# Population projection 2021–2070

## Birth rate in Finland is not sufficiently high for the age structure

According to Statistics Finland's latest population projection, 700,000 more people would die than be born in Finland by the end of 2060 if the birth rate remained at the level observed now. In the 2060s, only under 40,000 children would be born in Finland per year. In the long term, the birth rate is not sustainable in terms of the age structure.

**Number of live births in Finland in 1900 to 2020 and projection until 2070**
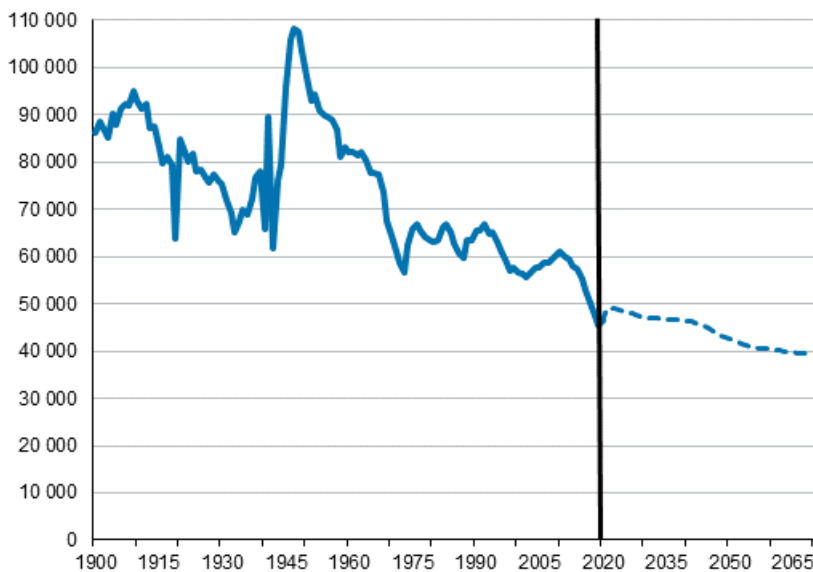
## Low birth rates have far-reaching effects

The current year is the fourth consecutive year when fewer than 50,000 children are born in Finland. These age groups will give birth 30 years from now. If the birth rate remains low for a long time, its reverberations will extend far into the future. At first, the effect is visible in the number of children born, but in the longer term also in the number of women of childbearing age.

In 2020, the number of births was higher than that of deaths in 53 municipalities. At the observed birth rate, there would be 39 corresponding municipalities in 2030 and only 15 in 2040.

According to the projection, the number of persons aged under 15 would be nearly 200,000 lower at the end of 2060 than at present. A protracted low birth rate would be visible in the size of the working-age population from the 2040s onwards and would also be reflected in the demographic dependency ratio.

**Demographic dependency ratio\* in 1900 to 2020 and projection until 2070**
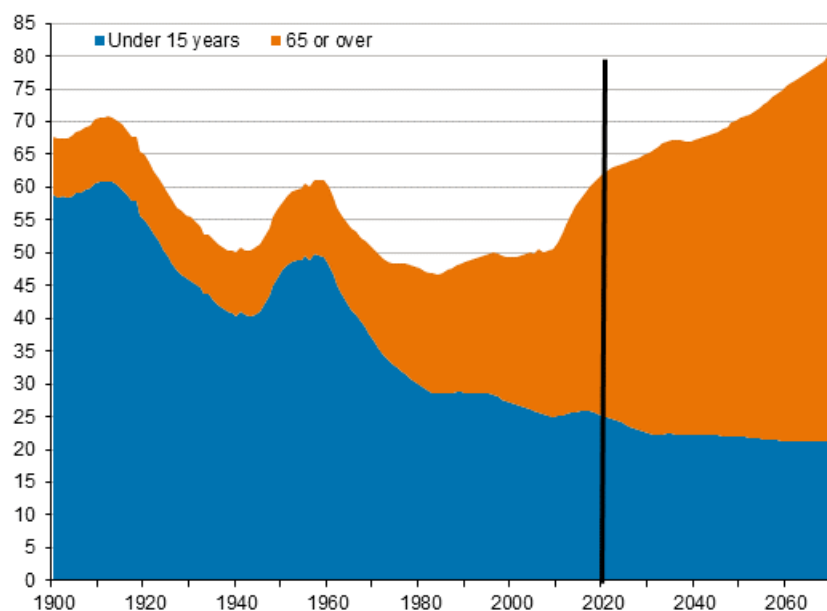


\*) The number of those aged 15 or under and 65 or over per 100 working age persons

