Analysis of Factors Contributing to Fertility Decline in Korea

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With the succesful national family planning program and rapid socio-economic advancement since 1962, the contraceptive prevalence rate has risen from 9 percent in 1964 to 79 persent in 1991, with the corresponding total fertility rate(TFR) going from 6.0 in 1960 to 1.6 in 1988 which is considerably below the replacement fertility rate. The main purpose of this study is, therefore, to identify the structural and causal factors that contributed to the fall in fertility over the last three decades, in an effort to formulate future population policy directions and strategies. The two methods used for the study were : the standardization approach to examine the structural factors on fertility decline, and the Bongaarts model to measure the effects of the proximate variables in the fertility decline. The study indicated that the fall in the CBR and the GFR for the periods of 1960 to 1970 and 1980 to 1990 were largely influenced by the decline in marital fertility which was triggered by the national family planning program initiated in 1962. The analysis based on the Bongaarts model revealed that the three principal factors which exercised strong influence on the fertility decline were the rise in age at marriage, the increase in induced abortion, and the increase in contraceptive use, but the influence of induced abortion has been decreasing in recent years. In gerenal, the study results suggest that the main concerns of the national FP program should be shifted from the past quantitative approach with emphasis on fertility reduction to a qualitative approach which stresses maternal and child health and other public health programs.

I. Introduction

Since 1945, the death rate in Korea has kept on declining steadily thanks to improvement in medical services and in public health in general, while the annual birth rate registered an unprecedented 3 percent in 1960, a result of the post-Korean War baby boom(1955−60), so the Korean government intorduced a national family planning program in 1961 as part of its Five-Year Economic Development Plan starting from 1962. This measure had to be taken as the government was aware that without a proper population control

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policy, it would not achieve rapid economic development within a short period.

Due to the successful implementation of population control and economic development policies, Korea could realize an 8% annual economic growth rate and a drastic decline in fertility. In fact, it took Korea only 20 to 30 years to complete its demographic transition, while in developed countries it took more than 100 years to complete it. During the 30-year period starting in 1960, the Korean total fertility rate(TFR) dropped from 6.0 to 1.6, the birth rate from 42.1 to 15.6, and as a result, the population increase rate decreased during the period from 3% to within the one-percent level.[1)]

Providing the present low fertility rate continues in effect, Korea's population is expected to stop growing in the year 2021. This low fertility level is, however, likely to generate a number of problems, including a rapid increase in the elderly population and a shortage of the labor required to restructure and expand industries. It is, therefore, time for Korea to launch a comprehensive scheme to overhaul its existing population policies to meet the need of a society with a low fertility rate.

This analysis is designed to find the structural and causal factors that contributed to the fall in fertility over the last 30 years and thus to provide a direction in which the nation's future family planning and population control policies should be geared.

II. Data and Methodology

The primary data for the analysis are the census data of the National Statistical Office(NSO) and the national survey data of the Korea Institute for Health and Social Affairs(KIHASA) for the 1960 to 1970 and 1980 to 1990 periods.

The two methods of analysis are the standardization approach developed by the United Nations to examine the structural factors of fertility decline, and the Bongaarts model specifically designed to measure the effects of the proximate variables in fertility decline. It would have been possible to use the decomposition method of E.M. Kitagawa for analysis of the structural factors, but the standardization approach was made use of in an effort to compare the results with those of the standardization approach conduted by Kenji Hayashi in his analysis of the Japanese data.[2)]

III. Analysis Based on the Standardization Approach[3)]

1. The approach

Standardization is a statistical technique often used in comparing two populations with differing age-sex structures ; for example, in comparing the crude birth rate(CBR), or general fertility rate(GFR) of the two populations over two or more separate points in time with the following four components : 1) proportion of women of reproductive age in the total population, 2) age structure of women of reproductive age, 3) proportion of married among women of reproductive age and 4) age-specific marital fertility.

The amount of the contributions of each of the four components to the variations in the CBR or in the GFR over a set period can be calculated using the standardization approach. To find out

1) KIHASA, *Population Component Plan of the Seventh Five-Year Economic and Social Development Plan (1992~96)*, 1991.

2) Kenji Hayashi, et al., "Analysis of Fertility Decline in Japan", *Japanese Journal of Public Health,* the Institute of Public Health(IPH), Vol.39, 1, 1992.

