



Household Projections by Province (2020~2050)

Over the period of 2020-2050, the number of households is projected to increase in 11 regions (excluding Seoul, Busan, Daegu, etc. from 17 regions).

○ (Total number of households)

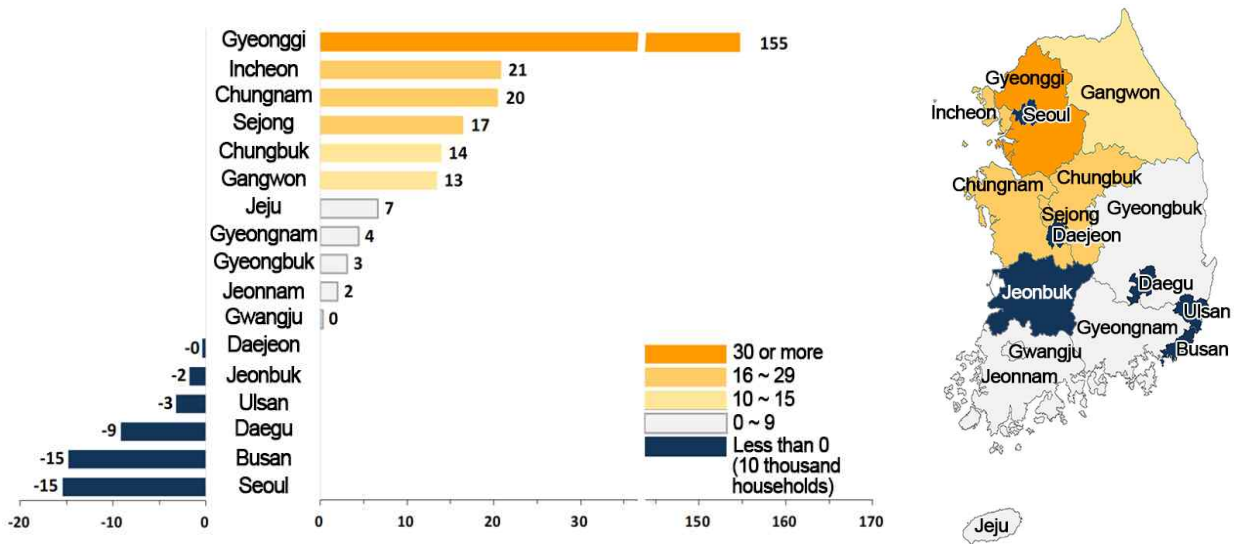
In 2020, the number of households in Gyeonggi is projected to mark the highest figure at 5.03 million, followed by Seoul (3.95 million) and Busan (1.4 million). In 2050, the number of households in Gyeonggi is projected to record the highest figure at 6.58 million, followed by Seoul (3.8 million) and Gyeongnam (1.39 million).

- As for the number of households, Busan, Daegu, Seoul and Ulsan are projected to start to decrease in 2029, 2029, 2030 and 2033, respectively. In 2050, 16 regions (excluding Sejong from 17 regions) are projected to decrease.

* (The nation)

The total number of households continues to grow from 20.73 million in 2020 to stand at 23.87 million in 2039. Afterward, this figure is projected to record 22.85 million in 2050.

< Change in households by province (2020 - 2050) >



As for the average household size, 15 regions (excluding Gyeonggi and Sejong from 17 regions) are projected to record below 2 persons in 2050.