## Population is projected to start declining in 2034

The year 2021 will be the sixth year in a row when deaths exceed births in Finland. According to the projection, net immigration will sustain population growth until 2034, when Finland's population will be 5.6 million. After this, the population will turn to a decline and according to the projection, Finland's population will already be lower in the 2050s than at present.

In 2020, the population grew in four regions and in Åland. According to the projection, the population would grow only in the regions of Uusimaa and Pirkanmaa and in Åland in 2040.

## Comparison with previous projections

The 2021 population projection projects the population for 2060 to 5.45 million persons. The population projected for 2060 by Statistics Finland's population projections made between 2007 and 2021 has varied between 5.3 and 6.2 million. This range reflects the uncertainty associated with population projections over the long term. The biggest difference between the projections made in different years is related to the birth rate assumption.

**Population in 2000 to 2020 and projected population in projections made in 2007 to 2021**
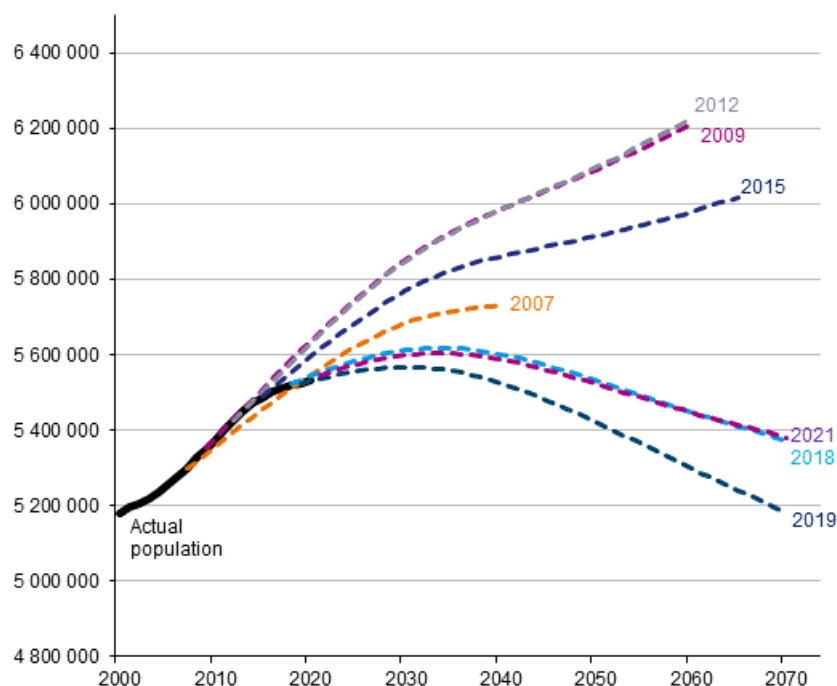


In the 2021 projection, the number of persons aged under 15 would be 712,000 in 2050, which is 152,000 lower than in the 2015 projection and 56,000 higher than in the 2019 projection.

## The worst of the decline in the working-age population is over so far

The number of the population of working age (aged 15 to 64) was highest in Finland in 2009, when their number was 3.55 million in our country. Between 2010 and 2020, the number of working-age people has fallen by 136,000 in Finland. Over the next two decades, it is projected that the working-age population will decrease at a slower pace, i.e. by 76,000 persons by 2040.

Due to the low birth rate, the decline in the working-age population would accelerate in the 2040s. During 2041 to 2050, the working-age population would decrease by 103,000 persons and between 2051 and 2060 by further 133,000 persons. At the end of 2060, the working-age population would number 3.1 million people, which is good 310,000 fewer than at present.

The proportion of people of working age in the population is currently 62 per cent. According to the projection, the proportion will diminish to 60 per cent by 2040 and to 57 per cent by 2060. According to the 2021 projection, the proportion of the working-age population in total population will be higher until 2060 than in the projections made in 2012 and 2015, because due to the lower birth rate, the population will also turn to a decline.

