Women's Human Capital and Fertility Convergence in Asian Countries

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Abstract

Asian countries during the last 50 years have experienced different fertility levels and trends. Today, different parts of the Asia have different fertility levels. Despite diversity in fertility levels, tremendous fertility decline have been experienced during the last three decades. This study is a secondary analysis. Statistical population composed of 24 East, South East, and South Central Asian countries. Data used is mostly taken from the United Nations Population Division (2009), and Asian Demographic and Human Capital Data Sheet (2008). The aim of this paper is to study the fertility levels and trends of these countries during 1970-2010, their convergence with world fertility, timing and intensity of fertility decline, and finally changes in Women's Human Capital (WHC) and its role in fertility convergence, controlling for the effect of contraception. Results show that more than 70 percent of countries were in natural fertility situation in the first half of 1970s. After 1970, differences between countries' fertility levels with world fertility, have been narrowed gradually, so that from 1990, in more than 85 percent of the countries, fertility rates reduced to below world's fertility level. Pakistan, Laos, Tajikestan, and Philippine are only countries with higher fertility levels comparing to that of world'sin 2005-2010, and the value of their index of convergence is negative. According to findings, there are apparent differences among countries in Women's Human Capital in 1970 and 2010. Results of the correlation analysis show that the intensity of the correlation between WHC and fertility in 2007 is more than corresponding value in 1970. In fact, despite the differences in Women's Human Capital levels, countries reached to a homogenous fertility regime in 2007. Findings support the results of previous research about the convergence of fertility in different socio-economic contexts.

Key Words:

Fertility Convergence, Fertility Transition, Below-Replacement Level Fertility, Human Capital, Women, Asian Countries

Introduction

World fertility has been declined dramatically during last 50 years. Although fertility in developed countries have been decreased to very low levels until 1970 and mid 1980, however, Asian countries experienced different fertility trends during last 50 years. Today, different regions are experiencing different fertility levels in Asia. Fertility is one of the major events of household life's which affect in turn many aspects of household life like mothers and children health (Lobao and Brown 1998, Khlat and Ronsmans 2000). Study of socio-economic determinants of fertility has a major role in demographic research. These determinants which constructed by modernization process and socio-economic development, by mediating ethnic-cultural context, are affecting fertility attitudes and desires, proximate determinants, and finally fertility levels. Regarding to ethnic - cultural and religious diversity of Asian countries and the fact that countries at the region experienced modernization and socio-economic development unequally, the study of fertility levels and trends and the role of women's human capital in recent and future fertility levels is necessary. The main questions are as follow:

1) How were the fertility trends in Asian countries during the last four decades?

2) Whether fertility changes leads to convergence with world fertility levels and trends? Which countries have experienced more convergence with world fertility?

3) What is the situation of countries with regard to women's human capital at the past and present?

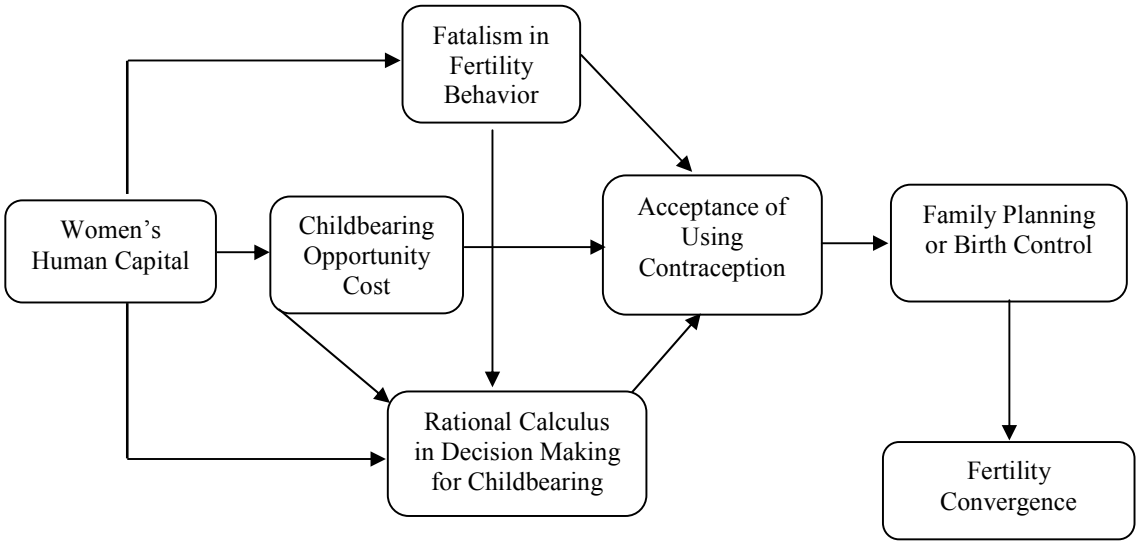
4) How would be the role of women's human capital in fertility convergence of Asian Countries if we control the effect of contraception?

