

HUMAN FERTILITY DATABASE DOCUMENTATION: CROATIA

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WARNING: Due to the lack of continuous and reliable population data, only data since 2002 are used for the calculation of the HFD output.

1. General Information

In its current form, Croatia did not come into existence until after World War II. However, the Croatian state has a rich and vigorous history. The territory of contemporary Croatia was once part of the (Western) Roman Empire. During the Early Middle Ages, an independent Croatian state (known as the Kingdom of Croatia) was established, and lasted until the beginning of the 12th century, when it entered into a personal union with the Kingdom of Hungary. During the Ottoman period, Croatia was a fortified border territory under the Habsburgs, although the Ottomans took about half of the present-day territory. Later on, under the Austria-Hungary dual monarchy, the northern part of the Croatian territory was dominated by Hungary, forming the Kingdom of Croatia-Slavonia. Another Croatian region, Dalmatia, became part of the Austrian Empire after spending many centuries under the rule of Venice. At the end of World War I, Austria and Hungary lost control over these territories. In 1918, Croatia-Slavonia and Dalmatia became part of the newly created Kingdom of the Serbs, Croats, and Slovenes (later named the Kingdom of Yugoslavia). After World War II, Croatia was created as a republic within the Socialist Federal Republic of Yugoslavia with the boundaries that still exist today. When Yugoslavia dissolved in 1991, Croatia left the federation and declared its independence (Rothenbacher, 2013).

The first statistical office (State Statistical Office of the Kingdom of Croatia, Slavonia, and Dalmatia) in Croatia was founded in 1875 in Zagreb. In 1924, this institution changed its name to the Statistical Office in Zagreb, but completely lost its financial and professional independence to the state statistics of the Kingdom of Yugoslavia only five years later. The Statistical Office of the National Republic of Croatia was established soon after the war, in 1945. The statistical office underwent several name changes, becoming the Bureau of Statistics and Records in 1951; the Bureau of Statistics of the National Republic of Croatia in 1956; and, once again, the State Bureau of Statistics of the Socialist Republic of Croatia in 1963. Regarding its finances and personnel, this bureau was relatively independent. However, it had to follow the rules and methodologies prescribed by the Federal Bureau of Statistics in Belgrade (Matko, 2005; Rothenbacher, 2013). Today, the main organization

responsible for the production and dissemination of population statistics in Croatia is the Croatian Bureau of Statistics (hereafter the CBS), which was officially established in 1992.

The earliest evidence (but without preserved data) on the population censuses (which were undertaken for military purposes) in the present territory of Croatia dates back to the 14th century, and refers to the city of Dubrovnik (Matko, 2005). Although some partial censuses were conducted from the end of 17th century onward, the first modern census in Croatia was performed in 1857, when Croatia was under the rule of the Habsburg Monarchy. Since then, 15 censuses have been conducted: five under Austro-Hungarian auspices (in 1869, 1880, 1890, 1900, and 1910), two in the Kingdom of Yugoslavia (in 1921 and 1931), six in the Socialist Yugoslavia (in 1948, 1953, 1961, 1971, 1981, and 1991), and the last two in the 21st century (in 2001 and 2011) in the Republic of Croatia.

The Croatian Bureau of Statistics has recalculated total population data of the Republic of Croatia in the current borders for the census years prior to 1948.

Although data on births in Croatia were recorded in parish registers for many centuries, the civil registration of vital statistics in Croatia was not fully established, and thus did not provide full national coverage, until after the Second World War. In the 1921-1939 period, the registration of vital events mainly occurred at the parish level, and the state authorities collected information on only a small fraction of those events (Gaćeša, 1991). Between 1947 and 1949, the Federal Bureau of Statistics collected only aggregate data on the total number of live births, which were counted based on the place of registration. Starting in 1950, each live birth was recorded in an individual statistical form, and all vital statistics data were processed according to each's "place of permanent residence." This approach was also applied to the subsequent population censuses. Starting in 1998, the standard of "place of usual residence" was implemented¹.

