Population Projections for Korea (2020~2070)

1. Total population and population growth rate

○ According to the medium growth scenario*, the total population is projected to drop by 60 thousand persons on annual average for the next decade from 51.84 million persons in 2020 to 51.20 million persons in 2030. Afterwards, the total population is projected to record 37.66 million persons in 2070, which is the same level as 1979.

  * This scenario assumes a medium growth of demographic variations (fertility rate, life expectancy at birth and net international migration).

○ According to the high growth scenario (assuming a high total fertility rate, a high life expectancy at birth and a high-level net international migration), the total population is projected to drop until 2022. Whereas, from 2023, the total population is projected to rise by 80 thousand persons on annual average to stand at 52.97 million persons in 2038. Afterwards, the total population is projected to steadily decrease to record 44.38 million persons in 2070, which is the same level as 1993.

  * This scenario assumes a high growth of demographic variations (fertility rate, life expectancy at birth and net international migration).

○ According to the low growth scenario (assuming a low total fertility rate, a low life expectancy at birth and a low-level net international migration), the total population is projected to drop by 170 thousand persons on annual average for the next decade to stand at 50.15 million persons and 31.53 million persons in 2070, which is the same level as 1969.

  * This scenario assumes a low growth of demographic variations (fertility rate, life expectancy at birth and net international migration).

[Table] Total population (1960-2070)

Indicator	Scenario	1960	1970	1980	1990	2000	2010	2020	2030	2040	2050	2060	2070
Total population (10 thousand persons)	Medium growth	2,501	3,224	3,812	4,287	4,701	4,955	5,184	5,120	5,019	4,736	4,262	3,766
	High growth							5,184	5,244	5,293	5,150	4,805	4,438
	Low growth							5,184	5,015	4,755	4,333	3,752	3,153

○ The population growth rate is projected to stand at -0.1% during the 2021-2035 period, dropping sharply to -1.24% in 2070.

[Table] Population growth rate (1961-2070)

Indicator	Scenario	1961	1970	1980	1990	2000	2010	2020	2030	2040	2050	2060	2070
Population growth rate (%)	Medium growth	2.97	2.18	1.56	0.99	0.84	0.50	0.14	-0.10	-0.35	-0.80	-1.21	-1.24
	High growth							0.14	0.20	-0.06	-0.47	-0.80	-0.79
	Low growth							0.14	-0.40	-0.69	-1.14	-1.64	-1.79

○ A total of 31 scenarios are made by combining assumptions of birth, death and international migration to reflect uncertainty in the future.

○ Three scenarios are formulated by combining three level of assumptions (medium growth, high growth and low growth of birth, life expectancy at birth and net international migration.

○ The following table shows demographic variations according to three scenarios (medium growth, high growth and low growth).

Demographic variations	2020	2024			2070		
		High growth	Medium growth	Low growth	High growth	Medium growth	Low growth
Total fertility rate (number of births per woman)	0.84 birth	0.92 birth	0.70 birth	0.65 birth	1.40 births	1.21 births	1.02 births
Life expectancy at birth (years) — Total	83.5 years	85.1 years	84.5 years	84.0 years	92.3 years	91.2 years	89.8 years
Life expectancy at birth (years) — Males	80.5 years	82.2 years	81.7 years	81.1 years	90.5 years	89.5 years	88.3 years
Life expectancy at birth (years) — Females	86.5 years	88.0 years	87.4 years	86.8 years	94.1 years	92.8 years	91.3 years
Net international migration (thousand persons)	-58 thousand persons	123 thousand persons	58 thousand persons	-7 thousand persons	96 thousand persons	40 thousand persons	-11 thousand persons

2. Demographic variations (Birth, death and international migration)

○ Under the medium growth scenario, the number of births would drop from 270 thousand persons in 2020 to 230 thousand persons in 2023 and 200 thousand persons in 2070.

  - Under the high growth scenario, the number of births would record 290 thousand persons in 2070.

  - Under the low growth scenario, the number of births would record 120 thousand persons in 2070.

○ Under the medium growth scenario, the number of deaths would rise from 310 thousand persons in 2020 to over 400 thousand persons in 2030 and 700 thousand persons in 2070. The figure for 2070 is 2.3 times higher compared to 2020.

  - Under the high growth scenario, the number of deaths would mark 730 thousand persons in 2070.

  - Under the low growth scenario, the number of deaths would mark 670 thousand persons in 2070.

○ Under the medium growth scenario, the natural increase is projected to drop from -30 thousand persons in 2020 to -100 thousand persons in 2030 and -510 thousand persons in 2070.

  - Under the high growth assumption, the natural increase is projected to mark -10 thousand persons in 2030 and -440 thousand persons in 2070.

- Under the low growth assumption, the natural increase is projected to mark -200 thousand persons in 2030 and -550 thousand persons in 2070.

○ Under the medium growth scenario, the net international migration is projected to record -60 thousand persons in 2020 and 2021, 10 thousand persons in 2022 and 40 thousand persons in 2070.

- Under the high growth scenario, the net international migration is projected to record 100 thousand persons in 2070.
- Under the low growth scenario, the net international migration is projected to record -10 thousand persons in 2070.