3) United Nations, *Manual IX, the Methodlogy of Measuring the Impact of Family Planning Programmes on Fertility,* New York, 1979.

what the contribution of each specific component makes to the total variations in the crude birth or in the general fertility rates, one controls for all other components, except for the one component under consideration, and the same operation is repeated for the other components successively to measure the total effect the components have on the total variation.

The standardization approach is considered to be an effective means for evaluating the impact of a population's structural change on fertility change, but it is deficient in that it proves to be an inappropriate means for evaluating family planning and population control program performance per se. The following are the usual equations used in the standardization approach :

$$CBR = BN / P = W / P \times BN / W = W / P \times GFR$$
$$GFR = BN / W = \Sigma(ai / W \times BNi / fi \times fi / ai)$$
$$= \Sigma(Ai \times Fi \times Mi)$$

CBR : Crude birth rate
GFR : Greneral fertility rate
P : Total population
BN : No. of births
W : Population of age 15 to 49 currently married women
BNi : No. of births to women in age group i
ai : Population of women in age group i
fi : Population of currently married women in age group i
Ai : Age structure component in age group i
Fi : Age specific marital fertility rate in age group i
Mi : Marital status distribution in age group i

In Table 1, in the first four rows, the individual component's contributions to the CBR an the GFR are specified, and in the fifth row, the joint effect of GFR and W / P is given, while t_1 and t_2 indicate the two different points in time, and i the ith age category.

There are usual equations used in the standardization approach for adjusting results of decomposition into components of changes in CBR and GFR by calculating the joint effects of age struc-

Table 1. Formula for Decompsition into Factors

Change in crude birthr rate due to four components	Procedure
Proportion of women of reproductive age to total population	$\cdots\cdots GFR\ (\frac{W_2}{p_2} - \frac{W_1}{P_1})$
Age struture of women of reproductive ages	$\frac{W_1}{P_1}\ [\Sigma(A_{2i} - A_{1i}) \cdot M_{1i} \cdot F_{1i}]$
Marital status distribution	$\frac{W_1}{P_1}\ [\Sigma(A_{1i} \cdot A(M_{2i} - M_{1i}) \cdot F_{1i}]$
Marital fertility	$\frac{W_1}{P_1}\ [\Sigma(A_{1i} \cdot M_{1i} \cdot (F_{2i} - F_{1i}]$
GFR * W/	$\triangle GFR_{\circ} \triangle \frac{W_1}{P_1}$

ture and marital status(A and M), age structure and marital fertility(A and F), and marital fertility and marital status(M and F). For example, the adjusted role of the age structure is obtained as the computed contribution of age structure less one half of the joint effects of age structure and marital status and less one half of the joint effects of age structure and marital ferility : the independent role of age structure(A) $-1/2$(Joint effects of A and M) $-1/2$(Joint effect of A and F). The joint effect can be calculated by deducting the combined role of two factors from the independent effecs of the two factors. The following is the equation for computing the joint effects of A and M : $[\Sigma(A_{2i}-A_{1i}) \cdot M_{1i} \cdot F_{1i}+\Sigma A_{1i1i} \cdot (M_{2i}-M_{1i}) \cdot F_{1i}]-[(\Sigma A_{1i} \cdot M_{1i} \cdot F_{1i})-(\Sigma A_{2i} \cdot M_{2i} \cdot F_{1i})]$

2. Data

The standardization approach used NSO census data and the KIHASA National Fertility Survey data. The data in Tables 3 and 5 provide changes in the proportion of women age 15 to 49 years to the total population, age structure, marital status, and marital fertility between the 1960 and 1970 and the 1980 to 1990 period.

3. Results of analysis

In Table 2, over the 1960 to 1970 period, the CBR declined by 24.8% from 41.65 to 31.31, and the GFR by 25.88% from 181.3 to 134.4, while the proportion of female population aged 15 to 49 years to the total population registered a 1.4% increase from 23% to 23.3% during the corresponding period.

In Table 3, over the 1960 to 1970 period, the female population age 20 to 24 years decreased by 1.8 percentage points, and the female population age 25−29 declined by 1.6 percentage points. In general, the proportion of married females decreased for those under 30 years of age, and increased for those over 30 years of age. In particular, for those women in the 20 to 24 age category, the proportion of those married decreased by 13.4 percentage points, perhaps due to the increase in age at first marriage. As for changes in the marital fertility rate, a drastic decrease was observed for those aged over 30 years, while for those aged 30 to 34 years, marital fertility decreased by 75, and for those 35 to 39 years old, and for those 40 to 44 years old, the marital fertility rate declined by 110 and 64, respectively.

