The changing trends in live birth statistics in Korea, 1970 to 2010

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Although Korean population has been growing steadily during the past four decades, the nation is rapidly becoming an aging society because of its declining birth rate combined with an increasing life expectancy. In addition, Korea has one of the lowest fertility rates in the world due to fewer married couples, advanced maternal age, and falling birth rate. The prevalence of low birth weight infants and multiple births has been increased compared with the decrease in the birth rate. Moreover, the number of congenital anomalies is expected to increase due to the advanced maternal age. In addition, the number of interracial children is expected to increase due to the rise in the number of international marriages. However, the maternal education level is high, single-mother birth rate is low, and the gender imbalance has lessened. The number of overweight babies has been decreased, as more pregnant women are receiving adequate prenatal care. Compared to the Asian average birth weight, the average birth weight is the highest in Asia. Moreover, the rate of low birth weight infants is low, and infant mortality is similarly low across Asia. Using birth data from Statistics Korea and studies of birth outcomes in Korea and abroad, this study aimed to assess the changes in maternal and infant characteristics associated with birth outcomes during the past four decades and identify necessary information infrastructures to study countermeasures the decrease in birth rate and increase in low birth weight infants in Korea.

Key words: Birth rate, Fertility rate, Maternal age, Low birth weight infant, Multiple birth, Korea

Introduction

During last 40 years, the Korean population has been increasing steadily, and reached 47.99 million in 2010. However, due to a decline in birth rate and total number of births, the fertility rate between 2005 and 2010 was the lowest in the world. In addition, the Korean population has been aging rapidly and is the highest in the world, resulting in adramatic demographic transition[1]. In 2000, Korea was labeled as an aging society and is expected to become an aged society by 2018 and a "super-aged" society in 2026[2]. Average maternal age

and advanced maternal age have been increased along with a decreasing average birth rate and an increasing low birth weight infants[3-7]. Thus, it is important to develop appropriate policies to the variety of issues addressed.

This study researched the changes in maternal and infant characteristics associated with birth outcomes during the past four decades are based on Korean birth data from the Statistics Korea (Korea National Statistical Office)[8], Organization for Economic Cooperation and Development (OECD) Family database[9] and studies of birth outcomes in Korea and abroad. Ultimately, this study aims to identify necessary information infrastructures to effective countermeasures the decrease in birth rate and increase in prevalence of low birth weight infants in Korea.

Changes in birth statistics in Korea

1. Changes in the population, marriages, and birth rate in Korea, 1970 to 2010

The Korean population increased from 31.43 million in 1970 to 47.99 million in 2010. The elderly population ≥65 years increased more than tripled, from 3.31% in 1970 to 11.30% in 2010; however, the population of children less than 15 years old decreased, from 42.12% in 1970 to 16.23% in 2010. The aged-child ratio, a ratio based on the proportion of elderly to young, increased from 34.98 in 2000 to 69.66 in 2010. An aging society is defined as a society with an aged-child ratio of >30; thus, Korea was classified as an aging society in 2000, because its aged-child ratio was >30. In addition, the number of marriages per year has been gradually decreased, thereby resulting in a decreasing crude marriage rate from 9.2 in 1970 to 6.5 in 2010. Live births declined from 1,006,654 in 1970 to 435,031 in 2005-the lowest number of live births recorded-and then rose to 470,171 in 2010. The crude birth

rate and total fertility rate decreased consistently, reaching their lowest in 2005, and then increasing slightly to 9.4 and 1.23 in 2010, respectively (Table 1)[1].

Compared to the total fertility rate of OECD member countries, Korea was higher than the OECD average before 1984; however, the average rate declined continuously after 1984. In 2009, the average for the 34 member countries of the OECD was 1.74, and the average for Korea was 1.15 which was the lowest overall[9].