[Table] Natural increase and net international migration (1970-2070)

(10 thousand persons)

Classification	Scenario	1970	1980	1990	2000	2010	2020	2030	2040	2050	2060	2070
Population growth (=A+B)	Medium growth	75	59	41	40	29	-9	-6	-19	-40	-52	-47
	High growth						-9	10	-5	-27	-38	-35
	Low growth						-9	-21	-35	-52	-62	-56
Natural increase (A)	Medium growth	75	59	41	39	21	-3	-10	-24	-44	-56	-51
	High growth						-3	-1	-15	-37	-48	-44
	Low growtz						-3	-20	-34	-50	-61	-55
Birth	Medium growth	101	86	65	63	47	27	31	29	24	18	20
	High growth						28	37	35	29	27	29
	Low growth						27	24	22	19	12	12
Death	Medium growth	26	28	24	25	26	31	41	53	68	74	70
	High growth						31	38	50	66	75	73
	Low growth						31	44	56	69	73	67
Net International migration (B)	Medium growth				1	8	-6	5	5	4	4	4
	High growth						-6	11	11	10	10	10
	Low growth						-6	-1	-1	-1	-1	-1

Note) Figures refer to data between July of the reference year and June of the following year.

3. Population by age group

○ As of 2020, the working age population aged 15~64 occupies 72.1% (37.38 million persons) of the total population. The elderly population aged 65 or more occupies 15.7% (8.15 million persons) of the total population. The child population aged 0~14 occupies 12.2% (6.31 million persons) of the total population.

- In 2070, the working age population, the elderly population and the child population are projected to occupy 46.1%, 46.4% and 7.5%, respectively.

○ The working age population is projected to decrease from 37.38 million persons in 2020 to 33.81 million persons in 2030 and 17.37 million persons (46.1% of the total population) in 2070.

- Under the high growth scenario, the working age population is projected to fall from 34.31 million persons in 2020 to 20.95 million persons (47.2% of the total population) in 2070.

- Under the low growth scenario, the working age population is projected to drop from 33.32 million persons in 2020 to 14.08 million persons (44.6% of the total population) in 2070.

○ Under the medium growth scenario, the elderly population is projected to increase from 8.15 million persons (15.7% of the total population) in 2020 to 13.06 million persons (an increase of 1.6 times) in 2030 and 17.47 million persons (an increase of 2.1 times) in 2070.

  - Under the high growth scenario, the elderly population is projected to increase to 19.31 million persons (43.5% of the total population) in 2070.

  - Under the low growth scenario, the elderly population is projected to increase to 15.63 million persons (49.6% of the total population) in 2070.

○ The child population is projected to record 6.31 million persons (12.2% of the total population) in 2020. This figure would decrease to 2.82 million persons in 2070, recording 44.6% of the 2020 figure.

  - Under the high growth scenario, the child population is projected to decrease from 4.89 million persons (9.3% of the total population) in 2030 to 4.13 million persons (9.3% of the total population) in 2070. Under the low growth scenario, the child population is projected to decrease from 3.96 million persons (7.9% of the total population) in 2030 to 1.82 million persons (5.8% of the total population) in 2070.

  - The share of the child population is projected to fall from 12.2% in 2020 to 7.5% under the medium growth scenario, 9.3% under the high growth scenario and 5.8% under the low growth scenario in 2070.

[Table] Population by age group (2020~2070)

(10 thousand persons, %)

Scenario		Age group	2020	2025	2030	2035	2040	2045	2050	2055	2060	2065	2070
Medium growth	Population	Total	5,184	5,145	5,120	5,087	5,019	4,903	4,736	4,515	4,262	4,007	3,766
		0-14	631	525	433	414	443	445	417	373	327	292	282
		15-64	3,738	3,561	3,381	3,144	2,852	2,624	2,419	2,265	2,066	1,875	1,737
		65+	815	1,059	1,306	1,529	1,724	1,834	1,900	1,877	1,868	1,840	1,747
	Percentage of the total population	0-14	12.2	10.2	8.5	8.1	8.8	9.1	8.8	8.3	7.7	7.3	7.5
		15-64	72.1	69.2	66.0	61.8	56.8	53.5	51.1	50.2	48.5	46.8	46.1
		65+	15.7	20.6	25.5	30.1	34.4	37.4	40.1	41.6	43.8	45.9	46.4
High growth	Population	Total	5,184	5,191	5,244	5,286	5,293	5,248	5,150	4,994	4,805	4,617	4,438
		0-14	631	545	489	502	542	540	507	463	425	407	413
		15-64	3,738	3,582	3,431	3,219	2,969	2,795	2,637	2,526	2,365	2,204	2,095
		65+	815	1,064	1,324	1,565	1,782	1,914	2,006	2,005	2,015	2,005	1,931
	Percentage of the total population	0-14	12.2	10.5	9.3	9.5	10.2	10.3	9.8	9.3	8.9	8.8	9.3
		15-64	72.1	69.0	65.4	60.9	56.1	53.2	51.2	50.6	49.2	47.7	47.2
		65+	15.7	20.5	25.2	29.6	33.7	36.5	39.0	40.1	41.9	43.4	43.5
Low growth	Population	Total	5,184	5,110	5,015	4,903	4,755	4,565	4,333	4,058	3,752	3,445	3,153
		0-14	631	516	396	343	344	343	322	291	250	207	182
		15-64	3,738	3,540	3,332	3,068	2,747	2,473	2,220	2,020	1,784	1,566	1,408
		65+	815	1,054	1,287	1,491	1,664	1,749	1,791	1,746	1,718	1,672	1,563
	Percentage of the total population	0-14	12.2	10.1	7.9	7.0	7.2	7.5	7.4	7.2	6.7	6.0	5.8
		15-64	72.1	69.3	66.4	62.6	57.8	54.2	51.2	49.8	47.5	45.5	44.6
		65+	15.7	20.6	25.7	30.4	35.0	38.3	41.3	43.0	45.8	48.5	49.6

4. Median age

○ The median age* is predicted to mark 43.7 years in 2020, exceeding 50 years in 2031. This figure is predicted to rise to 62.2 years in 2070.

