Early Human Development 91 (2015) 855–858

Contents lists available at ScienceDirect

Early Human Development

journal homepage: www.elsevier.com/locate/earlhumdev

Best practice guidelines

# Evidence of economic deprivation and female foeticide in a United Nations global births by gender data set

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ARTICLE INFO

*Keywords:*
Sex ratio
Birth rate/*trends
Infant
Newborn
Economics
Stress
Psychological/physiopathology

ABSTRACT

*Introduction:* The male-to-female ratio of live births is expressed as the ratio of male births divided by total births (M/F). Males are produced approximately 3% in excess. A large number of factors have been found to influence M/F. Stress and privation reduces M/F. Gender preference (which almost invariably favours males) with selective female foetal abortion increases M/F. This study was carried out in order to assess a United Nations data set for evidence of global trends in M/F in relation to broad socioeconomic conditions and male preference.
*Methods:* Data (M/F and total births, 1955–2009) was obtained from the United Nations (UN) Department of Economic and Social Affairs, Population Division, Population Estimates and Projection Section. The following regions were analysed: more developed countries, less developed countries and least developed countries (as defined by the UN General Assembly).
*Results: More developed countries:* M/F was initially stable at 0.53 up to 1979 then fell to 0.525.
*Less developed countries*: M/F was initially stable at 0.53 then rose after 1984 to 0.545 with a rise in male births and a fall in female births (estimated female birth deficit = 48734993).
*Least developed countries:* exhibited a stable M/F of 0.52 (all $p << 0.001$).
*Discussion:* This study has confirmed, on a global scale, that least developed countries have the lowest M/F. The rise in M/F in developed countries (which includes Asia) confirms widespread selective female foeticide due to cultural male preference. The declining trend in M/F in developed countries has been previously noted and remains unexplained.



**Contents**



## 1. Introduction

The male-to-female ratio of live births is expressed as the ratio of male live births divided by total live births (M/F), and males are produced in an excess of approximately 3% [1].

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http://dx.doi.org/10.1016/j.earlhumdev.2015.10.013
0378-3782/

### 1.1. Stress and economics

A large number of external factors have been found to influence this ratio [1,2]. Of particular relevance, stress reduces M/F. Such stress may be acute and may be induced by natural disasters [3] or by man-made events such as contracting economies [4].

This accords with the Trivers–Willard hypothesis (1973), which suggests that a male who reaches reproductive age in good condition is expected to out-reproduce a female in similar condition. Conversely, if both are in poor condition, a female is expected to out-reproduce a brother. This is because a weak son would compete poorly with stronger males for the same cohort of females, thus producing fewer offspring than a weak female daughter would [5].

The hypothesis holds that natural selection has therefore developed mechanisms by which pregnant females subjected to environmental stressors manipulate M/F by culling male foetuses that are least likely to eventually sire grandchildren and pass on their mothers' genes [5].

Chronic stress also plays a part. Caloric availability per capita was shown to correlate positively with M/F in over 200 countries. The same study also demonstrated that increases or decreases in caloric availability were associated with corresponding changes in countries' M/F. The authors speculated that this was probably related to higher intra-uterine male mortality rates due to nutritional deficiencies and associated stressors since male foetuses require more maternal resources [6].

### 1.2. Gendercide

Man has also deliberately modified M/F. Due to the patriarchal nature of most human societies, the termination of female foetuses is a far commoner occurrence than the termination of males. Male preference resulting in a higher proportion of males at all ages, particularly in Asia, has been attributed to the Confucian patriarchal tradition that is characterised by strong son preference and female subordination [7,8].

Modern and scientifically accurate methods for antenatally determining gender have been available as early as 1975 in China with the use of chorionic villous sampling [9]. Antenatal sexing was later facilitated, worldwide, by ultrasound technology in the 1980s [10].

This study was carried out in order to assess a United Nations data set for broad evidence of economic stress influencing M/F and for equally broad evidence of selective female abortion.

## 2. Methods

### 2.1. Data

Data were obtained from the United Nations Department of Economic and Social Affairs, Population Division, Population Estimates and Projection Section [11]. This was available as aggregated 5-year totals for birth and 5-year averages for M/F, by region. These two variables were used to calculate male and female births. Three categories were analysed:

*More developed regions* comprised Europe, Northern America, Australia, New Zealand and Japan.

*Less developed regions* comprised all regions of Africa, Asia (except Japan), Latin America and the Caribbean including Melanesia, Micronesia and Polynesia, but excluded all those countries in the next (following) category.

