Documentation of statistics for Population Projections 2023

1 Introduction

A population projection gives an estimate of the size and composition of the future population with respect to sex, age, municipality and origin. The estimate is subject to a number of conditions and assumptions on migration, mortality and fertility. The projection is based on the assumption that the development in recent years continues. Often the development in e.g. in-migration is different from what was assumed and, for that reason, the projection will typically not match the actual development exactly.

Statistics Denmark has prepared population projections since 1963. Since 2010, the projections have been produced in collaboration with DREAM (Danish Research Institute for Economic Analysis and Modelling), which is an independent institution whose purpose it is to develop and maintain tools for structural policy analysis.

2 Statistical presentation

Based on the projection for all of Denmark, Statistics Denmark subsequently makes projections that can be disaggregated by sex, age, provinces and municipalities. As part of the projections, figures are also available on demographic changes in terms of liveborn children, deaths, immigrants and emigrants.

2.1 Data description

Each year in February, Statistics Denmark delivers a vast volume of data to DREAM regarding immigration, emigration, liveborn children, deaths, population and change of citizenship, which can be disaggregated by sex, age and ancestry group. DREAM runs the actual projection model.

Statistics Denmark and DREAM regularly discuss the model assumptions regarding immigration, fertility and mortality to assess whether changes should be made in the projection model. Once the model for the whole country is declared ready, Statistics Denmark receives data from DREAM. The received data is the statistical basis of the release of the country projection as well as essential background data for the regional projections run by Statistics Denmark.

The population projection for the whole country can be disaggregated by sex (men and women), age (all individual ages from 0 to 109 years), ancestry (Danish origin, immigrants, descendants) and origin (Denmark, Western countries, non-Western countries) as well as year (2023-2060).

The year 2023 covers actual population as per 1 January 2023 The years 2024-2060 are projection years that also refer to 1 January of the year.

The population projection for provinces can be disaggregated by sex (men and women), age, (individual ages from 0 to 99 years as well as 100+, provinces (11 groups) and year (2023-2045).

The population projection for municipalities can be disaggregated by sex (men and women), age, (individual ages from 0 to 99 years and 100+, municipalities (98 groups) and year (2023-2045).

In 2015, Statistics Denmark initiated a thorough review of the population projection at municipal and regional level. As a result of this work, a number of adjustments have been made of the basis for the municipal population projection. These adjustments will result in a better projection of the demographic development at municipal level. For further information, see the subject page on population projection.

2.2 Classification system

The projections can be shown for the whole of Denmark or broken down geographically by regions (5), provinces (11) and municipalities (98). The correlation between the different geographical areas is available on the classification page for [Regions, provinces and municipalities](#).

2.3 Sector coverage

Not relevant for these statistics.

2.4 Statistical concepts and definitions

Immigration: In the projection, immigration includes only persons who come to Denmark during a year and who are in the population by the end of the year.

Emigration: In the projection, emigration includes only persons who emigrate from Denmark during a year and who have not returned to Denmark by the end of the year.

Ancestry: Breaks down the population in persons of Danish origin, immigrants and descendants. A person is of Danish origin if he or she has at least one parent who is both born in Denmark and has Danish citizenship. Neither immigrants nor descendants have that. The difference between the two is that descendants are born in Denmark, whereas immigrants are born abroad.

Country of origin: The projection can show the categories Denmark, Western countries and non-Western countries. Western countries include all 27 EU countries as well as Andorra, Iceland, Liechtenstein, Monaco, Norway, San Marino, Switzerland, the United Kingdom, the Vatican City State, Canada, USA, Australia and New Zealand. Non-Western countries include all other countries.

2.5 Statistical unit

Persons.

2.6 Statistical population

The population in Denmark as at 1 January of all projection years.

2.7 Reference area

There are three projections covering the whole of Denmark, the 11 provinces and the 98 municipalities respectively..

2.8 Time coverage

A new projection is made each year. Each projection is a new set of statistics.

2.9 Base period

The actual population as at 1 January 2023 is the baseline of the projections.

2.10 Unit of measure

Persons.

2.11 Reference period

The reference period of the 2023 projection is all years from 2023-2060. To assess the size of the population for each year, the reference date is 1 January, whereas liveborn children, deaths, immigrants and emigrants concern changes throughout the year.