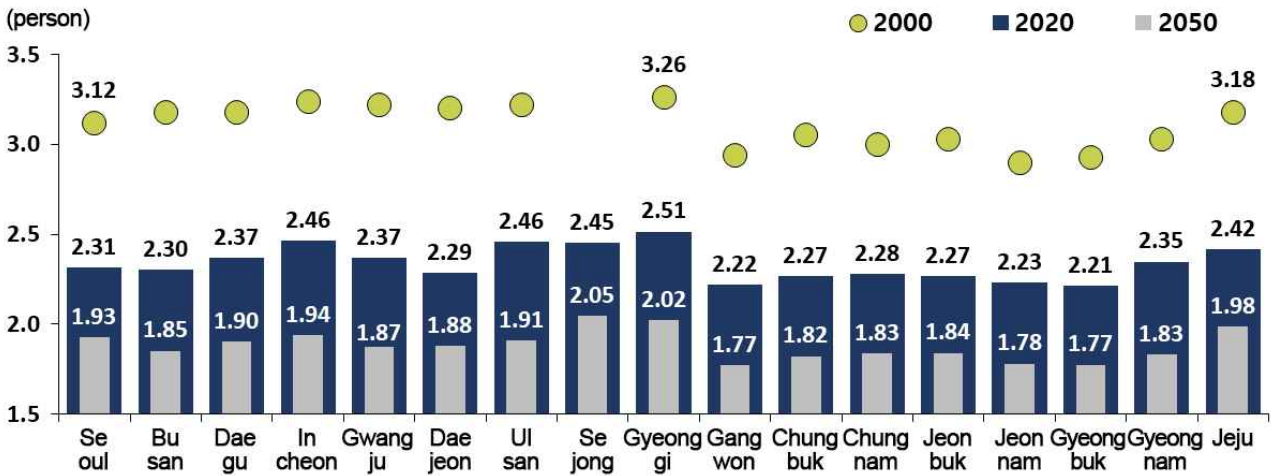
○ (Average household size)

In 2020, the average household size is projected to record the highest figure of 2.51 persons for Gyeonggi and the lowest figure of 2.21 persons for Gyeongbuk. In 2050, the average household size is projected to drop to the highest figure of 2.05 persons for Sejong and the lowest figure of 1.77 persons for Gangwon and Gyeongbuk.

* (The nation)

The average household size of the nation is projected to show a gradual decrease from 2.37 persons in 2020 to 1.91 persons in 2050.

< Average household size by province (2000, 2020, 2050) >



In 2050, one-person households are projected to occupy the largest proportion of the total households in all 17 metropolitan cities and provinces.

○ (Household type)

In 2020, one-person households are projected to occupy the largest proportion of the total households in 12 regions including Daejeon and Seoul. And in other 5 regions, couple households with children are projected to occupy the largest proportion of the total households. In the meantime, in 2050, one-person households are projected to account for the largest proportion of the total households in all 17 metropolitan cities and provinces.

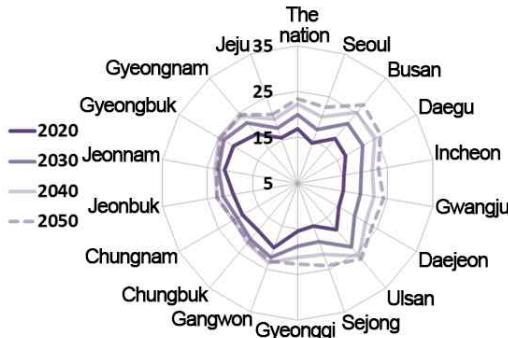
* (The nation)

In 2050, relative households are projected to occupy the largest proportion at 57.3% [couple households (23.3%), couple households with children (17.1%), fathers (mothers) with children (8.6%), etc.], followed by one-person households (39.6%) and non-relative households (3.1%).

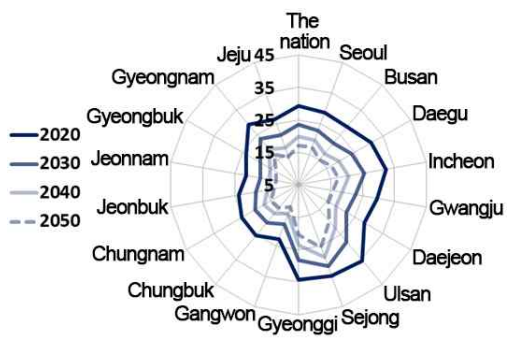
< Trend in household proportion by household type and province (2020-2050) >

(Unit: %)

