ORIGINAL RESEARCH ARTICLE

Sex Ratio at Birth and Racial Differences: Why Do Black Women Give Birth to More Females Than Non-Black Women?

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ABSTRACT

The two important questions that this paper will attempt to answer are: (1) why is it that regardless of race/ethnicity or geographic location, the sex ratio data at birth show more males than females?; and (2) Why is it that regardless of geographic location compared to other racial/ethnic groups, Black women or Women of sub-Saharan Black African descent tend to give birth to more females? Or to put this question the other way around, compared to Black women, why do non-Black women give birth to more males? *(Afr J Reprod Health 2008; 12[3]:139-150).*

RÉSUMÉ

Proportion sexuelle en accouchement et différences raciales: Pourquoi des femmes noires accouchent-elles de plus de filles que des femmes non-noires? Les deux questions pertinentes que cette communication essayera de répondre sont : (1) pourquoi les données de la proportion sexuelle à la naissance montre plus de filles que de garçons sans se soucier de la race/de l'ethnie ou du milieu géographique ? (2) Pourquoi les femmes noires ou des femmes descendues de l'Afrique noire subsaharienne tendent à accoucher plus de filles sans se soucier du milieu géographique par rapport aux autres groupes raciaux/ethniques ? Pour reformuler cette question ; pourquoi les femmes non colorées donnent naissance à plus de garçons par rapport aux femmes noires? *(Afr J Reprod Health 2008; 12[3]:139-150).*

KEY WORDS: Birth, Race, Sex ratio, Sub-Saharan black women

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Introduction

All across societies in the world, more males than females tend to be born at birth, but from the moment they are conceived, more females tend to survive than males. As a result, there are more males than females in the age group under 15 years. For example, in 2006, there were 919.2 million males under 15 years old and 870.2 million females under 15 years old. For all of Africa in this same time period, it was 187.3 million males and 183.7 million females.[2] In fact, this author carefully studied the male-female percentages for this age group for the year 2001 by examining over 250 nations and territories in the CIA World Fact book, and was surprised to learn that in all (but 8 nations: Bermuda, Cayman Island, Guinea, Guinea-Bissau, Liechtenstein (the only nation without Black majority), Mozambique, Sierra Leone and Swaziland) of those nations, there were more males than females under age 15.

By age 65 and over, however, there are substantially more females than males in the majority of countries or societies in the world. For example, as of 2006, there were 213.2 million males aged 65 and over and 270 million females aged 65 and over in the world. For all of Africa in this same time period, it was 13.3 million males and 16.6 million females. Africa's total population as of July 2006, was estimated at 910.5 million (14% of the total world population).[2] As to why more males than females begin to die at higher rate after birth, Legato (2006, June 17) presents some answers:

> *Even when a boy manages to be born, he's still behind the survival eight ball: he is three to four times more likely than girls to have developmental disorders like autism and dyslexia; girls learn language earlier, develop richer vocabularies and even hear better than boys. Girls demonstrate insight and judgment earlier in adolescence than boys, who are more impulsive and take more risks than their sisters. Teenage boys are more likely to commit suicide than girls and are more likely to die violent deaths before adulthood (p.A13).*[3]

If this is the case, why then are more boys born than girls? As Mackenzie et al.[4] note: "The birth sex ratio (male female) of a population is often reported as the male proportion (m = number of male births divided by the total of all births). Worldwide, the human live birth sex ratio is remarkably constant, ranging between 102 and 108 male to 100 female live births (m = 0.504-0.519)".[4]

However, a careful observation by this author of the sex ratio at birth for the over 250 countries and territories in the world shows that although more males are born at birth than females, women in sub-Saharan Africa give birth to more females than non-Black women in all other parts of the world. Or to put it differently, non-Black women tend to give birth to more males on average. A similar trend has also been observed in the United States, whereby compared with Black women, White women on average give birth to more males than

females. In fact, this author has pointed out that just as sub-Saharan Africa has the lowest life expectancy when compared to other racial groups in the world, so also do Black people in the U.S. have lower life expectancy than the various racial groups in the country. So here again we are about to examine data which show that just as women in sub-Saharan Africa give birth to fewer males when compared to Europe or other parts of the world, so also do Black women in the U.S. give birth to fewer males when compared to Whites and other groups. Let us go over the numbers before seeking some answers to these trends.

