

HUMAN FERTILITY DATABASE DOCUMENTATION: ITALY

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WARNING:

**There are significant data quality issues regarding the data for Italy.
Especially the birth data by birth order should be used with caution. See Section 5 for details.**

1 General information

This report documents data on live births by age of mother and birth order for Italy, collected for the Human Fertility Database (HFD) project. Time series of assembled age-specific data on births cover the years between 1952 and 2021. Data on births by month cover the period between 1900 and 2021. The report includes complete documentation of the official data on birth counts obtained from the National Institute of Statistics (Istat) of Italy, vital statistics publications, and data provided by the Observatoire Démographique Européen (ODE).

Age-specific birth count data since 1954 that are used in producing the HFD output are specified in Appendix 1. Birth counts for 1952–1953, and birth counts by birth order 1–4+ (or 1–3+) for 1954–2003 are not used for the calculation of HFD output, but they are available in the input file, which is also published on the country page of Italy.

All the input data used for generating the HFD output data and indicators are specified in Appendix 1.

1.1 Territorial coverage

The territory of Italy has not changed since 1954, when the province of Trieste was ceded back to Italy. All data for 1954–2021 included in the HFD refer to the current territory of Italy, as do monthly totals of births in 1900–1953 from the ODE. Registration of births in the period since 1954 is considered complete and covers the entire territory of Italy. For more details about territorial changes in Italy before 1954, consult the Human Mortality Database (HMD) country documentation file (Glei et al. 2024).

At present Italy is divided into 5 territorial units (NUTS 1), 20 regions (NUTS 2) and 110 districts (NUTS 3). Furthermore, Italy has about 8,100 municipalities (*comuni*). According to the 2021 Census, Italy has a population of 59.0 million.

1.2 Data collection and availability

The collection and dissemination of information on births in Italy is quite complex, as the data have undergone several significant changes in the past. In principle, there are primary sources of data (the data originally collected and disseminated) and secondary sources (where the data for the HFD come from). There is also a difference between the sources of data on births by age of mother and on births by month. References to the sources of all the data included in the HFD are available in the References file (the Input data section) on the country page of Italy. The list of the sources of data used for the HFD calculations can be found in the Sources file.

At present, the primary source of birth data in Italy are the *Municipal Resident Population Registers*. All births have to be recorded in the municipal population registers at the place where at least one parent is registered as a resident, even if the birth took place in another municipality or abroad. These data are then sent to the statistical office as individual forms. The main category used in the current demographic statistics and population censuses is thus *resident population*. This category includes all persons who permanently reside in the country and are registered in the municipal resident population registers. Live births to non-resident parents are excluded from the total number of live births. Live birth reference time is that of registration at the resident population register, not the actual time of birth.

In 1981, the vital statistics collection system changed from covering the *present (de facto) population* to the *resident (de jure) population*. Sections 2.1–2.6 discuss this issue in more detail.

The National Institute of Statistics (*Istituto Nazionale di Statistica*, Istat), formerly known as the Central Institute of Statistics (*Istituto Centrale di Statistica*), has been the main supplier of official statistical information in Italy since 1926. It collects and produces information on the Italian economy and society to disseminate it for study and decision-making purposes.

In the demographic domain, the Institute collects and processes data on births, marriages, divorces, deaths and population structures. The vital statistics data cover all inhabitants permanently residing in Italy, regardless of their citizenship. Istat also prepares, collects, processes and publishes data from censuses.¹

A secondary source of data for the period 1954–2003 is the Italian Fertility Database (IFD), an internal database built and maintained by Istat. The IFD contains data on births to the *resident population* since 1952 and is updated each year with data drawn from other Istat sources. Data are available at NUTS-2 level and by cohort of mothers (the first complete cohort is 1933). These data underwent several rounds of adjustments, specific for different periods, as described in detail in the following sections. These adjustment procedures also allowed reconstructing data by birth order.

Data for 2004–2021 were provided specifically for the HFD by the Division for Population Statistics, Istat.

¹ Population censuses took place in 1861, 1881, 1901, 1921, 1931, 1951, 1961, 1971, 1981, 1991, 2001, 2011, and 2021. The distribution of women by the number of live-born children is not available from the census data, however.