2.12 Frequency of dissemination

Annual.

2.13 Legal acts and other agreements

Population data is used as historical data for the projections. Population data is based on data extractions from the Danish Civil Registration System, which may be used for statistical purposes according to section 6 of Act on Statistics Denmark (see consolidating act no. 599 of 22 June 2000).

2.14 Cost and burden

The statistics are based on administrative registers. This means that there is no direct reporting task involved in the compilation of these statistics.

2.15 Comment

See more at [DREAM's]((https://dreamgruppen.dk/) or the subject page on Population and population projection website

3 Statistical processing

The population projections are based on historical data regarding the composition of the population in terms of sex, age and ancestry as well as fertility, mortality, immigration and emigration, and internal migration.

Assumptions on the future development in fertility, mortality and migration are necessary to be able to make the projections.

The projections are made every year using the population on 1 January. They are released in the beginning of May.

A projection is made for the whole country as well as projections for the 11 provinces and 98 municipalities.

3.1 Source data

The civil registration system (CPR) is the source of all basic data used in the projections.

3.2 Frequency of data collection

All data used in the projections is annual data.

3.3 Data collection

All population data originates from the civil registration system (CPR). Thus administrative data is applied.

3.4 Data validation

There is no troubleshooting of input data, since CPR validates data themselves. Cancellations/corrections from CPR are updated in Statistics Denmark's database as they arrive.

3.5 Data compilation

In practice, a projection is first made for the whole of Denmark, then the provincial projection, which is balanced against the country projection. Subsequently, the municipal projection is made, where he municipalities' provincial total is balanced against the results from the provincial projection.

Below you will find a description of how the key parameters used in the model are handled. The description regarding the country projection is reproduced from DREAM's documentation.

Births

The number of births in a given year depends partly on the age-specific fertility and partly on the number of women of childbearing age. The age-specific fertility indicates how many children a woman of a given age has on average. By multiplying the age-specific fertility for all ages with the number of women of the given age, you get an estimate of the number of births.

The projection period applies a projection of the age-specific fertility where short-term development is determined by the present trend in fertility, while long-term fertility converges towards a long-term level.

The total number of newborn babies is broken down by sex, assuming that a constant share of all newborn babies are boys. The share of baby boys is calculated based on the historic data period that is available. Based on the mother's group of origin, the origin of all newborn babies is determined using a probability distribution to end up in separate groups of origin. The probability distribution is constructed on the basis of historic experiences.

At the municipal and provincial level, age-specific fertility rates are calculated on the basis of the average for the last four years. The development in the municipalities' fertility rate is balanced against the development for the province. In this way, differences between the municipalities are maintained. Municipalities have different baselines when it comes to fertility, but they develop by the same rate. This balancing procedure where a course for the fertility that is presupposed in the projection for the whole country rubs off on the regional (provincial) fertility via a balancing procedure. This ensures coherence between the number of births in the provincial projection and the number of births in the country projection.

Via a similar balancing procedure, agreement is ensured between the number of births in the provincial projection and the number of births in the municipal projection. This ensures that the sum of figures for provinces and municipalities corresponds to the numbers in the country

projection. The geographical fertility differences are maintained throughout the projection period.

Immigration

Immigration to Denmark in a given year is divided into two types of immigration in the projection model. Population groups without Danish citizenship account for a given inflow of immigrants differentiated on the basis of right of residence, while population groups with Danish citizenship account for re-immigration, which is calculated on the basis of immigration rates. The re-immigration rate is assumed to be constant in the projection period.

In the projection at municipal level, no distinction is made between in-migration from abroad (i.e. immigration) and in-migration from other municipalities.

Deaths

The number of deaths in a given year depends partly on the age-specific mortality rate and partly on the number of persons at each age. The age-specific mortality rate indicates the probability of dying at a given age. By multiplying the age-specific mortality rate for all ages by the number of persons at each age, you get an estimate of the number of deaths.

A projection of the age-specific mortality rate is used as future mortalities. In this projection, it is assumed that the future development in a given age-specific mortality can be derived from the historic development in the age-specific mortalities.

In the regional projections, the calculations are based on mortality rates disaggregated by sex and age for all provinces. Mortality rates for the last four years are used in the calculations. The development in the country projection is applied to the provinces in connection with a balancing procedure, which ensures that the sum of deaths in the provinces matches the number of deaths in the country projection. The mortality differences between the provinces are thus maintained throughout the projection period.