The author believe that Asian countries have experienced different levels but similar fertility trends comparing to world fertility levels and trends during 1970-2010, and experiencing fertility convergence now. It seems this convergence is mainly due to improvements in women's human capital and contraception prevalence in Asian countries.

Theoretical Framework

Ansley Coale (1973) determined three preconditions for fertility decline: 1) Fertility must be within the calculus of conscious choice, 2) Fertility decline view as a social and economic advantage; 3) The effective means to birth control must be available. The first and second of Coal's Preconditions are directly related to human capital*. When individual comprehend importance of small families, believe that authority of their life is under their hands, and accept the use of contraception, fertility reduces in different socio-economic and cultural context if contraceptives available. Improvement in women's human capital is prior to any decisions for using contraception. Investment in human capital has direct and indirect expenses (Emadzadeh 1377: 54). Struggle for rising human capital have sustainable consequences ranging from rising lifetime income, greater social participation, better health and longevity of the educated persons and their families (Lutz et al 2005: 3) as well as economy of the society, which can affect other aspects of life such as, decision for marriage and family formation, timing of childbearing and final number of a woman's children. In fact, human capital in addition to rising production, have social and cultural consequences as well. At an individual level, the human capital stock for both male and female, may deeply affect preferences and decisions about fertility (Aldieri 2006: 282). Investment expenses in health and education considering limitations in resources, can lead to reduction in family size. Figure 1 shows conceptual framework of human capital impact on fertility convergence.

Figure (1)- Conceptual Framework for the Study of Impact of Women's Human Capital on Fertility Convergence



Then, it can be said that convergence of under study countries with world fertility levels and trends arising from improvements in women's human capital, diffusion of using contraception and family planning programs.

* Human capital is defined as investment aggregation in areas like education, health, training during the work and migration which increase individual productivity in work market and activities outside the market (Lutz et al 2005: 1, Slehi 1381: 44, 1384: 140, Emadzadeh 1377: 154-155, Souri 1384: 71, Taghavi and Mohammadi 1385, Sharp 2001: 3-7). In fact, human capital is equal to expenditures has been made in social projects like improving health level, education and social services.

Methodology, Data and Research Limitations

This study analyzes secondary data from 24 countries in East, South East, and South Central Asia. According to research objectives, the analysis covers two different time periods. For explanation of levels, trends and fertility convergence in under study countries, analysis focused on 1970-2005 period. Fertility convergence calculates according to values of total fertility rate by the following formula:

$$1)\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ FCI = \frac{(TFR_{W,t} - TFR_{AC,t})}{TFR_{W,t}} \times \mathbf{100}$$

In which, FCI is the index of fertility convergence, $TFR_{W,t}$ is total fertility rate for the world at the time of t, and $TFR_{MC,t}$ is total fertility rate for the Muslim countries at the time t.

For studying the role of women's human capital on fertility changes, the analysis focused on the years 1970 and 2007. Variables include women's human capital index (WHCI) and modern contraception prevalence rate. Data are taken from United Nations Population Division (2007, 2009), Asia Research Institute (ARI), and International Institute for Applied System Analysis (IIASA). We use four indicators, namely percentage of illiterate women aged 15-44 $(wedun)$, percentage of women aged 15-44 with secondary education $(weduth)$, mean years of schooling for women aged 15-44 $(mysch)$, and women's life expectancy at birth $(wlife)$ to construct the index of women's human capital using factor analysis. The results of the factor analysis of the above indicators revealed that all variables in each period are classified under one factor. After standardization of the variables, the index of women's human capital computed as follow:

$$2)\ \ldots\ldots\ldots\ldots\ WHC = Zwlife + Zmysch + Zwedut - Zwedun$$

For the study of changes that have been made in the pattern of women's human capital and the situation of Asian countries during 1970-2007, we use the method of cluster analysis for clustering the scores of women's human capital indices. In grouping of countries by fertility rates, countries with total fertility rate (TFR) equal 5 and more classified as countries in natural fertility situation, countries with TFR 3 to 4.9 as countries in transitional situation, and countries with TFR lower than 3 as countries in controlled fertility situation.