1.3 Population statistics accessible online

The Istat website at www.istat.it contains a complete listing of vital statistics publications. An important source of information is the Demo website at demo.istat.it, hosted on the Istat website, which features recent official data on the resident population in Italian municipalities. Data are updated regularly every year. Analyses of key demographic phenomena are also available.

In 2011, for the 150th anniversary of Italian unification, Istat compiled the *Italian Historical Statistical Repository*, available at timeseries.istat.it. The Repository describes environmental, social and economic changes that Italy has undergone from the unification to the present day, through a collection of approximately 1,500 time series. Data are organised into 22 thematic areas, one of them being *Resident population and demographic balance*.

2 Birth count data

Collection and dissemination of birth data varies significantly by historical periods. For clarity, the following text is therefore divided into subsections, describing the respective periods 1952–1968, 1969–1996, 1997–1998, 1999–2003 and 2004–2021.

2.1 Data on births in 1952–1968

For the years between 1952 and 1968, which preceded the introduction of Istat's computer archives, individual birth data were not available. Data on births to the present population in Italy were collected by Istat from the Present Population Registers and published in the *Annuari di statistiche demografiche* (Demographic Statistical Yearbooks), which contained statistics related to marital births. Meanwhile, information on non-marital ("illegitimate") births, for which tables with necessary data are not available, was obtained from unpublished data held in the Istat's historical archive.²

For the period 1952–1968, births were classified according to the place where the birth occurred, not by the mother's residence. The IFD performed an *ad hoc* study in order to verify the correspondence between the age and birth order distributions calculated for births classified by region of residence and by place of event. Given that no substantial or systematic differences emerged between these two distributions, it was concluded that the classification of births by the region of residence of the mother in this period can be approximated by classification by the place of birth. Therefore, the absolute numbers of births refer to the resident population, but the structure of births by mother's age and biological birth order is estimated from the births to the present population.

For 1952 and 1953, those born in what was then Free Territory of Trieste were added to the current region of Friuli-Venezia Giulia. However, because the HFD uses the exposure population from the HMD, which excludes Trieste until 1954, the birth count data for 1952–1953 are not used for the HFD output calculations.

² Data collected at that time included the following information on a newborn: date of birth, legal status of child, order of birth, some details of medical nature, type (single or multiple) and place of birth. Information on parents included main personal and socio-economic details, such as date of marriage, date of birth of any previous children, and existence of any kinship. The part reserved for stillbirths consisted mainly of medical information, e.g. cause of death, type of medical intervention to facilitate birth, time of death, whether before or during the birth, and any congenital malformation of the foetus.

2.2 Data on births in 1969–1996

For this period, individual computerised data are available, but these data had to undergo several adjustments. Most importantly, the classification of births by birth order included only marital children until 1979, and thus data on births by biological birth order, i.e. including children born out of wedlock, had to be reconstructed. However, because the birth order for this period was reconstructed only up to the category of 4+, and the HFD standard classification extends to birth order 5+, the birth order-specific data for these years are not used for the HFD output calculations and are only available in the input data file.

When processing the individual birth records, births with missing information on mother's age and/or birth order (the extent is not known to us) were proportionally redistributed, first by age of the mother and then by birth order. The redistribution was carried out separately for marital and non-marital births, as these two groups have significantly different age and birth order distributions.

2.3 Data on births in 1997–1998

The *Bassanini Law* No. 127/97 on “administrative simplification”, in force since 17 May 1997, prohibited the certificate of assistance at birth from being sent to the registrar to process information on the birth and the baby's health. This caused a break in the data series on births. Up to 1997, births had to be declared at the registers of the municipality where the event took place. The new law made it possible to declare live births also at the registers of the municipality of a parent's residence or at the hospital, and the data collection was extended to all 8,100 Italian municipalities. The *Bassanini Law* thus prevented the continuation of individual data collection of births from the *present population* registers.

The immediate application of the law in the middle of 1997 led to a significant undercount of births in 1997 and 1998: only 496,829 births were counted in year 1997, compared to 528,123 in 1996; in 1998 the count was only 479,463 live births. Numbers of live births by age of mother and birth order were re-estimated using monthly birth data available since 1969. The reconstructed data on births for 1997 and 1998 are available online at http://demo.istat.it/altridati/natid1d2/index_e.html. Again, because the birth order for this period was reconstructed only up to the category 4+, the birth order-specific data for these years are not used for the calculation of the HFD output.