In Table 4, there was a 10.3% decline in the CBR for the 1960 to 1970 period. The proportion of women aged 15 to 49 years increased by 5.6%, while the age structure showed a decrease of 10.4 %, and the marital status and marital fertility registered a 31.4% decrease and a 58.8% decrease, respectively. The joint effect of GFR*W/P also

Table 2. Changes in CBS and GFR, 1960−70 and 1980−90

	1960	1970	Change('70/'60)	
			Absolute	Percentage
Crude Birth Rate(000)	41.65	31.31	−10.34	−24.83
General Fertility Rate(000)	181.27	134.36	−46.91	−25.88
Proportion of women aged 15−49 to total pop.(00)	22.98	23.30	+ 0.32	+ 1.39
	1980	1990	Change('90/'80)	
			Absolute	Percentage
Crude Birth Rate(000)	22.99	14.35	− 8.64	−37.58
General Fertility Rate(000)	87.20	50.78	−36.42	−41.77
Proportion of women aged 15−49 to total pop.(00)	26.37	28.26	+ 1.89	+ 7.17

Table 3. Changes in Age Structure, Marital Status, and Marital Fertility, 1960−70

	Age Group	A_{1i}	M_{1i}	F_{1i}
1960 :	15−19	19.8	5.8	600
	20−24	18.6	55.7	447
	25−29	16.8	92.1	351
	30−34	13.7	91.6	298
	40−44	9.8	82.0	117
	45−49	8.8	72.7	22
	Total	100.0	67.4	289
	Age Group	A_{2i}	M_{2i}	F_{2i}
1970 :	15−19	20.7	2.8	595
	20−24	16.8	42.3	450
	25−29	15.2	88.4	356
	30−34	14.8	94.6	223
	35−39	12.9	91.9	122
	40−44	10.6	84.8	53
	45−49	9.0	76.9	8
	Total	100.0	62.9	214

Table 4. Decomposition into Components of Changes in CBR and GFR, 1960−70 (Base Population, 1960)

Factors	Changes in CBR		Changes in GFR	
	Aboslute (000)	Percentage (%)	Absolute (000)	Percentage (%)
Proportin of women aged 15−49 to total population	+0.58	+ 5.6		
Age structure	− 1.08	−10.44	− 4.72	−10.06
Marital status	− 3.25	−31.43	− 4.13	−30.13
Marital fertility	− 6.08	−58.80	−26.24	−55.95
GFR x W/P	− 0.15	− 1.45		
Total change explained	− 9.98	−96.52	−45.10	−96.13
Total change observed	−10.34	−100.0	−46.91	−100.0

showed a 1.45% decline, thus contributing to the CBR decline, however small the effect. In the case of the decrease in the GFR, the decline in the marital fertility rate contributed the most for the 1960 to 1970 period.

In Table 2 where the standardization approach was used in accounting for changes in the CBR and the GFR for the 1980 to 1990 period, the CBR decreased by 37.6% from 22.99 in 1980 to 14.35 in 1990, and the GFR also decreased by 41.77% from 87.20 in 1980 to 50.78 in 1990, while the proportion of women aged 15 to 49 years to

Table 5. Changes in Age Structure, Marital Status, and Marital Fertility, 1980−90

	Age Group	A_{1i} (%)	M_{1i} (%)	F_{1i} (000)
1980 :	15−19	20.8	1.6	529
	20−24	20.1	33.8	458
	25−29	15.6	84.9	292
	30−34	12.4	94.3	103
	35−39	11.1	93.4	28
	40−44	10.7	90.1	7
	45−49	9.3	83.1	1
	Total	100.0	59.8	146
	Age Group	A_{2i}	M_{2i}	F_{2i}
1990 :	15−19	17.9	0.5	250
	20−24	17.2	19.2	306
	25−29	17.3	77.6	234
	30−34	16.5	92.5	53
	35−39	12.1	92.3	7
	40−44	10.1	90.4	1
	45−49	8.9	86.3	−
	Total	100.0	63.0	81

the total population increased from 26.37 in 1980 to 28.26 in 1990, a 7.17% increase.

