

# A Study on the Sex Ratio in Ardabil, Iran during the Last Decade

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ARTICLE INFO	ABSTRACT
<i>Article type:</i> Short Communication	In recent years, population growth has faced to serious challenges. In addition to population decline, some demographic changes could exacerbate the population crisis. One of them is the sex ratio of birth. This study was conducted to investigate the sex ratio in Ardabil from 2011 to 2022. In this cross-sectional study, data of the last ten years in all rural and urban areas of Ardabil were collected. The results showed that in addition to the decreasing trend of live births in Ardabil, the sex ratio is higher than normal and has an increasing trend. The highest sex ratio was observed in 2022, when there were 127 live boys' births versus 100 girls, is higher than all reports so far in the world. This trend is threatened the regeneration. Some of the solutions in this field is to create a culture and eliminate preventing social factors to have girls.
<i>Article History:</i> Received: 27-Jun-2022 Accepted: 31-Jul-2022	
<i>Key words:</i> Gender Ratio Population Population Proportion Birth Reproduction Regeneration	
<p>► Please cite this paper as: Shahbazzadegan S. A Study on the Sex Ratio in Ardabil, Iran during the Last Decade. Journal of Midwifery and Reproductive Health. 2023; 11(1): 3638-3643. DOI: 10.22038/jmrh.2022.65965.1925</p>	

## Introduction

In recent years, population growth has faced serious challenges. In addition to population growth decline, some demographic changes such as sex ratio could exacerbate the crisis. The sex ratio of a population is the ratio of males to females. The World Health Organization estimates that the expected sex ratio at birth, in the absence of gender discrimination or interference, is about 105 boys per 100 girls, although this ratio can vary from 103 to 107 (1).

Some socioeconomical factors including social level, religion, mass media exposure, educational level of women, wealth index, place of residence, and geographical region have significant role in sex preference (2). The study by Kazemi (2016) showed that there is a preference for males as a cultural trait in Iran. Despite of this cultural problem, the health system also provides the means for sex selection (3). Miranda et al. (2018) argued that sex preferences in gender-equitable societies are relatively low or non-existent (4). Increase of the sex ratio at birth has been observed in some

Asian countries, including China, Vietnam, India, and the Caucasus after the collapse of the Soviet Union (5). Beltrán Tapia and Raftakis reported high sex ratio in Greece. They also declared that sex ratio increased as children grew because parents treat boy and girl differently (6). Le and Nguyen pointed out that son preference influences health disparities in 66 developing countries (7). This pattern has increased in parallel with the wider availability of technologies for fetal sex determination, such as ultrasound, and therefore is associated with sex-selective abortion (5, 8). According to data published by various demographic organizations, fertility rates are declining in many countries, including Iran. Decreased fertility rate is observed also in the city of Ardabil. This problem has several reasons. Higher sex ratio of the society could be one of the causes of decrease in fertility rate and must be considered as a priority by policy makers. This study was conducted to investigate the sex ratio in the city of Ardabil.

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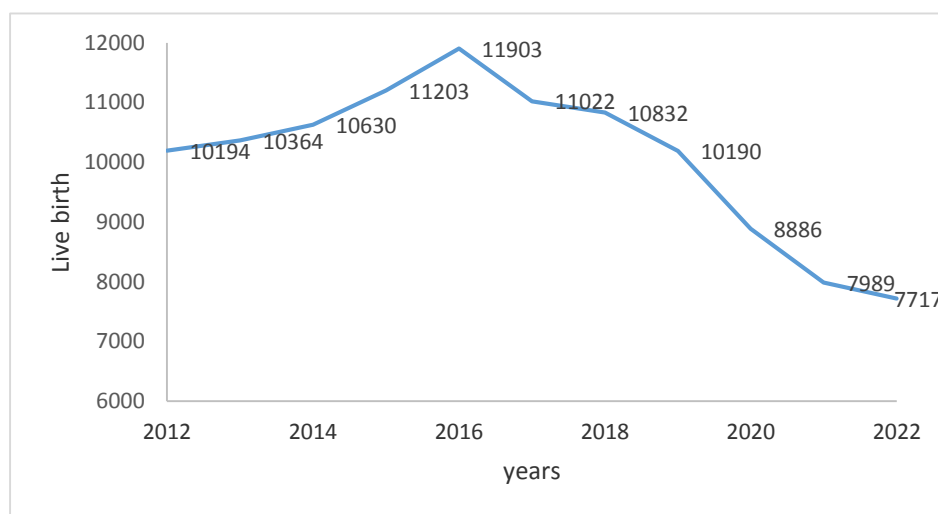
## Materials and Methods

