

## **THE MALE-FEMALE HEALTH-MORTALITY PARADOX**

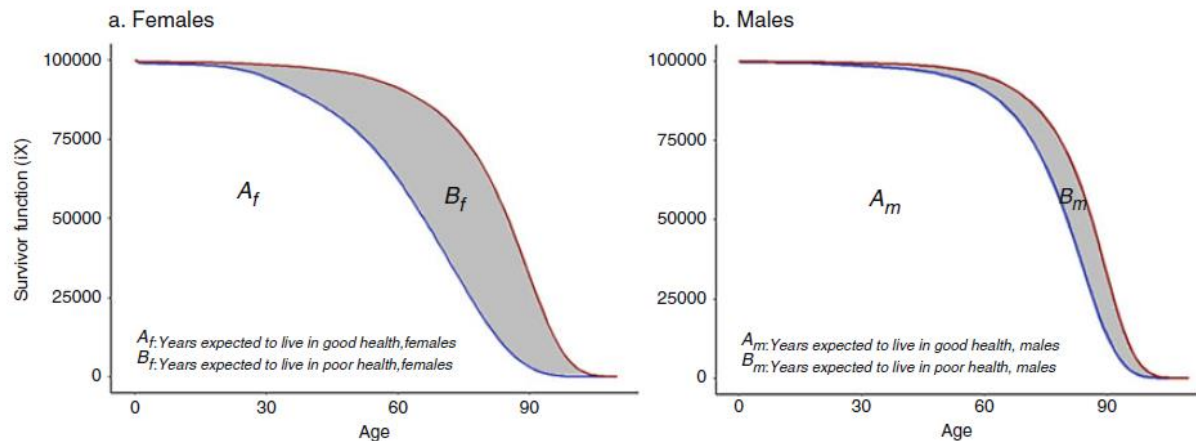
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### **Definition**

The male-female health-mortality paradox results from the fact that females live longer than males, but spend a higher proportion of their total life expectancy in poorer health states. The phenomenon is depicted in the schematic Figure 1, where the grey shaded area represents the proportion of total life expectancy spent in poor health, for females and males, respectively on panels a and b. It is clear that the grey shaded areas, representative of poor life expectancy, is larger for women than for men. The sum of the white area and the grey shaded area is equal to the total life expectancy. Since health is an important predictor of death, the fact that women live longer in spite of a higher proportion of their lives spent in unhealthy state puzzles researchers. Some other terms used to describe the phenomenon are: “gender and health paradox”, “morbidity paradox”, “morbidity-mortality paradox”, or “male-female health-survival paradox”.



**The Male-Female Health-Mortality Paradox, Fig. 1** Schematic depiction of the male female health-mortality paradox. (Source: Own elaboration)

### Overview

The differences in life expectancy between women and men remained more or less constant until the first half of the 20th Century and started to increase thereafter. This increase of the gap coincided with a rise among men in cardiovascular diseases, cancer, and accidents and a fall in maternal mortality and in causes of death related to pregnancy among women. Since the beginning of the 1980s, the gap between women and men in overall life expectancy has been slowly narrowing in the developed world, with Japan being the only exception. This does not apply to the oldest-old where the differences between the sexes continue to rise until today. In light of this universal observable male excess mortality, it is surprising that studies on gender differences in morbidity report that women are in worse health than men (among many others, Case and Paxson 2005; Deeg and Kriegsman 2003), and that women spend a higher proportion of their total life expectancy in poor health and with limitations (Crimmins et al. 2002; Robine et al. 2001).

Researchers have most commonly addressed this paradox by focusing either on **male excess mortality** or on **female excess morbidity**. Another complementary approach has been to attribute at least a part of the paradox to **methodological artifacts** that arise due to the survey framework and the behavior dynamics between respondents and interviewers.