In Table 5, over the 1980 to 1990 period, the population in the 15 to 19 and 20 to 24 age categories decreased by 2.9 percentage points, while those in the 25 to 29, 30 to 34, and 35 to 39 age categories increased by 1.7 percentage points, 4.1 percentage points, and 1.0 percentage point, respectively. The proportion of married decreased for those age less than 40 years, and to be specific, the proportion of married for those in the 20 to 24 and 25 to 29 age categories decreased by 14.6 percentage points and 7.3 percentage points, respectively, another indication of the rise in age at marriage. The marital fertility rate, excluding the young 15 to 19 age group, decreased by a 152 for those in the 20 to 24 age category, and by 58 and 49 for those in the 25 to 29 and for the 30 to 34 age groups.

In Table 6, as opposed to the continuing decline in the CBR for the 1980 to 1990 period, the proportion of women aged 15−49 years to the total population increased by 19.1% over a corresponding period, and the age structure increased by 12.0%. The proportion of those married decreased by 59.72% and the marital fertility by 90.16%, while the joint effect of GFR*W/P decreased by 7.99%. That is, the changes in age structure and the proportion of women aged 15 to 49 years to the total population both had a negative effect on the CBR decline, the decrease in the proportion married and in the marital fertility rate in particular. The drastic decline in the marital fertility rate contributed greatly to the fertility decline.

The above phenomenon stands in contrast to that during the 1960 to 1970 period as shown in Table 4. In Table 4, all three components, namely, the age structure, the marital status, and the marital fertility, all have a positive effect on the fertility decline, but as shown in Table 6, during the 1980 to 1990 period, the contraceptive pratice rate

Table 6. Decomposition into Components of Changes in CBR and GFR, 1980−90 (Base Population, 1980)

Factors	Changes in CBR		Changes in GFR	
	Absolute	Percentage	Absolute	Percentage
Proportion of women aged 15−49 to total pop.	+ 1.65	+ 19.1		
Age structure	+ 1.04	+12.00	+ 3.67	+10.07
Marital status	− 5.16	−59.72	−18.25	−50.11
Marital fertility	− 7.79	−90.16	−27.56	−75.68
GFR x W/P	− 0.69	− 7.99		
Total change explained	−10.93	−126.70	−42.14	−115.7
Total change observed	− 8.64	−100.0	−36.42	−100.0

Table 7. Adjusted Results of Decomposition into Componets of Changes in CBR and GFR, 1980−90 (Base Population, 1980)

Factors	Changes in CBR		Changes in GFR	
	Absolute	Percentage	Absolute	Percentage
Proportion of women aged 15−49 to total pop.	+ 1.65	+ 19.1		
Age structure	+ 1.07	+12.38	+ 3.78	+10.38
Marital status	− 4.09	−47.34	−14.47	−39.74
Marital fertility	− 6.75	−78.17	−23.90	−65.62
GFR x W/P	− 0.69	− 7.99		
Total change explained	− 8.81	−102.0	−34.59	− 95.0
Total change observed	− 8.64	−100.0	−36.42	−100.0

increased greatly compared to the intial 1960 to 1970 period, and the age at marriage steadily increased, but the female population in the 15 to 49 range began to increase as those born during the post-Korean War baby boom period entered their reproductive period. A similar situation also obtains in the case of the decline as seen in Table 6.

As the total change explained for the CBR and for the GFR recorded 126.7% and 115.7%, respectively(see Table 6), in Table 7, an adjustment has been made to scale down the percentage change to the 100 percent level by using the equation model for adjustment as explained earlier. The adjusted values indicate that no statistical change is observed for the age structure effect, but the proportion of the married decreased from the unadjusted 50.1% to 39.7%, and marital fertility from 75.7% to 65.6%. The joint effect of the proportion married and the marital fertility rate stood at −5.90, that of the age structure and the marital fertility rate at −1.66, and that of the age structure and the marital fertility rate at +1.43.

4. Comparison with Japanese Data, 1950−60 and 1975−85[4)]

Though the periods under analysis for Korea and Japan differ somewhat the comparison of the Korean data with those of Japan does provide an interesting contrast. In the case of Japan, for a 38.79% decline of the CBR from 28.08 in 1950 to 17.19 in 1960, there was a 84.07% decline in the marital fertility rate and a 21.59% decline in the proportion of women aged 15 to 49 years to the total population and the distribution of age structure increased by 14.6% and 3.2%, repectively. A 59.06% decline in the proportion married, a 58.4% decline in the age structure, and a 21.8% decline in the proportion of women aged 15 to 49 years to the total population contributed at the same time to a 30.81% decline in the CBR from 17.09 in 1975 to 11.83 in 1985. On the other hand, over the same period, the marrital fertility rate increased by 28.55%.