1.1 Data collection

All the data assembled for the HFD were acquired either from the CBS in Zagreb or from the library of the former Federal Bureau of Statistics in Belgrade. These data include live births by age of the mother, mother's year of birth (if available) and birth order, live births by calendar month, and population census data on the parity distribution of women.

The census results were published in the census books, statistical communications, and bulletins, as well as in the unpublished printed tabulations. A detailed list of all available census publications (from the 1857 census to the most recent 2011 census) is available by request at the CBS' User Communication Department.

The vital statistics results were published in regular statistical publications, studies, and statistical communications. A special demographic yearbook titled *Demographic Statistics* (or *Vital Statistics* until 1955) was published yearly from 1950 to 1990. These yearbooks contain detailed reviews of vital and population events. Also, upon request, many unpublished cross-tabulations are available in Zagreb, and even more detailed cross-tabulations are available in Belgrade.

The vital statistics data cover all individuals who were born or died in a particular calendar year, and whose birth or death was entered into the registers of births and deaths. The data in these registers are collected and processed in line with the definition of total population.

¹ According to this definition, only people whose usual residence is in Croatia (either people currently living in Croatia or those living abroad but planning to return back within a year after the departure) are included in the official population (CBS, 2012; Ćipin et al., 2017). The period of one year or longer and the intention of staying of at least one year are the basic criteria for the inclusion of a person to (or exclusion from) total population of the country.

Since 1998, the official statistics in Croatia have excluded the births and deaths of individuals who do not meet the definition of a usual resident.

The primary data source on birth counts are birth registers kept in the regional/local district registrar offices. The data on live births are collected by the registrar via the Statistical Report on Births (the DEM-1 form). Those statistical forms and reports serve as the foundation for the birth statistics in Croatia.

Since 2000, aggregate vital statistics tabulations have been released annually in the so-called first release publications, under the heading *Vital statistics of the Republic of Croatia/Natural Change in Population in the Republic of Croatia*. These tabulations are available online. Since 2009, a detailed yearly statistical report titled *Natural Change in Population* has been available in both a printed and an online pdf format.

The CBS released the results of the 2001 and 2011 censuses in both a printed and an electronic format, and many aggregate tables from these censuses are available online (see <http://www.dzs.hr/>). The 1991 census results were published in a printed format only, but detailed tabulations are also available in an electronic format upon request, and with a charge. Data from the population censuses of 1961, 1971, and 1981 are stored in Belgrade, and are not accessible at present. However, the CBS intends to acquire the data from these censuses and make them available in an electronic format in the near future. Data for all previous censuses have been printed in periodical census books on various topics.

Demographic data for Croatia exist in both printed and electronic formats. Most of the recent population and vital statistics count data currently included in the HFD were obtained directly from the CBS. The vital statistics data used in the HFD were purchased from an unpublished electronic database of individual births maintained by the CBS.

1.2 Territorial coverage after WWII

In 1945-1956, the territorial coverage of the vital statistics data for Croatia was not complete because of some territorial changes that occurred in that period. These changes affected approximately 0.5 percent of the total population. In October 1954, Buje municipality (part of Zone B of the Free Territory of Trieste) joined Croatia (Yugoslavia). On April 25, 1956, a registration of the population of Buje was conducted, and the data from that registration were included in subsequent population counts. On March 28, 1956, eight small Croatian settlements on the Croatian-Slovenian border joined Slovenia. On March 23, 1953, five settlements from Bosnia and Herzegovina joined Croatia; and on December 8, 1956, another settlement from Bosnia and Herzegovina joined Croatia.

Significant territorial changes also occurred in 1991-1997. From 1991 to 1995, a quarter of Croatian territory, which was home to approximately 12 percent of the total population of Croatia, was not under the control of the Croatian authorities (Akrap, 1995). In 1995, most of the previously occupied territory was liberated. Since in the beginning of 1998, all Croatian territory has been under the control of the Croatian authorities.