2. Birth outcomes of infants born in Korea, 1993 to 2010

As the number of live births has decreased, so has the average birth weight: from 3.31 kg in 1993 to 3.22 kg in 2010; males were 100 g heavier than females. The rate of very low birth weight infants (VLBWIs, <1,500 g) increased from 0.13 in 1993 to 0.6% in 2010, and the rate of low birth weight infants (LBWIs, <2,500 g) increased from 2.63 to 5.02%. The rate of preterm births before 32 weeks increased from 0.28 in 1995 to 0.75% in 2010, and the rate of preterm birthsbefore 37 weeks increased from 2.56 to 5.94%. The multiple birth rate increased steadily from 1.13 in 1993 to 2.76% in 2010, and among these births, the rate of LBWIs increased from 49.20 in 2000 to 54.50% in 2010, and the rate of preterm births before 37 weeks increased from 24.15 in 1995 to 53.70% in 2010 (Table 2).

Maternal factors that could influence the gestational age and birth weight of newborns were investigated. The average maternal age of first delivery increased from 27.6 years in 1993 to 31.3 years in 2010. The group aged 20 to 24 has increased continuously since 1970, was the highest at 40.5% in 1984, but decreased to 5.2% in 2010. The group aged 25 to 29 decreased from its highest at 54.6 in 1970 to 31.4% in 2010. The group aged 30 to 34 was the lowest at 8.5% in 1984 but increased to 45.7% in 2010. The >35-year group was 1.9% in 1988 and increased to 17.1% in 2010. The <20-year group has decreased

Table 1. Total Population and Number of Marriages and Live Births in Korea, 1970 to 2010

	1970	1975	1980	1985	1990	1995	2000	2005	2010
Population (n)*	31,435,252	34,678,972	37,406,815	40,419,652	43,390,374	44,553,710	45,985,289	47,041,434	47,990,761
Age (yr, %)									
<15	42.12	38.09	33.83	29.92	25.66	22.97	20.96	19.10	16.23
15-64	54.57	58.43	62.30	65.75	69.36	71.10	71.70	71.62	72.47
>64	3.31	3.48	3.87	4.33	4.98	5.93	7.33	9.28	11.30
Aged-child ratio	7.85	9.14	11.43	14.47	19.42	25.79	34.98	48.58	69.66
Marriages (case)	295,137	283,226	403,031	384,686	399,312	398,484	332,090	314,304	326,104
Crude marriage rate[†]	9.2	8	10.6	9.4	9.3	8.7	7	6.5	6.5
Live births (n)	1,006,645	874,030	862,835	655,489	649,738	715,020	634,501	435,031	470,171
Crude birth rate[†]	31.2	24.8	22.6	16.1	15.2	15.7	13.3	8.9	9.4
Total fertility rate	4.53	3.43	2.82	1.66	1.57	1.63	1.47	1.08	1.23
Sex ratio at birth	109.5	112.4	105.3	109.4	116.5	113.2	110.2	107.8	106.9

*Foreigners are excluded. [†]Per 1,000 persons.