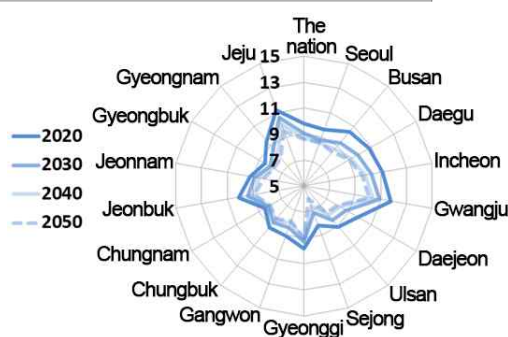
Couple households



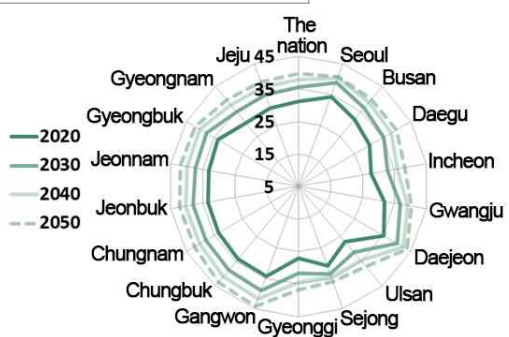
Couple households with children



Fathers (or mothers) with children



One-person households



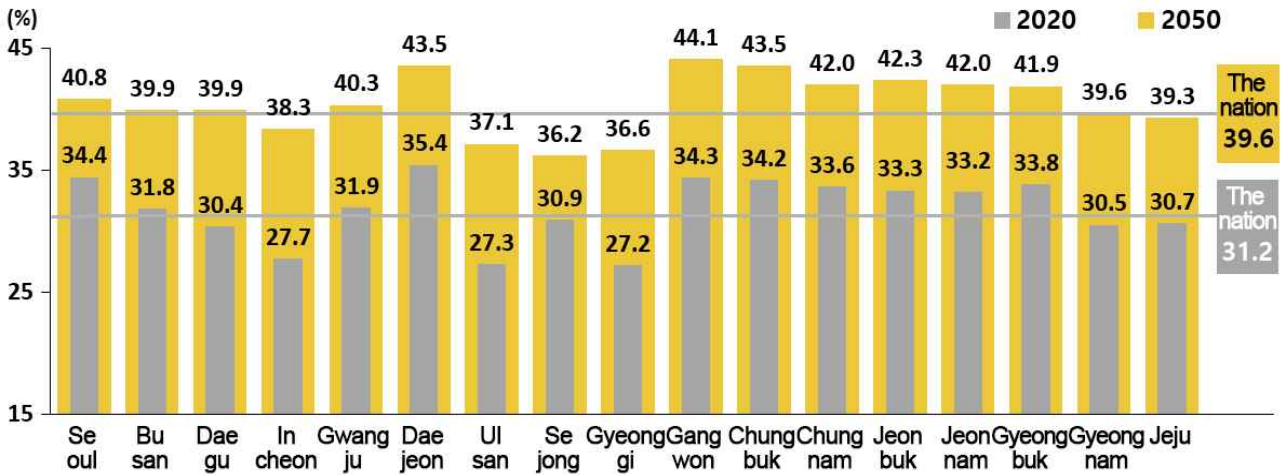
○ **(One-person households)**

In 2020, the proportion of one-person households is projected to exceed 30% in 14 regions including Daejeon and Seoul. In 2050, the proportion of one-person households is projected to exceed 40% in 9 regions including Gangwon and Chungbuk.

* (The nation)

The proportion of one-person households for the nation is projected to rise from 31.2% in 2020 to 39.6% in 2050.

< Proportion of one-person households by province (2020, 2050) >



Over the period of 2020-2050, in all 17 regions, the proportion of couple households is projected to increase, while that of couple households with children is projected to decrease.