Findings

Fertility trends in selected countries comparing with world fertility trends: 1970-2005

According to estimates, most (70.8%) of under study countries in the first mid of 1970s were in natural fertility situation; China, Kazakistan, South Korea, Kyrgyzstan, and Sri Lanka were in fertility transitional situation; and Japan and Singapore were in controlled fertility situation. The number of countries in natural fertility situation, during the time, have been reduced and transferred to transitional and controlled fertility situation (Table 1).

Fertility transition which primarily experienced by Japan in the early 1960s (Jones and Leete 2002) and have been experienced by China, Kazakistan, South Korea, Kyrgyzstan, and Sri Lanka, after mid 1990s have been more generality. So that, in the years leading to 2000 fertility transition have been changed to a pervasive phenomenon and all countries except Laos reaching to

transitional and controlled fertility situation. Fertility transition in under study countries is a phenomenon which specifically has been generalized after 1990s.

Table (1) - Transition in Asian Countries Fertility Situation from 1970 to 2010 by Frequency and Countries Name

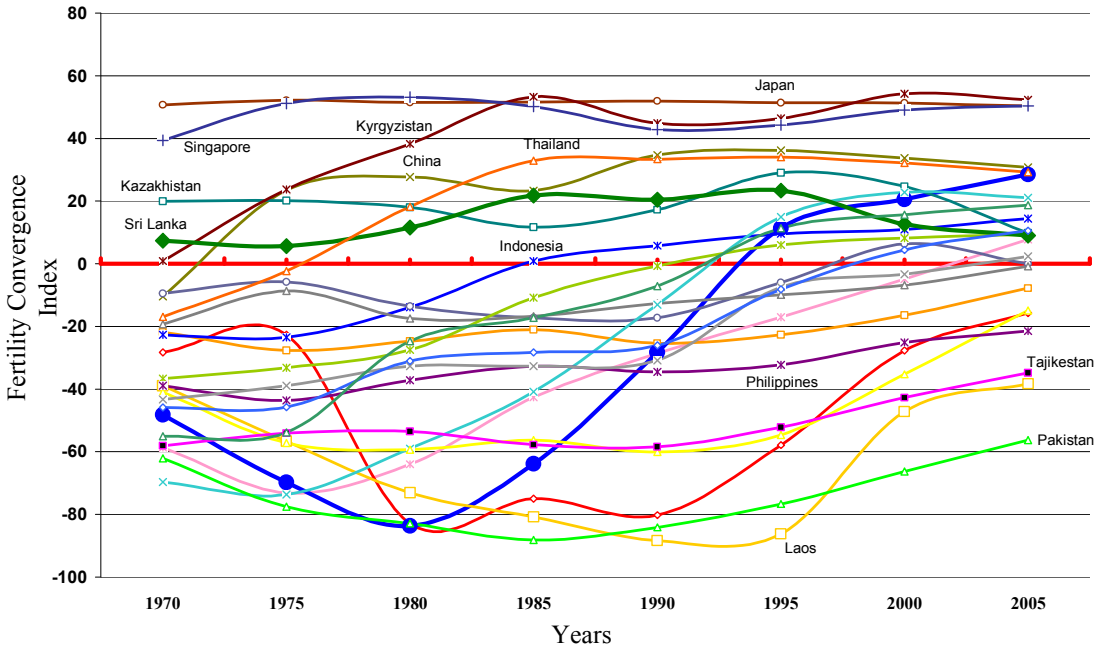
Total	Fertility Situation (2005-2010)				
	Controlled	**Transitional**	**Natural**		
17	Bangladesh, Cambodia, India, Indonesia, Iran, Malaysia, Mongolya, Myanmar, Thailand, Turkmenistan, Uzbekistan, Nepal, Vietnam	Tajikestan, Philippines, Pakistan, Laos	–	**Natural**	Fertility Situation (1970-1975)
5	China, Kazakistan, South Korea, Kyrgyzstan, and Sri Lanka	–	–	**Transitional**	
2	Japan, Singapore	–	–	**Controlled**	
24	20	4	-	Total	

Although, fertility changes during the last 40 years was not monotonous, but considering to countries order in three fertility situation in 2005-2010, and also experiencing low fertility in some countries at the region, it is expected that by joining countries in transitional fertility situation to countries having controlled fertility, fertility reduction continued in these countries.