This cross-sectional descriptive study was performed after obtaining permission from the Ardabil University of Medical Sciences by ethics code: IR.ARUMS.REC.1400.317. As a rule, data of birth, death, fertility and population of each city are available as vital Horoscope in the city health center. Data of the last ten years including number of live birth, gender of newborns, and maternal age at the birth were collected from Ardabil General and Rural Health Centers during March 2012 to March 2022

(according to Persian year). Sex ratio was calculated each year by dividing of live births of boys to girls multiplied by 100. Data were analyzed with Excel and SPSS software and the data were interpreted.

## Results

The mean births of live boys and girls were  $5452 \pm 537$  and  $4877 \pm 537$ , respectively. The results of the study showed a decreasing trend of live births (Figure 1). The number of total live birth was decreased in Ardabil since 2016.

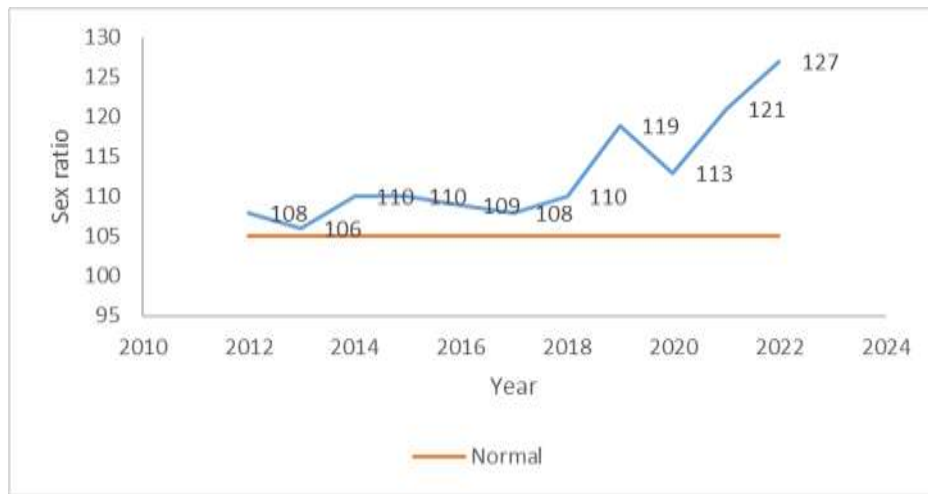


**Figure 1.** Live birth of Ardabil city from 2012 to 2022

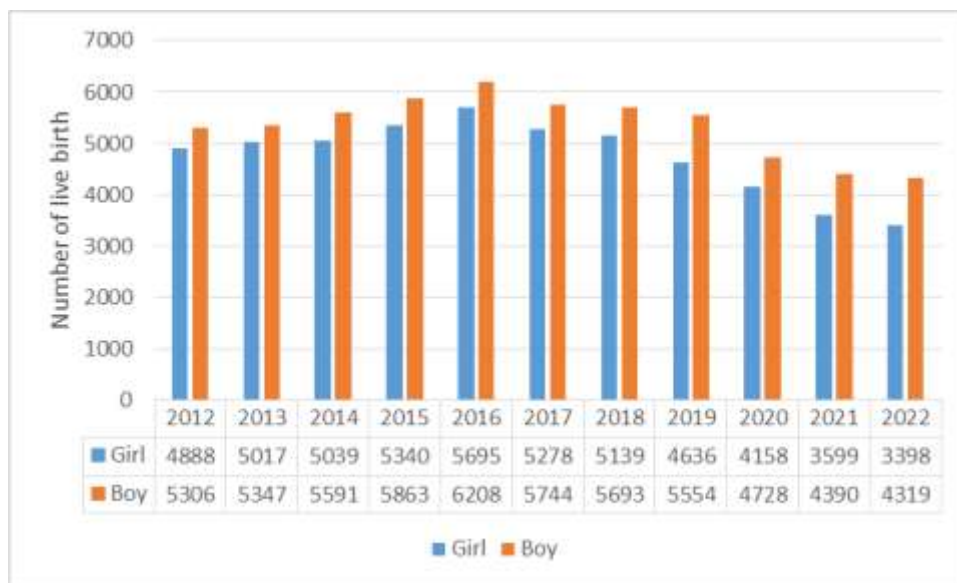
The sex ratio at birth in the last ten years of Ardabil city was shown in Figure 2. The increasing trend was accelerated from 2018. The highest sex ratio of 127 boys per 100 girls belonged to 2022.