2. Birth Count Data

2.1 Coverage and completeness

The following types of data on births are available in the HFD:

- Live births by age of mother and birth order, 1950-1983;
- Live births by age of mother, mother's year of birth and birth order, 1984-2017; and
- Live births by month, 1950-2017.

The results of a vital statistics coverage control, which was performed using the sample method at the end of 1955, showed that almost complete coverage had been achieved for all basic vital events by 1953. An additional survey of the completeness of the coverage of Croatia's live birth and death statistics that was conducted in the 1967-1970 period found an even higher level of coverage (Gaćeša, 1991).

Data on vital events could not be collected for the occupied territory of the Republic of Croatia in the 1991-1997 period. Until 1997, the data on births were processed according to the mother's place of permanent residence. Since 1998, the data on births have been collected and processed based on the mother's place of usual residence. The live births statistics from that period are considered to be complete and of good quality.

For the data currently used in the HFD calculations (2002-2017), the CBS maintains an individual record database of births (that has been functioning since 1984). Aggregate tables derived from the database exist in both a published form and as unpublished internal tabulations. The tabulations typically provide more detailed information. For the years 1984-2017, live births by age of the mother and the mother's year of birth and birth order (up to 5+) are available for Croatia.

The registration of a birth is based on the date of occurrence. The deadline for registering a child's birth is 30 days following the birth. Statistical reports of birth registrations in the state birth register are submitted to the CBS separately for each month. The local registrar's office sends the reports, together with all the relevant enclosures, to the CBS within three days after the end of the month for which the reports were completed.

Due to several data quality issues for the period prior to 2002 (for more details, see Čipin et al., 2017), the present HFD data series for Croatia begin in 2002. All the input data used for the HFD calculations are specified in Appendix 1.

2.2 Specific details

From 1967 to 1997, data on vital events were also collected for the population residing outside the country.

3. Population Count Data

3.1 Population count data by age

The annual age structure of women for the period covered in the HFD is taken from the Human Mortality Database (HMD). Because there is no continuous and reliable data series on the population before 2002, the HMD provides data on female population exposure for the period starting in 2002 (Čipin et al, 2017).

Recent population data

In the 2001 census, the total population was counted for the first time based primarily on each individual's "place of usual residence." Thus, the total population was defined as including all individuals whose place of usual residence was in Croatia, and who had not been absent from the country for longer than a year. However, this standard was not fully applied in the 2001 census, as individuals who were living abroad for more than a year, but who maintained close ties to a household or family in Croatia (by, for example, visiting frequently, supporting family members, or engaging in frequent communication) were also included in the total population (CBS, 2012).

The 2011 census again applied the “place of usual residence” standard, but introduced a question about the intention to stay as an additional criterion for determining whether a person should be included in the total population (CBS, 2012). The 2011 census included in the total population all individuals whose place of usual residence at midnight of March 31, 2011 (a census moment), was in Croatia. The place of usual residence was defined as the place where a person spends most of his/her time, even if s/he leaves it for short periods of time (e.g., to take a vacation or a trip, or to seek medical treatment).

Although the data of both censuses are based on the “place of usual residence” standard, making a direct comparison of these two datasets is a seemingly impossible task. This is partly because the question on the intention to stay was not included in the 2001 census. But more importantly, individuals who had been living abroad for more than one year, but who reported making seasonal or monthly returns to their place of residence in Croatia, were included in the total population in the 2001 census, but not in the 2011 census.

In mid-2013, Croatia joined the European Union. As in many other European countries, the post-censal population estimates underestimated emigration, especially after 2013. A revision of the population estimates for the 2001-2010 period was done to ensure the continuity of the population estimates for the years before and after the 2011 census. To ensure the full comparability of the population estimates for the period after 2001, the international migration data, which were used in calculating the revised population estimates, have been harmonized with international standards.