2.4 Data on births in 1999–2003

In January 1999, a new individual data collection form on live births registered in the resident population register (Istat P.4 form) was put in force by Istat, compiled by the resident population registers.

Data on births include all births to permanent residents of Italy, including births that were registered abroad. This individual data collection makes it possible to obtain information at the local municipal level (and by census area) on live births in the resident population, according to the following variables: sex of the new-born, date of birth of the child, place of birth, and citizenship of the child, mother's age and cohort, father's age and cohort, mother's marital status, father's marital status, mother's citizenship and father's citizenship.

The completeness of the birth statistics collection using the P4 form is evaluated against the information collected by Istat through the municipal summary form (forms Istat P.2 and Istat P.3). The total number of births is then inflated to equal the total gathered from these summary forms. The level of coverage of the birth data collection has constantly improved, rising from 95.8% in 1999 to 98.5% in 2010. The structure of live births by birth order was estimated as follows:

- data for 1999 were obtained by interpolation between 1998 and 2000

- data for 2000 and 2001 were estimated using the additional information from the Birth Sample Survey carried out by Istat in 2002
- estimates for 2002 were obtained by interpolation between 2000–2001 and 2003
- data for 2003 were estimated using the second edition of Birth Sample Survey 2005.

However, because the birth order for this period was reconstructed only up to the category 4+, the birth order-specific data for these years are not used for the HFD output calculations.

Birth Sample Survey (BSS, http://demo.istat.it/altridati/nascite2002/index_e.html) was carried out in 2002, 2005 and 2011–2012. For the 2002 and 2005 editions, the sample comprises around 50 thousand births enrolled at the Population Registers 18–21 months before the interview and represents around 10% of the total resident births registered in that period. Mothers were interviewed by means of the CATI technique (Computer Assisted Telephone Interview). The data collection was based on two questionnaires: a short form and a long form. The short form was given to the entire sample and allows representative estimates at the regional level, whereas the long form was given to only one-third of the sample (around 17,000 women), guaranteeing representation at a wider territorial level. The short form questionnaire collects primary socio-demographic information on the newborn, the parents, and the delivery and allows reconstruction of fertility structure by birth order on a regional level. The long form questionnaire contains additional sections about the mother's working conditions before and after childbearing, household composition, formal and informal childcare networks, and the division of household chores. Thus, it represents a valuable source for studying important aspects, such as the interaction between maternity and mothers' participation in the labour market, compatibility between family and work, and the availability of facilities for children. This information is relevant both for understanding recent Italian fertility dynamics and for designing suitable policy measures for helping parents. In the last edition, the BSS was divided into two: a traditional survey on a sample of 18,000 newborns registered in the Resident Population Register in 2009/2010; and a retrospective survey of a sample of 13,000 mothers who had already been interviewed in 2005.

2.5 Data on births in 2004–2021

Since 2004 the Istat P.4 birth form has included a new variable, “number of minors present in the registry card of the family”, which was designed as a proxy of birth order. This information has been tested by an individual record linkage with the information about the order of birth recorded for the same year in the second edition of the Birth Sample Survey. The comparison showed a high degree of correlation between the two variables (number of family members under age 18 and birth order), allowing the introduction of correction procedures for cases of mismatch. This procedure has allowed testing the reliability of this proxy, and since 2004 it has been used to estimate the information about birth order 1 to 5+. This procedure is revised and improved every year, and the cases of missing information of the proxy variable are becoming less frequent.