1.06 for the age group under 15 years old; and the ratio was 1.01 for the total population. The average sex ratio at birth for all of Africa, on the other hand, was 1.03 males born for every 1 female born, a 0.03% difference from the world average. This is a significant difference. For the age group under 15 years, it was 1.02 males for every 1 female, a 0.04% difference from the world average, again a significant difference. For the total population, there were 0.99 males for every 1 female in Africa (Table 1). Among the five regions in Africa (see appendix for list of nations), only Northern Africa had a sex ratio on

Table 1: **Sex Ratio at Birth (males born for every female born), under age 15 and Total Population, for World, Africa and Five Regions of Africa**

	Sex Ratio at Birth Male(s)/Female(s)	Under age 15	Total Population
Eastern Africa	1.03	1.01	0.99
Middle Africa	1.03	1.01	0.99
Northern Africa	1.05	1.05	1.02
Southern Africa	1.03	1.02	0.96
Western Africa	1.03	1.01	0.99
Africa	1.03	1.02	0.99
World	1.06	1.06	1.01

Source: Compiled and Computed by author based on Data in the 2006 CIA World Fact book

Sex Ratio at Birth, Under Age 15 and Total Population, 2006: World, Africa and Its Five Regions.

As of 2006, the average sex ratio at birth for the world was 1.06 males born for every 1 female born; the ratio was

average closer to that of the world: 1.05 at birth; 1.05 under age 15; and 1.02 for the total population. For the other four regions, the sex ratio at birth was 1.03 on average for each of them. For the age group under 15 years, on average it was

1.02 for Southern Africa, but 1.01 each for Eastern Africa, Middle Africa, and Western Africa. The average sex ratio for the total population was 0.96 males for every 1 female for Southern Africa, and 0.99 each for Eastern Africa, Middle Africa, and Western Africa (Table 1).

In the United States, although within both the Black and White population women give birth on average to more males than females, like women in sub-Saharan Africa, compared with women outside that region, more White females than Black females give birth to more boys than girls. According to Dodds and Armson[5]: "The sex ratio appears to be lower in black populations than in white populations…"[5] For example, the: "Number of white boy babies born in the United States in 2002 per 1,000 white girl babies: [was]1,050" and that the: " Number of black boy babies born in the United States in 2002 per 1,000 black girl babies: [was] 1,032".[6] According to Bogaert, "For white populations, the sex ratio is 106 male live births to 100 female live births" (p.111).[7]

Even in the Caribbean, where research by this author shows that the 24 nations and territories combined comprised at least 65% Black African population of 36.9 million as of July 2001[1] and are relatively more prosperous than Africa as a whole, there are many nations there with similar sex ratio at birth as sub-Saharan Africa. For example, in the following Caribbean nations, the sex ratio at birth in Anguilla in 2006 was 1.03 males for every female; 1.02 in the Bahamas; 1.01 in Barbados; 1.05 in the British Virgin Island; 1.02 in the Cayman Islands; 1 for Grenada; 1.05 in Guadeloupe; 1.03 in Haiti;1.05 in Jamaica; 1.05 in the Turks and Caicos Islands; and 1.06 in the Virgin Islands. The average for these 12 selected Caribbean nations with majority Black populations is 1.03, the same as the average for all of Africa and for African Americans.[1]

The two important questions then that will be asked in this paper are: (1) why is it that regardless of race/ethnicity or geographic location, the sex ratio data at birth show more males than females?; and (2) Why is it that regardless of geographic location compared to other racial/ethnic groups, Black women or women of sub-Saharan Black African descent tend to give birth to more females? Or to put this question the other way around, compared to Black women, why do non-Black women give birth to more males? Let us start by attempting to answer the first question.