* Median age is the age that divides a population into two numerically equal groups.

- In 2020, 50% of the total population is predicted to be over 43. Whereas, in 2070, 50% of the total population is predicted to be over 62.

- Years reaching the median ages: 20 in 1976, 30 in 1997, 40 in 2014, 50 in 2031 and 60 in 2056

○ According to both high and low assumptions, the median age is predicted to rise. Under the high assumption, the median age is expected to exceed 50 years in 2031, reaching 59.6 years in 2070.

- Under the low assumption, the median age is expected to exceed 50 years in 2030, reaching 64.7 years in 2070.

[Table] Median age (1960-2070)

(year)

Scenario	Sex	1960	1970	1980	1990	2000	2010	2020	2030	2040	2050	2060	2070
Medium growth	Total	19.0	18.5	21.8	27.0	31.8	37.9	43.7	49.8	54.6	57.9	61.2	62.2
	Males	18.2	17.9	21.2	26.3	30.9	36.9	42.3	48.5	52.9	56.5	59.9	61.0
	Females	19.8	19.2	22.4	27.7	32.7	39.0	45.1	51.2	56.3	59.5	62.4	63.4
High growth	Total							43.7	49.4	53.7	56.9	59.6	59.6
	Males							42.3	48.1	52.0	55.6	58.4	58.6
	Females							45.1	50.8	55.4	58.3	60.8	60.8
Low growth	Total							43.7	50.1	55.4	58.9	62.6	64.7
	Males							42.3	48.7	53.7	57.5	61.3	63.4
	Females							45.1	51.5	57.1	60.6	63.8	66.0

5. Dependency ratio and aging index

○ The total dependency ratio is projected to increase from 38.7 persons per 100 working age population in 2020, exceeding 100 persons in 2059. This figure is projected to record 117 persons in 2070.

- Under the high growth scenario, the total dependency ratio is projected to rise to 111.9 persons in 2070. Under the low growth scenario, the total dependency ratio is projected to rise to 124.0 persons in 2070.

○ The child dependency ratio is projected to sharply fall from 16.9 persons in 2020 to 12.5 persons in 2032. This figure is projected to rise to 16.2 persons in 2070.

○ The aged dependency ratio is projected to sharply rise from 21.8 persons in 2020, exceeding 50 persons in 2036. This figure is projected to record 100.6 persons in 2070, which is 4.6 times higher than that for 2020.

- The aging index (per 100 child population) is projected to steadily rise from 129.3 persons in 2020, 201.5 persons in 2025 and 502.7 persons in 2055. From 2055, the elderly population is projected to be over 5 times larger than the child population.

[Table] Dependency ratio and Aging index (1960-2070)

(per 100 working age population, per 100 child population)

Scenario		1960	1970	1980	1990	2000	2010	2020	2030	2040	2050	2060	2070
Medium growth	Total dependency ratio	82.6	83.8	60.7	44.3	39.5	36.9	38.7	51.4	76.0	95.8	106.3	116.8
	Child dependency ratio	77.3	78.2	54.6	36.9	29.4	22.0	16.9	12.8	15.5	17.2	15.8	16.2
	Aged dependency ratio	5.3	5.7	6.1	7.4	10.1	14.8	21.8	38.6	60.5	78.6	90.4	100.6
	Aging index	6.9	7.2	11.2	20.0	34.3	67.2	129.3	301.6	389.5	456.2	570.6	620.6
High growth	Total dependency ratio							38.7	52.8	78.3	95.3	103.2	111.9
	Child dependency ratio							16.9	14.3	18.3	19.2	18.0	19.7
	Aged dependency ratio							21.8	38.6	60.0	76.1	85.2	92.2
	Aging index							129.3	270.6	328.8	395.5	473.7	467.9
Low growth	Total dependency ratio							38.7	50.5	73.1	95.2	110.4	124.0
	Child dependency ratio							16.9	11.9	12.5	14.5	14.0	12.9
	Aged dependency ratio							21.8	38.6	60.6	80.7	96.3	111.0
	Aging index							129.3	324.7	483.1	555.9	686.3	857.9

6. Population pyramid

○ As of 2020, the population pyramid is pot shaped due to a large share of people aged 30~59. However, the population pyramid would become inverted triangle shaped due to a large share of people aged 60 or more.