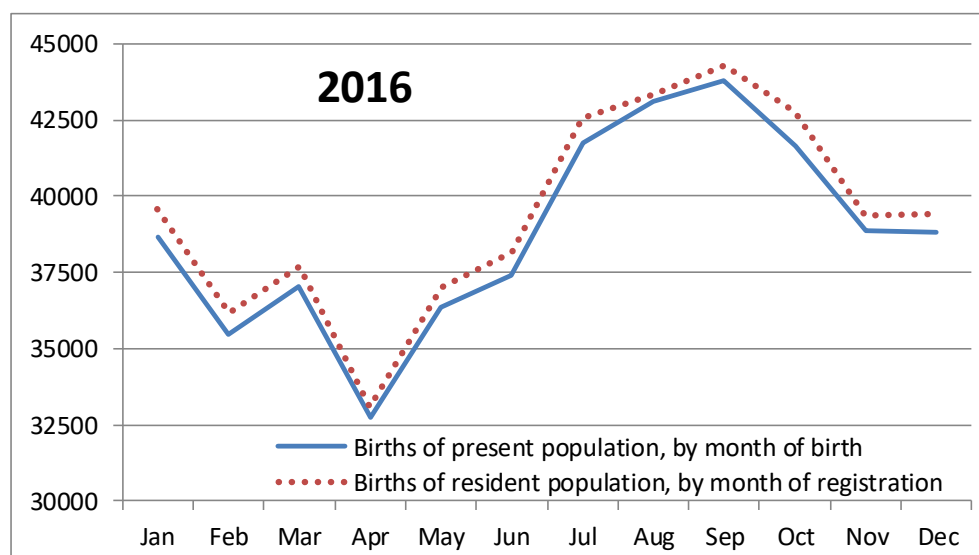
2.6 Births by calendar month of birth

Although births by age of mother refer to the *resident population*, for the monthly distribution of births it is more appropriate to analyse births to the *present population*, which offer time series that are longer and more reliable. Up to 2018, monthly births *to the present population* referred to the *actual month of birth* whereas *births to the resident population* refer to the *month of registration* in municipal resident population registers. This different reference explained slight differences observed between the two data series (Figure 1). In the case of births to the resident population, it can happen that some births that took place in the last period of one calendar year are registered in the first period of the following year.

The data on births to the present population were gathered from the municipal monthly survey on civil status events. This monthly summary form provided the number of births, marriages and deaths declared and registered in the present population register of every Italian municipality.

From 2019 on, HFD uses the new source of ISTAT (RefCode 10), which publishes monthly births by actual birth of month and refers to resident population.

Figure 1 Births to the present population and to the resident population, monthly numbers, 2016



3 Population count data

The annual age structure of women for the purposes of HFD computations is taken from the Human Mortality Database (HMD, www.mortality.org). However, the HMD uses the concept of present population before 1981 and resident population from 1981 onward. While data on births by age of mother in the HFD for the whole period are for the resident population, the fertility indicators for 1954–1980 mix occurrences (live births) among resident population with exposures (female population) based on the present population.

The distribution of women by the number of live born children is not available from the census data.

4 Specific details

4.1 Definition of live birth

Live birth refers to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life, e.g. beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles (current WHO definition of live birth).

4.2 Age

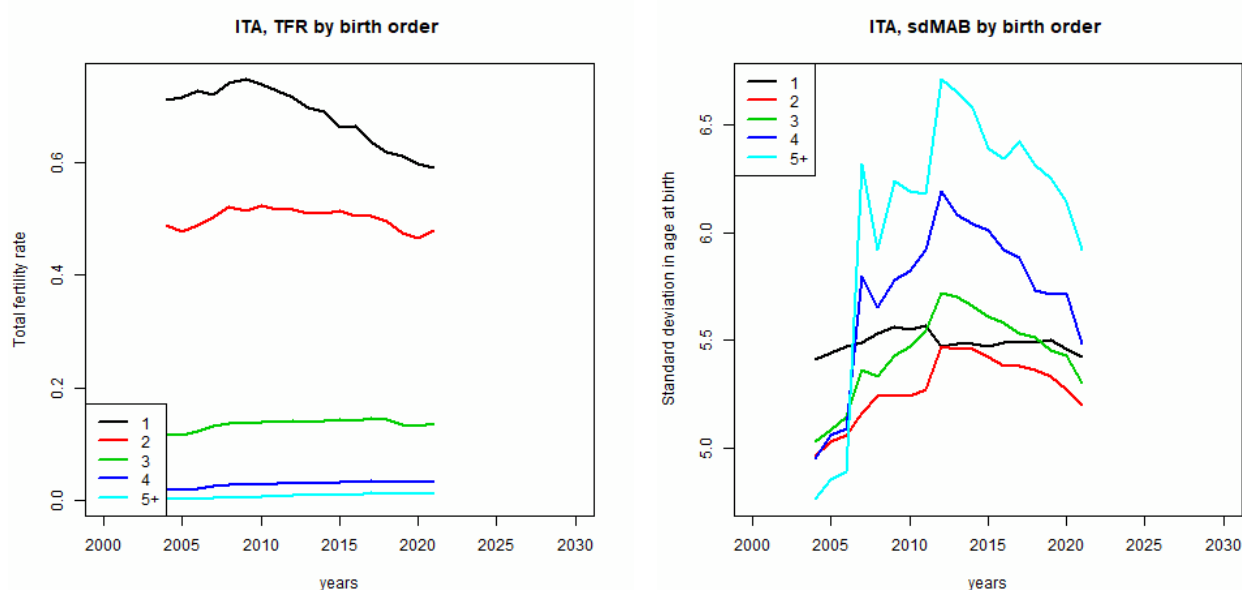
The age of the mother is recorded in completed years. From 2014 the births are available by both age of mother and mother's year of birth (cohort).