Why are More Males Born at Birth than Females across the World?

Scientists of different kinds and others have also been attempting to answer this question. In addition, they have also been noting and attempting to understand why in recent decades, the average sex ratio at birth has been gradually showing a decline in the number of males, despite more males than females continue to be born.[4,8,9] In a review of tens of scholarly articles investigating this issue, this author identified over two dozen factors or variables presented as responsible for the unequal balance in sex ratio at birth and

for the gradual decline in the birth of males. Most of the scholars pointed out some of these factors or variables and explained them in detail. Let us now examine these factors or variables.

Factors Cited for the Unequal Sex Ratio at Birth across the World

In an article examining why women in India give birth to more males than females, Jha et al.[10] point out that among the factors causing an unequal sex ratio at birth are: mothers' lower caloric intake; infection of Hepatitis B virus; the occupation of a father or his absence from home; smoking; hormonal factors; the time it takes to conceive a child or children; female infanticide; and the habit of under-reporting female births in some cultures. Jha et al. also add that cultural preferences for boys in countries such as India, the use of medical technology such as ultrasound, which in-turn might lead to abortion, also contribute to the unequal sex ratio.[10]

Mackenzie et al. [4] note that:

> *Although the sex of the human embryo is genetically controlled and determined at the time of conception, there is evidence that the sex ratio can be partially influenced by both endogenous and exogenous factors. Endogenous parental hormone concentrations of gonadotropins and/or testosterone at the time of conception are suspected to play a role in determining the sex of offspring.*[4]

Carlton and Stansfield[11] point out that:

> *… it might be possible for an X-linked gene product in a girl fetus to stimulate her mother to make antibodies that might affect her own survival as well as that of the next girl sibling, but not of a boy sibling. Because a boy inherits his X chromosome only from his mother, a male fetus would not stimulate his mother to make antibodies against his X-linked gene products.*[11]

According to Grech et al.,[12] included among the theories for the unequal sex ratio at birth are:

> *…the timing of conception within the ovulatory cycle,… endocrine effect,…and immunological effects In utero, the male fetus is more prone to morbidity and mortality from external influences than the female fetus…. Moreover, the male fetus is at greater risk of all obstetric complications than the female fetus…. Despite these adverse factors, males are invariably born in excess of females, implying an even higher conception rate of males over females than evinced by the sex ratio at birth.*[12]

Grech et al.[12] also point out that: "M/F fluctuates over a 30 cycle, and that this is attributed to a homeostatic mechanism that correlates sex at birth negatively with the adult sex ratio at the time of conception. … Several other hypothesis have been put forward to explain different trends in M/F ratios, with various factors assumed to influence the female genital tract environment in

ways to favour the Y-bearing spermatozoa".[12]

Grech et al.[12] also note that geographic location or region also helps to explain the unequal sex ratio at birth: "We have shown that M/F varies in geographic space, exhibiting a latitude gradient, … and that this gradient is different in Europe and North America, with more males born towards the south of Europe, compared with the North American continent where more males are born towards the north of the continent".[12] They presented data from 1953 to 1998 to substantiate their claim, showing that in Europe, for the following countries grouped under Mediterranean (Bulgaria, Greece, Italy, Portugal, and Spain), the total live births was 83,770,150 and the male live birth was 43,128,276 (0.5147%). In Northern Europe (Austria, Belgium, Denmark, Finland, France, Germany, Hungary, Ireland, the Netherlands, Norway, Poland, Romania, Sweden, Switzerland, and the United Kingdom), of the 223,383,046 total live births, males comprised 114,818,841 (0.5139%). In North America (Canada, Mexico and the United States), of the 248,523,196 live births, males comprised 127,034,732 (0.5112%, but 0.5087% of the 82,943,140 total live births for Mexico; 0.5123% of the 149,978,357 total live births in the U.S.; and 0.5136% of the 15,601,699 total live births in Canada).[12]

