, the lowest TFR of 1.2 are found in 14 countries, as follow: Armenia; South Korea; Taiwan; Belarus; Bulgaria; Czech Republic; Moldova; Poland; Romania; Slovakia; Ukraine; Bosnia-Herzegovina; San Marino; and Slovenia. However, if these two special administrative regions have not been considered as parts of Mainland China, Hong Kong and Macao would have been the lowest TFR regions, with the TFRs of 0.9 and 0.8 respectively. Strikingly, findings from this study also suggest that about 50 per cent of the below replacement-level fertility countries has TFRs of 1.5 or lower.

Fertility Decline in Thailand

Thailand's fertility decline has been an integral and characteristic element of Asia's substantial fertility declines in recent decades. In order to analyse the Thai case, it is desirable to preface the analysis with a discussion of its wider regional context and significance.

Since 1960s, fertility has fallen remarkably in East, Southeast and South Asia, to the extent that Japan has experienced the below replacement-level fertility for 40 years, followed by the 'tiger' states of Hong Kong, Singapore, Republic of Korea, and Taiwan (since the late-1970s), Thailand and China (since the late-1980s), and Sri Lanka (since mid-1990s), respectively. By global standards, what is distinctive about the Asian fertility transitions (Leete and Alam, 1993; Freedman, 1995) is the direct role of intervention programmes in supplementing, and sometimes in substituting for, the indirect role of socio-economic transformation in driving fertility decline.

It is not surprising that a combination of socio-economic transformation and strong programmes of family planning intervention rapidly reduced fertility in Japan, and the 'tiger' states. What is more surprising is how quickly fertility reductions have spread to, and how deeply they have impacted on, the remaining largely agricultural societies of the region, like Thailand (Hirschman and Guest, 1990).

The fertility decline in Thailand is among the earliest in Asia's second wave of fertility transitions. Within a mere 25 years, the country's TFR declined from 6.3 in the early 1960s to the replacement level of 2.2 (at then current mortality levels) in 1986. The decline of fertility between 1965-70 and 1985-90 can be seen in Figure 10. Remarkably, Thailand is one of the very few countries that have the shortest period of fertility transition.