4.3 Birth order

Because the reported birth order categories were 1, 2, 3, and 4+ until 1998, and 1, 2, and 3+ for the period 1999–2003, in producing the output the HFD uses data by birth order only for the period since 2004, i.e. up to when a wider range of categories until birth order 5+ can be distinguished. For earlier periods, the HFD uses data combining all birth orders. The birth-order specific data for the period until 2004 are available in the HFD input file.

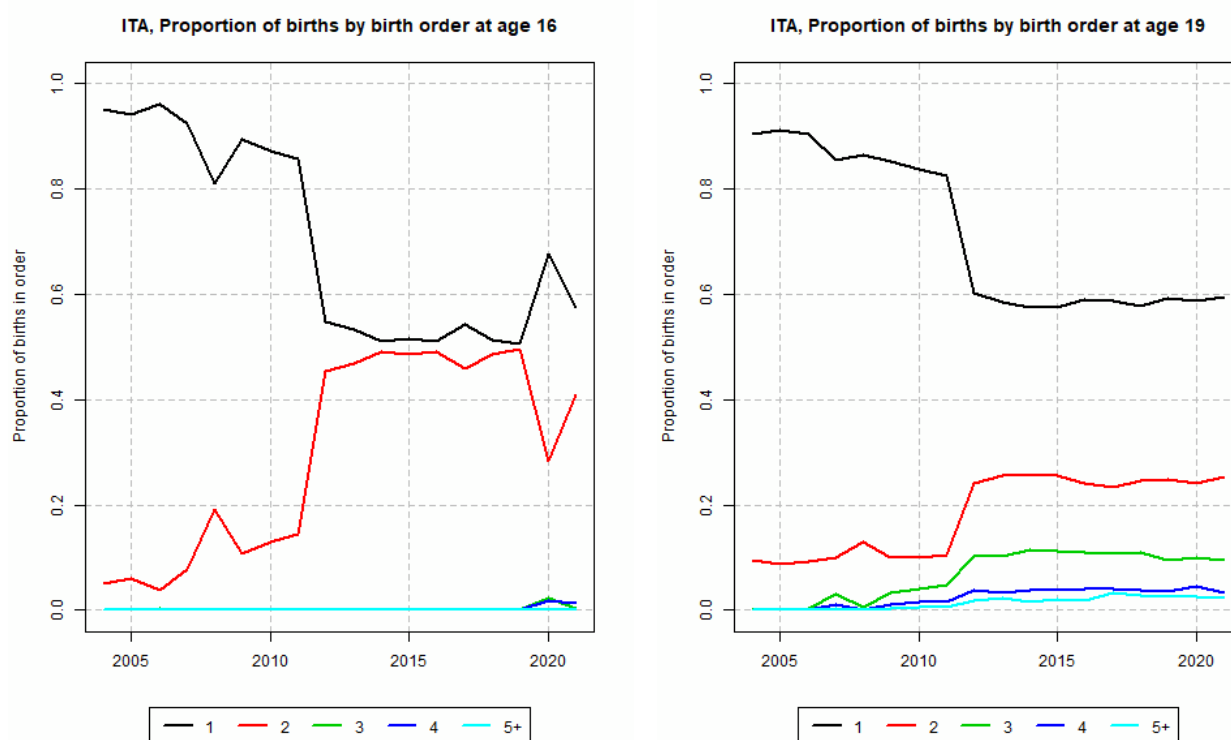
In the period since 2004, direct information on biological birth order is not available, and this information is estimated from the variable “number of minors present in the registry card of the family” on the birth form, as described in Section 2.5. The estimation gives inconsistent results concerning the age schedule of fourth and higher birth orders, manifested by a discontinuity with previous records. Specifically, the mean age at childbearing for birth orders 4 and higher shows a strong and implausible break between 2006 and 2007 (Figure 2). The trends in the period total fertility rate are not affected and do not display such a discontinuity (see Figure 2). These discontinuities affect a very small proportion of births — fourth-order births made up only 1.6% of all births in 2004–2009 and the proportion of fifth and higher-order births was estimated to be as low as 0.3% (however, this share appears implausibly low and thereafter increased to around 1% in recent years).