The total number of births by gender in Ardabil city is presented in Figure 3 that shows higher number of births of boys compare to girls.

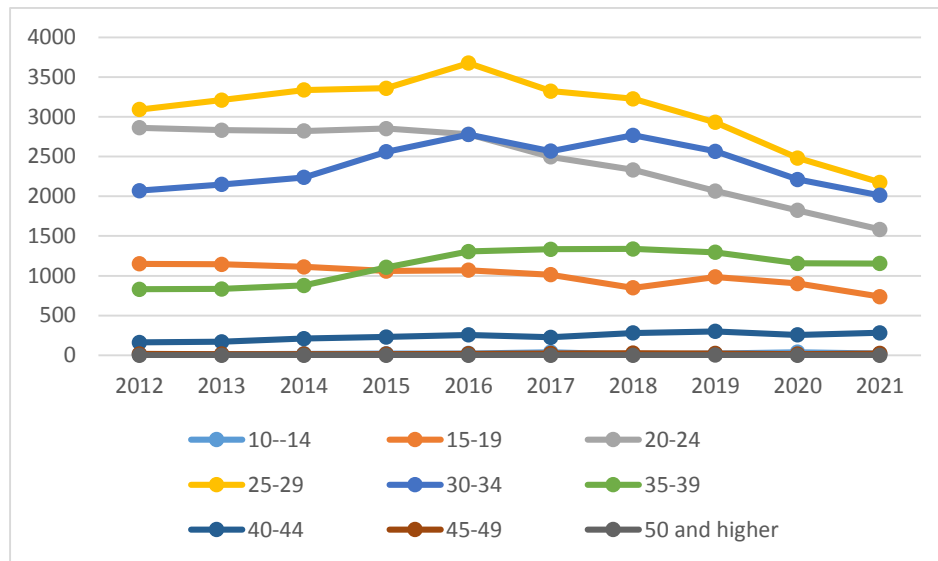
The number of births based on maternal age and year is shown in Figure 4. The highest number of births was observed in mothers between the ages of 29-25. The greatest decrease in the number of births was observed between the ages of 20-24 and 25 to 29 years, while the number of births increased at the age of 35-39 years. This result implies increase of childbearing age in Ardabil.



**Figure 2.** Sex ratio of Ardabil city from 2012 to 2022



**Figure 3.** Number of live births by gender in Ardabil city from 2012 to 2022



**Figure 4.** Number of births according to maternal age from 2012 to 2022

## Discussion

The results of the study showed that in addition to the decreasing trend in the birth rate in Ardabil, which has started since 2015, there is also an increasing trend in sex ratio. According to the World Health Organization, the sex ratio in Iran is equal to 105 male infants per 100 female infants (9). Compared to other cities of Iran, such an increase was not observed in any of the cities. Although sex ratio increased in Kermanshah, Lorestan and East Azarbaijan provinces (3), but this increase was steeper in Ardabil during the last two years.