The joint factors accounting for the fall in the CBR in Japan for the 1950 to 1960 periods were a high contraceptive practice rate and a rise in age at marriage. That is, the proportion of married and the marital fertility rate contributed to the decline in CBR in Korea starting in 1960, but the two components were already at work for the 1950 to 60 period in the case of Japan.

The three main contributing factors were the fall in CBR for Japan in the 1975 to 1985 period, the proportion married, the age structure, and the proportion of women 15 to 49 years old to the total population, with the marital fertility rate working a negative influence on the decrease in CBR. That is during the period, Japanese women married late, but child bearing within marriage was very much in evidence.

Ⅳ. Analysis based on the Bongaarts Model

1. The model

John Bongaarts points out the following seven proximate determinants of fertility level : 1) proportion of married females, 2) contraceptive use and effectiveness, 3) prevalence of induced abortion, 4) duration of postpartum infecundability, 5) fecundabulity, 6) spontaneous intrauterine mortality, and 7) prevalence of permanent sterility. Of the above seven components, Bongaarts focuses on the more important four principal proximate determinants, those more important than the other three in terms of their sensitivity to fertility change and their variability. The four are : 1) proportion of married females, 2) contraceptive use and effectiveness, 3) prevalence of induced abortion, and 4) duration of postpartum infecundability. Bongaarts says that the four principal proximate variables can explain as much as over 96% of the changes in the fertility level. The following equations summarize the basic structure of the Bongaarts model.

Basic structure of the model

$$TFR = Cm \times Cc \times Ca \times Ci \times TF$$

Cm = index of marriage(equals 1 if all women of reproductive age are married and 0 in the absence of marriage)

Cc = index of contraception(equals 1 in the absence of contraception and 0 if all fecund women use 100% effective contraception)

Ca = index of induced abortion(equals 1 in the absence of induced abortion and 9 if all pregnancies are aborted)

Ci = index of postpartun infecundability (equals 1 in the absence of lactation and postpartum abstinence and 0 if the duration of infecundability is infinite)

4) Kenji Hayashi, op. cit.

5) John Bongaarts, "The Fertility-Inhibiting Effects of the Imtermediate Fertility Variables", *Studies in Family Planning*, the Population Council, Vol. 13, No. 614, June / July 1982.

1966, to 54.5% in 1980, and to 79.4% 1990. The index of induced abortion(Ca) decreased from 0. 96 in 1960 to 0.83 in 1970, further down to 0.64 in 1980 and to 0.54 in 1990. That is, even if the number of induced abortions continued to increase, recent years the rate of increase has been on a constant decline.

During the 1960 to 1970 period, the index of postpartum infecundability(Ci) increased by about 0.18, and for the 1980 to 1990 period, by 0.08 from 0.78 to 0.86. The mean duration of postpartum infecundability during the to period 1980 to 1990 decreased from 7.15 months to 4.75 months, which indicates that the effect of breastfeeding decline on fertility has been minimal. In Korea, for the 1960 to 1990 period, the two major contributing factors to fertility decline were the index of marriage and the index of contraception. The duration of postpartum infecundability had gone down yearly from 1960, and the index has had a negative influence on fertility decline since then. The induced abortion rate among married women aged 15 to 44 increased yearly in the 1960s and '1970s, and it slowed down in the latter part of the 1980s. In spite of the high contraceptive practice rate of 79.4 percent as of 1991, the induced abortion rate was still high. According to the 1991 survey data, there were 0.68 abortions per birth, that is, about 32% of total births for the year were accounted for by induced abortions.[9]

Bongaarts, in his model, set the value of the total fecundity rate(TF) at 15.3, whereas Sun-Ung Kim set the value at 16.2, both of which were made use of in the present analysis.[10] The result provided a rough approximation to the actual TFR values for the year 1960 to 1970, but not for the years 1980 to 1990, an indication that the influences on fertility decline of contraception and induced abortion may have been overestimated, as Hyun-Sang Moon has suggested.[11] The rates of discontinuation of temporary contraceptive methods in Korea are rather high, despite a high contraceptive practice rate, so it has been decided to readjust the efficiency coefficients of IUD, oral pill, condom, and other methods down to 0.54, 0. 28, and 0.25, respectively. The readjusted results came up with a TFR of 3.1 for 1980 and 1.4 for 1990, a rough approximation to the actual TFR values of 2.7 for 1980 and 1.6 for 1990.