Figure 2 Total fertility rate and mean age at birth by birth order, Italy, 2004–2021



Another issue is unexpected fluctuations in the number and proportion of births by birth order at young ages (see Figure 3). Between 2011 and 2012, there was a sudden increase in the number and proportion of second births at the ages 15–19. At the same time, there was a sudden increase in the number and proportion of births of the birth order 3, 4 and 5+ at the ages 18–19. The first births dropped inversely. These implausible fluctuations are caused by the fact, that the birth order is not directly recorded in the vital statistics, but rather estimated, based on the variable “number of minors present in the registry card of the family” from the Birth Sample Survey (see section 2.5 for details). The indicators of fertility by birth order at the age below 20 should therefore be used with extra caution.

Figure 3 Proportion of births by birth order at the ages 16 and 18, Italy, 2004–2021



4.4 Legalisation of abortion in 1978

Abortion became legal in Italy in May 1978, when women were allowed to terminate pregnancy on demand during the first 90 days.³ Subsequently, abortion rates among Italian women first rose and then declined steadily, from a peak of 16.9 abortions per 1,000 women of reproductive age in 1983 to 9.8 per 1,000 in 1993. At the same time, a significant decrease of births to young (12–14 years) mothers has been observed.

5 Data quality issues

Here we summarise the present data quality problems noted in the preceding sections and their impact on the output fertility estimates.

5.1 The discrepancy between the present (*de facto*) population and the resident (*de jure*) population

In 1981, the vital statistics collection system changed from covering the *present (de facto) population* to the *resident (de jure) population*. Data on births prior to 1981 were recalculated to births to the resident population by Istat. On the other hand, the HMD population estimates used by the HFD include refer to the present population before 1981 and to the resident population from 1981 onward,

³ Italian women are eligible to request an abortion for health, economic, or social reasons, including the circumstances under which conception occurred. Abortions are performed free-of-charge in public hospitals or in private establishments authorised by the regional health authorities. The law also allows termination in the second trimester of the pregnancy when the life of the woman is at risk, or the foetus carries a genetic or other serious malformation.

i.e. the HMD follows the official statistics. To our knowledge, there are no reliable population estimates of the resident population prior to 1981. Therefore, in the fertility indicators for 1954–1980 occurrences (live births) to the resident population are related to exposures (female population) based on the present population (see Sections 2.1–2.2 and 3 for details). Annual number of births to the resident population are usually by up to 3% higher (except for 2002–2003 when it was 6%) than that to the present population. (Figure 4). At the same time, the resident population is up to 1% more numerous than the present population. As a result, this can be the cause of differences of total fertility rate (TFR) and crude birth rate (CBR) from official values, slightly overestimating the HFD values. And indeed, crude birth rates estimated by the HFD are 0.2–0.8 higher than the official CBR by Istat for the whole period 1954–1985 (differences in 1986–1992 and 1996 are 0.1–0.2). Differences in TFR in 1959–1974 are 0.03–0.04 (Figure 5).

Figure 4 Births to the present population and to the resident population, 1954–2018