[Figure] Population pyramid (1960-2070)
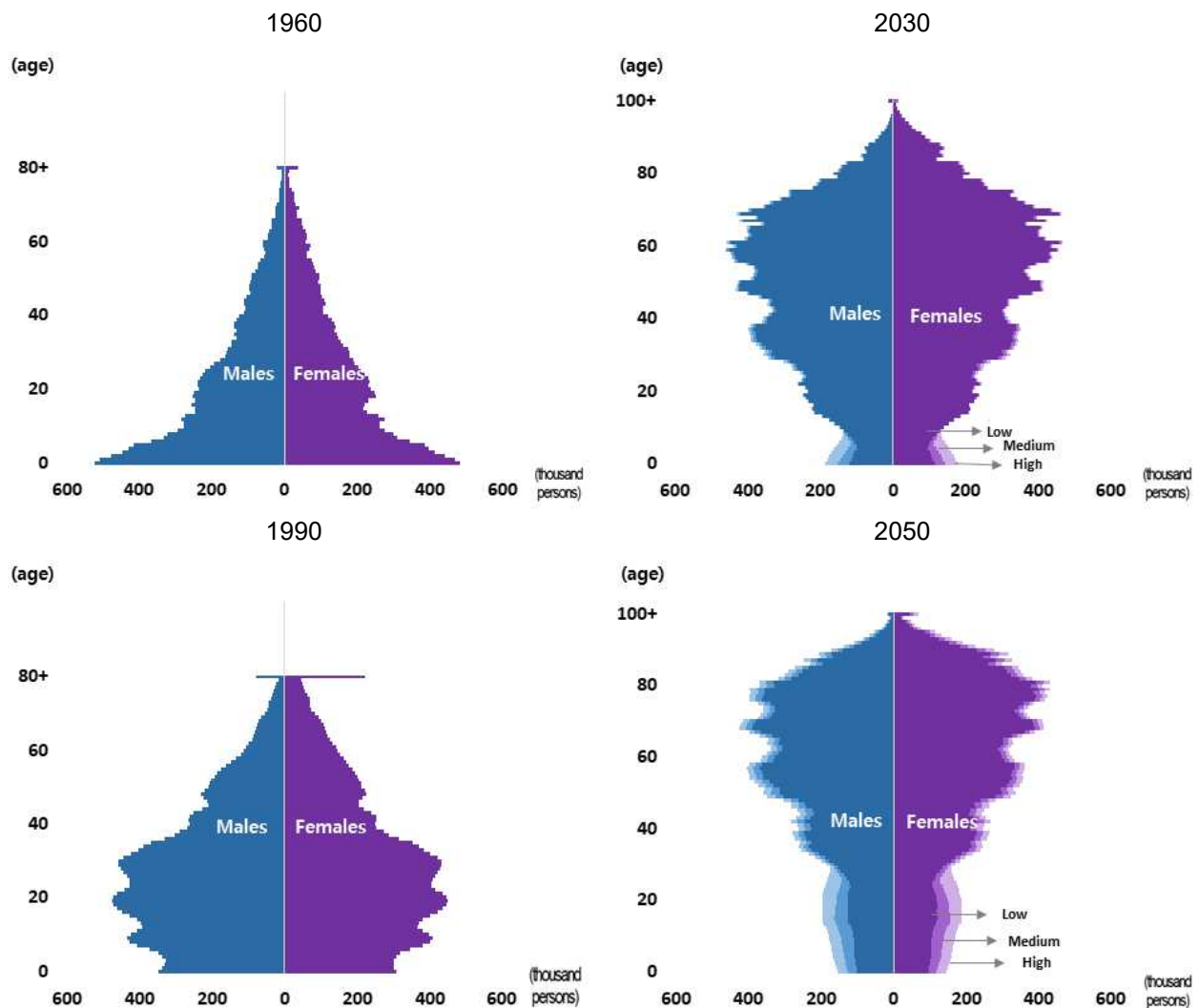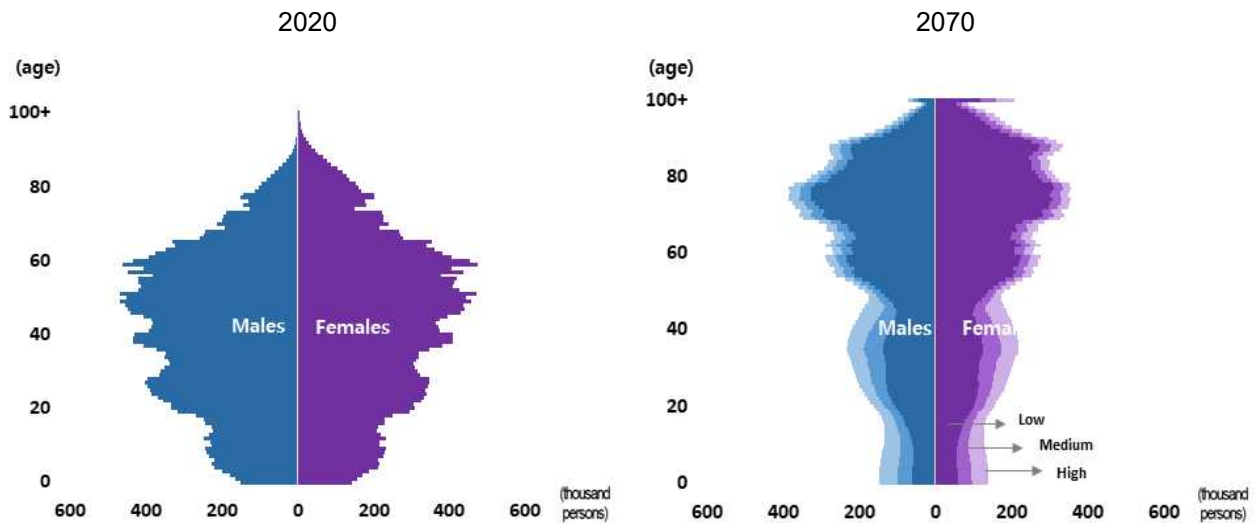
	2020	2070

Methodology and assumptions

1. Cohort component method

☐ Population Projections for Korea (2020~2070)』 are based on the results of the 2020 Population Census, which is a register-based census. Statistics of births, deaths and international migration for the latest data are used for population projections. According to the Cohort component method, the population size and the population structure by sex and age are projected from 2020 to 2070.

☐ According to the Cohort component method (birth, death and international migration), the population is projected by applying the demographic balancing equation. Births and net international migrations are added to the base population, while deaths are subtracted for population projections.

2. Base population (2020)

☐ The base population, which is a starting point for population projections, refers to the population as of July 1st, 2020.

☐ The base population (as of July 1st, 2020) is obtained by reflecting the demographic variations between July and October, 2020, on the basis of the census population as of November 1st, 2020 in the Population Census (Register-based Census).