Asian Countries' Fertility Convergence with World Fertility Levels and Trends

Figure 2 shows the fertility (trends and levels) convergence to world's fertility levels and trends in under study countries.

Figure (2) – Convergence Trends in Asian Countries, 1970-2005



In the first mid of 1970s, convergence index in Japan, Kazakistan, Kyrgyzstan, Singapore, and Thailand has been positive. In fact, fertility in these countries has been lower than the world's. After that time, fertility differences between under study countries and the world declined and a tendency to convergence appeared.

In China, Thailand, and Indonesia until 1990, fertility has been declined to values lower than the World. After 1990, variation in fertility levels of under study countries with world fertility reduced dramatically, in a way that, in more than 85 percent of the countries, fertility rate has declined to values lower than the World. Nonetheless, Pakistan, Laos, Tajikestan, and Philippine have experienced higher fertility than the world during the period leading to the time of the study, and their convergence index is highly negative.

Women's Human Capital and Fertility Changes

Analyses are indicative of diversity in fertility levels and trends, timing of fertility transition, the pace of fertility decline during the transition, and convergence with world fertility levels and trends during the last 4 decades. The cluster analysis of the scores of human capital index (Figure 3) distinguished three clusters. Countries with relative identical human capital level fell into one single cluster. Figure 3 shows that Mongolya, Philippine, Kyrgyzista, Kazakhista, Uzbekistan, Turkmenist, South Korea, Sri Lanka, Tajikestan, and Japan has the largest average score of women's human capital index (33.58), compared with other two clusters. Therefore, we label this cluster as countries with high women's human capital. In contrast, countries numbered 6, 16, 1, 11, 4, 2, and 15 fell in one other single cluster with an average index score of 25.50, have been classified as countries with low women's human capital. Singapore, China, Indonesia, Thailand, Myanmar, and Vietnam with an average index score equal to 29.38, which is respectively 13.2 percent more and 12.5 percent lower than that of countries with low levels of women's human capital index, has specify as countries with moderate women's human capital.