In an article which points to research findings showing bias in sex ratio at birth in favor of males in "China, Taiwan, Hong Kong, South Korea, India, and Bangladesh….", Secondi[13] notes that a debate has emerged as to whether such biases are in favor of males and the behavior of parents to produce more boys than nature would allow. According to Secondi, these types of behaviors may include aborting female fetuses, due to the medical technology of ultrasound, which helps parents know the gender of a child in advance, and also female infanticide.[13] Secondi also highlights the issue of under-reporting female births: "A number of scholars have argued that underreporting is so common that it can explain most of the bias in reported sex ratios at birth…".[13] Another issue noted by Secondi that may contribute to the unequal sex ratio is child mortality—parents ability to increase or decrease a child's chances of living based on its sex or gender. According to Secondi[13], "Child mortality can be influenced by parents in a variety ways, including sex differential allocation of nutrients and health care".

Grant[14] also observes that stress levels and maternal dominance tend to influence sex ratios at birth favoring males. Allan[15] points to an inconclusive study that: "found that as maternal age increased, the sex ratio also increased". The examples above have provided us with some understanding of the factors at play in the determination of the sex of a child at birth. We shall now turn our attention to understanding why non-Black women give birth to more males than their Black counterparts.

Why Do Black Women Give Birth to More Females, When Compared to Women in Other Racial Groups?

Although this paper does not include any particular studies explaining why Black women give birth to more females than their non-Black counterparts, as noted previously above, some studies have been examining the gradual decline of the sex ratio at birth in recent decades. In an article discussing the declining birth rates of males in Canada, Dodds and Armson[5] note that: "Sex ratio is thought to be affected by a wide range of biologic and environmental factors, including race, birth order, parental age, parental hormone levels, timing of conception, ovulation induction, environmental toxins and socioeconomic status".[5] Explaining ovulation induction and its impact on males, Dodds and Armson[5] note that:

> *It has been suggested that drugs used for ovulation induction result in a significant decrease in the sex ratio, although the magnitude of this decrease is not consistent across study populations…. The decrease may be directly related to increased gonadotropin levels or may be a secondary consequence of follicular phase length or timing of conception, which is often carefully controlled in the treatment of infertile couples.*[5]

Pertaining to Environmental factors, they claim that:

> *Evidence relating to the impact of pollution, environmental toxins and industrial exposures on the sex ratio is conflicting…. Several investigators found an association between an increase in the sex ratio and industrial pollution,… but this was later refuted? Associations between various occupational exposures (i.e., to dibromo-chloropropane, pesticides, inorganic borates, carbon, alchohol and lead) and low sex ratios have been reported…. It is thought that apparent decreases in the sex ratio may be related to an increase in female offspring secondary to elevated gonadotropin and normal testosterone levels in men exposed to industrial toxins.*[5]

According to Allan,[15] the study of animals suggest that, "… decreased maternal condition or adverse environmental conditions during pregnancy are associated with a decreased sex ratio", and that, "Exposure to environmental toxins has been shown to alter the sex ratio of live births in both human populations and animal models.[15] Allan concludes by pointing out that other factors that have been cited as affecting sex ratios include "… seasons, wars, birth order, certain diseases and various social factors.[15] Let us now examine some factors that might be causing Black women to give birth to more females than non-Black women.

Some Factors That Might Be Contributing to Black Women Giving Birth to More Girls than Non-Black Women

Several factors might be responsible for Black women giving birth to more

girls when compared with non-Black women. For example, there is a likelihood that because the total fertility rate in sub-Saharan Africa is substantially higher than those of other racial groups, it may be that the more children a woman has the less likely that she would conceive a boy. The average total fertility rate for the world in 2006 was 2.59 children born per woman; 2.09 in the U.S.; 1.47 in the European Union; 1.73 in China; and 2.73 in India. According to the U.N. Population division, nations or societies need 2.1 children born per woman to continue to replenish or sustain their populations. Of the five regions of Africa, Middle Africa and Western Africa had the two highest average total fertility rates respectively, 5.43 and 5.22 children born per woman; 4.87 children born per woman in Eastern Africa; 2.97 children born per woman in Southern Africa; and 2.86 children born per woman in Northern Africa (Table 2).