## Assumptions of the 2021 population projection

Statistics Finland's latest population projection assumes that the birth rate would remain constant in future. The imputed number of children that women give birth to during their lifetime, i.e. the total fertility rate is assumed to be 1.45.

The projection assumes that Finland's migration gain from abroad will be 20,000 people during the current year and after that 15,000 people yearly.

The mortality rate is projected to continue declining throughout the projection period. The mortality rate of people aged under 50 is assumed to continue declining similarly to what has been observed when comparing the mortality rates for 1987 to 1991 and 2016 to 2020. The mortality rate of persons aged 50 and over is assumed to fall similarly as observed when comparing the mortality rate during the periods 1997 to 2001 and 2016 to 2020.

Men's life expectancy is projected to lengthen by close on five years and women's by good three years by 2040. More detailed information about the projection method can be found in the quality description.

**Life expectancy at birth by sex in 1990 to 2020 and projection until 2060**
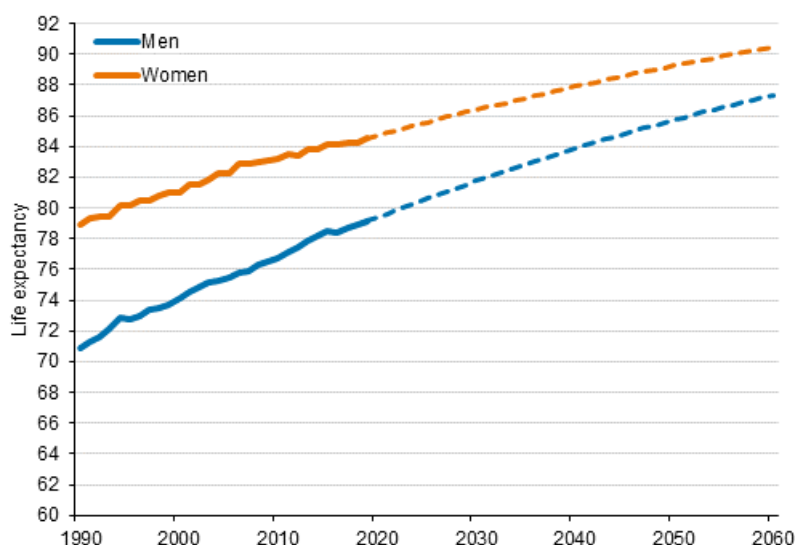


## The projection is a trend calculation and gives decision-makers a chance to react

Statistics Finland's population projections are demographic trend calculations based on observations on past development in the birth rate, mortality and migration. The projections do not seek to estimate the effect of economic, socio-political regional policy and other such factors on population development.

According to the nature of trend calculations, the projection expects past developments to continue into the future. When preparing the projection, no stand is taken on how the size of the population should develop. When examining population projection figures, it should be borne in mind that the projection only indicates the expected population development if the recent development continues unchanged into the next decades.

The task of a population projection is to provide tools with which decision-makers can assess whether measures need to be taken to try to influence the population development. Decision-makers should assess the advisability of the population development indicated by the projection and, if necessary, take action to prevent the materialisation of the projection if the population development indicated by the projection is not desired.

**The projection has been made for the whole country up to 2070 and regionally up to 2040. The next population projection will be published in autumn 2024.**

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## Tables

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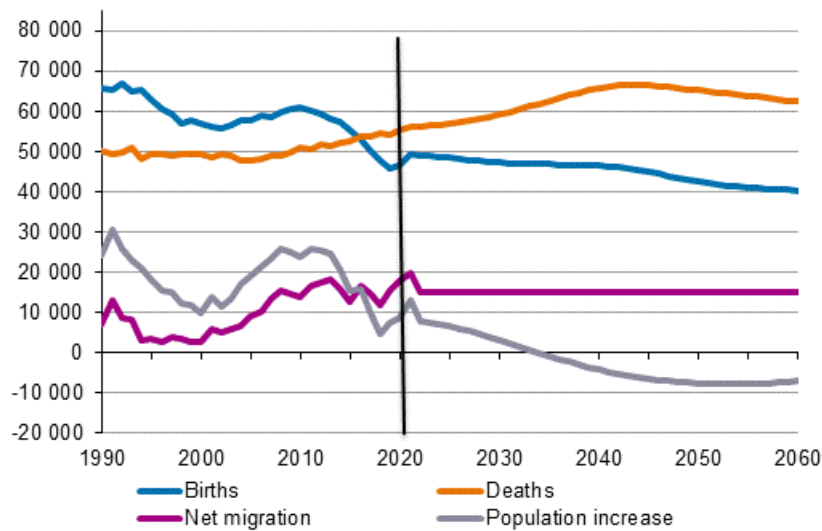
## Figures