*Least developed countries* as defined by the United Nations General Assembly in its resolutions included 49 countries in June 2013: 34 in Africa, 9 in Asia, 5 in Oceania and one in Latin America and the Caribbean. The group included 49 countries—Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of

**Table 1**
Calculated male and female births (from total births and M/F), from which upper and lower confidence intervals (UCI, LCI) were then calculated.

| | | 1950–1954 | 1955–1959 | 1960–1964 | 1965–1969 | 1970–1974 | 1975–1979 | 1980–1984 | 1985–1989 | 1990–1994 | 1995–1999 | 2000–2004 | 2005–2009 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| More Developed | Male | 49839319 | 50169575 | 49032684 | 45213640 | 43701470 | 42084016 | 41759317 | 41456572 | 37762690 | 34921394 | 34937716 | 36790769 |
| | Female | 44197132 | 45391521 | 43481815 | 40095115 | 38754133 | 37319788 | 37782239 | 37508327 | 34166244 | 31595547 | 31610314 | 33286886 |
| | Total | 94036451 | 95561096 | 92514499 | 85308755 | 82455603 | 79403804 | 79541556 | 78964899 | 71928934 | 66516941 | 66548030 | 70077655 |
| | UCI | 0.5301 | 0.5251 | 0.5301 | 0.5301 | 0.5301 | 0.5301 | 0.5251 | 0.5251 | 0.5251 | 0.5251 | 0.5251 | 0.5251 |
| | M/F | 0.5300 | 0.5250 | 0.5300 | 0.5300 | 0.5300 | 0.5300 | 0.5250 | 0.5250 | 0.5250 | 0.5250 | 0.5250 | 0.5250 |
| | LCI | 0.5299 | 0.5249 | 0.5299 | 0.5299 | 0.5299 | 0.5299 | 0.5249 | 0.5249 | 0.5249 | 0.5249 | 0.5249 | 0.5249 |
| Less Developed | Male | 183014824 | 193199044 | 215846257 | 230282608 | 236045909 | 232457879 | 250141694 | 275283458 | 263405287 | 247233847 | 247650665 | 253768348 |
| | Female | 162296165 | 171327455 | 191410832 | 204212878 | 209323731 | 206141892 | 221823767 | 239265062 | 224382281 | 210606610 | 206754224 | 211861648 |
| | Total | 345310989 | 364526499 | 407257089 | 434495486 | 445369640 | 438599771 | 471965461 | 514548520 | 487787568 | 457840457 | 454404889 | 465629996 |
| | UCI | 0.5301 | 0.5301 | 0.5300 | 0.5300 | 0.5300 | 0.5300 | 0.5300 | 0.5350 | 0.5400 | 0.5400 | 0.5450 | 0.5450 |
| | M/F | 0.5300 | 0.5300 | 0.5300 | 0.5300 | 0.5300 | 0.5300 | 0.5300 | 0.5350 | 0.5400 | 0.5400 | 0.5450 | 0.5450 |
| | LCI | 0.5299 | 0.5299 | 0.5300 | 0.5300 | 0.5300 | 0.5300 | 0.5300 | 0.5350 | 0.5400 | 0.5400 | 0.5450 | 0.5450 |
| Least Developed | Male | 25762925 | 28492066 | 31793472 | 35671585 | 39844773 | 44309296 | 49371781 | 53837046 | 58669522 | 63830323 | 68216799 | 72214280 |
| | Female | 23781162 | 26300369 | 29347820 | 32927616 | 36779790 | 40900889 | 45573952 | 49695734 | 54156481 | 58920298 | 62969353 | 66659336 |
| | Total | 49544087 | 54792435 | 61141292 | 68599201 | 76624563 | 85210185 | 94945733 | 103532780 | 112826003 | 122750621 | 131186152 | 138873616 |
| | UCI | 0.5201 | 0.5201 | 0.5201 | 0.5201 | 0.5201 | 0.5201 | 0.5201 | 0.5201 | 0.5201 | 0.5201 | 0.5201 | 0.5201 |
| | M/F | 0.5200 | 0.5200 | 0.5200 | 0.5200 | 0.5200 | 0.5200 | 0.5200 | 0.5200 | 0.5200 | 0.5200 | 0.5200 | 0.5200 |
| | LCI | 0.5199 | 0.5199 | 0.5199 | 0.5199 | 0.5199 | 0.5199 | 0.5199 | 0.5199 | 0.5199 | 0.5199 | 0.5199 | 0.5199 |