

Causes and Consequences of Skewed Sex Ratios

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Abstract

Slightly more males are born in the world than females. But because male mortality is usually greater, in old age groups there are many more women than men. The situation is particularly stark in the former Soviet Union, where male adult death rates are exceptionally high. In much of Asia, strong son preference has long informed unusually high female child mortality. And the impact of this on population sex ratios has been reinforced by the recent spread of sex-selective abortion. Especially in China, there is an unusually large number of boys relative to girls. Sex ratios are also skewed by migration, most notably male labor migration. Unbalanced sex ratios have many effects. Among other things, research has focused on the consequences of male outmigration for those who are left behind and on the implications of the coming heightened masculinity of young adult populations in Asia, e.g., with respect to marriage and crime.

INTRODUCTION

According to the United Nations (2011), in 2010 the world's population consisted of 3,478 million males and 3,418 million females, giving a nearly equal sex ratio of 1.017 [note that the sex ratio is expressed here as the ratio of males to females (m/f); unless otherwise noted, all demographic estimates are from United Nations (2011)]. However, this figure of 1.017 hides considerable variation. For example, the ratios were well above one in East Asia (1.062) and South Asia (1.057). These populations had a distinctly masculine edge. North Africa (1.005), sub-Saharan Africa (0.999), and Southeast Asia (0.990) had ratios close to one. Latin America (0.976) and North America (0.975) had figures indicative of slightly more females than males. Europe's population (0.930) was by far the most feminine.

The sex ratio at birth in the world in 2010 is estimated by the United Nations at 1.07—i.e., there were approximately 107 male births for every 100 female. But males tend to die at higher rates than females at all ages. Indeed, the United Nations considers that in the current five-year period, 2010–2015, male and

female life expectancies are 67.1 and 71.6 years, respectively, signifying a female advantage of 4.5 years. Moreover, the excess of male death rates over female death rates increases at older ages, as the overall risk of dying increases. Therefore, the modest surplus of males at birth is gradually—and then rapidly—whittled away. **Figure 1** shows that especially beyond age 60, there are fewer and fewer males in the world compared to females.

The United Nations publishes detailed demographic estimates for 196 political units. These illustrate sex ratio imbalances in other key respects. Thus, if the ratio of males to females in the world was nearly equal in 2010, there was huge variation between different units. The three most feminine countries—all with population sex ratios near 0.85—were Ukraine, Estonia, and Latvia. In these places, adult male death rates are extremely high compared to those of females. The countries with the most masculine populations were Qatar (3.11), the United Arab Emirates (2.28), and Bahrain (1.66). The very high sex ratios of these small oil-rich states reflect the presence of large numbers of migrant men.

These initial remarks have implications for the structure of this review. The balance of the sexes in a population reflects the sex ratio at birth, inequalities in mortality between the sexes, and differences in composition due to migration (Coale 1991). Therefore, the first three parts of this paper address the causes of skewed sex ratios with reference to these three factors in turn. The fourth part discusses the consequences of skewed sex ratios. The review concludes with some brief remarks on future trends. Here, fertility decline is relevant because it is the main cause of population aging. We have already seen that more women survive into older ages. Therefore, the age structure of a population is another significant factor influencing the sex ratio. [Fertility also influences the sex ratio through the sex ratio at birth. Because the latter ratio is usually slightly greater than 1.00, other things equal, a population with a higher birth rate will be (slightly) more masculine.]

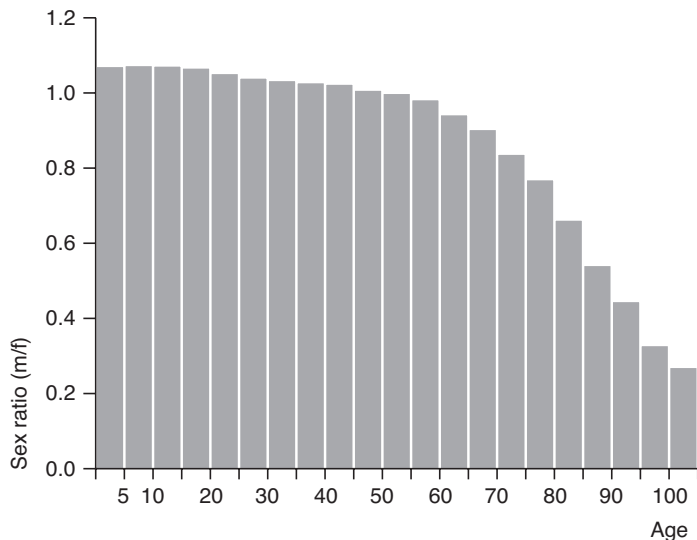


Figure 1

The sex ratio (m/f) of the world's population by age in 2010. The highest age group shown relates to people aged 100+. Source: United Nations (2011).

THE SEX RATIO AT BIRTH

Until recently, it could be safely assumed that the sex ratio at birth in most populations would be close to 1.05. This was because data for countries with accurate birth registration regularly revealed ratios between 1.04 and 1.06. For example, a study covering the period 1940–2002 in the United States found that the annual sex ratio at birth varied between 1.046 and 1.059 (Mathews & Hamilton 2005). Some of the year-to-year variation in the ratio would reflect random fluctuation. And the ratio can also exhibit slight upward or downward trends. For instance, this may happen because of alterations in the incidence of stillbirths, the ages of parents, and possibly environmental factors (Klasen 1994, Waldron 1998a, Davis et al. 2007).