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# Appendix tables

**Appendix table 1. Population and demographic dependency ratio at the end of 2030 in population projections compiled in different years**
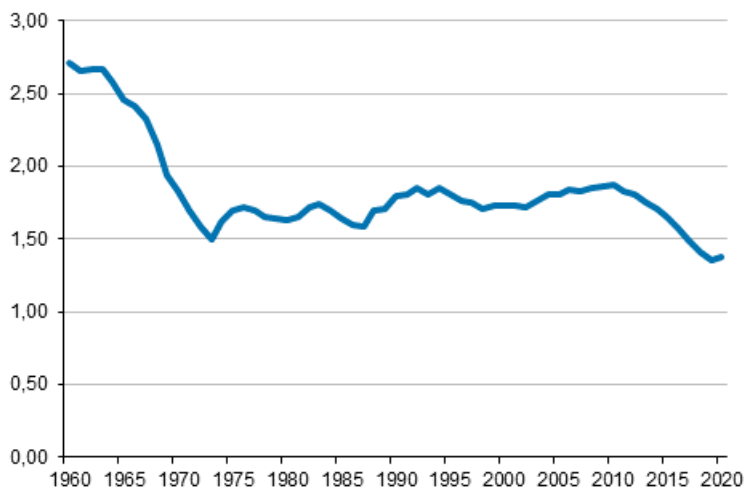
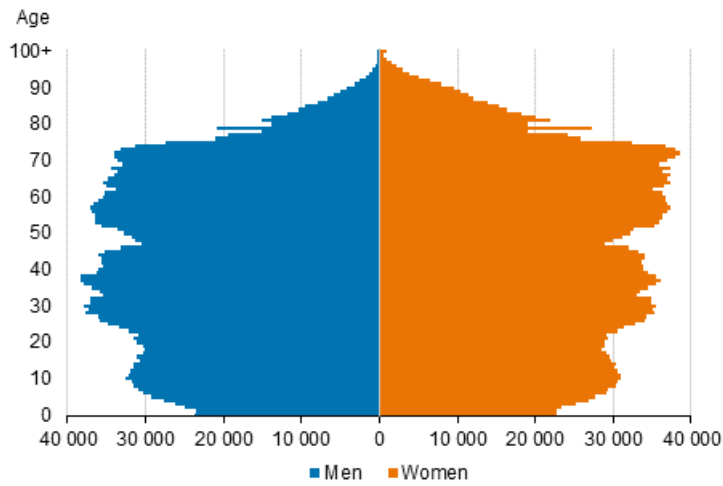| Population in population projections compiled in different years | Year of compilation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1998 | 2001 | 2004 | 2007 | 2009 | 2012 | 2015 | 2019 | 2021 |
| Population at the end of 2030 | 5 249 755 | 5 290 563 | 5 442 841 | 5 683 182 | 5 850 097 | 5 847 678 | 5 769 032 | 5 566 685 | 5 598 821 |
| Dependency ratio | 70,1 | 70,9 | 71,8 | 73,3 | 73,0 | 71,2 | 69,2 | 64,5 | 65,2 |
| Number of persons aged 65 and over | 1 348 502 | 1 389 126 | 1 420 395 | 1 494 360 | 1 525 155 | 1 495 624 | 1 478 426 | 1 462 251 | 1 452 839 |
| Proportion of persons aged 65 and over (per cent) | 25,7 | 26,3 | 26,1 | 26,3 | 26,1 | 25,6 | 25,6 | 26,2 | 25,9 |
| Number of persons aged 85 and over | 152 754 | 169 022 | 178 503 | 220 505 | 242 156 | 226 001 | 219 209 | 216 003 | 215 385 |
| Proportion of persons aged 85 and over (per cent) | 2,9 | 3,2 | 3,3 | 3,9 | 4,1 | 3,9 | 3,8 | 3,9 | 3,8 |