Mortality rates are not calculated at municipal level. Mortality rates for each municipality are based on the last four years' mortality rates for the province to which the municipality belongs. In practice, information is required for all ages from 0 to 110 years, and because of the stringent level of detail required, calculations are not made for the individual municipalities. It is thus assumed that mortality is the same for all municipalities in a given province. The development in mortality is given by the development in the projection for the whole country. Each province has a different baseline when it comes to mortality, but they develop by the same rate. Coherence is ensured between the number of deaths in the provinces and the number of deaths in the municipal projections through a balancing procedure.

Emigration

The number of people who emigrate from Denmark in a given year depends partly on the age-specific emigration rates, which also depend on origin and basis of right of residence, and partly on the number of persons at each age. The emigration rates are calculated based on historic data. By multiplying the age-specific emigration rate by the number of persons of a given age and given origin and basis of right of residence, you get an estimate of the number of people who emigrate from Denmark. The emigration rate is assumed to be constant throughout the projection period.

In the projection at municipal level, no distinction is made between out-migration to other countries (i.e. emigration) and out-migration to other municipalities.

In-migration and out-migration

In the municipal projection, no distinction is made between internal migration on the one hand and

immigration and emigration on the other. Anyone taking up residence in a municipality is part of an in-migration, regardless whether he or she comes from abroad or from another municipality. The same applies to migration out of a municipality. This is out-migration, regardless whether people move abroad or to another municipality. This also applies to the provincial projection, where no distinction is made between migration due to movements between provinces in Denmark and migration as a result of immigration and emigration.

Data for the last four years is applied for migration. For each municipality, out-migration rates are calculated for all ages and both sexes. For each municipality, it is calculated for each age and sex how much of total in-migration to the province the municipality accounted for in the last four years. In-migration is calculated based on the relevant province/municipality's share of total in-migration into provinces/municipalities in the country in the last four-year period.

Both out-migration rates and in-migration shares for the last four years are assumed to be constant throughout the projection period. It is presumed that the moving pattern for the individual provinces and the individual municipality throughout the projection period corresponds to the average of the sex-specific and age-specific out-migration rates in the last four-year period. Since 2016, a different method has been applied. For these years, Statistics Denmark has distributed the in-migration of refugees according to the distribution plan for refugees determined by the Danish Immigration Service.

Any other in-migration is distributed according to out-migration rates and in-migration shares for the last four years.

Change of citizenship

The number of people without Danish citizenship who change citizenship in a given year is determined based on the age-specific change of citizenship rate. This is multiplied at each age by the number of people without Danish citizenship, whereby you get an estimate of the number of persons who change citizenship. The change of citizenship rate is assumed to be constant in the projection period.

The first projection year is calculated for each sex and age group, balanced against the projection for the country or province, and the result then becomes the opening population the following year with the age plus one year.

In the calculation of the provincial projection, out-migration rate is first multiplied by mortality of the opening population. The relationship between the number of deaths in the country projection and the sum of the calculated number of deaths for all provinces is taken into consideration, so that the sum is balanced. The balanced number of deaths and the out-migration number are deducted from the opening population of the province, and the remaining population in all provinces is summed up. The difference between this figure and the country projection estimate for the closing population is multiplied by the share that the province has received on average of all in-migrants in all provinces in the last four years (for each sex, age).

The number of children born is calculated as the sum of all one-year fertility multiplied by the average number of women in the age group ((opening+closing year)/2). Boys account for 51.4 of these, girls account for the remaining. The number of children born is balanced against the country projection. Out-migration, deaths and in-migration of 0-year-olds is calculated as for the other age groups. The total closing population is calculated, and it then constitutes the opening population of the next projection year - only difference being that everybody is a year older. Input data for the regional model consists of:

1. Calculated fertility, mortality and in- and out-migration rates for all provinces and municipalities
2. Opening population in municipalities and provinces the first year

3. Data from the country projection and later the provincial projection is used to balance population, births and deaths of the separate projection years.

The first two products are based on Statistics Denmark's population registers, which in turn reflect events registered in the civil registration system (CPR).