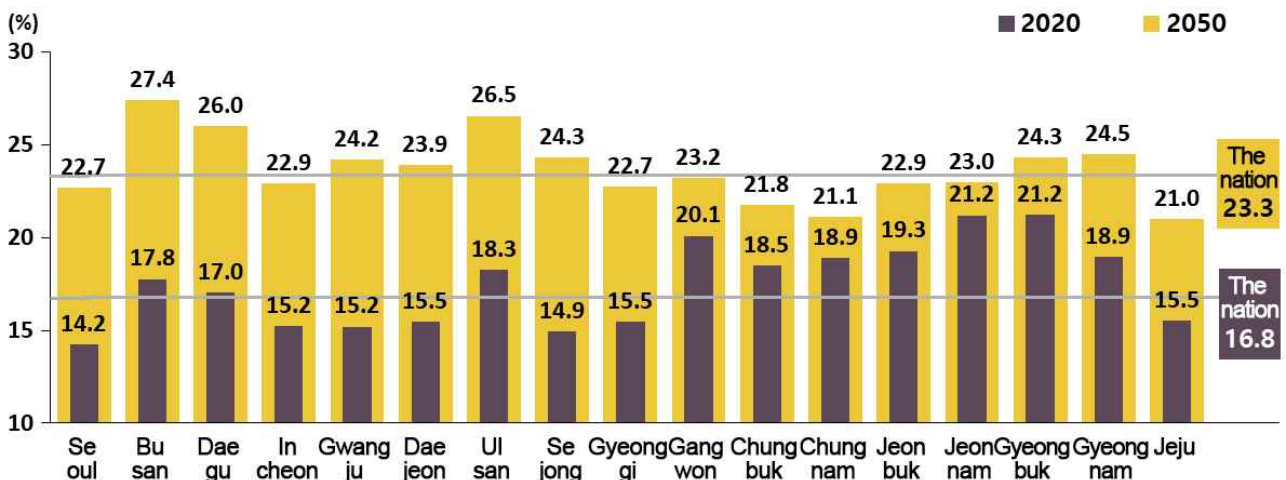
○ **(Couple households)**

In 2020, Gyeongbuk (21.2%) and Jeonnam (21.2%) are projected to show the highest proportion of couple households, followed by Gangwon (20.1%). In 2050, all 17 regions are projected to exceed 20% of couple households.

* (The nation)

The proportion of couple households for the nation is projected to rise from 16.8% in 2020 to 23.3% in 2050.

< Proportion of couple households by province (2020, 2050) >



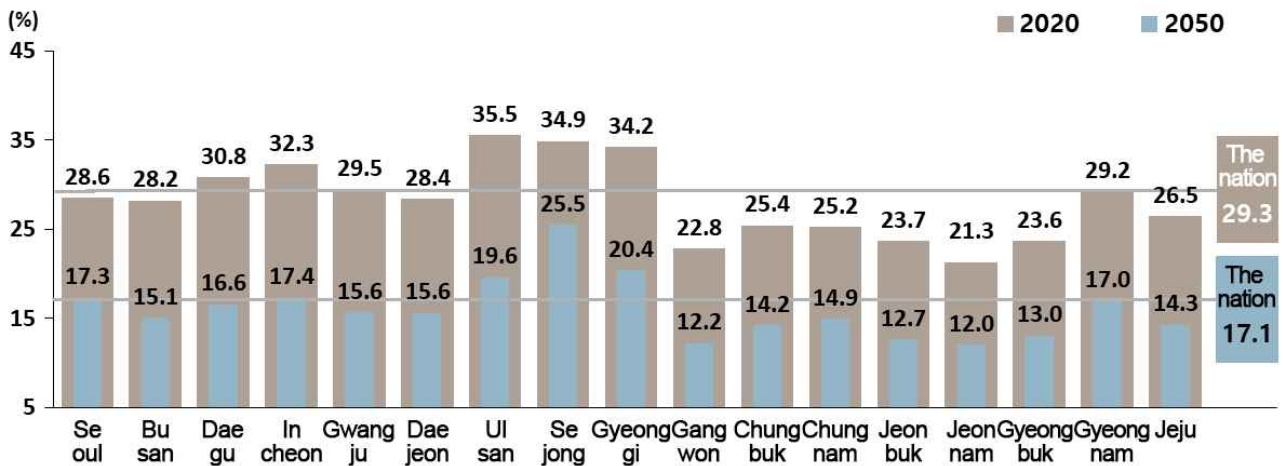
○ **(Couple households with children)**

In 2020, Ulsan (35.5%) is projected to mark the highest proportion of couple households with children, followed by Sejong (34.9%). In 2050, 15 regions (excluding Sejong and Gyeonggi from 17 regions) are projected to record below 20% of couple households with children.