# Appendix figures

**Appendix figure 1. Births, deaths, net immigration and population change in 1990 to 2020 and projection for 2021 to 2060**
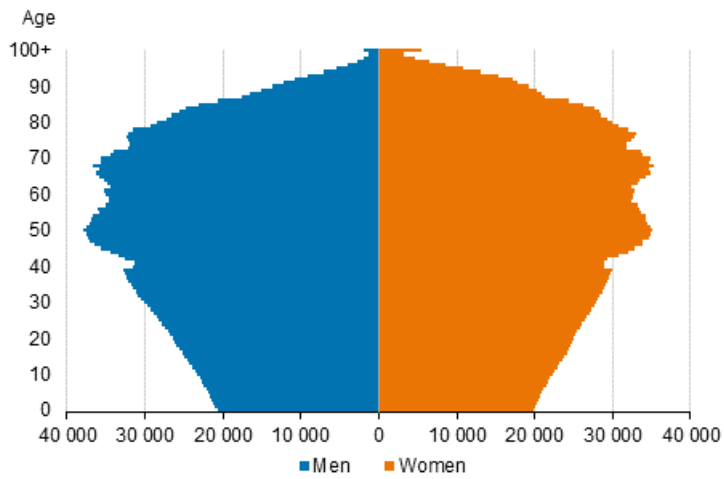


**Appendix figure 2. Total fertility rate 1960–2020**

**Appendix figure 3. Population by age and gender 2020**



**Appendix figure 4. Population by age and gender 2060, projection 2021**

# Quality description: Population projection 2021–2070

## 1. Relevance of statistical information

The basic population for this population projection has been population by municipality at the end of 2020 by 1-year age group according to gender. The projection was calculated by municipality and the figures for regions and the whole country were derived from municipality data by summing. The projection data can also be printed out using any other regional division as long as it is based on municipalities. In addition to data on population numbers, data are also available on the numbers of births, deaths and migrants according to the projection and the coefficients used in calculating the projection.

There are two calculations of the projection:

- A calculation including migration (calculation 1), where account is taken of the effect of the birth rate, mortality, inter-municipal migration and migration on population development.

- The self-sufficiency calculation (calculation 2) expresses what the future population development would be like without migration. The calculation takes only the impact of the birth rate and mortality on population development into account. The assumptions concerning birth rate and mortality are the same as in calculation 1. The numbers of births are, however, different in these calculations, as migrants assume the fertility of the receiving area in the calculation including migration.

The Central Statistical Office of Finland published the first population projection concerning Finland's future population development in 1934. In 1956 the memorandum of the statistical committee set up in 1953 proposed that population projections should be compiled at regular intervals. The first projections related to the population development of the whole country. Preparation of regional projections started in the 1960s.

In 1973 the so-called population projection group established by the Prime Minister's Office published its report "On arrangement of compilation of population projections" ("Väestöennusteiden laadinnan järjestäminen", Valtioneuvoston kanslian julkaisuja 1973:1). In the report population projections were defined as follows: "Population projections are calculations based on the past development of the factors influencing population development, which do not include population development planned by the compiler of the projection or any expressions of intent related to regional policy."

According to the report, population projections "...indicate to decision-makers primarily what the development will lead to if social policy stays unchanged. Decision-makers have to assess the advisability of the development and consider on that basis whether the projections can be used as foundation for decisions on investments and on measurement of activities."

## 2. Methodological description of survey

The population projection method used is a so-called demographic component model in which the future population number and structure are calculated by means of age-specific birth rate, mortality and migration coefficients. The coefficients are calculated on the basis of demographic statistics for the last few years. To decrease random variation of the coefficients they are calculated for several years and in addition, municipalities are grouped into birth rate, mortality and out-migration areas.

