

TOTAL FERTILITY RATE

1. Definition:

TOTAL FERTILITY RATE is the sum of the age-specific birth rates (5-year age groups between 10 and 49) for female residents of a specified geographic area (nation, state, county, etc.) during a specified time period (usually a calendar year) multiplied by 5. (NOTE: This rate estimates the number of children a hypothetical cohort of 1,000 females in the specified population would bear if they all went through their childbearing years experiencing the same age-specific birth rates for a specified time period.)

Calculation:

$$(\sum \text{ASBR}) \times 5$$

where **ASBR** is each five-year **age-specific birth rate** defined as

$$\frac{B_x}{P_x} \times 1,000$$

where B_x is the number of live births to mothers age x and P_x is the number of resident women age x . The values or age groups represented by B_x are under 15, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, and 45+. The values or age groups represented by P_x are 10-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44 and 45-49 years. The sum of these ASBRs is multiplied by 5 because each ASBR represents a five-year cohort of women.

3. Examples:

The Total Fertility Rate for a state for year 2000:

Age Group	2000 Births	2000 Female Population	(grossly rounded) ASBR
10-14	300*	165,000	1.8 live births per 1,000 ages 10-14
15-19	11,000	179,000	61.5
20-24	20,000	192,000	104.2
25-29	22,000	222,000	99.1
30-34	20,000	213,000	93.9
35-39	10,000	212,000	47.2
40-44	2,000	210,000	9.5
45-49	500*	200,000	<u>2.5</u>

Total or \sum of ASBRs =====> 419.7

$$\text{TFR} = 419.7 \times 5 = \underline{\underline{2,098.5}} \text{ live births per 1,000 female state residents in 2000 who live through their reproductive years}$$

*For the age groups 10-14 and 45-49, births to ages under 15 and 45+ are used.

4. Technical Notes:

- The Total Fertility Rate (TFR) is perhaps the most commonly used standardized fertility measure because it is ideal for comparative purposes and is a comprehensive summary measure readily understood, at least as a general concept.
- Like all standardized measures, TFR is hypothetical and only appropriate for comparison to other TFRs. In the above example, in reality, the women in the state in 2000 did NOT (or will not) yield on average 2,098.5 live births per 1,000 throughout their reproductive lifetimes.
- The theoretical replacement rate for a population is a TFR of 2,100. This implies 1,000 women have 1,000 live births to replace themselves, 1,000 births to replace their male counterparts and 100 births to replace those who do not reach or survive through their reproductive years.
- Sometimes TFR is expressed per woman instead of per 1,000 women. For example, the theoretical replacement rate would be expressed as 2.1 live births per woman.
- TFR only includes age-specific birth rates for the five-year age ranges within 10-49 years. However, all births to mothers less than 15 years of age and ages 45+ are included in the calculation of the birth rates for the age groups 10-14 and 45-49 while population data in the calculations correspond to the age groups 10-14 and 45-49
- Two variations in the five-year age groups used for calculating TFR are 15-49 and the formerly common 15-44 year age range. Comparing TFRs using different age ranges, such as the above, can result in slight numerical differences, so one should take note of formulas when comparing TFRs from different sources. As an example, using our above TFR calculation for a state for year 2000, omitting the age-group 10-14 years has a minimal impact in the final TFR. In this example of using the 15-49 year age range, the 300 births to mothers less than age 15 years would be added to the 15-19 year age group total while the population denominator would remain 179,000. The resulting 15-19 ASBR would be 63.1. The net result of the new sum of ASBRs, deleting the 10-14 value and using the now higher 15-19 age group value, is 419.5. This yields a TFR of 2097.5, a slight decrease from the above example.
- The TFR can be applied to subgroups of a population based on demographic characteristics other than age and sex. For example, the TFR could be particular to a race category, geographic area, marital status, etc., as long as both birth and female population data can be obtained that match for that characteristic. For example, to calculate the TFR for Pacific Islanders for a given state, one would need birth data that classified mothers by age and Pacific Islander race category as well as population that classified women by age and Pacific Islander. In the case of race categories especially, care must be taken that the category definition(s) match for both the numerator and denominator data.
- Reporting of live births may differ by birthing facility or attendant at time of birth. For example, a live birth can be interpreted and subsequently registered as a fetal death or stillbirth when the neonate very briefly shows signs of life and subsequently dies. In some countries, “live birth” may be defined differently than

in the U.S. (or not applied to the same degree in practice), which follows the World Health Organization (WHO) definition. In the U.S., age of mother is often accurate to the single year of age.

- Sometimes live births do not become part of the official count of a state's resident live birth total because:
 - a) the birth to a state resident occurred in an area (often another country) for which the state does not have a vital records exchange agreement,
 - b) the birth to a state resident occurred in an area for which the state does have an exchange agreement but it arrived to the state's vital registration office too late for inclusion in the state's official count or
 - c) the live birth occurred in the state but simply was not registered in time (e.g., an at-home birth) for inclusion in the state's official count. Also note that a state's official count of resident live births may vary somewhat from that determined by NCHS for that state due to variations of the above reasons.
- Other fertility measures include the following non-standardized measures: crude birth rate, general fertility rate and pregnancy rate.

(maf 12/2008)

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