The main exception to the generalization that the sex ratio at birth would be around 1.05 related to sub-Saharan Africa. Ratios in this region tend to be slightly lower (Chahnazarian 1988). For example, a study of births recorded in African surveys since 1977 found a ratio of 1.03—a figure close to those of populations of African origin living in the United States and the United Kingdom (Garenne 2002). Yet even this represents only minor variation from the general experience. The main explanation for why, until recently, the sex ratio at birth in all populations has been slightly masculine (i.e., slightly above 1.00) is that the feature arose from natural selection to counterbalance the tendency of males to die at higher rates than females at all ages (Fisher 1930).

In the 1980s, however, there were reports that women in some countries—notably China, India, and South Korea—were undergoing newly available medical procedures (ultrasound or amniocentesis) in order to determine the sex of the fetus they were carrying, with the aim of having an abortion if the sex were female. Early reports of sex-selective abortion were anecdotal. It was usually undertaken covertly and before any open sign of pregnancy. Reliable data with which to assess the extent of the practice were generally unavailable. For example,

an increase in the sex ratio at birth indicated by survey data could simply reflect reporting changes. Thus, against the background of China's forceful one-child family planning program, the increase in male births indicated by several national surveys in the 1980s might have been because—in their desire to avoid being penalized for a second child—parents were underreporting the birth of daughters (Hull 1990).

However, there is now strong evidence that the sex ratio at birth has risen in several Asian countries in recent decades. As well as the three countries mentioned above, there is clear evidence for Armenia, Azerbaijan, Georgia, Pakistan, Singapore, and Vietnam (Guilmoto 2009). There have probably been increases in other Asian countries as well, although good data are lacking. There are signs of rises for Albania and Montenegro, small states in Southeast Europe (Guilmoto 2009). And increases have also been detected for certain Asian migrant communities living in Europe and North America (Dubuc & Coleman 2007, Abrevaya 2009).

It was previously claimed that these increases in the sex ratio at birth had a biological cause—in particular, that the spread of hepatitis B somehow explained them (Oster 2005, 2006). But this idea has been discounted, largely because data invariably reveal that the heightened tendency of women to bear sons is closely related to the sex composition of the children they already have (Das Gupta 2005). For example, survey data for China circa 1990 indicate that the sex ratio of second births for women who already had a daughter was 1.49, and for women with two or more daughters—but no sons—it was 2.24 (Das Gupta 2006). Thus, women with daughters but no sons exhibit the increased probabilities of giving birth to males. The claim regarding hepatitis B has been retracted (Klasen 2008, Oster et al. 2010).

The recent increases in the sex ratio at birth have occurred in societies that are highly patriarchal. Relevant features of these societies have long been known to comparative sociologists (Goody 1976). Traditionally, and still to some extent today, sons remain at home at

marriage and are consequently seen by parents as sources of support in old age and continuity for the male line. In contrast, daughters join their husbands' households at marriage, and their main duty is to bear sons for their husbands' lineage. Moreover, parents may need to provide costly dowries for daughters. Therefore, raising a daughter can be seen as analogous to "watering the neighbor's garden," as opposed to watering one's own (Attané & Guilmoto 2007b). Research shows that there is considerable variation in how son preference is manifested in Asia. Nevertheless, in general, societies elsewhere in the world do not exhibit a preference for sons—and sometime indifference toward daughters—to anywhere near the same degree (Arnold 1997, Fuse 2010).

Clearly, the spread of sex-selective abortion has involved increased access to methods of prenatal sex determination. And the practice has also been facilitated because many governments have promoted abortion as part of their family planning programs (Attané & Guilmoto 2007a). However, fertility decline has probably been the most important factor behind the spread of the practice. As recently as 1970, the average level of total fertility in Asia was approximately 5.1 births per woman, and, in these circumstances, few women would fail to give birth to a son. However, for the period 2010–2015, the level of fertility is estimated at only 2.2 births, and in some countries—e.g., China (1.6) and South Korea (1.4)—it is much lower. In these new circumstances, the chance of not having a son is far greater. Thus, in the absence of sex-selective abortion, for women who only have one birth, the chance is obviously approximately one in two; and for women who have two births, the chance is still roughly one in four. The role of fertility decline in exerting pressure on couples to resort to sex-selective abortion to help ensure that they have a son has been variously termed an "intensification" or a "squeeze" effect (Das Gupta & Bhat 1997, Guilmoto 2009).

Not every Asian society exhibits son preference, however. Survey data suggest that it is absent or weak in Southeast Asian countries such

as the Philippines and Thailand (Arnold 1997, Fuse 2010). Moreover, even where the preference exists, people may be reluctant to resort to prenatal sex determination and, still more, abortion. Here, the fact that some interpretations of Islam are opposed to abortion may help to explain the relative absence of the practice from some—although not all—Muslim countries. And the same may apply in some Christian communities (Guilmoto 2009). Furthermore, the timing, speed, and extent of fertility decline have varied among populations. Such considerations help to explain why increases in the sex ratio at birth—and therefore increases in the sex ratio of young children—have also varied.

According to the United Nations, the sex ratio of the population aged 0–4 in China rose from roughly 1.06 in 1980 to reach 1.21 in 2010—a striking increase. Fertility in China fell below two births per woman in the early 1990s and has remained low ever since. Survey data indicate that by 2004 the sex ratio at birth had risen to approximately 1.20 and that in some areas it was approaching 1.30 (Guilmoto 2009). Today roughly 12% of all births occur in China, and this largely explains why the United Nations puts the world's sex ratio at birth in 2010 at 1.07. In India, the estimated rise in the sex ratio of children aged 0–4 over the same period has been much less marked, an increase from 1.07 to 1.09. However, India contains societies with low and high levels of son preference. In northern parts of the country, where there is particularly strong son preference and widespread discrimination against girls (Visaria 1971, Das Gupta 1987), the increases in the masculinity of the child population have been similar to the increase experienced in China (Chung & Das Gupta 2007).