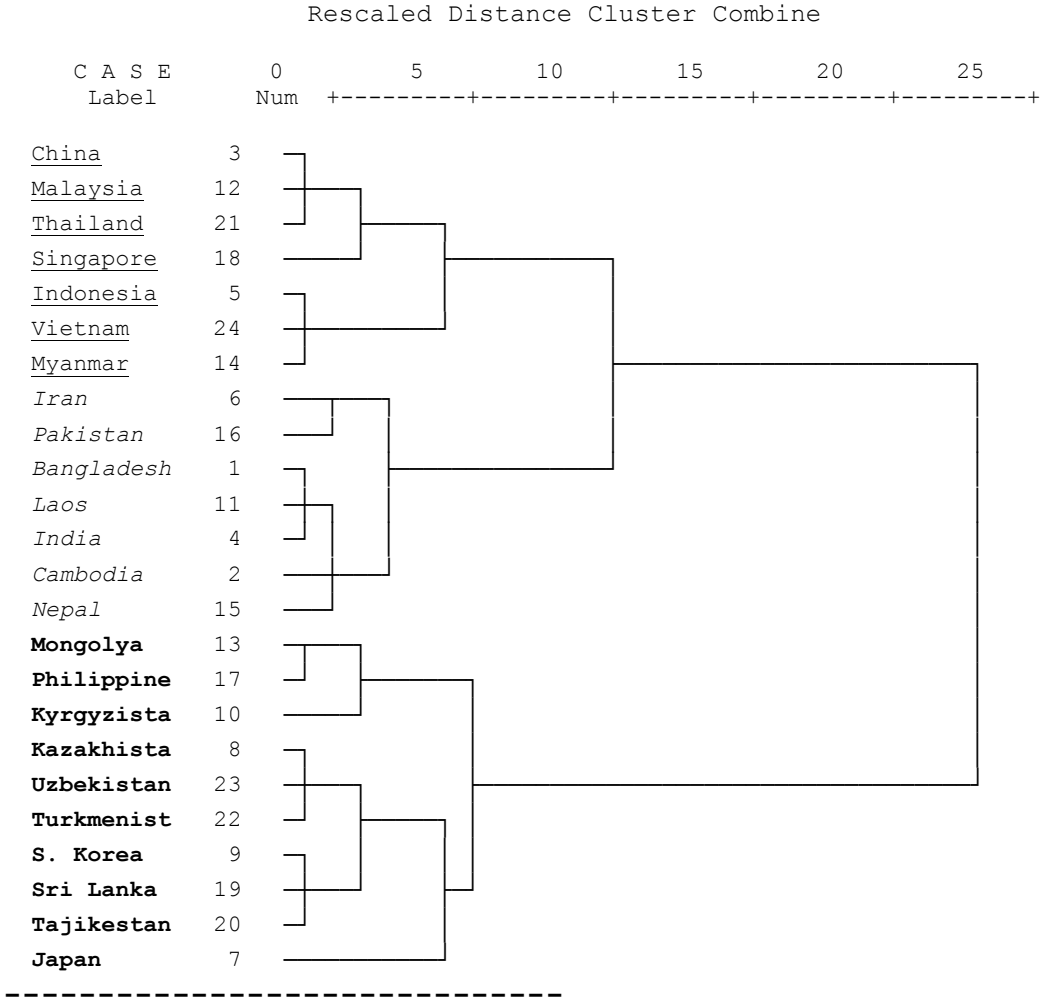
Generally speaking, analysis shows an unequal pattern of women's human capital in under study countries in 1970. The difference between average scores of countries in low and high levels of women's human capital in 1970 and 2007 are respectively 8 and 10.2, while the difference between average and high clusters are respectively 4.2 and 4.61. In fact, the gap between countries with respect to women's human capital during the time has been moderately increasing.

These findings are contradictory to our general expectation of process of improvement in human capital indexes and generally development indexes at the world and the Asia. Disintegration of the former Soviet Union countries, specific situation of countries at the region, and consequently their downfall from high to moderate level women's human capital could be some partial explanations for these trends. In general, the number of countries at the average level of women's human capital increased during the time and has been reached from 7 countries in 1970 to 14 in 2007 (Figure 4). In fact, although human capital pattern in 2007 is more homogenous than 1970, however, increases in the number of countries with moderate level of human capital is not due to improvements of the index among the countries, rather rooted in the fall of some countries' index level. This is the case of members of former Soviet Union, such as; Kyrgyzistan, Kazakistan, Tajikestan, Turkmenistan, and Uzbekistan, which left the high human capital group and joined the moderate human capital group during 1970-2007.

Generally speaking, except Singapore and Iran which changed their situation respectively from moderate and low level of women's human capital in 1970 to high and moderate level in 2007, other countries either not changed their situation in 1970 or change their situation in 1970 to lower situation in 2007 (high to moderate or moderate to low). Nevertheless, fertility of countries has changed to more homogenous pattern in 2007. For instance, the differences between the total fertility rate (TFR) of Iran and Japan decreased 83.6 percent from 4.27 in 1970 to 0.7 in

2007, while these countries were in different levels of women's human capital in 2007. This trend in reduction of fertility differences during 1970-2007 can be seen in other countries.

Figure (3) – Dendrogram for between-groups linkage hierarchical cluster analysis of scores of women's human capital Index among Asian countries, 1970