4. Comparison with Japanese Data, 1950−60 and 1975−85[12]

In Japan, fertility decline for both the 1950 to 1960 and 1975 to 1985 periods was influenced to a great extent by changes in the proportion of married females, but the index of postpartum infecundability had a negative influence on the fertility decline for both periods. The contraceptive practice rate had an influence on the fertility decline during the 1950 to 1960 period, but not for the 1975 to 1985 period.

In Korea, for both the 1960 to 1970 and 1980 to 1990 period, the index of marriage and the index of contraception had a strong influence on the fertility decline, but in Japan, the two factors had an effect on fertility decline during the 1950 to 1960 period, but for the 1975 to 1985 period, only the index of marriage influenced the fertility decline. The index of marriage in 1990 stood at 0.53 in Korea, in contrast to 0.29 in 1985 for Japan. The index of postpartum infecundability stood at 0.86 in 1990 for Korea, in contrast to 0.93

9) Kong, S.K., et al., *1991 National Fertility and Family Health Survey Report,* KIHASA, 1992.

10) Kim, S.U., "Factors Affecting Induced Abortion Behavior among Married Women in Korea", *Korea Development Riview,* KDI, 1981.

11) Moon, H.S., "Estimates of Effects of the Intermediate Fertility Variables in Bongaarts Model", *Journal of Population and Health,* KIHASA, Vol. 5, No. 2, 1985.

12) Kenji, Hayashi, op. cit

TF=Total fertility

Equations estimating the intermediate variables

$$Cm=\frac{TFR}{TM}=\frac{\Sigma f(a)}{\Sigma f(a)/m(a)}$$

m(a)=age specific proportion of women currently married

f(a)=age specific fertility rate

$$Cc=1-1.08\times e\times u$$

e ; average use effectiveness of contraception

u ; proportion of married women currently using contraception

$$Ca=\frac{TFR}{TFR\times 0.4\times(1+u)\times TA}$$

TA ; Total induced abortion rate

$$Ci=\frac{20}{18.5+i}$$

i ; mean duration of postpartum infecundability(in month)

if i is not available

$$i=1.753\times\exp(0.1396\times B-0.00187\times B^2)$$

B ; lactation period

2. Data

The present study was carried out in the form of a comparative study of the 1960 to 1970 and the 1980 to 1990 periods. The data on the marriage rate are from the population census data and those on contraception and abortion from the National Fertility and Family Health Survey data.

Unfortunately, there are no national data on the duration of postpartum infecundability for the study periods of 1960 to 1970 and 1980 to 1990, and the data on breast-feeding duration to estimate the duration of postpartum infecundability were collected for the first time in the 1985 Fertility and Family Health Survey in which the lactation duration stood at 12 months.[6] In his 1973 survey, Kil-Won Kang showed that the lactation duration stood at 17 months, and the 1974 World Fertility Survey revealed that the lactation duration in Korea was 17 months.[7] Cho analysized the breast-feeding duration to be 24 months for the 1970s.[8] Based on past similar research findings, the following lactation durations were set up for this study : 30 months for 1960, 17 months for 1970, 12 months for 1980, and 8 months for 1990.

It has been reported that in the case of Japan, the coefficient of the duration of postpartum infecundability was estimated from the value of the total fertility rate, rather than vice versa, but in the case of Korea, the TFR value estimated on the basis of the Bongaarts model does not come close to the actual TFR level, and it appears therefore, necessary to adjust the coefficient in the original model.

3. Results of data analysis

The results of the data analysed with the help of the Bongaarts model are in Table 8. The TFR declined from 6.0 in 1960 to 4.7 in 1970, and further down to 2.7 in 1980, and to 1.6 in 1990. The index of marriage(Cm) decline from 0.82 in 1960 to 0.78 in 1970, and again to 0.61 in 1980 and to 0.53 in 1990, which appears to be a major contributing factor to the rapid fall in fertility. The index of contraception(Cc) declined from 0.97 in 1960 to 0.22 in 1990, and the contraceptive practice rate increased from 4% in 1960 to 20.1% in

6) Kim, E.S., et al., "Impacts of Lactation and Post-partum Amenorrhea on Fertility", *Fertility Changes in Korea,* KIHASA, 1987.