Fertility, mortality and migration rates are based on the average of the last four years' data for provinces and municipalities respectively. Data is created for both sexes and age groups 0-109 years, however, fertility is only created for women aged 15-49. Mortality is only created at country level, whereas the other rates are created at both provincial and municipal level.

Fertility is calculated as the number of children born according to the mother's age divided by the average of the opening and closing population's number of women in the given one-year age group in the area. Since this fertility curve is not even in the majority of municipalities and provinces – despite a four-year average – the curve is smoothed using a transreg procedure.

The mortality rate is calculated as the number of deaths in the year divided by the opening population disaggregated by sex, age and province. Since the mortality for the oldest citizens is based on a few events, a smooth curve is made for people above the age of 90 based on the mortality curve for the 60-89-year-olds. Mortality at the provincial level is used in the provincial projection as well as in the projection for all municipalities in the province.

In addition, the opening population in provinces and municipalities at the beginning of the year and output data from the country and provincial projections, respectively, are loaded for balancing of each projected year.

Please refer to the extensive documentation of the projection, which is available at DREAM's website. Documentation of the projection is also available on the subject page on Population and population projection.

3.6 Adjustment

Not relevant for these statistics.

4 Relevance

The projections for municipalities are widely used by the municipalities, and they create the basis for the municipalities' own projections, which often incorporate a number of local factors that are not part of Statistics Denmark's projections. The municipalities may use the projections in their planning of institutions, schools and the need for nursing homes in the future. Local media across the country take great interest in Statistics Denmark's projection.

4.1 User Needs

Municipalities, regions, ministries, professional and industrial bodies, research establishments and private businesses as well as news media such as newspapers, radio and television and private individuals are some of the users of the population projections.

The projection for the whole of Denmark is made in collaboration with DREAM, which uses the projections as key input in their combined model system. The purpose of DREAM's full model system is to be able to offer an opinion on the long-term development in public finances. A number of businesses offer to work out local projections, e.g. COWI and KMD. Statistics Denmark's results from the municipal projections are incorporated as a basis in their own model, which some municipalities apply to get projections with other scenarios.

Some municipalities want projections at a more detailed level than the municipal level, and Statistics Denmark has been requested to make this type of projections as special data runs. However, Statistics Denmark has estimated that the uncertainty of sub-municipal projections will be too high for Statistics Denmark to offer them. It is the uncertainty regarding in-migration and out-migration in particular that is estimated as too high.

There are also users who would like municipal projections to be disaggregated by groups of ancestry. Due to the extensive requirements to very detailed background data, however, Statistics Denmark estimates that the vast majority of municipalities do not have enough immigrants and descendants for this to be doable. Nor does Statistics Denmark make special projections for individual municipalities, as the projections are indeed a coherent system in which the projection for all municipalities is run simultaneously, and where they are balanced against the levels from the country projection.

4.2 User Satisfaction

In 2015, Statistics Denmark received two requests from municipalities that argued that the projections for the municipalities in question were way off compared to the actual development and that this had gone on for years. Even though there may be significant differences between the projected and the actual population development, the requests afforded grounds for Statistics Denmark to reconsider whether there was room for improvement of the basis of the municipal projection. For that reason, Statistics Denmark initiated a thorough review of the population projection at municipal and regional level.

4.3 Data completeness rate

Not relevant for these statistics.

5 Accuracy and reliability

The population projection is built on previous years' development and is an estimate of the population development. The estimate is subject to a number of conditions and assumptions on migration, mortality and fertility. The projection is based on the assumption that the development seen in recent years will continue. Often the development in e.g. in-migration is different from what was assumed and, for that reason, the projection will typically not match the actual development exactly.

In 2022, the projection for Denmark was 0.1 percentage points below actual population growth. To a wide extent, the uncertainty at municipal level is linked to the fact that local development plans and local decisions are not part of the model. Especially in 2020 and 2021, the COVID-19 pandemic has created uncertainty. In 2022, 73 per cent of the municipalities were within minus 0.5 percentage points of the actual population growth the first year.

5.1 Overall accuracy

Projections are inherently associated with uncertainty. The purpose of the projection is first and foremost to give an estimate of how the population will develop given a number of assumptions. Whether these assumptions are consistent with the actual development is subject to uncertainty. The further into the future you look, the higher the uncertainty.