* (The nation)

The proportion of couple households with children for the nation is projected to drop from 29.3% in 2020 to 17.1% in 2050.

< Proportion of couple households with children by province (2020, 2050) >



In 2050, the proportion of elderly households with heads aged 65 or more is projected to exceed 50% in 10 regions including Jeonnam and Gyeongbuk.

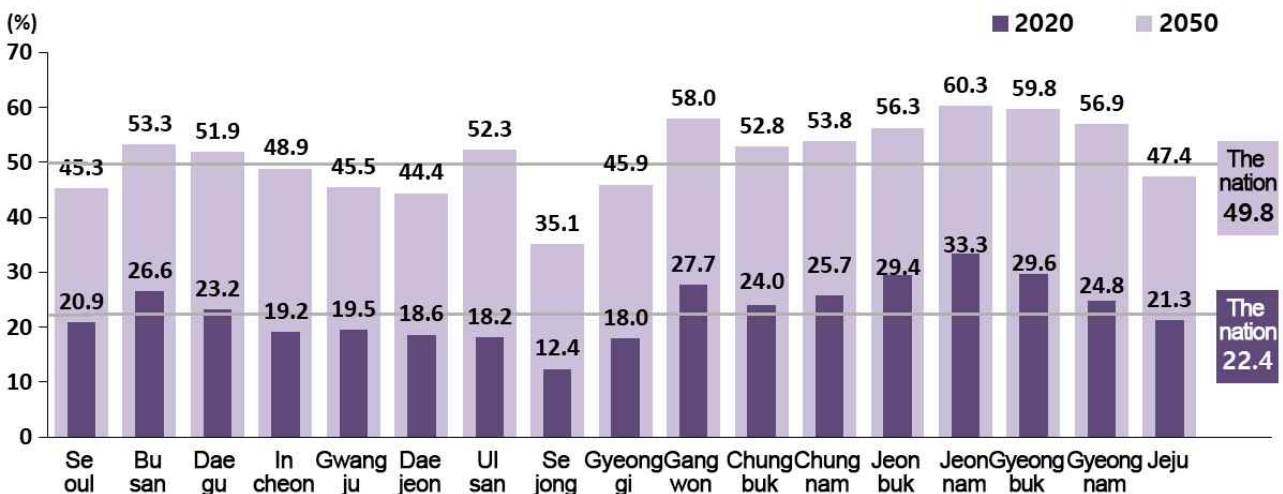
○ **(Elderly households)**

In 2020, Jeonnam (33.3%) is projected to record the highest proportion of elderly households, followed by Gyeongbuk (29.6%) and Jeonbuk (29.4%). In 2050, 10 regions including Jeonnam (60.3%) and Gyeongbuk (59.8%) are projected to exceed 50% of elderly households.

* (The nation)

The proportion of elderly households for the nation is projected to rise from 22.4% in 2020 to 49.8% in 2050.

< Proportion of elderly households (with heads aged 65 or more) by province (2020, 2050) >



In 2050, the proportion of female household heads is projected to exceed 30% in all 17 metropolitan cities and provinces.