○ The base population as of July 1st, 2020 (51.84 million persons) was 7 thousand persons larger than the census population as November 1st, 2020 (51.83 million persons).

[Table] Census population and base population (2020)

| 2020	Population (10 thousand persons)		
	Total	Males	Females
Census population (November 1st)	5,183	2,592	2,591
Base population (July 1st)	5,184	2,593	2,591

3. Retrospective population (2018~2019)

○ The retrospective population as of July 1st 2018 (2019) is calculated by reflecting demographic variations during the July-October period in 2018 (2019) on the basis of the Population Census as of November 1st 2018 (2019).

4. Fertility projection method

□ Fertility projection method

○ In the short-term, the total fertility is projected by reflecting marriage trends. In the long-term, it is estimated by reflecting the recovery of the cohort fertility rate.

[Figure] Short-term and long-term fertility projection methods
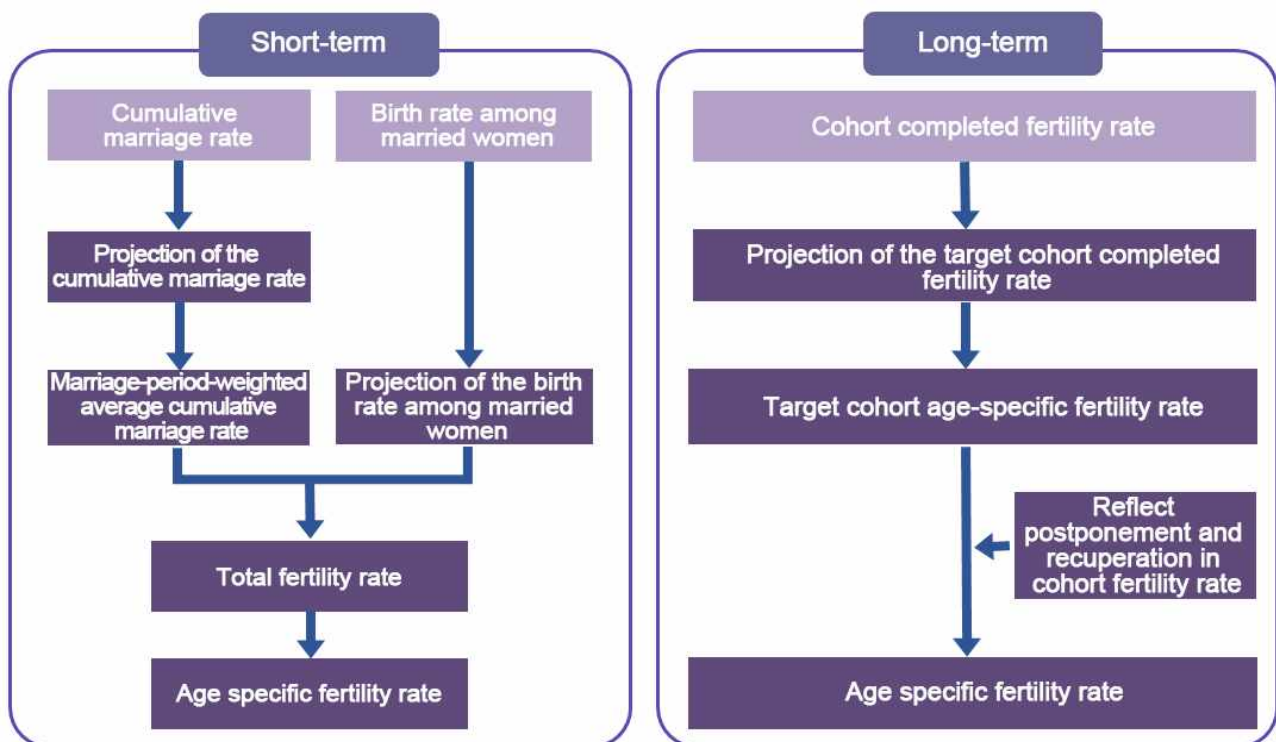
○ Details of short-term and long-term projection methods

1) In the short term, the total fertility rate is estimated with the marriage rate and the birth rate among married women for the recent years.

$$TFR_t = \sum_s M_{s,t} b_{s,t} + \epsilon_t$$

- TFR_t : Total fertility rate at time t
- $M_{s,t}$: Birth rate among married women by birth order s (1, 2, 3+) at time t*
- $b_{s,t}$: Birth rate by birth order s (1, 2, 3+) at time t per married woman**

$$M_{s,t} = \sum_k m_k w_{s,k}$$

- m_k : Cumulative marriage rate until age 39 during time k of marriage period
- $w_{s,k}$: Weight of childbirth at time k of marriage period by birth order s (1, 2, 3+)

- k : Marriage period, $\begin{cases} [\,t-2,\ t\ ] & (\text{if } s=1\ ) \\ [\,t-6,\,t-2\,] & (\text{if } s=2\ ) \\ [\,t-9,\,t-4\,] & (\text{if } s=3+) \end{cases}$

  $w_{s,k} = p_{s,k}/\sum_k p_{s,k}$

  $\cdot p_{s,k}$: Percentage at time k of marriage period by birth order s (1, 2, 3+)

* Weighted average cumulative marriage rate for the recent marriage period: Cumulative percentages until age 39 by year, which are the weighted average of marriage period by birth order. The weighted average of the cumulative marriage rate for the recent 3 years for the first child, the recent 2-6 years for the second child and the recent 4-9 years.