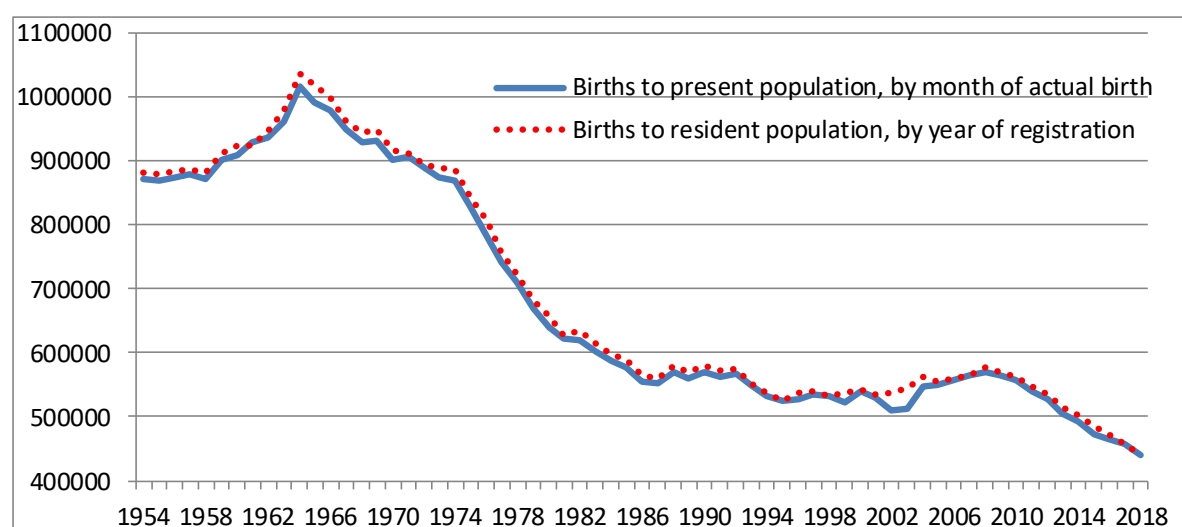
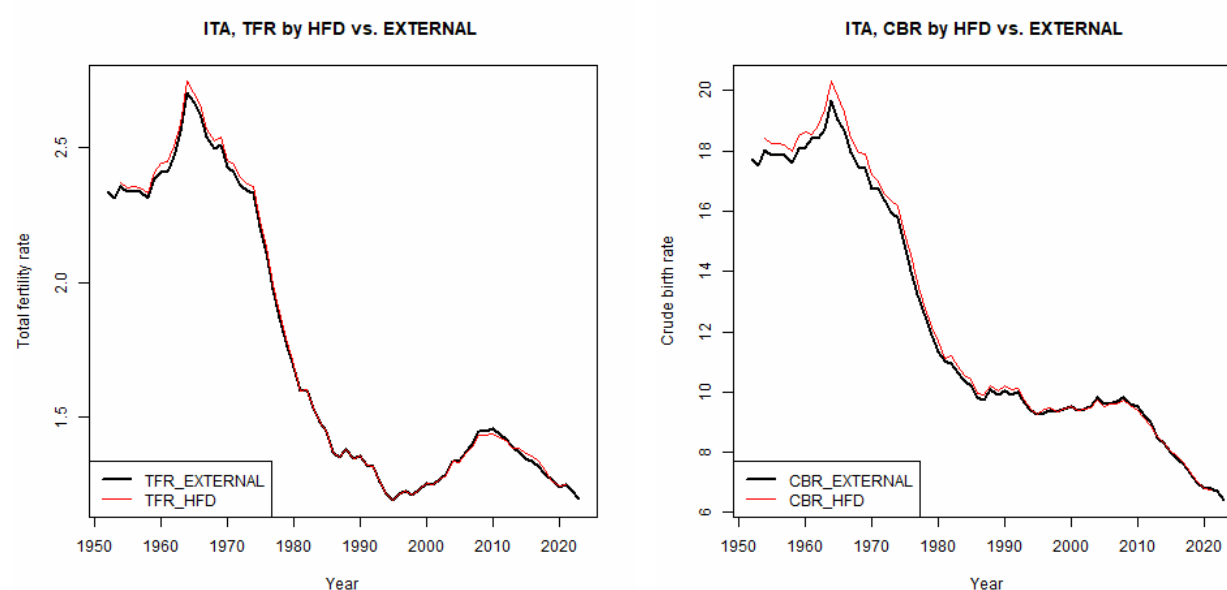


Figure 5 Total fertility rate (TFR) and crude birth rate (CBR), HFD *versus* official Istat estimates, 1954–2021



5.2 Monthly births pertain to the present population, whereas age-specific births pertain to the resident population

Monthly birth data up to 2018 pertain to the present population and refer to the actual month and year of occurrence, whereas births by age of mother pertain to the resident population and refer to the year of registration (see Section 2.6 for details). In the HFD, monthly birth data are used to estimate the share of births born in first and second half of the year, therefore the difference between the two datasets does not influence the results significantly. From 2019 on, HFD uses the new source of ISTAT (RefCode 10), which publishes monthly births by actual birth of month and refers to resident population.