Table 2. Birth Outcomes of Infants Born in Korea, 1993 to 2010

|	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Infants																		
Live births (n)	715,826	721,185	715,020	691,226	668,344	634,790	614,233	634,501	554,895	492,111	490,543	472,761	435,031	448,153	493,189	465,892	444,849	470,171
Mean birthweight (kg)	3.31	3.30	3.29	3.29	3.28	3.27	3.25	3.26	3.26	3.27	3.26	3.26	3.25	3.24	3.24	3.23	3.22	3.22
Birth weight <1,500 g (%)	0.13	0.14	0.16	0.17	0.20	0.22	0.24	0.24	0.36	0.36	0.39	0.39	0.41	0.42	0.47	0.50	0.57	0.60
Birth weight <2,500 g (%)	2.63	2.79	3.03	3.10	3.26	3.46	3.58	3.80	3.96	3.99	4.07	4.16	4.29	4.38	4.69	4.90	4.95	5.02
Gestation <32 wk (%)	-	-	0.28	0.33	0.37	0.41	0.50	0.44	0.75	0.69	0.66	0.56	0.58	0.59	0.58	0.60	0.69	0.75
Gestation <37 wk (%)	-	-	2.56	3.08	3.17	3.49	3.86	3.78	4.31	4.41	4.53	4.65	4.76	4.89	5.18	5.55	5.72	5.94
Multiple live births (%)	1.13	1.13	1.32	1.36	1.36	1.51	1.56	1.69	1.80	1.98	2.02	2.11	2.19	2.42	2.74	2.76	2.72	2.74
Birth weight <2,500 g (%)	-	-	-	-	-	-	-	49.20	50.30	50.20	49.30	50.00	50.30	48.20	52.70	53.30	54.40	54.50
Gestation <37 wk (%)	-	-	24.15	28.31	30.47	34.28	37.20	38.32	39.30	40.27	42.49	44.13	44.99	43.63	47.90	51.13	52.47	53.70
Mother																		
Mean age (yr)	27.60	27.80	27.90	28.09	28.28	28.48	28.68	29.02	29.26	29.49	29.71	29.98	30.20	30.40	30.60	30.80	31.00	31.30
Age (yr, %)																		
<20	1.22	1.06	0.99	0.95	0.88	0.88	0.83	0.73	0.70	0.89	0.79	0.73	0.72	0.73	0.70	0.60	0.63	0.62
20-34	94.90	94.54	94.15	93.61	93.41	93.09	92.70	92.29	91.53	90.97	90.61	89.65	88.48	87.32	86.07	84.96	83.83	82.17
≥35	3.79	4.30	4.75	5.33	5.66	5.97	6.20	6.66	7.36	8.02	8.42	9.43	10.59	11.76	13.03	14.27	15.37	17.04
≥12 yr education (%)	87.00	89.10	90.60	92.00	93.30	94.30	95.00	95.80	96.40	96.80	97.30	97.60	97.60	97.70	97.70	97.70	97.70	97.80
>12 yr education (%)	23.30	24.70	25.60	27.40	29.30	32.25	34.50	37.50	40.70	44.40	48.50	52.50	55.40	58.70	60.40	63.30	65.50	67.30
Unmarried (%)	1.20	1.30	1.20	0.91	0.63	0.70	0.77	0.87	0.96	1.06	1.30	1.30	1.50	1.50	1.60	1.80	2.00	2.10
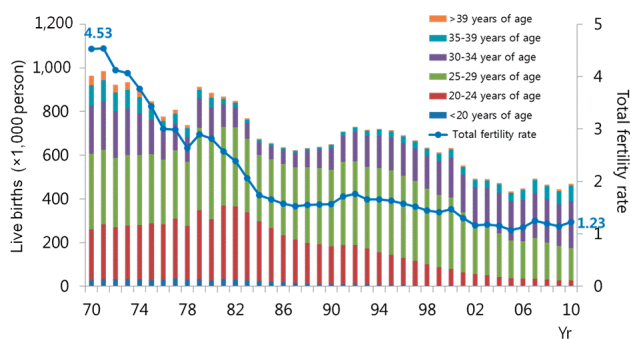
Fig. 1. Live births by grouping of age of mother in five-year intervals and total fertility rate in Korea, 1970 to 2010. The group excludes foreigners. Total fertility rate; the average number of children that would be born to a woman over her lifetime.

Table 3. Distribution of Infants Birth Weight Group in Relation to Maternal Age in Korea, 1995 to 2010

Maternal age (yr)	1993	1995	2000	2005	2010
Live births (n)					
≤15	10	7	7	24	34
15-19	8,708	7,048	4,599	3,104	2,900
20-24	164,358	137,092	74,328	32,833	24,538
25-29	374,424	387,247	328,207	174,743	147,197
30-34	140,507	148,825	183,044	177,319	214,616
35-39	24,292	30,243	36,904	40,516	70,835
≥40	2,870	3,744	5,374	5,562	9,291
Total	715,826	715,020	634,501	435,031	470,171
Birth weight (mean, kg)					
≤19	3.24	3.20	3.16	3.16	3.11
20-24	3.29	3.27	3.24	3.23	3.19
25-29	3.31	3.29	3.26	3.26	3.23
30-34	3.33	3.30	3.27	3.26	3.23
35-39	3.29	3.27	3.24	3.24	3.21
≥40	3.24	3.21	3.19	3.18	3.18
Total	3.31	3.29	3.26	3.25	3.22

from 3.0 in 1970 to 1.6% in 2010 (Fig. 1). The mean age of Korean women at the birth of their first child at 29.6 years was ranked 5th among OECD member countries. The United Kingdom ranked the highest with 30.0[9]. The mean age of Korean women at the birth of their first child increase to 30.1 years in 2010.