Birth rate

To calculate the number of births, municipalities are grouped into 136 fertility areas on the basis of the total fertility rate in the years 2016 to 2020. Municipalities with a population of 20,000 form their own fertility areas. Municipalities with a smaller population are combined into fertility areas. Municipalities with small populations have been paired up with municipalities from anywhere in the country which have the same fertility rate. Previously the combinations were made within regions. When forming fertility areas, account has also been taken of age-specific fertility.

Age-specific fertility rates (women aged 14 to 50) have been calculated for the fertility areas for the years 2016 to 2020. Municipalities belonging to the same fertility area have identical fertility coefficients. In the projection the fertility rates have been kept constant throughout the projection period. For the whole country the average total fertility rate, that is, the average number of children born to each individual woman during her lifetime is 1.45.

Mortality

In order to calculate the number of deaths, 22 mortality areas have been formed. The six municipalities with the largest populations (at least 190,000 people) form their own mortality areas and smaller municipalities have been combined into mortality areas. Municipalities have been grouped into mortality areas on the basis of age- and gender-standardised mortality for the years 2014 to 2020. Therefore, the mortality area of a municipality is not determined by its geographical location.

To reduce random variation, the mortality coefficients of the whole country are used in all mortality areas for persons aged 0 to 17 and 90 to 104. Area-specific coefficients are used for persons aged 18 to 89. Age-specific mortality rates have been calculated for the years 2016 to 2020.

Coefficients by age and gender group for the annual change in mortality of people aged under 50 were derived by calculating how much mortality changed when comparing 1987 to 1991 with 2016 to 2020. Coefficients by age and gender group for the annual change in mortality of persons aged 50 and over were derived by calculating how much mortality changed when comparing 1997 to 2001 with 2016 to 2020. Mortality was not inflated for any age group, however.

Migration

Municipalities are divided into 136 out-migration categories according to the out-migration propensity of those aged 0 to 6 and 16 to 44 from 2016 to 2020. Municipalities with a population of 25,000 form their own out-migration areas. Municipalities with a smaller population are combined into out-migration areas. Municipalities with small populations have been paired up with municipalities from anywhere in the country which have the same out-migration propensity. Previously the combinations were made within regions. Age group-specific out-migration coefficients by gender for the out-migration areas were calculated on the basis of the years 2016 to 2020.

The whole country is divided into 31 migration major regions. Migration major regions are areas formed around large regional centres (excl. Uusimaa and Åland). A municipality's major migration region is determined by the regional centre or municipalities adjacent to a regional centre to which the municipality has had the most out-migration during 2016 to 2020. More migration areas have been formed into Southern Finland, because the population and migration numbers in the area require smaller area units.

In the population projection, migration between major migration regions is calculated with migration probabilities. First the total number of out-migrants from the major migration region is calculated by summing the number of out-migrants in the municipalities belonging to the major migration region. Then migration probabilities are used to calculate the proportion of the out-migrants who stay within their own major migration region and the proportion of out-migrants who go to other major migration regions. Age group-specific migration probabilities by gender for major migration regions were calculated for persons aged 0-6 and 18-44 on the basis of the years 2016 to 2020. Age group-specific migration probabilities by gender for major migration regions were calculated for persons aged 7-17 and 45 and older on the basis of the years 2011 to 2020.

In-migration proportions have been calculated for municipalities for each age and gender group
(a) for the migrants who stay in their own major migration region,
(b) migrants from other major migration regions and
(c) migrants from abroad into the major migration region.

The proportions were calculated from the sum of the in-migrations in the municipality's major migration area. In-migration proportions of the migrants from the municipality's own major migration region were calculated for the age groups 0-6 and 18-44 on the basis of the years 2016 to 2020 and on the basis of the years 2011 to 2020 for other age groups. In-migration proportions of the migrants from other major migration regions and for the migrants from abroad were calculated on the basis of the years 2011 to 2020.

All migration coefficients and in-migration proportions have been kept constant throughout the projection period.