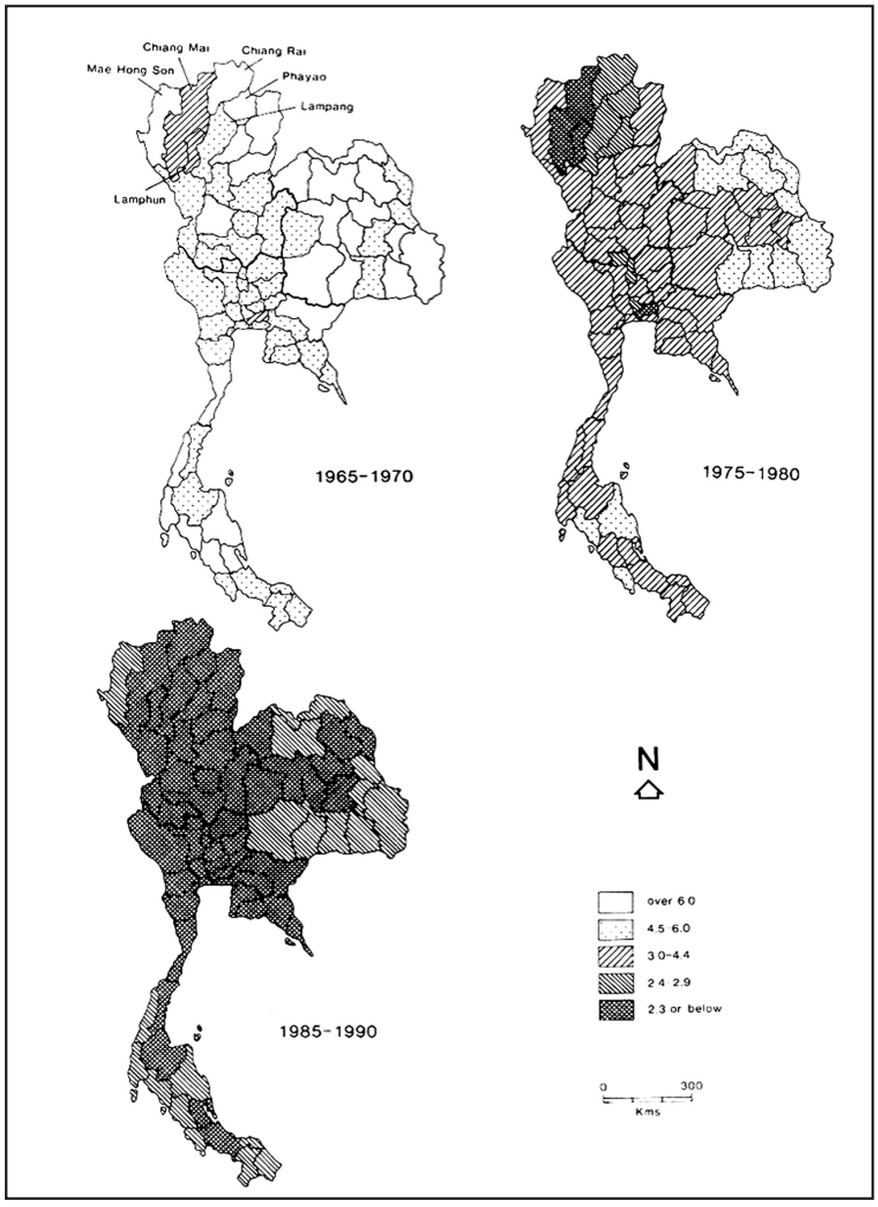

Figure 10. Thailand's fertility transition, 1965-1990
Source: Pardthaisong, 1995.

Moreover, fertility has not just declined to, and remained at, the replacement level but has gradually declined. At a regional level, TFR is lowest in Bangkok, followed by the North, Central (excluding Bangkok), Northeast, and the South, respectively[3] (Pardthaisong, 1998). Differential levels of development in the country partly explain the variation in levels of fertility reduction by region. Socio-economic transformation began in Bangkok, before spreading to the nearby provinces in the central region, to the cities which are the centre of each region, to the municipal areas, and finally, to the rural areas. A similar diffusion and gradient applied to the development of hospitals, health stations and family planning services. Since reaching the replacement level in the late-1980s, the country's fertility rate has gradually declined to the current level of 1.7 (Population Reference Bureau, 2004).

Fertility Decline in Chiang Mai

The rapid fertility decline in Chiang Mai has long been recognised as special. It was a result of the country's earliest family planning programme being established by a missionary physician at McCormick Christain Hospital in Chiang Mai city. This programme was introduced in 1963, then expanded to family planning clinics in towns outside Chiang Mai city in 1967, with a mobile family planning unit being added in 1969 to serve the rural population. The programme started by using the intrauterine device (IUD), but focused on the injectable contraceptive Depo Provera from 1965 to establish what is believed to be the largest injectable contraceptive programme in the world (Pardthaisong, 1986). By the second half of the 1970s, nearly all women of childbearing age in Chiang Mai province knew the cost, a service location, and a mode of transport for obtaining contraception. Although the government programme was implemented here in the early 1970s, the McCormick programme still accounted for the majority of new acceptors in Chiang Mai province until the latter part of the 1970s.

After the McCormick family planning programme had been introduced in Chiang Mai, fertility began to decline rapidly. Although the different structural context and later availability of family planning services delayed the decline of fertility in rural areas, the rural fertility declined more rapidly than urban fertility once it had got underway (Pardthaisong, 1978). Consequently, between 1960 and 1975, the total fertility rate of Chiang Mai province declined by almost 50 per cent, and reached the replacement level by 1980 (Figure 11).

[3]Based on 1990-19-95 registration data.

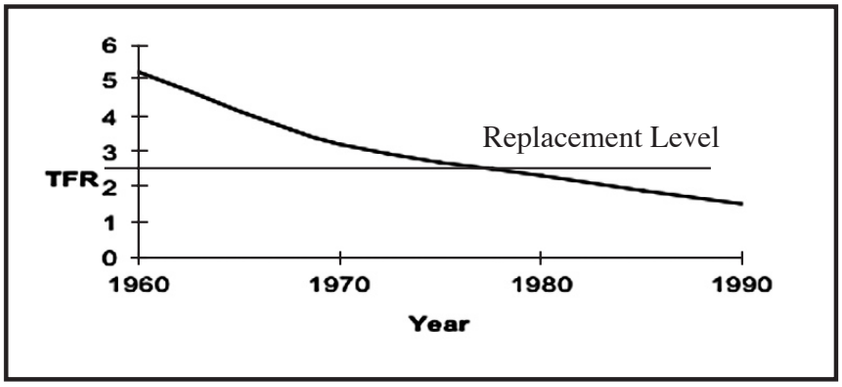

Figure 11. Total fertility rate, Chiang Mai province, 1960-1990.
Source: Pardthaisong, 1994.