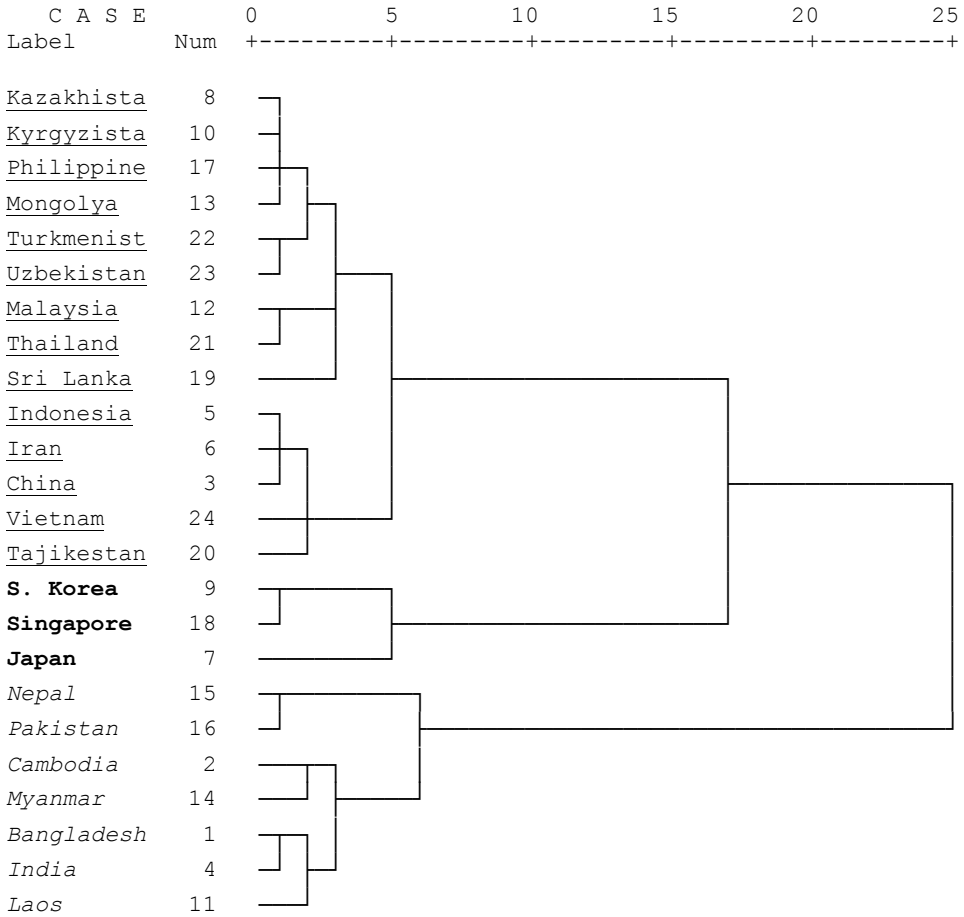


Legend for Countries:
Bold: High Level of Women's Human Capital
Underlined: Average Level of Women's Human Capital
Italic: Low Level of Women's Human Capital

Although, For example, Bangladesh and Singapore have experienced different levels of human capital in 2007, their fertility differences have been declined 61.4 percent from 4.23 in 1970 to 1.6 in 2007. Thus, it can be said that Asian countries, despite their differences in the level of women's human capital, have been approaching more convergence fertility pattern. Partial correlation results show that when controlling for the effect of modern contraceptives, correlation intensity between women's human capital and fertility convergence with a 25 percent decline, reaches from 0.622 (zero order coefficient) to 0.468 (controlling for contraception). It could be said that, modern contraception prevalence rate has a determinant role in fertility convergence of Asian countries at different levels of women's human capital. Of course, precise assessment of these findings requires controlling for the role of other factors such as; percent of women in

union, and etc, which we could not include in this paper. Based on analytical model presented in figure 5, the direct effect of women's human capital on the fertility convergence of Asian countries is 0.382. Countries with higher level of women's human capital have more convergence with world fertility levels.

Figure (4) – Dendrogram for between-groups linkage hierarchical cluster analysis of scores of women's human capital Index among Asian countries, 2007

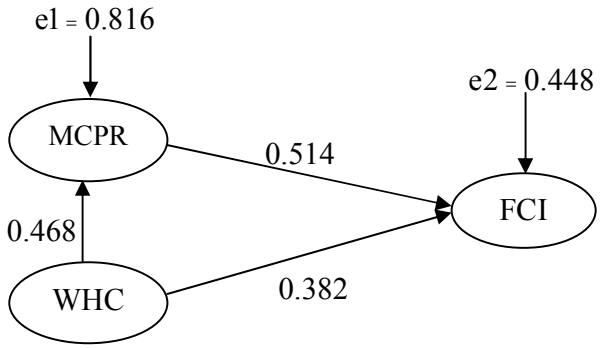


Legend for Countries:
Bold: High Level of Women's Human Capital
Underlined: Average Level of Women's Human Capital
Italic: Low Level of Women's Human Capital