Also in the U.S., Black females give birth to more children than White women. For example, according to Dye,[16] as of June 2004, of the 47,984,000 White women 15 to 44 years old, 45.1% were childless, and the number of children ever born per 1,000 White women was 1,159. For Black women, there were 8,798,000 of them from 15 to 44 years old, with 40.5% of them childless, and the number of children ever born for every 1,000 Black women was 1,361.[16]

Allan[15] notes that: "Parental age has also been shown to affect the sex ratio. … as paternal age increased, the sex ratio decreased". This might be a contributing factor in Africa. In sub-Saharan Africa, because older men tend to be more financially secured, they tend to have very young brides. It is not uncommon in sub-Saharan Africa to see a man in his fifties or older to be married to a teenage girl, primarily because of his economic status in the village, town or city.

Jha et al.[10] point out that "lower caloric intake by mothers" (p.211) might cause an unequal sex ratio at birth. Mathews et al.[17] also found in their study of women in the United Kingdom that: "…using data from 740 British women who were unaware of their fetus's gender, we show that fetal sex is associated with maternal diet at conception. Fifty six per cent of women in the highest third of preconceptional energy intake bore boys, compared with 45% in the lowest third".[17] This is an observation that might hold true in sub-Saharan Africa. People in that region continue to consume fewer calories when compared to rich nations. For example, a careful review of the caloric intake section of the 2000 United Nations Development Program World Development Report show that, while the average caloric intake for the top 30 ranked nations was over 3,000 calories in 1997, for 14 of Western Africa's 16 countries, the average daily per capita intake of calories in 1997, was 2,403 [18] and that figure for Western Africa is highly likely to be lower for women. But this is an argument that would not hold true for Blacks in the U.S. and the Caribbean.

Relative lack of technology might be a contributing factor in why women in Sub-Saharan Africa give birth to more

Table 2: **Total Fertility Rate (Children born per woman), Africa and Its Five Regions, World, U.S., EU, China and India: 2006**

	Total fertility rate(children born/ woman)
Eastern Africa	4.87
Middle Africa	5.43
Northern Africa	2.86
Southern Africa	2.97
Western Africa	5.22
Africa	4.68
World	2.59
United States	2.09
European Union	1.47
China	1.73
India	2.73

Source: Compiled and Computed by author based on Data in the 2006 CIA World Fact book

females than non-Black women. By this the author means that compared with China, India and developed nations, people in sub-Saharan African nations may still lack technology such as ultrasound machines to help them know in advance whether they would be giving birth to a boy or girl. This then means that, women in that region might be giving birth in a more natural way than their counterparts in other parts of the world. This argument also might not hold true for Black women in the U.S. or the Caribbean, who have immediate access to such technology. This then brings us to the author's next speculation.

One must also consider the fact that in sub-Saharan Africa women tend to give birth to more children to help them with household chores and for economic reasons. And as already noted the more children a woman has, the more likely more females may be born. Lamenting on why she needs many children, a woman in Burkina Faso was quoted by Danaher (1993) as saying: "It takes me four hours every day to fetch water, and another four hours to collect firewood. Then there are the cattle to care for. I need children to help with the chores. They can also work for other people, and eventually earn and contribute to our income".[19]

Finally, in a review of Grant[14], Bogaert[20] points out that: "… all animals have a 100/100 secondary sex ratio, that is, 100 male live births to 100 female live births, whereas humans consistently have a higher (secondary) sex ratio, that is, 105/100".[20] Can one then suggest that nature might be at work here? Would it not be possible that if all other animals have a 100/100 sex ratio at birth, are Black women not becoming the first humans to reach that natural evolutionary stage? For many years now this author has been observing that as females

continue to equal and surpass males in many important areas such as educational attainment, life expectancy, etc. in the U.S., Black females tend to be the first to make such achievements, before females in other racial groups follow. Might this be another such trend? If humans are potentially in the process of equal sex ratio at birth, are there future implications?