Fertility rates at the district level are shown in Figure 12. It can be seen that the districts that lag behind the province's average rate are those located in the mountainous areas where the majority of the population is hilltribe. The cultural differential and the limited transportation system there had made it difficult for any kind of modern development, let alone family planning services.

It is clear that the rapid decline of fertility in Chiang Mai is attributable only marginally to socioeconomic transformation, and substantially to the effective family planning programme (UN, 1988). The pre-eminent role of family planning services in the Chiang Mai's early fertility decline is strongly implied by the following evidence: firstly, there has been only a very modest trend towards later age at marriage among females, with the singulate meanage at marriage for women in Chiang Mai province being 20.6 years in the 1960 census, 21.2 in 1970, and 23.0 in 1980 and 1990; secondly, it was not until 1970s that the rural population were significantly exposed to modernising influences like cars, motorcycles, secondary education and television; finally, the prevalence rates for contraceptive use among married women in Chiang Mai province were generally higher in rural areas (except for the minority hilltribe population) than in Chiang Mai city, despite the greater education experience of the city women.

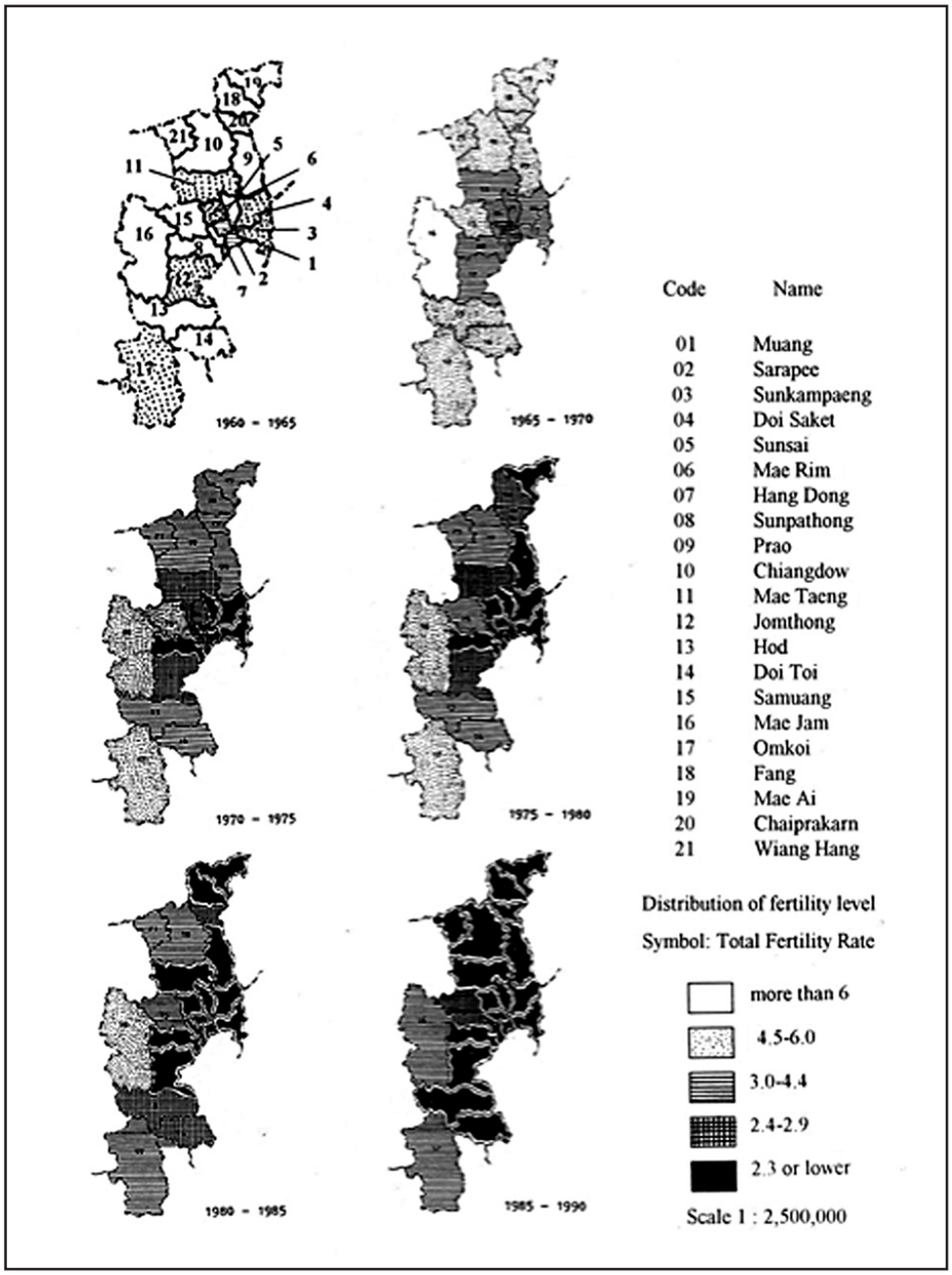

Figure 12. Fertility transition in Chiang Mai, 1960-1990
Source: Pardthaisong, 1995.

It has been more than two decades that the total fertility rate in Chiang Mai has been below the replacement level and, more importantly, has continuously declined. Apart from the wide availability of contraceptive throughout the whole province - in both rural and urban areas, factors related to modernisation have played a major part in the continuing decline of fertility. It was found that economic-related factor is the most important factor for most women to decide not to have many children (Pardthaisong-Chaipanich, 2003).

Pardthaisong-Chaipanich (2003) has pointed out that most parents could not financially support the bringing up of many children even though they knew that they would gain significant benefits in return when their children grew up. Traditionally, having children was regarded as beneficial - particularly by providing labour for household farming and help with housework and family duties. Since the onset of compulsory education and the further development of the education system, children have been removed from household production, and the costs of children through uniforms, fees, books, and other materials have been increasing. This perceived high expense of schooling seems to be the most important factor for parents to decide not to have many children. Moreover, the phenomenon of rising aspirations for material goods has clearly impacted on the desired number of children. Parents have opted for small family size, and often consciously prefer buying material goods rather than rearing children. This kind of substitution effect has been found in rural Chiang Mai as early as the 1980s (Pardthaisong, 1986).

DISCUSSION AND CONCLUSION