The number of mothers who graduated high school increased from 87.0 in 1993 to 97.8% in 2010, and the number of mothers who graduated college or had a higher level of education, increased from 6.1 in 1973 to 27.6 in 1993 and to 67.3% in 2010. The rate of delivery after legal marriage was 98.9% in 1981 and 97.9% in 2010. However, the rate of births out of wedlock has been increased gradually from 1.1 to 2.1%[10]. The proportion of births out of wedlock in 2008 in OECD countries, rated from lowest to highest, was Korea (1.8%), Japan (2.0%), OECD average (36.3%), United States (US) (38.5%), and Iceland (64.1%)[9].

3. Distribution of infant birth weight groups in relation to maternal age in Korea, 1993 to 2010

From 1993 to 2010, average infant birth weight decreased by 90 g. When maternal age was divided according to five-year intervals, mothers <20 years and >40 years had infants with the lower average birth weight (Table 3).

The birth rate of VLBWIs has increased at least three times in the

last 17 years, and the maternal group <20 years and >35 years had higher risk pregnancies. In addition, the rate of LBWIs has increased at least 1.5 times in the last 17 years. The birth rate of normal birth weight infants (2.5 to 3.9 kg) increased <1%, and the rate of birth weights ≥4.0 kg decreased >3%. The rate of overweight newborns became lower as maternal age became younger (Table 4).

Notably, the VLBWIs group has increased at least two times more than the LBWIs group. This suggests that with advance in neonatal care in Korea there may have been an increase in the reporting of live births, such as would be the case in very small birth weights or extremely low gestational age, as opposed to what would have been reported as stillbirths[11].

Table 4. Percentage of Births of Very Low Birth, Low Birth, Normal Birth, and Excessive Birth Weight by Maternal Age in Korea, 1995 to 2010

Maternal age	1993	1995	2000	2005	2010
Birth weight <1.5 kg (%)					
15-19	0.11	0.19	0.26	0.65	1.05
20-24	0.11	0.13	0.17	0.30	0.52
25-29	0.11	0.14	0.20	0.32	0.44
30-34	0.17	0.21	0.29	0.43	0.58
35-39	0.32	0.31	0.48	0.76	0.94
≥40	0.32	0.46	0.71	0.81	1.12
Total	0.13	0.16	0.24	0.41	0.60
Birth weight <2.5 kg (%)					
15-19	3.55	4.18	4.89	5.99	7.30
20-24	2.57	2.97	3.51	3.97	4.86
25-29	2.41	2.74	3.45	3.77	4.29
30-34	2.88	3.33	4.06	4.34	4.95
35-39	4.37	4.86	5.68	6.00	6.42
≥40	4.79	6.35	7.29	7.19	7.43
Total	2.63	3.03	3.80	4.29	5.02
Birth weight 2.5-3.9 kg (%)					
15-19	91.87	91.41	92.04	90.55	90.60
20-24	91.46	91.62	91.98	92.07	92.36
25-29	90.89	91.07	91.76	91.90	92.38
30-34	89.07	89.39	90.33	90.95	91.30
35-39	87.65	88.02	88.09	88.48	89.39
≥40	88.52	86.89	87.46	88.19	88.28
Total	90.56	90.68	91.12	91.15	91.34
Birth weight ≥4.0 kg (%)					
15-19	4.58	4.41	3.07	3.46	2.10
20-24	5.97	5.41	4.51	3.96	2.79
25-29	6.70	6.19	4.79	4.32	3.33
30-34	8.05	7.29	5.61	4.70	3.74
35-39	7.98	7.12	6.23	5.52	4.19
≥40	6.69	6.75	5.25	4.61	4.29
Total	6.81	6.29	5.07	4.57	3.63

In Korea, the low average birth weight is closely related to a mixture of an increase in low birth weight newborns (+2.39%), a decrease in over-weight newborns (-3.18%), and a slight increase (+0.75%) in normal weight newborns.