Specific episodes in demographic history

The 1960s was a period of extensive guest-worker emigration, predominantly to Germany and Austria. After Yugoslavia opened its borders in 1965, citizens of Yugoslavia were permitted to emigrate permanently or work abroad temporarily. Approximately 900,000 people left Yugoslavia (either temporarily or permanently) during this period, and estimates indicate that one in three of these emigrants were from Croatia (Nejašmić, 1987). Nevertheless, these individuals were still counted as residents of Yugoslavia in the censuses and population estimates. To avoid enumerating a considerable population outflow, the Federal Bureau of Statistics introduced some methodological changes. The 1971 census was the first census to include a category for absent “guest workers” and their family members whose permanent residence remained in Croatia or elsewhere in Yugoslavia. This category was also used in the 1981 and 1991 censuses (Josipovič, 2015).

3.2 Population count data by age and parity

Data on the female population by age and number of live-born children are available for all post-war censuses (1948-2011). For the last three censuses (1991, 2001, and 2011), detailed parity data by single year of age are available. But for the earlier censuses, a combination of single- and five-year age groups have been published.

Appendix 1 provides more detailed information about the data on the distribution of women by age and parity from the 2011 census, which is used in the HFD calculations.

4. Specific details

4.1 Definitions

Definition of a live birth

During the period currently covered by the HFD, the World Health Organization's definition of a live birth is used. The CBS defines a live-born child (live birth) as a child who exhibits signs of life at birth, such as breathing, beating of the heart, pulsation of the umbilical cord, or definite movements of voluntary muscles. If a child dies soon after the birth, it is first registered as live-born, and then as dead.

The definition of a live birth has remained the same for the whole period covered by the data available for Croatia in the HFD (1950-2017).

Definition of a stillbirth

In their methodological explanations, the CBS states that a stillborn child (stillbirth) is defined as a child who, after a complete expulsion or extraction from its mother, neither breathed nor showed any other sign of life, provided the pregnancy lasted for at least 22 weeks and the child weighed at least 500 grams. When comparing data on stillborn children, it is necessary to bear in mind that the definition of a stillborn child was changed. Up to 2000, a stillborn child was defined a child who was expelled or extracted from its mother and neither breathed nor showed any other sign of life after a minimum gestation of 28 weeks. From 2001 onward, a stillborn child has been defined as stated above based on recommendations of the Assembly of the World Health Organization and the International Federation of Gynecology and Obstetrics (FIGO).

Definition of birth order

In the 1950-1958 period, the definition of birth order took into account all children born to a mother, including any stillbirths. From 1959 onward, live births by birth order were tabulated separately.