Finally, South Korea's experience is especially interesting. The country has accurate birth registration. The technology of prenatal screening became available in the 1980s, and the country's sex ratio at birth rose sharply to peak at 1.15 in the mid-1990s (Chung & Das Gupta 2007). However, more recently the ratio has fallen, and by 2008 it was approaching 1.06—i.e., close to the level expected in

the absence of sex selection (Statistics Korea 2009).

The screening procedures that make sex selection possible are still spreading. In many places, the sex ratio at birth is probably continuing to rise. However, there are signs—notably for South Korea—that the increases may eventually be reversed. This may happen because son preference diminishes with socioeconomic development (e.g., with increased female employment); it may be influenced by government policy; and it may also occur because an oversupply of sons eventually produces difficulties in society that provoke a countervailing response among parents (Das Gupta et al. 2009, Guilмото 2009). Clearly, the same new medical technologies can be used to help ensure the birth of daughters. And, indeed, there is tentative evidence of this for women with two or more sons—but no daughters—in China (Das Gupta 2006).

SEX DIFFERENCES IN MORTALITY

Excess female mortality occurs mostly in childhood and early adulthood and has long been observed in Asia (Wyon & Gordon 1971). Indeed, increases in the sex ratio at birth are a modern manifestation of those social features that in the past, and still today, have underpinned the occurrence of many excess female deaths. Excess male mortality is virtually universal (Lopez & Ruzicka 1983). Higher male mortality can occur at all ages, but it invariably becomes appreciable at some point in adulthood. Thus, even in societies for which there is excess female mortality, there comes an age above which men die at notably higher rates than women. Excess female mortality is chiefly the result of discriminatory behavior toward girls and women. Excess male mortality reflects behavior as well, but there is much evidence that higher male mortality also reflects sex-based differences in biology (Wizemann & Pardue 2001).

Excess mortality of either sex is difficult to estimate precisely. It is often viewed as mortality resulting from patterns of behavior that

are not gender neutral. However, it is difficult to disentangle the many behavioral, environmental, and biological influences on mortality. Therefore, it is difficult to know what mortality would be if patterns of behavior were indeed gender neutral. Mortality statistics based on European societies are sometimes used as reference standards here. But it is unlikely that these societies have ever been gender neutral. Indeed, in parts of Europe, female child death rates exceeded those of males until well into the twentieth century (Stolnitz 1956). Examining whether the mortality of one sex is higher than that of the other is also insufficient because females are thought to have an inherent mortality advantage at all ages (Waldron 1983, 1998b). It is difficult to assess this advantage, but it might be expected to be more evident in populations for which external influences on mortality are most reduced, i.e., circumstances in which life expectancy is high. That said, it is important to note that females alone experience certain mortality risks, e.g., those associated with childbirth. Moreover, research suggests that females are innately more susceptible to some infectious diseases (Garenne & Lafon 1998).

Following Waldron (2003), **Figure 2** plots ratios of male to female death rates by age in three countries with different levels and sex profiles of mortality. In the United States, male death rates exceed those of females at all ages, but especially between the late teens and early thirties, largely reflecting male deaths from accidents and violence. In Russia, too, male mortality exceeds that of females at all ages. But in contrast to the United States, the ratio peaks in a later age group (ages 30–34) and at a much higher level. The Russian ratio then remains very high in subsequent age groups.

It should be noted that, at all ages, female death rates in the United States are appreciably lower than those in Russia. Therefore, the high Russian ratio in all age groups implies especially heavy mortality among adult males in absolute terms. In India, male death rates are higher than female death rates in the 20–24 age group and all subsequent age groups. But during the first 20 years of life, female death rates exceed those

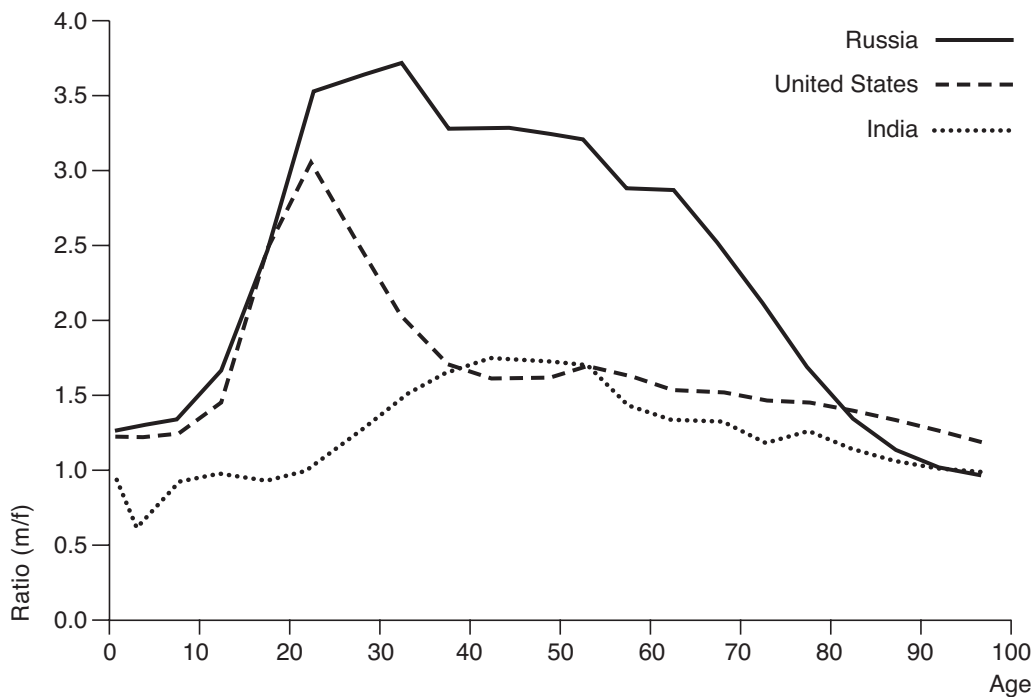


Figure 2

The ratio of male to female death rates by age for Russia, the United States, and India around 2008. The rates used are life table death rates. Source: World Health Organ., *Global Health Observatory Data Repository*, <http://apps.who.int/ghodata>.