Future Implications

It appears that if the trend of the decline in the birth rate of males continues and ends up being equal (100/100), females will become the overwhelming majority in the world. That is because even with more males than females being born at this moment, they are outlived by females. So if there is an equal sex ratio at birth there will be a relatively large number of young males and a relatively larger number of females aged 65 and over. In fact, there is a region of the world where there is a massive population gap between males and females age 65 and over. That region comprised the group of nations called Commonwealth of Independent States (CIS) (Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan). When this author compiled and computed 2001 demographic data for the five regions of Africa and the following regions: Caribbean, Central America, South America, Middle East, East Asia, Southeast Asia, South Asia, and the CIS, it was surprising to learn that for the age group 65 and over, there were 10.6 million males and 21.4 million females in the CIS out of a total population of 283 million, that is more than double. Northeast Asia (China, including its Administrative Regions of Hong Kong and Macau; Japan, Mongolia; North Korea; South Korea; and Taiwan) also had a gap of more than 10 million, with 55.2 million males and 65.5 million females aged 65 and over. However, their total population in 2001 was far more than that of the Commonwealth of Independent States (1.5 billon).[1] So the point that is being made here is that the world may be experiencing in the decades and centuries to come the gender gap now being experienced in the Commonwealth of Independent States.

One big implication then would be the shrinking of the male population worldwide, causing women difficulty in finding husbands. Would this result in the implementation of Muslim or some U.S. Mormon church customs, whereby a man could marry more than one woman? Another important implication will be the gradual transfer of legal authority and wealth from males to females. That is to say in the U.S., for example, since wives tend to live longer on average than their husbands, they would inherit the wealth that they accumulated together. The average life expectancy in 2006 in the world for males was 63.16 years and 66.47 years for females; 51.8 years for males and 54.51 for females in Africa; 75.02 years for males and 80.82 years for females in the United States; 75.1 years for males and 81.6 years for females in the European Union; 70.89 years for males and 74.46 years for females in

China; and 63.9 years for males and 6.57 years for females in India. As for a breakdown of the average life expectancy of Black Americans, in 2002, the average life expectancy for Back males was 68.8 years and 75.6 years for Black Females. For White Americans it was 75.1 years for males and 80.3 years for females.[21] Also, since there would be far more females than males, it is those females that would take over most of the important leadership positions within nations.

Conclusion

This paper has attempted to contribute to the investigation of why regardless of race/ethnicity or geography, women give birth to more boys than girls. The figures presented from across the world continue to show this trend. However, there is an increasing number of studies now showing a decrease in the number of boys being born, and environmental factors are cited to be part of the primary reason.

Black people or people of Black African descent appear to be the first racial group to be showing a visible decline in the number of boys born, when compared with other racial groups. Several examples are presented to help explain why this is the case. Included among those examples is that humans might just be going back to their natural stage whereby like other animals, they too will start experiencing an equal sex ratio, and that Black women might just be getting there first.

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Appendix

List of African Nations (N=57)

Eastern Africa (n=19)
Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Reunion, Rwanda, Seychelles, Somalia, Tanzania, Uganda, Zambia, Zimbabwe and Mayotte.

Middle Africa (n=9)
Angola, Cameroon, Central African Republic, Chad, Republic of Congo, Democratic Republic of Congo, Equatorial Guinea, Gabon and Sao Tome & Principe

Northern Africa (n=7)
Algeria, Egypt, Libya, Morocco, Sudan, Tunisia and Western Sahara

Southern Africa (n=5)
Botswana, Lesotho, Namibia, South Africa and Swaziland

Western Africa (n=17)
Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo and Saint Helena

Source: *Country/regional classifications by the United Nations Statistics Division, Department of Economic and Social Affairs. Retrieved on July 12, 2004, from http://unstats.un.org/unsd/methods/m49/m49regin.htm*