It has been reported that the mother's sociodemographic factors are closely associated with birth outcomes. These include maternal education, age, place of birth, parity, marital status, smoking, alcohol use, prenatal care status, and medical and obstetric complications[12-15]. Lim et al.[11] examined birth outcomes of Korean infants in the US between 1995 and 2004. Decreased parity, unmarried status, smoking during pregnancy, inadequate prenatal care, and obstetric complications-all increased the risk of a low birth weight. The risk factors that can cause low birth weight are also partially caused by the increased use of in vitro fertilization technologies and delivery management techniques such as induction and Cesarean section[16,17]. Kim et al.[18] analyzed the birth rate of LBWIs in Korea between 1995 and 2007 and indicated that the birth rate of LBWIs is related to prematurity, multiple births, female gender, unmarried mother, and mother more than 35 years old.

Although the percentage of LBWIs has increased in Korea, it is still remarkably low in comparison to other countries. Compared to OECD countries in 2008, Korea (4.9%) was lower than Japan (9.6%), the US (8.2%), the OECD average (6.6%), and higher than Iceland (3.8)[9].

The risk of overweight newborns is related to the mother having a history of overweight-newborn deliveries, having a substantial weight gain, gestational diabetes mellitus, and obesity[19,20]. Park et al.[21] reported that macrosomia is related to an increase in gestational age, the male gender, a maternal age of 30 to 39 years, mothers with a high-school diploma, and birth during the spring, autumn, or winter. The reasons for the decrease in overweight newborns in Korea are considered to be the development of antenatal care for postmature babies, diabetes mellitus, and obesity as well as a decrease in high-risk pregnancies through an increased number of Cesarean sections, a decreased rate of three or more children, which decreases the total fertility rate, and a decrease in the preference for a son rather than a daughter.

4. Distribution of mean maternal ages by birth order, 1981 to 2010

According to the distributions of birth order between 1981 and 2010, the rate at which women delivered third (16.4%→9.4%) and fourth (9.1%→1.3%) child were decreased extremely, but there were no change in therate at which women delivered first and second child (Table 5).

The mean maternal ages by birth order in Korea between 1993 and 2010 had increased in every birth order, and that the average maternal age for a first delivery was 30.1 years in 2010. Ten years ago, average

Table 5. Percentage of Births by Birth Order in Korea, 1981 to 2010

	1981	1985	1990	1995	2000	2005	2010
Birth order (%)							
1st	41.0	51.5	53.6	48.3	47.2	51.7	50.4
2nd	33.5	37.6	38.9	43.1	42.4	38.7	38.9
3rd	16.4	7.5	6.0	7.5	9.4	8.6	9.4
≥4th	9.1	3.3	1.5	1.1	1.0	1.0	1.3

maternal age for women with more than three deliveries was >30 years; however, in 2010, theaverage maternal age for a woman's first delivery was >30 years (Fig. 2).

5. The sex ratio of live births by birth order in Korea, 1981 to 2010

The sex ratio at birth in 1970 was imbalanced at 109.5, recovered to 106.2 (normal ratio, 103 to 107) in 2007, and was 106.9 in 2010. Compared with birth order, contrary to first and second sex ratio at birth was relatively balanced, third or more sex ratio had a severe imbalance. However, the imbalance in the sex ratio of the third (111.1) and fourth (109.8) child was significantly improved in 2010. This suggests that a parent's notion of preferring a son has changed (Fig. 3).

6. The multiple birth rate

Despite the total number of newborns in 2010 was lower than in 1991, the number of multiple gestations increased from 7,066 in 1991 to 12,841 in 2010, and the multiple birth rate increased 2.5 times from 11.3 to 27.2 in 2008. Comparing maternal age and the multiple birth rate, the multiple birth rate was high at 37.4 in the group of 35 to 39-year old, and 30.3 in the group of 30 to 34-year old. Mothers ≥40-yea rold were generally more prevalent than those <30-year old (Table 6).

Advanced maternal age and the use of advanced reproductive technology (ART) procedures are significant factors associated with the increasing trend in multiple births[5]. Similar trends have been reported in other countries. Choi and his associates indicated that the increasing multiple birth rate is due to an increase in maternal age and the use of ART[16,22].