of males. At these younger ages the biggest difference between female and male death rates, in both proportional and absolute terms, is in the 1–4 age group. Finally, it is worth noting that although a country’s age and sex structure reflects its cumulative past demographic experience (and not just its recent mortality), it is nevertheless the case that in 2010 the age group in which the number of women in the population began to exceed the number of men was 30–34 in Russia, 45–49 in the United States, and 60–64 in India. These differences broadly correspond to what might be anticipated from **Figure 2**. (The level of mortality is also important in determining the crossover age at which females begin to outnumber males. Other things equal, when life expectancy is low, females outnumber males at a younger age than when life expectancy is high.)

With respect to excess female mortality in Asia, it was evident to nineteenth-century observers that infanticide was commonly

practiced in China, much of northern India, and other patriarchal societies such as Japan. Research confirms that the practice was highly sex selective (Miller 1981, Saito 1992, Lee et al. 1994). Killing female infants at birth was regarded as acceptable—not very different from how abortion, and even birth control, are sometimes seen today. Indeed, the purpose of infanticide was precisely to control the size and composition of families. The practice eventually decreased, partly because of outside philosophical influences (Caldwell 2001).

However, to varying degrees, excess female mortality persists in many Asian countries and some countries in North Africa (Adlakha & Suchindran 1985). The evidence is usually clearest for the 1–4 age group (as for India in **Figure 2**). And it is especially clear if mortality patterns derived from European countries are used to assess its extent (Hill & Upchurch 1995). However, higher female mortality

specifically in infancy is rare. Thus, whereas mortality at ages 1–4 is often influenced by differences in behavior toward boys and girls, deaths in the first year of life—many of which occur soon after birth—are more likely to reflect endogenous biological considerations that, as noted, tend to favor females. Of the 196 populations for which the United Nations provides estimates of the infant mortality rate for the period 2010–2015, there are only two for which the female rate is much above the male rate. They and their respective male and female infant mortality rates, per 1,000 live births, are China (16.3, 23.6) and India (46.9, 49.0). Especially in China, this probably reflects the continuing practice of infanticide (Coale & Banister 1994, Croll 2001).

Data for India clearly show that excess female child mortality is most pronounced for girls who have older sisters, and that it is usually absent or slight in the case of firstborn girls (Das Gupta 1987, Arnold et al. 1998, Arokiasamy 2007). Differences in food allocation between boys and girls, leading to differences in nutritional status, may help to explain the phenomenon. But research has questioned whether differential feeding patterns are particularly germane, especially if one takes account of the higher food energy requirements of boys (Harris & Watson 1987, Basu 1989). Research using longitudinal data from Bangladesh has been important in suggesting that what really counts in modern circumstances are differences in the behavior of parents toward sons and daughters in matters of health care. Thus, if a son becomes ill, he is more likely to receive medical treatment (Chen et al. 1981). That boys are more likely to receive curative, and sometimes preventive, medical treatment applies in much of Asia and North Africa (Timaeus et al. 1998). Moreover, survey data for many countries suggest that sex biases in food distribution have been overstated and that the nutritional status of boys is often actually worse than that of girls (Marcoux 2002).

Excess female mortality from discriminatory behavior can extend well beyond childhood. Moreover, especially in the past—when

fertility levels were higher—the physiological and other burdens of repeated childbearing also contributed to the toll of female deaths. As noted, female death rates in India now exceed those of males at all ages below 20 years. But as recently as 1970, female death rates were higher at all ages below 40 years (Visaria 2005). In short, the fact that women are now having fewer births (e.g., two or three) and mostly at younger ages (e.g., while in their twenties) has contributed to a reduction of maternal mortality, both in Asia and elsewhere (Stover & Ross 2008).

In recent decades, the subject of excess female mortality has become more widely known, partly due to an article by Sen (1990) in which he estimated that more than 100 million women were “missing” from the world, mostly from Asia. Sen focused on deaths resulting from discriminatory behavior. He did not address sex-selective abortion because when he initially wrote on the subject, this practice was neither very apparent nor widespread.

However, Sen’s article stimulated much research on the topic of missing women and girls, whether due to excess deaths or abortion (Bhat 2002a,b; Sen 2003; Alam et al. 2007; Bossen 2007; Anderson & Ray 2010). Subsequent attempts to estimate the number of missing women have used more elaborate methods, and they have tended to produce somewhat lower, although still huge, numbers. Coale (1991) put the number in 1990 at roughly 60 million, and Klasen (1994) estimated the figure at 90 million. The worst-affected countries include China, India, Pakistan, and Bangladesh. The situation appears to be improving in most places, however, and this conclusion holds largely irrespective of the method of estimation used (Klasen & Wink 2002, Das Gupta et al. 2009).

The estimates of life expectancy produced by the United Nations suggest a faster rate of mortality improvement for females than for males in most world regions—including East Asia (with China) and South Asia (containing India, Pakistan, and Bangladesh). As child death rates fall, so does the absolute difference between the rates for females and males. In

addition, any inherent female advantage is more likely to be visible at low levels of mortality as the influence of external factors is reduced. Finally, scholars have noted that the practice of sex-selective abortion presumably leads to a reduction in the number of unwanted—mainly female—births. And it is these—e.g., second- or third-born daughters—who are most likely to experience neglect, or worse. So it may be that sex-selective abortion is itself playing a role in reducing the discriminatory behavior that leads to the death of some young girls (Goodkind 1996, Westley & Choe 2007).