7) Kang, K.W., et al., *Relationships between Lactation and Post-Partum Amenorrhea,* Korea Institute for Family Planning, 1973.

8) Cho, L. J., et al., *the Determinants of Fertility in the Republic of Korea,* Committee on Population and Demographiy, Report No. 14, Washington D.C., National Academy of Sciences.

Table 8. Changes in Effects of Intermediate Variables on Fertility Decline based on the Bongaarts Model, 1960−70 and 1980−90

Variables	1960	1970	1980	1990
Total fertility rate(TFR)	6.0	4.7	2.7	1.6
Index of marriage(Cm)	0.82	0.78	0.61	0.53
Index of contraception(Cc)	0.97	0.77	0.48	0.22
Use effectiveness of contraception	0.70	0.87	0.88	0.91
Proportion of FP users(u)	0.04	0.24	0.55	0.79
Index of postpartum infecundability(Ci)	0.52	0.68	0.78	0.86
Mean duration of postpartum infecundability(i)	17.02	10.96	7.15	4.75
Index of induced abortion(Ca)	0.96	0.83	0.64	0.54

in 1985 for Japan, and the index of postpartum infecundability in Japan has had a negative influence on the fertility decline ever since the 1950 s, while a similar phenomenon was observed in Korea starting in the 1960s.

According to government statistics in Japan, the proportion of women breastfeeding continued to decline up to 1975, and due to a nationwide campaign for breastfeeding, the proportion of breastfeeding increased somewhat around 1975, then began to resume its downward trend in 1977, after which period, the proportion of breastfeeding has remained stable.

V. Summary and Conclusion

According to cnesus results, the CBR of Korea dropped from, 43.0 in 1960 to 15.6 in 1990, a 63.7 % decline. The standardization approach has been used to analyse the factors that contributed to the rapid fertility decline for the 1960 to 1970 period, as well as for the 1980 to 1990 period. During the 1960 to 1970 period, the proportion of female population in their prime reproductive age category of 20−29 years began to decline following the post-Korean War baby boom period of 1955 to 1960. This period was also characterized by a decline in the proportion of married females due to a rise in the age at marriage and a rapid fall in the marital fertility rate, primarily due to the government's family planning programs starting in 1962. The changes in the female age structure, in the proportion of married women, and in marital fertility were among the principal factors that contributed to the decline in the CBR and in the GFR. On the other hand, for the 1980 to 1990 period, the changes in the female age structure had a negative influence on the fertility decline, probably due to the increase in the female population that resulted from the baby boom in the late 1950s.

Throughout the 1960 to 70 and the 1980 to 90 periods, the fall in the CBR and the GFR was influenced, to a large extent, by the decline in marital fertility which, in turn, was triggered by the government's family palnning programs initiated in 1962 as part of the national population control policy.

The results obtained by applying the Bongaarts model to Korean data show that the fertility decline in the past 30 years was largely attributable to the decrease in the index of marriage and in the index of contraception, but the influence of induced abortion on the fertility decline has been decreasing in recent years, and the increase rate of induced abortion in Korea is on the decrease. The three principal factors believed to have exercised a strong influence on the fertility decline in

Korea are the rise in the age at marriage, the increase in induced abortion, and the increase in contraceptive use.

The 1991 National Fertility and Family Health Survey reveals that Korea's TFR has been hovering around the 1.6 level since 1987, far below the replacement level, and that the contraceptive practice rate for those women in the 15 to 44 age category stood at 79% as of 1991. It appears therefore that, in the present circumstances, we cannot expect either the CBR or the marital fertility rate to decline further. In addition, if the low-level fertility in developed countries provides any example, it is likely that Korea will sooner or later have to confront the socio-economic problems resulting from a negative population growth rate.