7. Congenital anomalies

According to the congenital anomaly survey and statistics in 2005 to 2006 by The Korea Institute for Health and Social Affairs[23], the prevalence of congenital anomalies in newborns was 272.9 per 100,000 in 2005, and 314.7 per 100,000 in 2006. In 2006, the prevalence per 100,000-rated from highest to lowest-was cardiopulmonary (141.40, 44.9%), musculoskeletal (55.96, 18.8%), gastrointestinal (34.30, 10.9%), and urological systems (30.99, 9.8%). The prevalence of the ten major congenital anomalies were atrial septal defect (73.39), ventricular
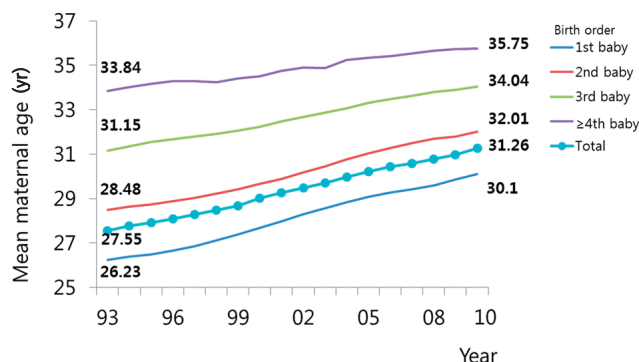

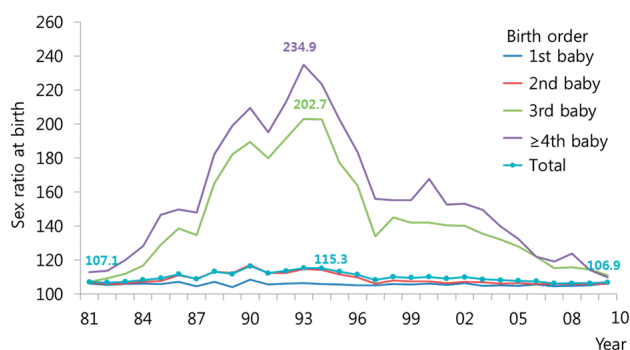Fig. 2. Mean maternal ages at delivery by birth order in Korea, 1993 to 2010.

Fig. 3. Sex ratio at birth by birth order in Korea, 1981 to 2010. Sex ratio is the ratio of males to every 100 females in a population. The natural sex ratio at birth was estimated to be close to 103 to 107 males/100 females.

septal defect (40.57), congenital hydronephrosis (18.72), patent ductus-arteriosus (15.82), undescended testis (12.29), polydactyly (11.76), hip dislocation (8.64), cleft palate (7.50), syndactyly (5.73), and cleft lip (5.27). The prevalence of atrial and ventricular septal defects was over two times higher than other congenital anomalies.

In 2006, the prevalence of anomalies (968.11) in premature births was 3.7 times higher than in term-births (260.37). The prevalence of anomalies in multiples (531.26) was 1.8 times higher than in singletons (289.35). Low birth weight infants (1,057.84) were four times more prevalent than in normal birth weight infants, and infants of mothers ≥35-year (339.28) were more prevalent than in infants of mothers <35-year. Compared to the prevalence of congenital anomalies in OECD countries, transposition of the great arteries, reduction defects of the limbs,

Table 6. Change of Multiple Birth Rate by Maternal Age in Korea, 2000 to 2010

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Age (yr)											
<20	9.12	8.26	10.53	9.09	6.08	3.20	9.50	9.23	3.60	7.10	8.52
20-24	11.87	12.92	11.63	11.40	13.90	12.73	15.89	13.46	13.77	13.61	14.10
25-29	14.93	14.96	16.37	16.91	17.44	18.70	19.27	19.92	21.07	20.17	20.68
30-34	20.39	22.26	24.64	24.28	24.52	24.80	27.84	32.94	31.59	31.14	30.32
35-39	26.64	30.27	29.43	29.40	29.78	30.88	33.54	39.22	38.91	38.62	37.41
>40	25.87	20.94	20.87	24.62	20.92	18.34	18.06	34.10	31.58	28.72	27.23
Total	16.85	17.96	19.63	19.99	20.90	21.74	24.03	27.28	27.45	27.11	27.31

spina bifida, and Down syndrome were lower in Korea. The number of congenital anomalies is expected to increase due to advanced maternal age[4]. Korea only has national statistical data for congenital anomalies during 2005 and 2006. Therefore, it is required to collect national data every year.