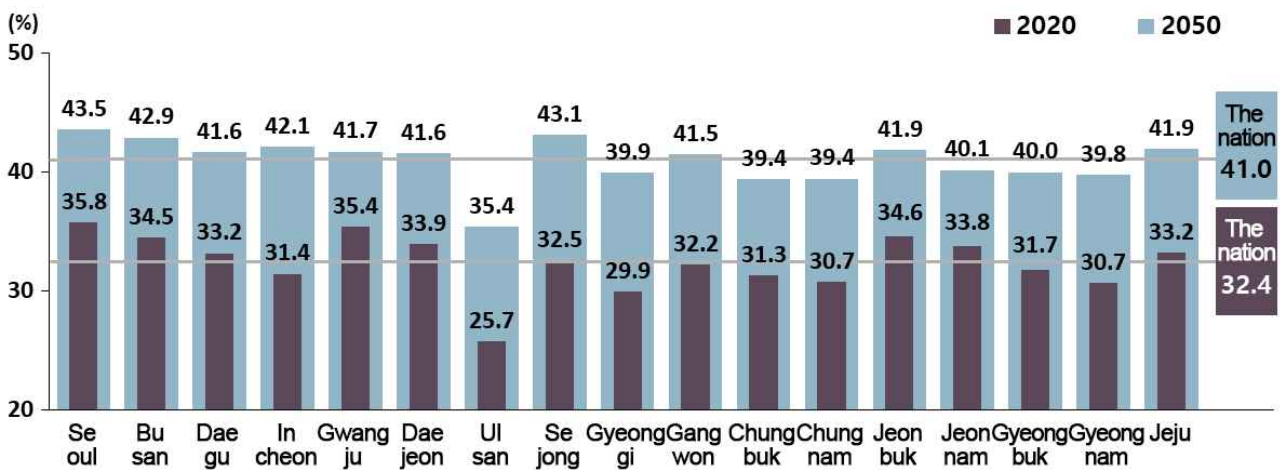
○ **(Female household heads)**

In 2020, Seoul (35.8%) is projected to record the highest proportion of female household heads, followed by Gwangju (35.4%). In 2050, 11 regions including Seoul, Sejong and Busan are projected to exceed 40% of female household heads.

* (The nation)

The proportion of female household heads for the nation is projected to rise from 32.4% in 2020 to 41.0% in 2050.

< Proportion of female household heads by province (2020, 2050) >



I . Note

Overview of household projections

- **(Overview)** To predict the number, size and types of households in the future by reflecting the recent trends in household changes
- **(Purpose)** To provide basic data for mid-term and long-term policy making of the government, local governments and enterprises, and demand prediction
- **(Target households)** General households (relative households, non-relative households of 5 persons or less, one-person households)
 - * Excluding: Group households (non-relative households of 6 persons or more, institutional households), foreigner households
- **(Coverage)** The nation
- **(Cycle)** Quinquennial
- **(Projection period)** 2020-2050 (3 decades)
- **(Projection method)** Headship rate method
- **(Projections)**
 - Households by age of household head and household type
 - Households by age of household head and the number of household members
 - Households by sex, age and marital status of household head

Statistical terms

- Household: A unit of living of one person or two persons or more who share livelihood such as cooking and sleeping
- Household head: A person who effectively represents a household and is responsible for livelihood regardless of the household head according to resident registration. In case of households of 2 persons or more without relative relationship, one representative person becomes the head of a household.
 - ※ In household types, 'Child(ren)' represents 'Unmarried child(ren)'.

Precaution

- Household projections are made from the assumption that the recent trend in household changes will continue for a certain period of time in the future.
 - Therefore, there might be a difference between projected values and actual values depending on changes in the social and economic environment and social behavior patterns.
 - Besides, as time goes by, the uncertainty of projection results increases.

- There is a difference between the number of households in 2020 according to household projections and the number of households according to the 2020 Population Census owing to their respective reference time point.
 - The reference time point of household projections is July 1st, while that of the Population Census is November 1st.
- In some statistical tables, due to rounding, totals may not correspond with the sum of the separate figures.

II. Household projection method

1. Headship rate method

- The headship rate method is used to project the number of households in the future by estimating future headship rates and applying population projections.