In the country projection, it is especially the uncertainty regarding immigration of foreign citizens and the future development in fertility that are worth paying attention to. For the provincial and municipal projections, you should pay particular attention to the uncertainty regarding in-migration and out-migration. It is assumed in the projection that the current migration pattern based on historical data for the last four-year period will stay at the same level throughout the projection period.

The projections are deterministic, i.e. based on historic experiences – if the development that we have seen so far continues then the development in the years to come will be like this. The projection only contains one scenario for the future development. To a wide extent, the uncertainty at municipal level is linked to the fact that local development plans and local decisions altogether are not part of the model. Uncertainty is an important factor, however, the uncertainty is not calculated, nor is it possible to calculate it with the present projection models.

The number of children born in future depends on the development in fertility. The uncertainty in this variable is thus significant because of the uncertainty in the future fertility development. This affects e.g. the number of children in preschool class six years into the projection period.

The future number of deaths is subject to a certain amount of uncertainty due to the unpredictable development in mortality. For a long time, the development in mortality has been declining and for that reason, it may be regarded as simpler to model than fertility and migration. First and foremost, deviations in this component affect the elderly part of the population. Immigration is subject to a significant level of uncertainty due to the highly fluctuating movements and unpredictable development. This applies primarily to immigration of foreign citizens. The number of people immigrating is influenced by conditions in Denmark as well as conditions abroad. The Danish migration policy also has an impact on how many people are granted a residence permit in Denmark.

Emigration is subject to uncertainty due to the highly fluctuating movements in migrations and an unpredictable development. The uncertainty of emigration is also caused by uncertainty in relation to the future immigration. Many immigrants emigrate within a relatively short span of time from their immigration, and high immigration will thus result in high emigration. The uncertainty regarding migration between municipalities in Denmark is important. The number of people

moving to or away from a municipality is affected by e.g. job opportunities, access to housing and financial situation.

If the projection for all of Denmark is inaccurate, this will affect the municipal projections so that they are also inaccurate. Especially in 2015, it turned out that the number of refugees and reunited families was underestimated.

Because the projection model uses a four-year average, the projection will not reflect a trend. If a municipality has a soaring or plummeting population, the model will even out this development. Since the projection is for 25 years ahead in time, it is reasonable to use a more cautious approach to population growth/population decline. The municipal projection is "mechanical" in the sense that it does not incorporate factors beyond the strictly demographic conditions. Thus, the demographic consequences of decisions e.g. to increase housing construction are not included.

Statistics Denmark's population projection has a very important restriction in that the sum of populations projected for municipalities must equal the projected country population. It is not possible to add to the population in one municipality without subtracting a corresponding number from other municipalities. Consequently, it would be possible to make a more accurate projection for the individual municipality seen in isolation if it did not have to be balanced against the result of all other municipal projections.

5.2 Sampling error

Not relevant for these statistics.

5.3 Non-sampling error

The projection describes the future population, which is inherently subject to uncertainty.

If the actual development deviates from the model assumptions, which it is bound to do to some extent, the future population will not correspond to that of the projection.

Assumptions of the 2023 projection for the whole country:

Fertility

Future fertility levels are difficult to predict. No methods can remove the great uncertainty with respect to assumptions on fertility development. In the short term, fertility may show considerable variations. From 2010 to 2011, total fertility in Denmark thus dropped from 1.88 to 1.76.

Long-term levels of fertility:

· Women of Danish origin, Danish citizenship: 1.90 · Women of Danish origin, foreign citizenship: 1.90 · Immigrants, non-Western with Danish citizenship: 1.70 · Immigrants, non-Western with foreign citizenship: 1.96 · Immigrants, Western with Danish citizenship: 1.73 · Immigrants, Western with foreign citizenship: 1.76 · Descendants, non-Western with Danish citizenship: 1.90 · Descendants, non-Western with foreign citizenship: 1.90 · Descendants, Western with Danish citizenship: 1.75 · Descendants, Western with foreign citizenship: 1.75

In the projection of fertility, you maintain the current trend for the first projection year. Only then, fertility will gradually approach the long-term level.

Transition rates:

Newborn babies with a mother who is an immigrant or a descendant can be categorised either as

descendants or as persons of Danish origin. The categorisation of the child depends on the ancestry and citizenship of both the mother and the father. In the projection, newborn babies are broken down by origin in accordance with the pattern applicable in the period 2019-2021. E.g., 18,4 per cent of newborn babies were categorised as of Danish origin when the mother was a non-Western immigrant with Danish citizenship. The shares are kept at the same level throughout the projection period.