** Birth rate among married women = Birth rate by birth order / Weighted average cumulative marriage rate for the recent marriage period by birth order

2) In the long term, the completed fertility rate of target cohort is predicted by using the time-series model and reflecting recuperation of cohort fertility rate.

$$CFR_t = \beta_0 + \beta_1 \ln(t) + \varepsilon_t \ (\varepsilon_t = \phi_1 \times \varepsilon_{t-1})$$

- CFR_t : Cohort completed fertility rate at time t

① The completed fertility rate of women* born in 2005 is predicted by using the time-series model on the basis of the completed fertility rate of women born in the 1945-1985 period.

  * Women aged 15 in 2020

② The fertility rate of the target cohort by age is calculated by using the generalized log gamma model.

③ The cohort completed fertility rate of women born in between 1986 and 1990 is projected by reflecting postponement and recuperation of fertility of 3 cohorts (benchmark (b)*, national standard (n)**, x-specific fertility (c))

  * Benchmark cohort (women born in 1969): Showing the decrease and postponement of child birth consistently and clearly in cohort of women born in 1969 and afterwards

  ** National standard cohort (Women born in 1975 and 1980): Cohorts of women born in 1980 (aged 40 as of the reference year (2020)) and women born in 1975

3) The age-specific fertility rate is calculated by using the generalized log gamma model.

$$f(x) = \frac{C|\lambda|}{b\Gamma(1/\lambda^2)} \left(\frac{1}{\lambda^2}\right)^{\lambda^{-2}} \exp\left[\frac{1}{\lambda}\left(\frac{x-u}{b}\right) - \frac{1}{\lambda^2} \exp\lambda\left(\frac{x-u}{b}\right)\right]$$

- C : Probability of childbirth by birth order
- u : Average age at childbirth
- b : Standard derivation of the average age at birth (u)
- λ : Distribution pattern

4) The short-term and long-term fertility rate is calculated as a weighted average.

$$TFR_t = \sum_{i=15}^{49}(1-w_t)ASFR_{s,i} + \sum_{i=15}^{49} w_t ASFR_{l,i}$$

• $ASFR_{s,t}$: Age-specific fertility at age i at time s • s : Final year of the short-term projection: 2024 (Medium fertility). 2023 (High fertility), 2025 (Low fertility) • l : Beginning year of the long-term projection (2035)	• $w_t = \dfrac{t-s}{l-s}$

☐ Fertility projection results

〇 By reflecting the uncertainty of fertility in the future, three fertility assumptions and long-lasting impact of COVID-19 are formulated.

- Under the medium fertility scenario, the total fertility rate would drop to 0.70 birth in 2024. The figure would rise to 1.00 birth in 2031 and 1.21 births in 2046.

- Under the high fertility scenario, the total fertility rate would rise from 2022 to record 1.00 birth in 2026 and 1.40 births in 2045.

- Under the low fertility scenario, the total fertility rate would drop to 0.61 birth in 2025. This figure would rise to 1.00 birth in 2045 and 1.02 births in 2049.

- Under the long-lasting impact of COVID-19 scenario, the total fertility rate would drop to 0.52 birth in 2025. This figure would rise to 0.98 birth in 2070.

[Table] Total fertility rate (2021-2070)

(Number of births per woman aged 15 to 49)

Scenario	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2035	2040	2070
Medium	0.82	0.77	0.73	0.70	0.74	0.78	0.83	0.87	0.91	0.96	1.18	1.19	1.21
High	0.83	0.85	0.88	0.92	0.96	1.00	1.04	1.08	1.12	1.16	1.36	1.39	1.40
Low	0.81	0.73	0.68	0.65	0.61	0.64	0.67	0.70	0.74	0.77	0.94	0.95	1.02
Long-lasting impact of COVID-19	0.81	0.69	0.62	0.57	0.52	0.55	0.57	0.60	0.62	0.64	0.77	0.89	0.98

5. Mortality projection method

☐ Mortality projection method

〇 The death rate by sex and age is projected by the extended Li-Lee-Gerland model (2013).

- The death rates by sex and age between 1970 and 2021 are used as basic data.

- The high and low mortality scenarios apply the 99% confidence interval of the extended Li-Lee-Gerland (LLG) metod.

〇 Extended Li-Lee-Gerland model (2013)

$$\log m_{x,t,i} = a_{x,i} + B_{x,t}K_t + b_{x,i}k_{t,i} + \varepsilon_{x,t,i}$$

- a_i : Age pattern of mortality for the individual group (males and females)
- $B_{z,t}K_t$: Age pattern of mortality change and time varying index of the level of mortality at time t for total population
- $b_{x,i}k_{t,i}$: Age pattern of mortality change and time varying index of the level of mortality at time t for the individual group (males and females)

- The change pattern of the death rate by age at time t $(B_{x,t})$ is calculated as the weighted average of B_x of the Li-Lee (LL) model and the change pattern of the death rate by final age $(B_x(u))$.

$B_{x,t} =$	B_x	$, e_0(t) < 80$	$w_t = \dfrac{e_0(t)-80}{e_0(u)-80}$,
	$(1-w_t)B_x + w_t B_x(u)$	$, 80 \le e_0(t) < e_0(u)$	$e_0(u)$: Final life expectancy (103) maintaining the change pattern of the death rate by age
	$B_{x(u)}$	$, e_0(u) \le e_0(t)$	$B_x(u)$: Age pattern of mortality change by final age

☐ Mortality projection results

○ Three scenarios of life expectancy at birth are established by considering the uncertainty of future mortality.

- Under the medium mortality scenario, the life expectancy at birth of males and females would stand at 89.5 years and 92.8 years, respectively, in 2070.

- Under the low mortality scenario, the life expectancy at birth of males and females would stand at 90.5 years and 94.1 years, respectively, in 2070.

- Under the high mortality scenario, the life expectancy at birth of males and females would stand at 88.3 years and 91.3 years, respectively, in 2070.