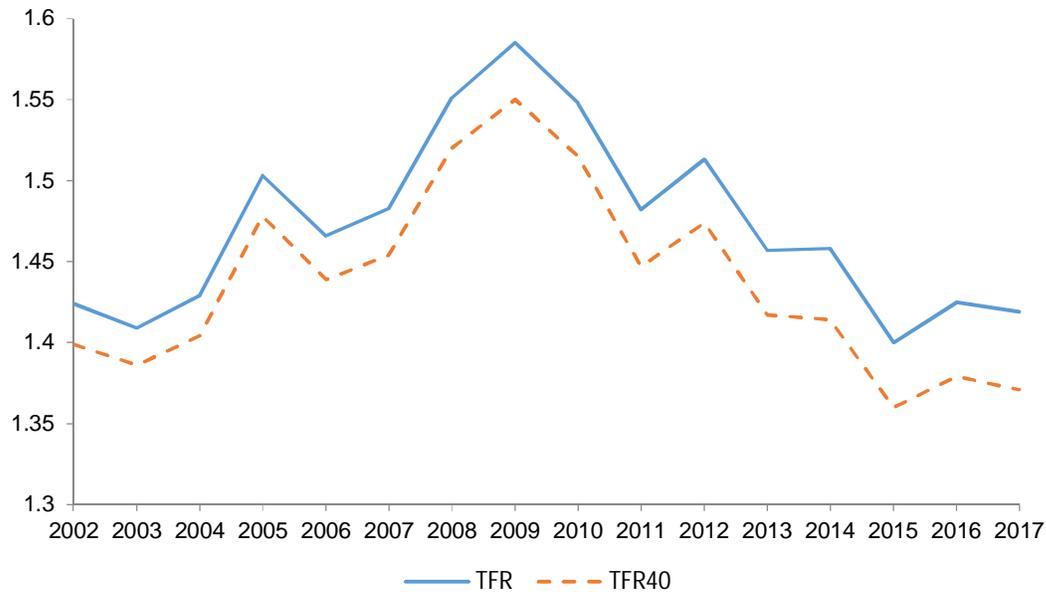
Definition of age

For the whole period, age has been defined as age in completed years (ACY), or age at the last birthday. For cases in Yugoslavia in which a person's exact date of birth was unknown, but the person's age or year of birth were registered in the individual statistical form, the age was recalculated with the assumption that the person was born on July 1.

4.2 Data quality issues

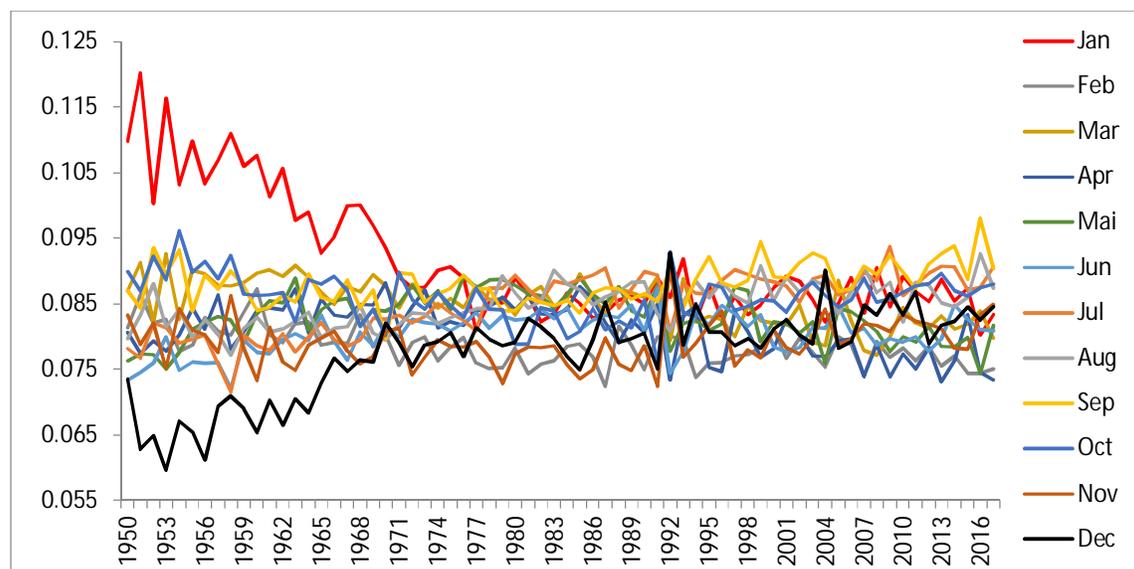
1. In Croatia, the period TFR was increasing during the 2002-2009 period (Figure 1), but has since been decreasing. This decline is probably attributable to the effects of the financial crisis, which hit many European countries hard. It has been observed that in many CEE countries, the TFR was increasing in the second half of the 2000s, but stalled in response to the economic recession (Goldstein et al., 2013).

Figure 1: Period total fertility rate (TFR) and period total fertility rate by age 40 (TFR40) in Croatia, 2002-2017