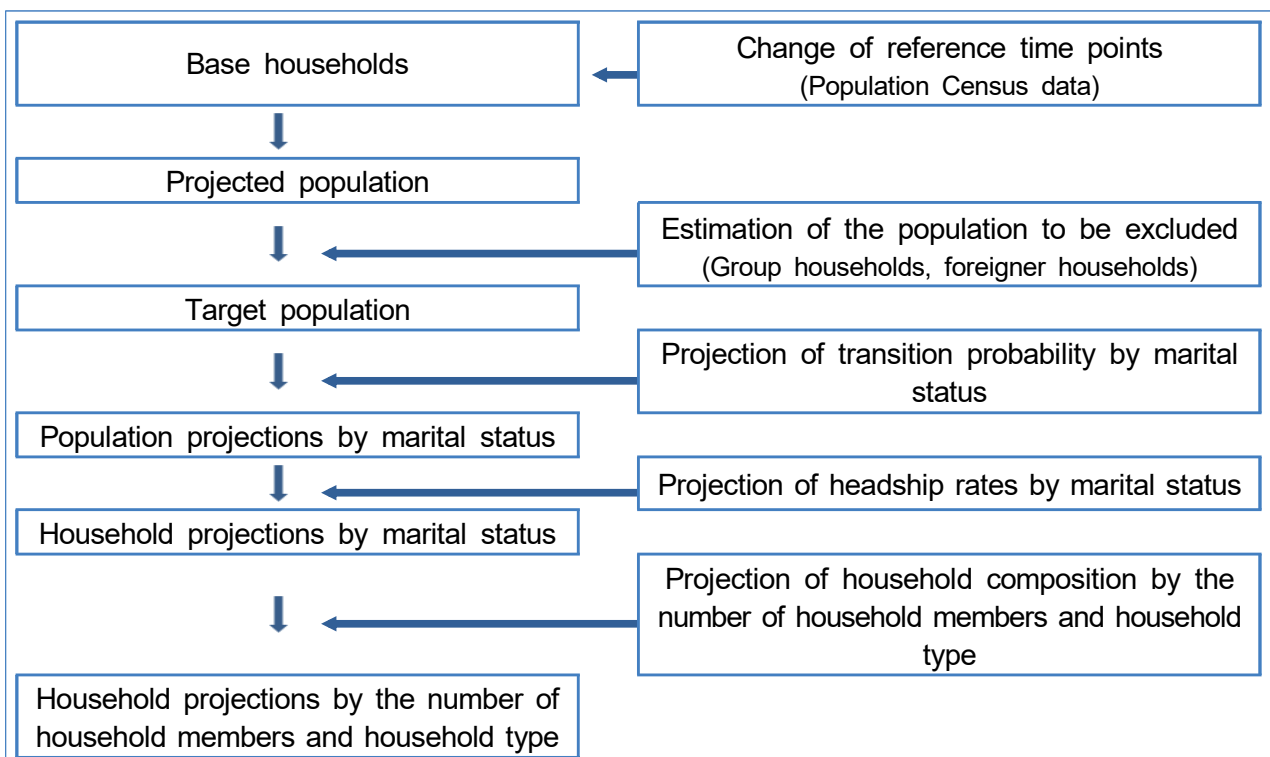
$$H^s(x,t) = \sum_m P^s(m,x,t) \times h^s(m,x,t)$$

Where ' $H^s(x,t)$ ' denotes the number of households of household head's sex s and age x in year t .

' $P^s(m,x,t)$ ' denotes the population of sex s , marital status m , age x and in year t .

' $h^s(m,x,t)$ ' denotes the headship rate of sex s , marital status m , age x and in year t .

[Figure] Process of household projections



2. Base households and retrospective households

- Base households and retrospective households are calculated by changing reference time points (from November 1st to July 1st) after reflecting the share of sex, age and marital status of the sample survey of the Population Census.

3. Target population

- Household projections include only general households. Therefore, the target population of household projections excludes the population in group households and foreigner households.

Target population of household projections
= Projected population - (Population in group households and foreigner households)

4. Population projection by marital status

1) Transition rates by marital status

- The unstable transition rates of the young and old age groups, which result from the low changes in marital status, are adjusted and extended.
 - The robust regression model is used to eliminate outliers. The Brass-Logit model (marriage and divorce) and the log linear regression model (death) are used for adjustment and age extension.

2) Projection of transition rates by marital status in 2020-2050

- On the basis of age-specific first marriage, remarriage, divorce and death transition rates during the period of 2005-2020, transition rates by marital status are projected by using univariate time series modelling (Li and Lee model).