○ Under the medium mortality scenario, the gender gap in the life expectancy at birth would drop from 6.0 years in 2020 to 3.3 years in 2070.

[Table] Life expectancy at birth (2020~2070)

(year)

Scenario		2020	2021	2025	2030	2035	2040	2045	2050	2055	2060	2065	2070
Medium	Total	83.5	83.9	84.7	85.7	86.6	87.4	88.2	88.9	89.5	90.1	90.7	91.2
	Males	80.5	80.9	81.9	83.0	84.1	85.1	86.0	86.8	87.5	88.3	88.9	89.5
	Females	86.5	86.8	87.6	88.4	89.1	89.8	90.4	90.9	91.5	92.0	92.4	92.8
	Gender gap	6.0	6.0	5.7	5.3	5.0	4.6	4.4	4.1	4.0	3.7	3.5	3.3
High	Total	83.5	83.9	85.4	86.6	87.6	88.5	89.3	90.1	90.7	91.2	91.8	92.3
	Males	80.5	80.9	82.5	83.9	85.1	86.1	87.0	88.0	88.6	89.3	90.0	90.5
	Females	86.5	86.8	88.2	89.3	90.1	90.8	91.6	92.2	92.7	93.2	93.6	94.1
	Gender gap	6.0	6.0	5.7	5.4	5.0	4.8	4.5	4.2	4.0	3.9	3.7	3.6
Low	Total	83.5	83.9	84.1	84.7	85.5	86.3	86.9	87.6	88.2	88.8	89.4	89.8
	Males	80.5	80.9	81.3	82.1	83.2	84.0	84.9	85.6	86.4	87.1	87.7	88.3
	Females	86.5	86.8	86.9	87.3	87.9	88.5	88.9	89.5	90.0	90.4	91.0	91.3
	Gender gap	6.0	6.0	5.6	5.1	4.7	4.4	4.0	3.8	3.6	3.3	3.2	3.0

6. International migration projections

☐ International migration projection method

○ International migrations of Koreans and foreigners are separately projected to reflect their different migration characteristics.

○ The net international migration rate of Koreans is assumed by applying the average net international migration by sex and age for the past 8 years.

○ The net international migration rate of foreigners is assumed by considering the number of entries and departures of foreigners by status of sojourn to reflect the characteristics of migration by status of sojourn.

- The entries of foreigners by sex and status of sojourn are calculated by applying the first-order autoregression model using the trend in entries by sex and status of sojourn.

- The departures of foreigners are calculated with the departures among the entries for the past 5 years (including the current year) by considering their departures after staying in Korea for a certain period.

❍ For the 2021-2023 period under the influence of COVID-19, the decrease in departures of Koreans and entries of foreigners is reflected.

☐ Results of international migration projections

❍ By reflecting the uncertainty of net international migration in the future, three net international migration assumptions and long-lasting impact of COVID-19 assumption are formulated.

- Under the medium international migration scenario, the net international migration would rise from -58 thousand persons in 2020 to 46 thousand persons in 2030 and 40 thousand persons in 2070.

- Under the high international migration scenario, the net international migration would increase to 108 thousand in 2030 and 96 thousand persons in 2070.

- Under the low international migration scenario, the net international migration would rise to -15 thousand persons in 2030 and -11 thousand persons in 2070.

- Under the long-lasting impact of COVID-19 scenario, The net international migration would record 31 thousand persons in 2030 and 25 thousand persons in 2070.

7. Population projection scenarios

❍ The three assumptions of the high growth, medium growth and low growth scenarios are established by considering components of demographic variations (birth, death and international migration) to reflect future uncertainty into a total of 31 projection scenarios.

❍ A combination of all the assumptions leads to 27 scenarios (3 assumptions of birth x 3 assumptions of death x 3 assumptions of international migration).

- As basic scenarios, the medium assumption is formulated by combining the medium assumptions of birth, death and international migration. The high assumption is formulated by combining the high assumptions of birth, death and international migration. The low assumption is formulated by combining the low assumptions of birth, death and international migration.

❍ Four special scenarios are added by considering foreigner policy, child birth and the impact of COVID-19.

- The zero international migration scenario* is assumed to eliminate the effect of international migration, which is easily affected by policy factors.

  * The birth rate and life expectancy at birth follow medium growth assumption.
- The scenario of the continuation of the current fertility rate in 2020* assumes that the fertility rate in 2020 will be maintained.
  * Life expectancy at birth and international migration follow medium growth assumption.

- The scenario of the OECD average fertility rate* reflects the average recovery speed of fertility rates in OECD member countries.

  * Life expectancy at birth and international migration follow medium growth assumption.

  · The scenario assumes that the total fertility rate would reach 1.3 births in 2038 by increasing

at the average rebound speed (lasting 13.6 years and a year-on-year increase of 0.35) of countries experiencing lowest low fertility rates (less than 1.3).

· The scenario assumes that the total fertility rate would reach 1.61 births (the average level of OECD member countries in 2019) in 2053 by increasing at the average rebound speed (lasting 12.9 years and an increase of 0.3) of the total OECD member countries.

- The scenario of the impact of long-lasting COVID-19 assumes that births and international migration are influenced by long-lasting COVID-19.

 * Life expectancy at birth follows medium assumption.

· Births are assumed to show a sharply decreasing trend in marriage due to COVID-19. This trend would last from 2021 to 2025. The gap between the medium assumption and the low assumption would reach 30% in 2070.

· The international migration assumes low international migration owing to COVID-19. The entries of foreigners would record 50% compared to the medium assumption of the entries of foreigners. The net international migration of Koreans assumes medium assumption.