The sex ratio of births observed in Ardabil is higher than all the reported values so far in the world. In terms of sex ratio in the world, this ratio is naturally between 105 and 107 boys for every 100 girls. The highest sex ratio in the world in 2020 was observed in Liechtenstein 126 and the lowest in Norway 84 (10). In some countries of the world, such as India and China, from 2000 to 2010, the birth rate of a boy was higher than the birth rate of girls, which is now declining. In the United States, in 1946, 105 boys born per 100 girls was born and reached to 104 per 100 girls in 2000 and stabilized after that (11).

Sex ratio in China and South Korea was 113, 110 in Taiwan, and 107 among Chinese living in Singapore and Malaysia (9). The birth rate of

boys is higher than that of girls in many countries of the world (12).

The findings of the present study are in according to Sen 2003, who warned in an article entitled "Terrible increase in boys" that the current population of women in China and India is more than 100 million less than the male population. A figure known as the phenomenon of "female deprivation"(12) that showed the social anti-women aspect.

Different behaviors in childbearing that indicate a preference for boys over girls have been recorded in Armenia, Azerbaijan, India, Jordan, Pakistan and Nepal (13). Gender preference has been common in some cultures and societies (14-16). For example, according to Hinduism, "giving birth to and raising a daughter is like watering the flowers in your neighbor's garden" (17).

The findings of the present study are in contrast to the findings of Miranda et al. in Sweden that showed there was a stronger pattern of preferences for girls than boys during 1980s-1990s (4). Their findings are related to gender reassignment and continued development of gender revolution in Scandinavia and Sweden (18). Moreover, the preference for son slightly decreased during 1992 to 2016 in India (2). When women have more opportunities to develop their potential in the society, girls may become more valuable to

their parents (4). However, the birth rate of boys is still higher in Sweden (106/100) (10).

There are many influential factors in gender selection, including the decisive role of variables of ethnicity, religion, social class. Other influential factors in this high sex ratio were patriarchy, gender gap, and more discriminatory behaviors. Also, due to the economic problems and the tendency of families to have one child and the limited number of children, families in Ardabil may be due to the above reasons that need further study. Family size, gestational age, parental occupation, multiple children, race, frequency of intercourse, hormone therapy, environmental pollution, stress, multiple illnesses, and war have been considered as other factors influencing sexual orientation (19-21).

Obviously, if this trend of procreation continues, the society will face many problems. This trend will be accompanied by an increase in the number of young men ready to reproduce, who are often from low-income level of the society with low education, and this will lead to many social and cultural problems. These single men who cannot able to form a family, exhibit anti-social behaviors, and increase unrest in the society (19). The study in India found a direct link between homicide and sex ratio (22). Other consequences of gender imbalance are declining birth rates, homosexuality among men, and rising crime rates. Another problem of reducing the number of women is increasing dowry costs, which is one of the factors preventing marriage and aggravating the problem of childbearing decline. Another point is that reducing the number of women does not increase their social value but increases the value of their accompanying men (father, brother and husband). In addition, it will increase the acerbated control by these men and the restrictions of women (22). Due to the high gender ratio in Ardabil, more qualitative studies focused on cultural and social factors affecting the sex ratio of births are suggested. The issue of elective abortions and the role of fertility and infertility centers should be paid more attention. Further monitoring of the role of medicine and new technology in the phenomenon of gender selection, is also needed.

## Conclusion

The stability of a society is related to the balance between the population of girls and boys. The number of girls to boys born in Ardabil is decreasing. This trend reduces the number of mothers and rebirth, reduces marriage, and has other negative social consequences. This trend has reached to a worrying level and urgent measure in this regard seems to be necessary. Some of the solutions in this regard are to create a culture and reduce or eliminate social factors against women, as well as to form campaigns to emphasize the value of daughters and encourage families to have girls.

## Acknowledgements

Ms. Peymaneh Ahmadi, Ardabil Family Health Officer, is thanked for her sincere cooperation.

## Conflicts of interest

Author declared no conflicts of interest.

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