The share of newborn babies that are categorised as of Danish origin, disaggregated by the mother's origin and citizenship:

· Women of Danish origin, Danish citizenship: 100 per cent · Women of Danish origin, foreign citizenship: 100 per cent · Immigrants, non-Western with Danish citizenship: 18.4 per cent · Immigrants, non-Western without Danish citizenship: 16.6 per cent · Immigrants, Western with Danish citizenship: 41.3 per cent · Immigrants, Western without Danish citizenship: 18.9 per cent · Descendants, non-Western with Danish citizenship: 100 per cent · Descendants, non-Western without Danish citizenship: 30.9 per cent · Descendants, Western with Danish citizenship: 100 per cent · Descendants, Western without Danish citizenship: 23.0 per cent

Mortality

Age- and sex-disaggregated mortality rates are projected based on the development in the period 1990-2022 using a variant of the Lee-Carter method. Mortality is not disaggregated on different groups of ancestry, which is mostly due to a lack of data on immigrants and descendants. It is thus assumed that the age- and sex-disaggregated mortality rates are the same for persons of Danish origin and all groups of immigrants and descendants. The projection of mortality rates results in life expectancies for 0-year-olds in 2059 of 86.9 years for men and 89.3 years for women.

Immigration and emigration

Immigration to the population groups consisting of persons of Danish origin and descendants is determined based on estimated immigration rates and the size of the resident population in each projection year. The same applies to immigration to the groups of immigrants with Danish citizenship. Immigration propensity is calculated broken down by sex, age, citizenship, origin and - for the groups of immigrants - also basis of right of residence. Immigration propensity is assumed to be constant throughout the projection, which is why a change in the absolute extent of immigration will be reflected in the size of the resident population.

Contrary to the other population groups, immigration to the groups consisting of immigrants without Danish citizenship from Western and non-Western countries is assumed to be determined exogenously. This type of immigration is typically the most sensitive to changes in politics concerning immigration or international matters. Thus, this type of immigration shows the highest variations in the scope of immigration year on year and, consequently, it is challenging to estimate the level ahead. Including the basis of right of residence in the model is estimated to make it easier to determine the extent of gross immigration, as this is now based on the development in immigration for each basis of right of residence rather than on the basis of the total flow. The immigration figures calculated for the projection indicate persons who were not in the population at the beginning of the year and who subsequently immigrate and are in Denmark by the end of the year. This is why they are not directly comparable with the higher figures published in Statbank Denmark. The figures in Statbank Denmark also include persons who immigrate during the year and have emigrated before the end of the year.

Since many immigrants also emigrate each year, net immigration is significantly lower. For all ancestry groups, the annual emigration is based on calculated emigration rates for all groups of sex and age. Emigration rates are kept constant throughout the projection period.

Assumptions of the 2023 projection for provinces:

Fertility

Age-specific fertility rates are calculated at provincial level. For each province, the age-specific fertility rates for the four-year period 2019-2022 are used as a basis. The development in fertility that is assumed in the country projection rubs off on the regional fertility through a balancing procedure, which ensures that the sum of figures for provinces matches the country projection figures. The geographical fertility differences are maintained throughout the projection period. The fertility assumptions are further described in the declaration of contents for the population projection for all of Denmark.

Mortality

In the regional projections, the calculations are based on mortality rates disaggregated by sex and age for all provinces. They are calculated on the basis of the mortality 2018-2022, corresponding to the latest publication of figures concerning life expectancy. The development in the country projection is applied to the provinces in connection with a balancing procedure, which ensures that the sum of deaths in the provinces matches the number of deaths in the country projection. The mortality differences between the provinces are thus maintained throughout the projection period.

Out-migration

It is assumed that the moving pattern for the individual provinces throughout the projection period corresponds to the average of the sex-specific and age-specific out-migration rates in the period 2019-2022. In the provincial projections, no distinction is made between out-migration due to internal migration in Denmark and out-migration due to emigration. Out-migration is not calculated at regional level.

In-migration

The number of refugees in 2023 and 2024 is distributed based on municipal quotas for refugees.