○ As for the fertility rate, a simple assumption (the total fertility rate: between 0.6 and 2.2 births in 2070) is applied to formulate the reference scenario.

 * Life expectancy at birth and international migration follow medium assumption.

[Table] Major scenarios for population projections

Scenarios		Assumptions		
		Total fertility rate	Life expectancy at birth	International migration
Basic scenario	Medium growth	Medium growth	Medium growth	Medium growth
	High growth	High growth	High growth	High growth
	Low growth	Low growth	Low growth	Low growth
Combined scenario	High fertility rate	High growth	Medium growth	Medium growth
	Low fertility rate	Low growth	Medium growth	Medium growth
	High life expectancy at birth	Medium growth	High growth	Medium growth
	Low life expectancy at birth	Medium growth	Low growth	Medium growth
	High net international migration	Medium growth	Medium growth	High growth
	Low net international migration	Medium growth	Medium growth	Low growth
	High aging speed	Low growth	High growth	Low growth
	Low aging speed	High growth	Low growth	High growth
Special scenario	Zero international migration	Medium growth	Medium growth	Zero migration
	Continuation of the current fertility rate in 2020	Continuation of the fertility rate in 2020	Medium growth	Medium growth
	OECD average fertility rate	Average rebound speed of OECD countries	Medium growth	Medium growth
	Long-lasting impact of COVID-19	Long-lasting impact of COVID-19	Medium growth	Decrease in international migration
Reference scenario	A simple assumption fo the total fertility rate	Between 0.6 birth and 2.2 births in 2070	Medium growth	Medium growth

[Table] Population projection scenarios and projection results

Indicator		Medium growth	High growth	Low growth	Zero international migration: Birth (medium) + Death (medium)	Continuation of the total fertility in 2020	Average fertility rate of OECD countries	Long-lasting impact of COVID-19
Total fertility rate (births per women)	2020	0.84	0.84	0.84	0.84	0.84	0.84	0.84
	2054	1.21	1.4	1.02	1.21	0.84	1.61	0.98
Life expectancy at birth (year)	2020	83.5	83.5	83.5	83.5	83.5	83.5	83.5
	Males	80.5	80.5	80.5	80.5	80.5	80.5	80.5
	Females	86.5	86.5	86.5	86.5	86.5	86.5	86.5
	2070	91.2	92.3	89.8	91.2	91.2	91.2	91.2
	Males	89.5	90.5	88.3	89.5	89.5	89.5	89.5
	Females	92.8	94.1	91.3	92.8	92.8	92.8	92.8
Net international migration (thousand persons)	2020	-58	-58	-58	-58	-58	-58	-58
	2070	40	96	-11	0	42	37	25
Total population (thousand persons) (Growth rate)	2020	51,836 (0.14)	51,836 (0.14)	51,836 (0.14)	51,836 (0.14)	51,836 (0.14)	51,836 (0.14)	51,836 (0.14)
	2070	37,656 (-1.24)	44,378 (-0.79)	31,531 (-1.79)	34,974 (-1.5)	34,778 (-1.6)	40,570 (-0.95)	32,998 (-1.74)
	Population peak (year)	2020	2038	2020	2020	2020	2020	2020
Population aged 15-64 (thousand persons, %)	2020	37,379 (72.1)	37,379 (72.1)	37,379 (72.1)	37,379 (72.1)	37,379 (72.1)	37,379 (72.1)	37,379 (72.1)
	2030	33,813 (66.0)	34,308 (65.4)	33,317 (66.4)	33,432 (65.7)	33,813 (65.9)	33,813 (65.4)	33,456 (66.6)
	2070	17,368 (46.1)	20,946 (47.2)	14,078 (44.6)	15,293 (43.7)	15,533 (44.7)	18,933 (46.7)	13,957 (42.3)
Population aged 65 or more (thousand persons, %)	2020	8,152 (15.7)	8,152 (15.7)	8,152 (15.7)	8,152 (15.7)	8,152 (15.7)	8,152 (15.7)	8,152 (15.7)
	2030	13,056 (25.5)	13,238 (25.2)	12,867 (25.7)	13,078 (25.7)	13,056 (25.5)	13,056 (25.3)	13,055 (26.0)
	2070	17,473 (46.4)	19,305 (43.5)	15,631 (49.6)	17,171 (49.1)	17,473 (50.2)	17,473 (43.1)	17,413 (52.8)
Population aged 0-14 (thousand persons, %)	2020	6,306 (12.2)	6,306 (12.2)	6,306 (12.2)	6,306 (12.2)	6,306 (12.2)	6,306 (12.2)	6,306 (12.2)
	2030	4,329 (8.5)	4,891 (9.3)	3,963 (7.9)	4,375 (8.6)	4,428 (8.6)	4,836 (9.4)	3,738 (7.4)
	2070	2,815 (7.5)	4,126 (9.3)	1,822 (5.8)	2,510 (7.2)	1,773 (5.1)	4,165 (10.3)	1,628 (4.9)
Total dependency ratio (Aged dependency ratio) (per 100 working age population)	2020	38.7 (21.8)	38.7 (21.8)	38.7 (21.8)	38.7 (21.8)	38.7 (21.8)	38.7 (21.8)	38.7 (21.8)
	2030	51.4 (38.6)	52.8 (38.6)	50.5 (38.6)	52.2 (39.1)	51.7 (38.6)	52.9 (38.6)	50.2 (39.0)
	2070	116.8 (100.6)	111.9 (92.2)	124.0 (111.0)	128.7 (112.3)	123.9 (112.5)	114.3 (92.3)	136.4 (124.8)