Despite the fact that Korea has a high contraceptive practice rate, it still has a high induced abortion rate. This indicates that the future family planning program should focus, not on the quantitative side of population, including the lowering of the fertility level, but on improvement of population quality, i.e, the prevention of induced abortions. The proportion of women breastfeeding is on the decline, and indications are that this proportion is likely to decrease further as ever greater numbers of women seek employment outside the home. It is about time that specific measures are taken to encourage mothers to breastfeed their children, not to lower the fertility level, but to improve maternal and child health(MCH). Future family planning programs, in this repect, should be integrated with the public health and, in particular, with MCH care programs.

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《국문초록》

韓國의 出産率 低下要因에 관한 分析

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우리나라는 1962년부터 經濟開發計劃과 家族計劃 위주의 人口抑制政策을 성공적으로 추진하여 연평균 8% 이상의 고도 경제 성장은 물론이고 先進國에서 100여년에 걸쳐 이룩된 人口轉換이 우리나라에서는 불과 20~30년이라는 단기간에 완료되었다. 즉 1960~90년 기간중 우리나라는 合計出産率(TFR)은 6.0명에서 1.6명으로, 그리고 인구증가율은 3%에서 1%이내로 저하되었다. 따라서 본 연구는 1960년이래 가장 出産率의 감소폭이 컸던 1960~70년과 1980~90년 兩期間을 분석대상으로 하고 UN에서 개발한 標準化方法(Standardization Approach)에 의거 出産率 저하에 관한 구조적 요인을 분석하고, 동시에 봉가르츠 모형(Bongaarts Model)을 이용하여 出産率 저하에 미친 관련 媒介變數의 영향도를 측정함으로써 향후 家族計劃事業의 추진방향을 제시하는데 목적을 두고있다.

標準化 方法의 분석결과에 의하면 1960~70년 기간에 있어서는 전후 출산붐(1955~60)의 終了와 더불어 高出産 20代 여성의 人口比率이 감소되었고 1960년이래 여성의 초혼 연령이 상승됨에 따른 결혼율의 감소, 그리고 1962년부터 착수된 政府家族計劃事業의 여파로 有配偶 出産率이 크게 감소하게 되었다. 따라서 1960~70년 기간중에는 여성의 연령구조, 결혼율, 유배우 출산율의 변동이 CBR 및 GFR의 저하에 긍정적으로 영향을 미친것으로 판명되었다. 한편 1980~90년 기간중에는 상기 3개 요인중에서 여성의 年齡構造만이 出産率 저하에 부정적 요인으로 작용했는데 이는 1950년 후반기에 있었던 전후 출산 풍년의 여파로 1980년대에 나타난 可姙女性의 증가에 기인된 것이다. 결론적으로 지난 30년에 걸친 우리나라 出産率(CBR 및 GFR)의 저하는 주로 有配偶 出産率의 저하에 의해서 이룩되었고 이와 같은 결과는 1962년부터 人口抑制 政策의 일환으로 추진되어온 政府家族計劃事業이 주효했다고 볼 수 있다.

한편 봉가르츠 模型分析에 의하면 1960년이래 非婚係數 및 避姙係數에 의한 출산력 저하 효과는 지속적으로 증대되어온 반면에 人工姙娠中絶의 증가폭이나 출산력에 미친 성과는 최근에 이를수록 크게 감소되고 있다. 그러나 1991년 조사결과에 의하면 우리나라의 合計出産率은 1988년이래 人口代置水準 이하인 1.6명 수준을 유지하고 있고 부인(15~44)의 避姙實踐率은 79%라는 높은 수준에 도달되었기 때문에 앞으로 급격한 조출생율이나 유배우 출산율의 저하는 기대하기 어렵고, 우리나라 人口政策의 長期的인 안목에서 이미 先進國에서 경험하고 있는 저출산율에 의한 인구의 마이너스 성장에 따른 제반 문제를 고려한다면 더 이상의 出産率 저하는 바람직하지 못할 것으로 전망된다.

그러나 우니라나는 높은 피임실천율에도 불구하고 아직도 높은 人工姙娠中絶率을 보이고 있기 때문에 향후의 家族計劃事業은 출산력 저하가 아니라

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人工姙娠中絶의 예방을 통한 人口資質의 향상에 촛점을 두어야 할 것이다. 또한 母乳授乳의 증대는 출산력 저하 차원이 아닌 母子保健 차원에서 대책이 강구되어야 한다. 따라서 이제까지 인구억제 정책의 일환으로 추진되어온 가족계획사업은 일반 保健事業, 특히 母子保健事業과 統合 推進되어야 함을 암시하고 있다.