Any other in-migration is calculated on the basis of the relevant province's share of other in-migration in the period 2019-2022. In the provincial projections, no distinction is made between in-migration due to internal migration in Denmark and in-migration due to immigration. In-migration is not calculated at regional level.

Assumptions of the 2023 projection for municipalities:

Fertility

Fertility is based on age-specific fertility rates calculated separately for all of the 98 municipalities for the four-year period 2019-2022. The fertility development assumed in the projection for the whole country rubs off on the regional (provincial) fertility via a balancing procedure, which ensures coherence between the number of births in the provincial projection and in the country projection. Via a similar balancing procedure, agreement is ensured between the number of births in the provincial projection and the number of births in the municipal projection.

Mortality

In the municipal projections, the calculations are based on mortality rates by sex and age for the province in which the municipality is located. They are calculated on the basis of the mortality rate 2018-2022, corresponding to the latest publication of figures concerning life expectancy. In the calculations, it is assumed that all municipalities within a province have the same mortality. Coherence is ensured between the number of deaths in the provinces and the number of deaths in the provincial projection using a balancing procedure, which at the same time applies the country projection's development in mortality in all provinces, but maintains the regional differences in

mortality rate.

Out-migration

For each municipality, sex-specific and age-specific out-migration rates are calculated on the basis of out-migration in 2019-2022. In the municipal projections, no distinction is made between out-migration due to internal migration in Denmark and out-migration due to emigration.

In-migration

The number of refugees in 2023 and 2024 is distributed based on municipal quotas for refugees.

Any other in-migration is calculated on the basis of the relevant municipality's share of other in-migration in the period 2019-2022. In the municipal projections, no distinction is made between in-migration due to internal migration in Denmark and in-migration due to immigration.

5.4 Quality management

Statistics Denmark follows the recommendations on organisation and management of quality given in the Code of Practice for European Statistics (CoP) and the implementation guidelines given in the Quality Assurance Framework of the European Statistical System (QAF). A Working Group on Quality and a central quality assurance function have been established to continuously carry through control of products and processes.

5.5 Quality assurance

Statistics Denmark follows the principles in the Code of Practice for European Statistics (CoP) and uses the Quality Assurance Framework of the European Statistical System (QAF) for the implementation of the principles. This involves continuous decentralized and central control of products and processes based on documentation following international standards. The central quality assurance function reports to the Working Group on Quality. Reports include suggestions for improvement that are assessed, decided and subsequently implemented.

5.6 Quality assessment

The purpose of the projection is primarily to give an estimate of how the population will develop given a number of assumptions. Whether these assumptions are consistent with the actual development is obviously subject to uncertainty. The further into the future you look, the higher the uncertainty.

In the country projection, it is especially uncertainty regarding immigration of foreign citizens and the future development in fertility that are worth paying attention to.

For the provincial and municipal projections, you should pay particular attention to uncertainty regarding in-migration and out-migration. It is assumed in the projection that the current migration pattern based on historical data for the last four-year period will remain at the same level throughout the projection period.

The projections are deterministic and, for that reason, they contain only one scenario for the future development. However, uncertainty is an important factor, but uncertainty is not calculated, nor is it possible to calculate using the present projection models.

5.7 Data revision - policy

Statistics Denmark revises published figures in accordance with the [Revision Policy for Statistics Denmark](). The common procedures and principles of the Revision Policy are for some statistics supplemented by a specific revision practice.

5.8 Data revision practice

Only final figures are published.

6 Timeliness and punctuality

Statistics have been published as announced without delay in the month of May or June.

6.1 Timeliness and time lag - final results

Published annually in May/June. Data used as a basis for the projections is available in mid-February.

6.2 Punctuality

The statistics are released without delay according to the pre-announced publication date under Scheduled Releases.

7 Comparability

Each projection is a new set of statistics and must not be used for time series together with previous projections.

With the projection 2010, Statistics Denmark made the projection for all of Denmark for the first time in collaboration with DREAM, and in connection with this, a switch was made to a new projection model based on DREAM's previous model.

7.1 Comparability - geographical

The projections for provinces and municipalities are made in the same way for all provinces and municipalities, and for that reason, the results are comparable.

Eurostat also makes population projections for all EU countries, including Denmark. The results of two different projections will always vary, since there are practically endless ways to make the assumptions in the projections. This is why the results from Eurostat's projection are different from those of Statistics Denmark.