It is clear that even in an age of rapid fertility transitions, as Hirschman et al., (1994) argued, the Thai case is exceptional as the country remained overwhelmingly poor, agricultural and rural. The unique experience of early and rapid fertility decline in Chiang Mai has made it an interesting case study for any implications regarding to such rapid population change, as has already been observed in several studies (for example, Pardthaisong 1978, 1986, 1997; Pardthaisong-Chaipanich, 2000; 2004).

Generally, the decline of fertility has been viewed as given both advantages and disadvantages. At a macro-level, it has greatly reduced the national dependency ratio which gives advantages for economic development. Moreover, the quality of education can be expected to rise because of greatly-improved pupil-teacher ratios. At a micro-level, children from small families are more likely to continue their schooling beyond the compulsory level than those from large families (Knodel et al., 1990); and reductions in family size have contributed to improved family welfare, including health (Havanon et al., 1992). On the other hand, the rapid decline of fertility may lead to demographic and socio-economic consequences which may not be favourable in the medium- and longer-terms. The most important concern is for the age structure of the population – the increase proportion of the elderly, the decrease proportion of children and, at a much later stage, the decrease proportion of the working-age population.

At a global level, fertility reduction has caused serious pension and health-care problems in Europe, Japan and the United States. Such problems have been accompanied by related, and important, issues like economic growth, immigration, ethnic diversification and military power (Wattenberg, 2004). For example, the European governments are concerned about too few workers in future years to support the growing number of retirees in the population. An ageing population strains a nation's social security system and pension plans, and puts pressure on health budgets because of higher health care costs for the elderly. Some governments are also concerned about whether a lack of working-age population will mean a great need for immigrants, and whether population decline signals a weakening of political and economic clout (Ashford, 2004). The less-developed countries, in contrast, are facing a potentially-beneficial "demographic dividend" – a large cohort of the working-age population. This prime period, however, has a limitation – especially for countries that have experienced the rapid

fertility decline. The proportion of the working-age population in Thailand, for example, will increase and reach its peak in 2009 before declining (Wongboonsin, 2003).

Given the long-term implications of fertility reduction, combining with implications of other population changes such as mortality and migration, further research is therefore needed in order to investigate such impacts under the global and regional rapid socio-economic transformation.

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REFERENCES

Ashford, L. 2004. World population highlights 2004. Washington, DC: Population Reference Bureau.