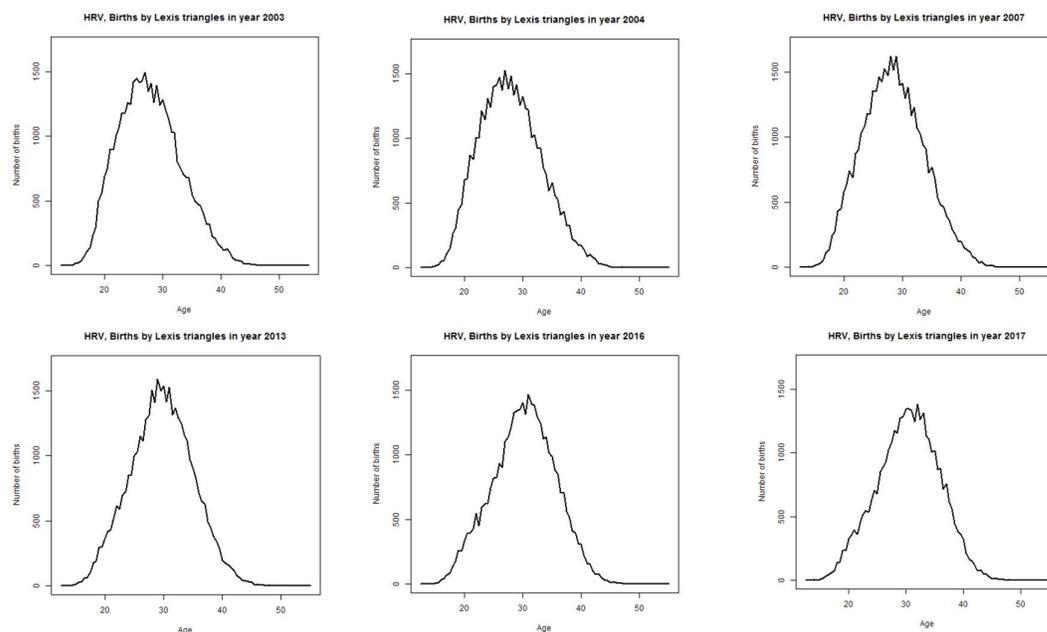
2. A further decline in the fertility level in Croatia was observed after 2013, or the year when Croatia joined the European Union. This decline could be related to the underestimation of emigration.
3. An examination of monthly data for the 1950-1969 period revealed a skewed distribution of births within some calendar years (January vs. December, Figure 2), which suggests that there were data registration problems in these years. For this reason, the monthly data for the 1950-1969 period were not used in the calculations.

Figure 2: Proportion of live births by month within a calendar year, Croatia, 1950-2017



4. In the 2011 census, the parity was unknown for 2.6% of women. Most of these cases are attributable to an incomplete census questionnaire. Out of the 2,088 cases, only 135 were of a woman who reported the results herself. In most of the other cases, a proxy person (usually outside of the household) provided some of the information.
5. For the years 2003-2004, 2007, 2013, and 2016-2017, there are more pronounced fluctuations in the number of births in the neighboring triangles (Figure 3). The original data were checked for possible miscalculations in dividing the data by triangles, but the data were found to be correct. There are no clear explanations for such fluctuations.

Figure 3: Birth counts by Lexis triangles, Croatia, selected years



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**APPENDIX 1
INPUT DATA USED FOR HFD CALCULATIONS**

BIRTHS

Period	Type of data	Age scale	Birth order	RefCode(s)
2002-2014	Annual number of live births by age of mother, mother's year of birth and birth order (Lexis triangles)	13/14, ..., 47/57 ¹ , unknown	1-5+, unknown	1
2015	Annual number of live births by age of mother, mother's year of birth and birth order (Lexis triangles)	12, 13, ..., 50, unknown	1-5+, unknown	4
2016-2017	Annual number of live births by age of mother, mother's year of birth and birth order (Lexis triangles)	14, 15, ..., 52, unknown	1-5+, unknown	6, 8
1970-2017	Annual number of live births by month	total	total	1, 4, 7, 8

¹The minimum and the maximum age categories vary across the years.

FEMALE POPULATION: Distribution by age and parity

Period	Type of data	Age range	Year of birth, range	Parity	RefCode(s)	Notes
31.03.2011	Number of women by age and parity	15, 16,...,105, 106	-	0, 1,...,18, 19+, unknown	2	"Golden census"

FEMALE POPULATION: Exposure by age and year of birth

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 <http://www.mortality.org> or <http://www.humanmortality.de>.