5.3 Inconsistent results concerning higher birth order fertility at very young ages

Direct information on the biological birth order is not available for the period covered by the HFD birth order data (since 2004), and this information is estimated by Istat from the variable “number of minors present in the registry card of the family” on the birth form. The estimation yields inconsistent results concerning the distribution of births of higher birth orders at very young (between 15 and 19) ages, manifested by a discontinuity with the earlier records and implausible levels of higher birth order fertility. See details in Section 4.3 and Figures 2 and 3.

6 Revision history

Changes with the September 2017 revision:

Compared to the previous release as of 12.02.2016, the release includes new data for 2013–2014. The population estimates taken from the HMD were revised for the years 2001–2012. The new population estimates based on updated data published by Istat (2015) are by up to 2% higher as compared to the previous release (see Glei et al. 2024 for details). Accordingly, there are small changes in age-specific fertility rates and summary indicators for period 2001–2012 and corresponding cohorts.

Changes with the March 2020 revision:

The release includes new data for 2015–2017. Monthly births for 2013–2014 were corrected, with no changes in results and indicators.

Changes with the August 2021 revision:

The release includes new data for 2018. Changes in the used HMD population exposures (see Glei et al. 2024) caused small changes in the calculated numbers of births and fertility rates in 2001–2017.

Changes with the May 2022 revision:

The release includes new data for 2019. Monthly births for 2019 come from the new source, and pertain to resident population.

Changes with the September 2023 revision:

The release includes new data for 2020.

Changes with the November 2024 revision:

The release includes new data for 2021.

References

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- ISTAT. 2015. Resident population at NUTS-2 level: new series of estimates for the January 1st 2002-2014 period. Retrieved from <http://www.istat.it/en/files/2015/01/ricostruzione-serie-popolazione-English.pdf?title=New+series+of+estimates+on+resident+population++-+14+Jan+2015+-+Full+text.pdf>

APPENDIX 1 INPUT DATA USED FOR HFD CALCULATIONS

BIRTHS⁴

Period	Type of data	Age range	Birth order	RefCode(s)	Note
1954–1968	Annual number of live births by age of mother (Lexis squares)	-13, 14, ..., 49, 50+	–	1	resident population
1969–1998	Annual number of live births by age of mother (Lexis squares)	-13, 14, ..., 49, 50+	–	1	resident population
1952–1998	Annual number of live births by age of mother (Lexis squares)	-13, 14, ..., 49, 50+	–	1	resident population
1999–2003	Annual number of live births by age of mother (Lexis squares)	-13, 14, ..., 49, 50+	–	2	resident population
2004–2013	Annual number of live births by age of mother and birth order (Lexis squares)	-13, 14, ..., 49, 50+	1, 2, 3, 4, 5+	3	resident population
2014–2021	Annual number of live births by age of mother, mother's year of birth and birth order (Lexis triangles)	-13, 14, ..., 49, 60	1, 2, 3, 4, 5+	6, 8, 9, 11, 13	resident population
1900–1996	Annual number of live births by month	total	total	4	present population
1997–2018	Annual number of live births by month	total	total	5, 6, 8	present population
2019–2021	Annual number of live births by month	total	total	10, 12	resident population

FEMALE POPULATION: Distribution by age and parity

Female population exposure by calendar year, age and year of birth (Lexis triangles) is estimated using data on population size and deaths from the Human Mortality Database, which is available at www.mortality.org or <http://www.humanmortality.de/>⁵

⁴ Birth counts for 1952–1953 and birth counts by birth order 1–4+ (or 1–3+) for 1952–2003 are included in the HFD input file for births but are not used for the calculation of the HFD output.

⁵ It is noteworthy that in the calculation of female population exposure, the HFD consistently uses data on births by month of occurrence pertaining to the present population (i.e. for estimating the size of birth cohorts of women), whereas the HMD, starting from 2001, uses births by month of registration and these data pertain to the resident population. Because of these discrepancies we also see differences between the HMD and HFD female population exposures in the respective birth cohorts.