In the calculation containing migration, the net immigration for the whole country is assumed to be 20,000 persons on the first projection year and 15,000 persons per year for the rest of the projection period. Net immigration is obtained by adding the assumed net immigration to the emigration for the whole country. The age distribution of immigration was calculated on the basis of immigration during 2011 to 2020. Immigration is divided into the major migration regions on the basis of the immigration proportion coefficient of each region. The immigration proportion of the major migration regions of the immigration of the whole country was calculated by age group and gender on the basis of the years 2011 to 2020. Municipalities' immigration was calculated from the sum of immigration to their own major region by using the in-migration proportion coefficient.

## 3. Correctness and accuracy of data

Municipal projections should be compiled for all municipalities with the same principles. It would be impossible to treat municipalities "individually", and therefore there have always been and will always be cases where e.g. the calculation period of the projection coefficients has somehow been exceptional for a municipality, which causes the projection to differ from the trend development in either direction.

The projection deviations for small municipalities are primarily due to their projection coefficients not corresponding to the actual level of out-migration, in-migration, fertility or mortality. Small municipalities must be combined into larger entities in order to reduce random variation.

In previous population projections the whole country was divided into four mortality areas. The number of mortality areas used now is much higher. The number of mortality areas has been increased so that regional differences in the level can better be taken into account. The population projection by municipality has previously had some over-mortality. In order to reduce random variation, mortality coefficients have been calculated for a longer period and mortality coefficients for the whole country have been used for certain age groups (0 to 17 and 90 to 104+).

## 4. Timeliness and promptness of published data

Statistics Finland has prepared population projections by municipality at intervals of roughly three years. In the intervening years, projection calculations were made concerning the whole country on the basis of various assumptions, e.g. the low, average and high alternative. In recent years alternative calculations have been made mainly only as chargeable assignments, in which case the calculations have been based on the assumptions specified by the customer.

In connection with the 1998 projection a so-called stochastic forecast was calculated for the whole country with the PEP software (Program for Error Propagation) developed at the University of Joensuu. In it the population change components vary like they have varied in the past, and from the produced projection database e.g. the range of some statistical information can be derived with the desired probability. (For further information, see Juha M. Alho: A Stochastic Forecast of the Population of Finland. Katsauksia 1998:4).

The 2021 projection extends to the year 2070. It has been published by region up to the year 2040.

## 5. Accessibility and transparency/clarity of data

Up to 1972, population projections by municipality were published in the "Tilastollisia tiedonantoja" series, then until 1985 in the "Tilastotiedotus VÄ" series and after that in the OSF Population series. Municipalities' projected figures by age group were published as a separate volume of the 1969 projection, while age group data by municipality from later projections were available as photocopies. In the 1990s the data were mainly supplied as Excel tables. Previous projection files by municipality were not retained. Data on the population projections made in 2001, 2004, 2007, 2009, 2012, 2015, 2018, 2019 and 2021 are available in electronic format.

Data from the latest projection are available free of charge from the Px-Web StatFin service on the Internet at http://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/StatFin__vrm__vaenn/?tablelist=true

## 6. Comparability of statistics

Statistics Finland's population projections are long-term projections. Therefore, they do not always give a reliable picture of e.g. the number of births or deaths in the coming years. Since the 1970s the birth rate has fluctuated up and down so that the total fertility rate has varied between 1.35 (2019) and 1.87 (2010). In population projections fertility has been kept constant at some average or initial level, because it would be impossible to guess the turning points in development. Likewise, mortality has fallen quickly at times and slowly at others. In the projections, the change coefficients for mortality have been calculated for around 20–year periods so that they would include periods of both quick and slower lowering.

When comparing different projections, differences in the projection assumptions should be taken into account. Many municipalities prepare their own population projections, whose assumptions may deviate greatly from those used in Statistics Finland's projections. In addition to Statistics Finland, population projections concerning the whole of Finland are produced by e.g. Eurostat and the UN.

## 7. Coherence and consistency/uniformity

In Statistics Finland's population projections, the population figures for each year refer to the situation on 31 December. In the projections by Eurostat and many municipalities, the figures refer to the situation on 1 January. In the UN projections, the figures represent the situation in the middle of the year.

## Inquiries

Markus Rapo          029 551 3238
Head of Department in charge:
Hannele Orjala

vaesto.tilasto@stat.fi
www.stat.fi
Source: Population projection 2021-2070. Statistics Finland