Turning to excess male mortality, that male death rates usually exceed those of females is generally seen as partly reflecting a natural female advantage. However, here it is interesting to consider the higher male death rates at ages 15–35 in the United States (**Figure 2**). Many societies experience much higher male mortality at these ages, mainly due to deaths from accidents and violence. In part, such mortality can be seen as avoidable because it results from behavior that, in principle, might be reduced. But it also reflects behavior that can be seen as innate, such as the greater tendency of young men to take risks. Notice that this difficulty of gauging the extent to which there is excess mortality also pertains to older ages, at which higher male death rates are often partly the delayed result of behavior earlier in life with respect to activities such as smoking and drinking. So social influences often reinforce the inherent component of higher male mortality (Waldron 2003).

That there is exceptional excess mortality among Russian men is clear (**Figure 2**). Their remarkably high death rates are mainly due to cardiovascular disease, cancers, and violence (e.g., homicide, suicide). Such deaths are frequently related to very high levels of alcohol consumption, although other harmful lifestyle features (e.g., poor diet, smoking) contribute too (McKee 1999). Poorly educated men are most affected. And the social conditions behind these high death rates include job insecurity and stress. The health of Russian men has been grim for decades, but the situation further worsened

following the collapse of the Soviet Union in 1991 (Chen et al. 1996, Shkolnikov et al. 1998, Bobak et al. 2002, Murphy 2011).

To conclude, **Figure 3** plots the current relationship between life expectancy for both sexes combined and the ratio of male to female life expectancy internationally. There is considerable scatter, but three points are worth making: First, higher life expectancy is associated with a declining ratio—i.e., greater female advantage in terms of the number of years lived. Thus, a life expectancy of roughly 50 years—as applies in much of Africa—implies a female advantage of approximately one year in life expectancy, other things equal. But a life expectancy of 80 years is associated with a female advantage of approximately six years. Second, in only 5 of the 196 units is female life expectancy below that of males. In addition to Qatar, these populations are Botswana, Lesotho, Swaziland, and Zimbabwe, all countries that have been exceptionally badly affected by HIV/AIDS. It may be that women in these countries have poorer access than men to health care and antiviral drugs (Sprague 2008, Jusrut & Kalipeni 2010). But it is also likely that because women are generally infected with HIV at younger ages than are men, female life expectancy has fallen to a greater degree. The presence of HIV/AIDS in sub-Saharan Africa certainly helps to account for the recent assertion, using rather particular assumptions, that there are large numbers of missing women in Africa (Anderson & Ray 2010). Finally, notice the shaded group of countries in **Figure 3** with life expectancies of 65–75 years, but with very low ratios. These countries—Russia, Belarus, Estonia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Turkmenistan, and Ukraine—were all part of the former Soviet Union and all have very high male death rates in adulthood (Bobadilla et al. 1997, Cornia & Panicià 2000), as discussed previously with respect to Russia. Average male life expectancy in these countries is approximately ten years below that of females. **Figure 4** shows the percentage age and sex distribution of Ukraine; the relative shortage of adult males is clear.

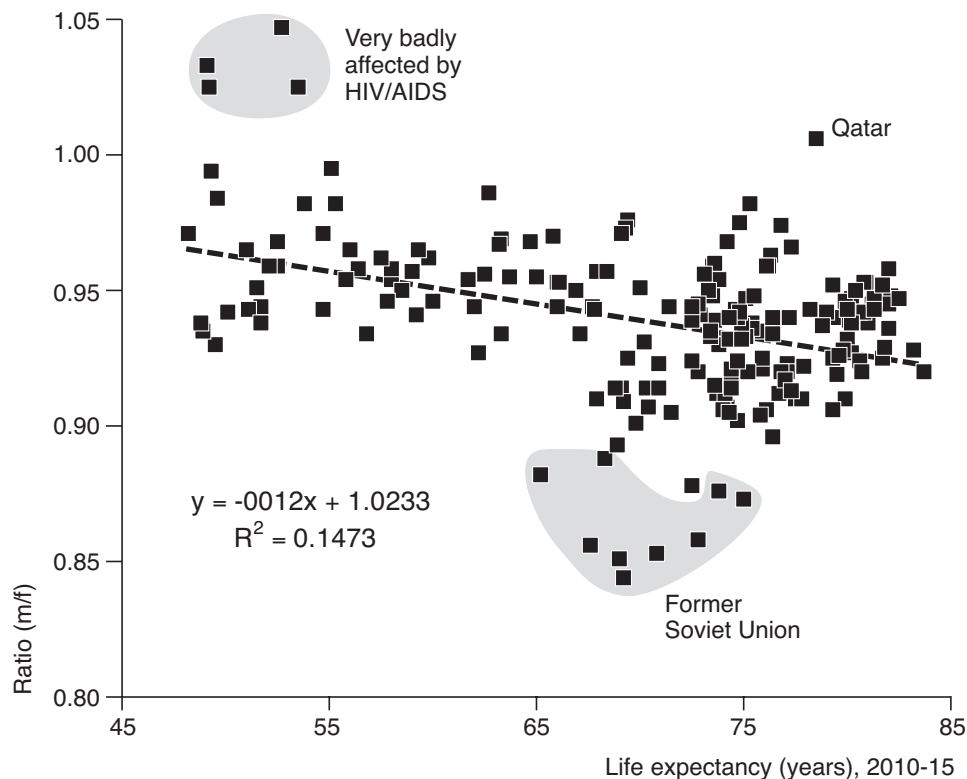


Figure 3

Life expectancy at birth for both sexes combined and the ratio of male to female life expectancy, 196 populations. Source: United Nations (2011).