Moreover, women's human capital has an indirect effect on Asian countries' fertility convergence with world fertility levels and trends, via increasing the modern contraception methods' utilization. The indirect effect of women's human capital on fertility convergence is 0.241 (0.468*0.514) which is obviously less than its direct effect. Consequently, the total effect of women's human capital on fertility convergence is equal to 0.623 (0.382 +0.241). That is, the model could explain a high percent of the overall relationship between women's human capital of 24 Asian countries and their convergence with world fertility levels in 2007. As shown in figure

5, the direct effect of women's human capital levels on prevalence rate of modern methods of contraception (0.468) is somewhat more than its direct effect on fertility convergence (0.382).

Figure (5) - Paths of Impact of Women's Human Capital on Asian Fertility convergence, 2007



This study shows that women's human capital and the rate of using modern methods of contraception have explained 55.5 percent of Asian countries fertility convergence.

Conclusion and discussion

Results show that more than 70 percent of countries at the mid 1970s were in natural fertility situation and only Japan and Singapore have controlled their fertility. Fertility transition which primarily experienced by Japan in the early 1960s, and experienced by China, Kazakistan, Kyrgyzistan, South Korea, and Sri Lanka at the mid 1970s, has become a more general pathway at the early 1990s, and other countries except Pakistan, Laos, and Cambodia, have joint to countries experiencing the transitional situation. Consequently, at the threshold of 21st century, fertility transition generalized and all countries reached to transitional or controlled fertility situation. Among countries with controlled fertility, China, Iran, Singapore, Japan, Kyrgyzistan, Mongolya, Thailand, and Vietnam are experiencing below replacement level fertility. Subsequently, it is expected that more countries with transitional fertility situation join to countries with controlled fertility and the fertility decline continue consistently.

Although, tremendous changes have been made in fertility during the last 40 years, however, these changes have not been monotonous. In first half of 1970s, Japan, Kyrgyzistan, Kazakistan, Singapore, and Sri Lanka have experienced lower fertility than the world. The difference between study countries' fertility level and the world fertility narrowed gradually during recent decades, and Asian countries have been approaching a more convergent fertility level comparing to that of world's fertility. In countries such as; China, Indonesia, and Thailand fertility declined to levels lower than the world. After 1990, the difference between countries fertility level with world fertility level declined dramatically. In more than 85 percent of the countries, fertility declined to values lower than the world. Nonetheless, Laos, Tajikestan, and Philippine has experiencing higher fertility than the world and their convergence index is negative remarkably. This study also shows that the gap between countries by women's human capital index has been increased slightly between 1970 and 2007. Nonetheless, the results of correlation analysis show that the intensity of correlation between women's human capital and fertility in 2007 is higher than the observed correlation in 1970. In fact, it can be said that fertility convergence is a predominant characteristic of Asian countries at different socio-economic and cultural contexts. Increases in the modern contraception have a major role in fertility convergence at different levels of women's

human capital. Women's human capital directly and indirectly, by influencing on modern methods of contraception, has affected fertility convergence. This study shows that improvement in women's human capital indicators, at least in under study countries, is a necessary prerequisite for diffusion of contraception and convergence with world fertility levels and trends.

According to the results, it can be said that in countries like Pakistan, Laos, Philippine, and Tajikistan, which still experiencing fertility transition, efforts for increasing women's human capital can have an important role in fulfillment of family planning goals, expedition of fertility transition, and experiencing controlled fertility in these countries. Improvement in women's human capital, at least in chosen countries, is a necessary prerequisite for acceptance of contraception, diffusion of contraceptive methods, and finally convergence with world fertility levels and trends. Then, governments of countries with higher fertility rates should pay more attention to raise the women's human capital in national development programs. Efforts to enhance women's human capital by increasing their level of education and improving their health condition, especially for young daughters of the past baby boom who reach the ages of marriage and childbearing is one of the main pathways to lower fertility, this kind of interventions, will lead to a situation in which women have a better and more equal status at the family, and then will have a more control on their fertility behavior.

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