Becker, G. S. 1960. An economic analysis of fertility. In: Universities-National Bureau Committee for Economic Research (ed.) Demographic and economic change in developed countries. Princeton: Princeton University Press. pp. 209-31.

Bongaarts, J., and S. C. Watkins. 1996. Social interactions and contemporary fertility transitions. Population and Development Review 22 (4): 639-82.

Caldwell, J. C. 1982. Theory of fertility decline. London: Academic Press.

Cleland, J., and C. Wilson. 1987. Demand theories of the fertility decline: an iconoclastic view. Population Studies 41: 5-30.

Coale, A. J., and S. C. Watkins. 1986. The decline of fertility in Europe. Princeton: Princeton University Press.

Freedman, R. 1995. Asia's recent fertility decline and prospects for future demographic change. Asia-Pacific Population Research Report (1). East-West Centre. Hawaii.

Havanon, N., J. Knodel, and W. Sittitrai. 1992. The impact of family size on wealth accumulation in rural Thailand. Population Studies 46: 37-51.

Hirschman, C., J. E. Tan, A. Chamratrithirong, and P. Guest. 1994. The path to below replacement-level fertility in Thailand. International Family Planning Perspectives 20 (3): 82-7.

Hirschman, C., and P. Guest. 1990. The emerging demographic transitions of Southeast Asia. Population and Development Review 16 (1): 121-52.

Jones, H., and L. Pardthaisong. 2000. Demographic interactions and developmental implications in the era of AIDS: findings from northern Thailand. Applied Geography 20: 255-75. Pergamon.

Knodel, J., N. Havanon, and W. Sittitrai. 1990. Family size and the education of children in the context of rapid fertility decline. Population and Development Review 16 (1): 31-62.

Leete, R., and I. Alam. (eds) 1993. The revolution in Asian fertility. Oxford: Clarendon Press.

Notestein, F. 1953. Economic problems of population change. In Proceedings of the Eight International Conference of Agriculture Economists. Oxford: Oxford University Press.

Pardthaisong, T. 1978. The recent fertility decline in the Chiang Mai area of Thailand. East-West Centre. Hawaii.

Pardthaisong, T. 1986. Factors in the achievement of below-replacement fertility in Chiang Mai, Thailand. East-West Centre. Hawaii.

Pardthaisong, T. 1994 (in Thai). The effect of family planning on the Thai society. National Development Institute. Bangkok.

Pardthaisong, T. 1995. Fertility transition in Thailand. Paper presented at the International Conference on Population Geography. Dundee. UK.

Pardthaisong, T. 1997 (in Thai). The collapsing of Chiang Mai. Thai Research Fund/Race and Development Centre, Social Research Institute, Chiang Mai University. Thailand.

Pardthaisong, T. 1998 (in Thai). The collapsing of Thai society from family planning programme: The theory. Chiang Mai University. Thailand.

Pardthaisong-Chaipanich, L. 2000. The developmental implications of rapid demographic change: fertility decline, net out-migration, and HIV/AIDS interactions in rural Northern Thailand. Ph.D. Thesis, submitted to the University of Dundee. UK.

Pardthaisong-Chaipanich, L. 2003. Ageing in Chiang Mai. Paper presented at the international workshop on "Local Initiatives in Social Development and Human Security", organised by Keio University, Japan and Faculty of Social Sciences, Chiang Mai University. December 5-7. Chiang Mai, Thailand.

Pardthaisong-Chaipanich, L. 2004. Population change in Northern Thailand. Paper presented at the 7th Southeast Asian Geography Association International Conference on "Southeast Asia: Development and Change in an Era of Globalisation". November 29– December 2, 2004. Khon Kaen, Thailand.

Population Reference Bureau. 2004. 2004 World Population Data Sheet. Washington, DC: Population Reference Bureau.

Reed, H., R. Briere, and J. Casterline. (eds) 1999. The role of diffusion processes in fertility change in developing countries: report of a workshop. Washington, DC: National Academic Press.

Thompson, W. S. 1929. Population. American Journal of Sociology 34 (6).

United Nations. 1988. The geography of fertility in the ESCAP region. New York.

Wattenberg, B. J. 2004. Fewer: How the new demography of depopulation will shape our future. Chicago: Ivan R. Dee.

Wongboonsin, K. 2003 (in Thai). Demographic dividend from the Thai changing age structure. College of Population Studies. Chulalongkorn University. ISBN 974-13-2562-2.

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