MIGRATION

Migration has less predictable effects on population sex ratios than deaths (or births). This has been attributed to the fact that it tends to be “spasmodic, linear, and localized in impact” (Clarke 2003, p. 877). Clearly, migration is a complex subject. For example, it can occur for many reasons and be defined with respect to different distances and durations. There is also a paucity of reliable data on migration. However, several points are worth making with respect to its influence on sex ratios.

The sex ratios of large populations are generally less influenced by sex-selective migration than are those of small ones. For example, the populations of China and India are so large that any likely quantum of migration—in or out—

will have only a minor effect on their sex ratios. Indeed, in such cases this may even hold for the age groups (e.g., 20–34) for which migration rates are highest. In contrast, the sex ratio of small populations can be greatly affected by relatively small flows of migrants if such flows are mainly of one sex. Also, within large populations, the sex ratio of specific places that are foci for migration (e.g., mining centers, industrial sites) can be greatly affected, although the sex ratios of the populations from which the migrants come may be little affected (if those populations are large).

Clearly, with respect to both places of origin and destination, the effect of migration on the sex ratio of a population depends upon the extent to which the flow of migrants is sex selective. Here, it is important to note that many

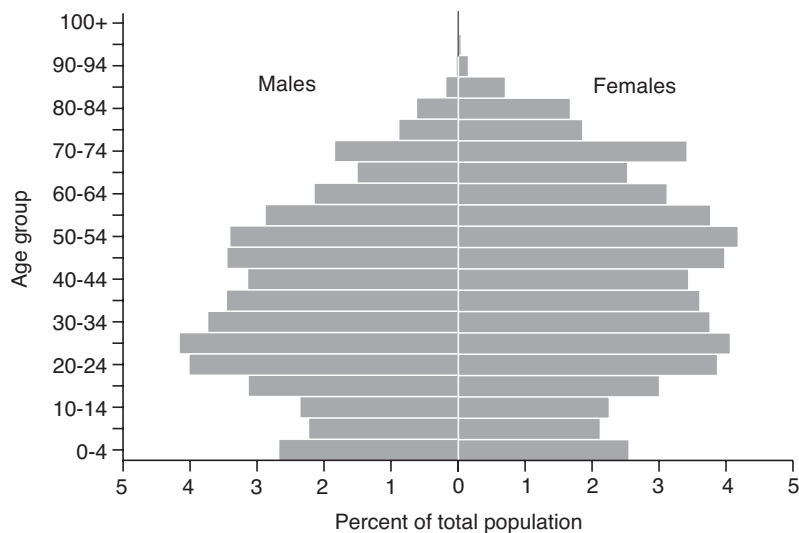


Figure 4

The age and sex distribution of the population of Ukraine in 2010. Source: United Nations (2011).

forms of migration are fairly balanced (Clarke 2003). This is true, for example, of migration involving children and households. Marriage migration may be sex selective, but communities that send, say, women also receive them. Seasonal labor migration is often sex selective, but it is usually short term, and therefore its impact on population sex ratios is often short-lived.

Much sex-selective migration has involved, and still involves, young men moving for reasons of employment. But as migration streams evolve, women often form a rising proportion of migrants—partly because they may be moving to join their husbands (Chant 1992, Bilsborrow 1993, Crook 1993). That said, there are places such as the Philippines and Thailand where women have long been prominent in migration—e.g., moving to find work in the urban service sector. And there is increasing evidence of a more general feminization of migration in relation to both internal and international movement (UNFPA 2006). In many places, women are migrating independently of men (Zlotnik 2003, Morrison et al. 2008). The global economic restructuring of recent decades has often produced employment opportunities—e.g., in light

industry and call centers—that favor women. The emigration of women has contributed to relatively high sex ratios in small island populations in the Pacific (Clarke 2003).

Several of the world's main migration flows, initially dominated by men, have seen increasing participation by women. Thus, in China, the massive movement of temporary migrants toward the eastern coastal zone, from the 1980s onward, was mostly men. This was partly due to the physically demanding nature of the jobs that were available (Yang & Guo 1999). However, there are signs that the sex ratio of this migration flow has become more balanced, reflecting changes in employment opportunities and a growing acceptance that women can move by themselves (Tuñón 2006). The migration to South Africa of men from neighboring countries to work in the mines dates from colonial times. The absence of these men from their homelands was evident in lowered sex ratios at ages 20–34 exhibited in census data for sending countries such as Lesotho and Swaziland. However, since the late 1980s there have been signs of change, with women becoming more prominent in migration to South Africa (Crook 1997, Posel 2006). Again, for most of the twentieth

century, migration from Mexico to the United States was largely male. Consequently, there were relatively few men in some areas of Mexico. But women have increased in this flow too, migrating either alone or as part of households (Donato 1993, Donato et al. 2008).

From the 1960s onward, migration to Saudi Arabia and neighboring oil-rich countries has been strictly controlled and overwhelmingly male (Weiner 1982). A significant fraction of the male labor force of sending countries such as Pakistan are working in the Persian Gulf countries in jobs such as construction (Gould 2009). However, even here there are signs of some feminization. For example, roughly as many women as men have migrated to the Gulf from Sri Lanka and the Philippines. Most of these women are employed either as domestic servants or in the wider service sector (Esim & Smith 2004, Shah 2004). That said, migration to the Gulf is still overwhelmingly male.

Figure 5 shows the age and sex distribution of Qatar; the presence of male “guest” workers is striking.

CONSEQUENCES

More is known about the causes of skewed sex ratios than about their consequences. The immediate causes are usually fairly identifiable, but the effects are often diffuse. Indeed, people may be so inured to them that they go unremarked. Moreover, the consequences may unravel over very long periods. Thus, the sharp rise in the sex ratio at birth in China will have effects that unfold over the lifetimes of the affected cohorts of children, and perhaps beyond.