8. Rate of international marriages

Marriages to foreigners have been more than 10% of all marriages since 2004. The total number of marriages was 326,104 in 2010, and the number of marriages to foreigners decreased slightly to 34,235 (10.5%) from 10.8% in 2009. Among these, there were 26,274 marriages between a Korean man and a foreign woman and 7,961 marriages between a Korean woman and a foreign man. The major nationalities of the foreign women were Chinese (36.6%), Vietnamese (36.6%), and Pilipino (7.3%). The major nationalities of the foreign men were Chinese (28.8%), Japanese (26.3%), and American (19.0%). The average age difference between Korean men and foreign women was 12.1 years[10].

The number of newborns born in a multiracial family is expected to increase steadily; however, the national statistics is insufficient. Newborn birth weight is highly related to parents' ethnicity, particularly the mother's. Along with the increased number of marriages to foreigners, both maternal ethnicity and the acculturation process influence the birth weight of Korean newborns[24]. Lim et al.[11] compared the birth weights of Asian infants born in the US and classified them into six groups by parent ethnicity, which indicated that the birth weight of a newborn in Korea is the highest, followed by China and the Philippines. A study on birth outcomes of international marriages is important. Moreover, it is likely that a continuous national plan of growth, development, and adjustment to society will be needed.

Summary and Perspectives

Korea has one of the lowest total fertility rates in the world due to the decrease in the number of married couples, advanced maternal age, and a declining birth rate. The prevalence of low birth weight

infants and multiple births has increased as compared to the decrease in birth rate[25]. This trend reduces human capital, and also increase aged-child ratio. Socio-economic and individual factors that have had a negative influence on fertility, include increase in uncertainty for the future due to high unemployment among young population, unstable job security, increasing economical burden of child-rearing including costs for private education of children, incompatibility between works and home, lack of infrastructure for child-care, etc. These factors have also interactive impact on people's attitudes on marriage and child. Therefore, it needs to provide the youth with employment opportunities with stable status as well as to put an emphasis on values in favor of marriage and children from their early ages under school and social education system[26].

In June 2006, the Presidential Committee on Aging Society and Population Policy promulgated the basic plan for low fertility and aged society: 1) The first basic plan (2006 to 2010) aims to foster environments in favor of child-rearing, to establish a base for improving the quality of life in the aged society. 2) The second basic plan (2011 to 2015) aims to steady the recovery of fertility rate, and consolidate the social system for the aged society. 3) The third plan (2016 to 2020) aims to increase the fertility rate to the average level of OECD countries, and foster successful adaption for the aged society.

It is notable that the number of children increased from 435,031 in 2005 to 470,171 in 2010. Further, the crude birth rate and total fertility rate increased slightly from 8.9 and 1.08 to 9.4 and 1.23. Such an increase is worthwhile, but more precise access on its further trends should be required.

Medical field can contribute to increase human capital by reducing morbidity and mortality of LBWIs being born. Recent advances in neonatal medicine have been attributed to reducing morbidity and mortality of infants, but yet a lot more improvement is needed, which can be made by diffusing medical knowledge and technology of newborn care from the major city centers to throughout the country. And also Governmental comprehensive supports for neonatal intensive care unit are required.

Compared to the Asian average birth weight, the Korean average

birth weight is the highest in Asia. Moreover, the rate of low birth weight infants is low, and infant mortality is similarly low across Asia. The maternal education level is high, the single-mother birth rate is low, and the gender imbalance has been lessened. The number of overweight babies has decreased due to the increased adequate prenatal care.

The number of congenital anomalies and multiple births is expected to increase due to advanced maternal age. In addition, the number of interracial children is expected to increase due to the rise in the number of international marriages. Therefore, it will be necessary to collect data on congenital anomalies, babies from international marriages, artificial abortion, and artificial reproductive therapies, due to the lack of domestic statistical materials.

Accurate and detailed national birth outcome data is needed to consider how best to deal with the low fertility and the aged Society. Birth outcome data from the Korea National Statistical Office lacked detailed information, particularly for parental race, prenatal care status, and maternal medical and obstetric complications. In addition, it is necessary to collect accurate detail data of very low birth weight infants; therefore, data should be collected in various ways through medical institutions (Obstetrics or Pediatrics) and the National Health Insurance Corporation, and should include birth registration.

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