7.2 Comparability over time

If you compare results of projections from different years, you must pay attention to the fact that the assumptions change from one year to the next. You can always consider the latest projection to be the most up-to-date.

In 2015-2016, a thorough review was completed of the population projection at municipal and regional level. As a result of this work, a number of adjustments were made of the basis for the municipal population projection.

7.3 Coherence - cross domain

In the projections, the definitions of the concepts immigration and emigration differ from those of other statistics. In the projections, immigration includes persons who were not in Denmark at the beginning of the year, who immigrated during the year and were in Denmark by the end of the year. In the projections, emigration includes persons who were in Denmark at the beginning of the year, who emigrated during the year and had not returned to Denmark by the end of the year. In Statistics Denmark's published figures for immigration and emigration, all movements are counted. Including e.g. immigrants who emigrated before the end of the year.

Since the projection's population delimitation is made by year of birth and year of event, the age of people who died and net immigrated in the population projection is stated as at the end of the year and not as their age at the time of the event.

In the projection, we project the population from one turn of the year to the next. As a result, people moving several times in a year contribute with only one move or no move if they live in the same municipality at the beginning and at the end of the year. This also applies to immigration and emigration.

7.4 Coherence - internal

The projections for the whole country, provinces and municipalities are in fact three different projections. However, the aim is to ensure coherence between the three of them, as the projections for provinces and municipalities are adjusted to the projection for the whole country.

Due to rounding, however, there are a few minor differences.

8 Accessibility and clarity

The population projections are published in Nyt fra Danmarks Statistik (Statistics Denmark's news series in Danish) under the subject Befolkningsfremskrivning. For further information, go to the subject page for these statistics.

8.1 Release calendar

The publication date appears in the release calendar. The date is confirmed in the weeks before.

8.3 User access

Statistics are always published at 8:00 a.m. at the day announced in the release calendar. No one outside of Statistics Denmark can access the statistics before they are published.

8.2 Release calendar access

The Release Calender can be accessed on our English website: [Release Calender](#).

8.4 News release

The population projections are published in our news series Nyt fra Danmarks Statistik (in Danish) on the day that the year's projection is released.

8.5 Publications

Ikke relevant

8.6 On-line database

The statistics are published in the StatBank Denmark under [Population projections](#) in the following tables:

- [FRDK123](#): Population projections 2023 for the country by ancestry, sex, age and time
- [FRDK223](#): Key figures 2023: Summary components of changes according to population projection by ancestry, type of movement and time
- [FRDK323](#): Assumptions of fertility for the population projection 2023 by age, ancestry and time
- [FRDK423](#): Assumptions of mortality for the population projection 2023 by sex, age, life table and time
- [FRDK523](#): Assumptions of migrations for the population projection 2023 by sex, age, ancestry, movement and time
- [FRLD123](#): Population projections 2023 by region, age, sex and time
- [FRLD223](#): Key figures 2023: Summary components of changes according to population projection by region, type of movement and time
- [FRKM123](#): Population projections 2023 by region, age, sex and time
- [FRKM223](#): Key figures 2023: Summary components of changes according to population projections for municipalities

8.7 Micro-data access

The annual version of the projection is kept in sets of summarised data. The data sets contain information on persons broken down by population group, sex, one-year age groups and projection year. Micro-data on an individual level is not relevant for the projections.

8.8 Other

Not relevant for these statistics.

8.9 Confidentiality - policy

Confidentiality is not relevant for the projections as the future population is a calculated quantity that cannot be disaggregated on an individual level.

8.10 Confidentiality - data treatment

Confidentiality is not relevant for the projections as the future population is a calculated quantity that cannot be disaggregated on an individual level.

8.11 Documentation on methodology

The projection model and methods are described in detail in Denmark's future population – population projection 2013 by DREAM, which can be downloaded from [DREAM's website.] https://www.dreamgruppen.dk/) website.

8.12 Quality documentation

Results from the quality evaluation of products and selected processes are available in detail for each statistics and in summary reports for the Working Group on Quality.

9 Contact

In terms of administration, the division Population and Education is responsible for these statistics. Annika Klintefelt is the head of statistics, tel. +45 39 17 36 78, e-mail: akf@dst.dk

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