Many Asian populations have had relatively high sex ratios for centuries (e.g., due to infanticide). Although these ratios reflect the patriarchal nature of the societies involved, they also help to sustain patriarchy. Thus, excess female child mortality acts to raise the ratio of men to women at adult ages, and so extends the age range over which men outnumber women in the population. In turn, this helps to sustain the unequal distribution of power in society with respect to gender. Relatedly, the raised

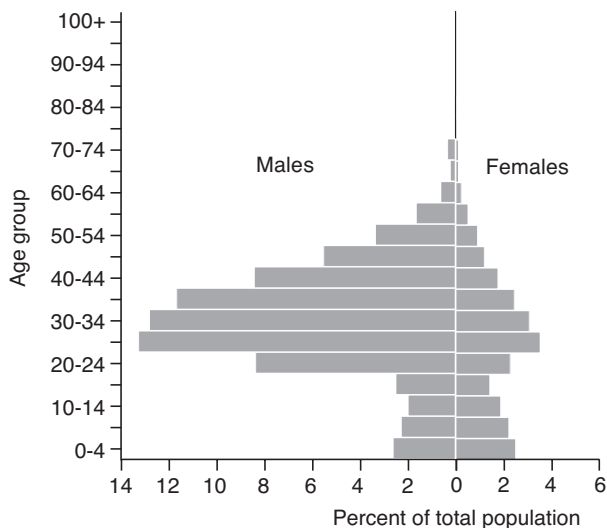


Figure 5

The age and sex distribution of the population of Qatar in 2010. Source: United Nations (2011).

sex ratios that prevailed in the past at young adult ages helped to maintain a relatively large age gap between husbands and wives—and this too probably helped to bolster male dominance within households. Yet another effect of excess female mortality that is often unseen is that there are fewer women of reproductive age in the population than there would otherwise be, which exerts a downward effect on birth rates (Miller 1981, Caldwell 2001).

There has been considerable speculation about the future effects of the very high sex ratio at birth in China. It has been claimed that, because young men are more likely to engage in violent behavior, there will be greater crime and disorder as the unbalanced cohorts enter adulthood (Smil 2005, Hesketh & Xing 2006). And, indeed, research has suggested that the rise in masculinity at ages 16–25 was responsible for roughly 15% of the increase in low-skill crime in China between 1988 and 2004 (Edlund et al. 2009). Drug use and sexual behavior among the country’s surplus men may also mean that they become a major risk group for sexually transmitted diseases (Tucker et al. 2005). Moreover, still further into the future, large numbers of elderly, poor, and never-married Chinese men

may face particular economic difficulties (Das Gupta et al. 2010). Some have even proposed that China's prospect of becoming a democracy may be reduced. Indeed, at the extreme, it has been argued that militaristic tendencies will be boosted, jeopardizing the pursuit of a peaceful foreign policy (Hudson & Den Boer 2002, 2003; Den Boer & Hudson 2004).

The implications of unusually high sex ratios for the so-called "marriage market" have also received attention. Other things equal, there will be shortages of women of marriageable age (Tuljapurkar et al. 1995, Jiang et al. 2007). And, due to hypergamy—the tendency of men to marry down in social terms—the difficulty of finding a wife should be greatest for men in the lowest socioeconomic strata (Edlund 1999, Hesketh & Xing 2006, Das Gupta et al. 2010). Such considerations are thought to have informed the recent expansion of marriage migration in Asia—a phenomenon that is increasingly commoditized. An example is the transfer of young women from rural Vietnam to become the wives of Taiwanese farmers. This involves intermediaries and big payments by the farmers (Hugo & Nguyen Thi 2007). Vietnamese women are also trafficked into China (Le Bach et al. 2007). And within China, criminal gangs are said to kidnap women in remote rural areas to sell them into forced marriages in towns (Plafker 2002, Smil 2005). There is also said to be increasing movement of women into India in response to perceived shortages (Hugo & Nguyen Thi 2007). However, because India's sex ratio imbalances are chiefly in the country's north, there may also be more internal migration by men in search of wives.

Several words of qualification are needed here. Much of the so-called "marriage squeeze" in Asia is actually the result of rapid fertility decline, rather than sex-selective abortion (Westley & Choe 2007). Also, China's population is so large that any lack of potential wives cannot be met through international migration. Furthermore, the ability of people to find partners will improve if men are prepared to consider marrying widows, divorcées, and older women (Jiang et al. 2007). Westley & Choe

(2007) estimate that in China in 2020, there will be 103 women aged in their early thirties for every 100 men aged in their late twenties. However, perhaps the most important caveat to make is that marriage is becoming a weaker institution in many Asian societies anyway (Leete 1994, Jones 1997). So perhaps the high sex ratios at early adult ages arising from sex-selective abortion will merely add to other processes that are already producing more flexible forms of sexual and cohabiting relationships.

The extent to which countries have developed laws and policies to promote gender equity has varied. India and China have been in the vanguard here, whereas in South Korea family law worked to bolster patriarchy until recently (Das Gupta et al. 2004, Chung & Das Gupta 2007, Westley & Choe 2007). Nevertheless, and irrespective of their timing and extent, most such laws and policies have been aimed at persuading parents to value daughters as much as sons. They have not been introduced because of specific concerns regarding the population sex ratio. However, this may be less true of measures designed to eliminate sex-selective abortion. This practice has aroused worries among policy makers regarding its eventual wider effects, operating through the heightened masculinity of populations. Therefore, starting with India and China, interventions have been introduced with the aim of trying to rebalance the sex ratio at birth. Most of these measures prohibit prenatal sex determination and are difficult to enforce (Zheng 2007, Guilamoto 2009, Bhaskar 2011). However, the disciplining of doctors in the early 1990s as well as associated media campaigns are thought to have contributed to the decline of sex-selective abortion in South Korea (Hesketh & Xing 2006, Westley & Choe 2007).