$$\begin{aligned} &< \text{Li and Lee model}^1 > \\ &\log(p_{x,t,i,j}) = a(x,i,j) + B(x,j)K(t,j) + b(x,i,j)k(t,i,j) + \epsilon(x,t,i,j) \\ p_{x,t,i,j} &: \text{transition rates for age } x, \text{ year } t, \text{ province } i, \text{ marital status } j \\ a(x,i,j) &: \text{Average transition rate by province, age and marital status} \\ B(x,j)K(t,j) &: \text{Transition speed and time index of transition rate for age } x, \text{ year } t, \text{ and marital} \\ &\text{status } j \\ b(x,i,j)k(t,i,j) &: \text{Transition speed and time index by excluding common trends from trends of each} \\ &\text{province } i \\ &* \log(p_{x,t,i,j}) - a(x,i,j) - B(x,j)K(t,j) \end{aligned}$$

3) Transformation to transition probability by marital status

- Transformation of transition rates by marital status into transition probability

1) Li, N. and Lee, R.(2005)."Coherent mortality forecasts for a group of populations: An extension of the Lee-Carter method." *Demography* 42(3): 575-594

- Transition probability by marital status $({}_n\pi_{x,t}^{ij}) = \frac{n \times {}_n m_{x,t}^{ij}}{1 + \frac{n}{2} \times \sum_{i \neq j} {}_n m_{x,t}^{ij}}$

4) Population projection by marital status in 2020-2050

- Population projection by marital status by applying transition probability to the population by marital status

| | |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unmarried population aged $x+1$ in $t+1$ year: | $P_{x+1,t+1}^s = P_{x,t}^s \cdot (1 - {}_n\pi_{x,t}^{sm} - {}_n\pi_{x,t}^{sd})$ |
| Married population aged $x+1$ in $t+1$ year: | $P_{x+1,t+1}^m = P_{x,t}^m \cdot (1 - \pi_{x,t}^{mw} - \pi_{x,t}^{mv} - \pi_{x,t}^{md}) + P_{x,t}^s \cdot \pi_{x,t}^{sm} + P_{x,t}^w \cdot \pi_{x,t}^{wm} + P_{x,t}^v \cdot \pi_{x,t}^{vm}$ |
| Widowed population aged $x+1$ in $t+1$ year: | $P_{x+1,t+1}^w = P_{x,t}^w \cdot (1 - \pi_{x,t}^{wm} - \pi_{x,t}^{wd}) + P_{x,t}^m \cdot \pi_{x,t}^{mw}$ |
| Divorced population aged $x+1$ in $t+1$ year: | $P_{x+1,t+1}^v = P_{x,t}^v \cdot (1 - \pi_{x,t}^{vm} - \pi_{x,t}^{vd}) + P_{x,t}^m \cdot \pi_{x,t}^{mv}$ |

| P_x^s : Unmarried population | P_x^m : Married population | P_x^w : Widowed population | P_x^v : Divorced population |
|--------------------------------------------------------------------------|---------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------|
| π_x^{sm} : Probability of first marriage of the unmarried population | π_x^{mw} : Probability of bereavement of the married population | π_x^{wm} : Probability of remarriage of the widowed population | π_x^{vm} : Probability of remarriage of the divorced population |
| π_x^{sd} : Probability of death of the unmarried population | π_x^{mv} : Probability of divorce of the married population | π_x^{wd} : Probability of death of the widowed population | π_x^{vd} : Probability of death of the divorced population |
| | π_x^{md} : Probability of death of the married population | | |

5. Projection of headship rates

- Projection of headship rates by sex, age and marital status in 2020-2050 by applying modified exponential model, on the basis of trends in headship rates of the Population Census

- Modified exponential model: $h_{m,x,t} = d + ab^{c_t}$
 - $h_{m,x,t}$: marital status m , age x , headship rate in year t
 - d : 1 when $h_{m,x,2020} > h_{m,x,2005}$; 0 when $h_{m,x,2020} < h_{m,x,2005}$
 - a : $h_{m,x,2005} - d$
 - b : $(h_{m,x,2020} - d) / (h_{m,x,2005} - d)$
 - c_t : $(t - 2005) / (2020 - 2005)$

6. Household projection by household type and the number of household members

- Household projection by household type and the number of household members in 2020-2050 by applying modified exponential model, on the basis of trends in household distribution by household type and the number of household members of the Population Census
 - The composition by age, the number of household members and household type is projected with the lower classification of the composition by age and the number of household members.
 - * Refer to '5. Projection of headship rates' to see the formula of the modified exponential model