Turning to the progression of sex ratios by age, as noted, in all countries there are more women at later ages compared to men. In the extreme case of Ukraine, the sex ratio at ages 70 years and over in 2010 was just 0.46 (see **Figure 4**). In China and India, the ratio at these ages was 0.85. And the ratio was 0.69 for the United States and 0.61 for Europe. Greater

mortality decline for females has led to what Davis & van den Oever (1982) term a “revolutionary imbalance” at older ages—an imbalance that becomes more prominent with population aging. That Europe has the most feminine population of any world region is partly because it has the oldest population. Population aging has a significant effect in lowering population sex ratios (Guillot 2000).

At later ages, women are much more likely than men to have lost their marriage partners. This is partly because male death rates are higher. But it also reflects age selection—i.e., that women generally marry older men. Furthermore, if women lose their partners, they are less likely to find new ones—because there are fewer potential partners around. A consequence of this is that, upon remarrying, and with greater numbers from which to choose, older men tend to marry women who are younger than themselves by an even larger margin than applies in the case of first marriages. In sum, at later ages the sex ratio of the married population is very high—because most men at these ages are married, and to women who are younger than themselves. However, the sex ratio of the unmarried population is very low because, at these ages, there are many women who have lost their partners and have not found new ones. These basic features characterize both developed and developing countries (Davis & van den Oever 1982). They mean that the conditions of widows without spousal support—conditions that often involve loneliness and destitution—feature prominently in studies of elderly people everywhere (Palmore 1987).

Many studies have investigated the consequences of sex-selective migration for those who are left behind, especially women (Gulati 1987, Aysa & Massey 2004, Nguyen et al. 2006). The effects for sending communities vary depending on the context and the nature of the migration. However, women often experience greatly increased workloads (Hugo 2000, Menjivar & Agadjanian 2007). Their role in raising and educating children tends to rise. They may suffer financial difficulties, and they can face problems in controlling

children (Smith-Estelle & Gruskin 2003, de la Garza 2010). Those who stay behind can also experience isolation and be exposed to infections brought back by returning migrants (World Health Organ. 2003, Cortés 2008). However, the increased responsibilities that women often experience—e.g., in relation to household management—can have positive effects for their autonomy and their relationships with men (Hadi 2001). Improvements in the position of women in contexts in which men are largely absent may both result from and contribute to the strengthening of female social networks (Chant 1992, Gulati 1993, Abril & Rogaly 2001). But, although remittances can have beneficial effects for sending communities, they can also contribute to increased inequality between households. At the extreme, community cohesion can be destroyed if migrant men participate in criminal activities, such as trading drugs and trafficking people (de la Garza 2010).

Turning to the effects of skewed population sex ratios in places of destination, Boserup (1970) famously discussed the characteristics of “male towns.” These were of two types. The first arose from labor policies that favored the recruitment of single men. Such towns often emerged at sites such as railway junctions and mines. Many of the (few) women present in these places worked in bars and in the selling of sex. The second type of town was found mainly in the Middle East and was male in a different sense. The sex ratios were not unusually high in strictly demographic terms. Rather, outdoor activities were dominated by men, and women were confined to the home. Here, the fact that young men were restricted in their interactions with young women also conditioned the demand for commercial sex. Boserup considered that the prevalence of both town types was declining as sex ratios became more balanced with urban growth and as the practice of female seclusion diminished. Nevertheless, much that she wrote still resonates today. Thus, the association of unusually high sex ratios—in places such as ports, construction sites, and military bases—with large numbers of stressed and lonely men is strong, as is the link with

activities such as drug use and prostitution (Edlund & Korn 2002, Campbell 2003, Xu et al. 2008). The many male migrants in Qatar work in heavy industries such as gas and construction, and they live largely apart from the rest of the population. The social consequences must be manifold.

CONCLUSION

The title of this review denotes a vast and complex field. And, inevitably, we have had to be restrained in discussing causal chains. Thus, although the immediate causes of skewed population sex ratios have been addressed, the factors underlying them—e.g., those behind son preference or sex-selective migration—have not been explored in detail here. Similarly, we have had to restrict the discussion of effects. For example, there has been little mention of the political consequences of skewed sex ratios, such as the idea that voting rights were first extended to women in male-dominated frontier locations (e.g., Wyoming, New Zealand) due to a perceived need to attract women (Markoff 1996).

It is clear that much research in this field has been driven by events. And in certain respects—notably relating to sex-selective abortion—these events have been fast-moving. But we have also noted that it will be a long

time before the full effects of this practice can be investigated. And this means that there is inevitably a fair amount of speculation regarding future effects. It may well be that research will increasingly find itself addressing the use of sex-selective abortion to help ensure the birth of daughters. And, with the feminization of migration, there may be increasing research on the effects of migration for the men who are left behind.

Research can say much about those who conduct it. And it must be said that, although not denying their importance, excess female mortality and the abortion of female fetuses have held a particular—indeed, perhaps an inordinate—fascination for researchers. The allure will continue, no doubt. But perhaps somewhat greater attention will come to be given to the circumstances of boys and men, especially if males continue to fall still further behind in terms of life expectancy. Moreover, partly because of differences in mortality, and partly because of continued population aging resulting from fertility decline, the sexual composition of most world regions—including East Asia and South Asia—is expected to become marginally less masculine in the decades immediately ahead. Indeed, the sex ratio of the human population, 1.017 in 2010, is projected to fall slightly to 1.006 by 2050 (United Nations 2011).

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