## **Hypotheses for explaining male excess mortality**

**Biological factors.** The lower female mortality is assumed to be a consequence of the additional X chromosome (Christensen et al. 2000) and endogenous female hormones (Horiuchi 1997), which should protect most notably against ischemic heart disease even after myocardial infarction diagnosis (Vaccarino et al. 1996). Further, biological factors seem to cause a higher male susceptibility to parasitic diseases (Moore and Wilson 2002). Higher male mortality rates are also observed among children (Théré and Rohrbasser 2006) and infants in the prenatal period, when higher rates cannot be caused by acquired risks (Kalben 2002; Waldron 1985; Wingard 1982). Not exclusive to humans, male excess mortality exists in most animal species (Clutton-Brock and Isvaran 2007), with some scholars reporting empirical evidence from animal species for the “costly growth hypothesis”, i.e. the larger sex is the more vulnerable in terms of survival (e.g Kalmbach et al. 2005). Taken together, this all suggests that at least a biological basis for the female survival advantage exists.

**Acquired risks.** On the other side, the advocates of the non-biological approach argue that society and culture influence men to lead lifestyles that are increasingly detrimental to health and life (in terms of smoking habits, alcohol consumption, diet, exercise, reckless driving, and so on). This implies that men are subject to greater health risks at work, and that they are generally more exposed and susceptible to different kinds of social and psychological stress than their female counterparts. Probably the largest contribution of this kind is nicotine consumption (Pampel 2005; Preston and Wang 2006). Smoking also appears to play a considerable role in the currently observable narrowing of the male-female differentials in mortality, since the proportion of female smokers has increased greatly in recent decades (Luy and Wegner-Siegmundt 2015), together with declining differences in alcohol consumption (Simons-Morton et al. 2009).

Social stress is another basic causal factor for male excess mortality. Jenkins (1976) introduced the notion of the “Type A behavior”, which is characterized by intensive striving for achievement, competitiveness, easily provoked impatience, time urgency, abruptness of gesture and speech, over-commitment to vocation or profession, and excess of drive and hostility. In Western societies, Type A behavior is found more frequently among men since it is strongly linked to professional life and social status (Luy and Di Giulio 2006; Waldron 1985). Because lifestyles generally differ with the level of social status, male-female

differences in mortality could also be affected by the fact that men and women are not equally distributed within various social classes (see, e.g. Marmot et al. 1984) and that male excess mortality is determined by the harmful lifestyles of men of low socioeconomic status (Nathanson and Lopez 1987). Luy and Gast (2014), and Wingard et al. (1983) supported this hypothesis with different empirical approaches. In contrast, Springer and Mouzon (2011) showed that men with strong masculinity beliefs do not benefit from higher education or socioeconomic status when it comes to preventive care, which could partially explain the fact that men experience lower life expectancy relative to women, despite their higher overall socioeconomic status. Moreover, women tend to consult a doctor more often than men do both on noticing symptoms of illness and for health care needs related to childbearing (Galdas et al. 2005; Verbrugge and Wingard 1987).

Several authors have attempted to determine the relative contributions of biological and acquired risks factors, since research on the field indicated that the extent and trends in mortality differences between women and men are probably a combination of both biological and non-biological factors. The main conclusion is that acquired risks are mainly responsible for the differences in life expectancy between women and men (Lemaire 2002; Verbrugge 1982; Waldron 1995; Wingard 1982). Additionally, the extent of the differences is mainly resulting from the level of male mortality (Luy 2003; Staetsky and Hinde 2009). The few who attempted to estimate the absolute contribution of biological factors concluded that inherited risks should cause no more than two years of life expectancy in favor of women (Luy 2003; Pressat 1973). However, it is very difficult to separate biological and non-biological factors empirically since there are several routes through which they might be interacting.

### **Hypotheses for explaining female excess morbidity**

**Types and severity of illnesses and disability.** One explanation for the seemingly contradiction in the male-female differences in health and mortality is that women and men differ regarding the types of illnesses, which in turn are differently related to mortality. Several studies based on both interview and medical data indicate that women have indeed more chronic conditions than men do, but their conditions are less severe and are often not life threatening diseases, like arthritis (Case and Paxson 2005; Grundy 2006; Verbrugge 1985; Verbrugge and Wingard 1987). On the other hand, men suffer from life-threatening conditions such as coronary heart disease and cerebrovascular disease, alcoholism-related

cirrhosis of the liver, accidents and homicide, as well as more permanent disability (Rieker and Bird 2000; Verbrugge and Wingard 1987).

**Illness and prevention orientation.** People vary in their perception of symptoms, assessment of symptom's severity and readiness to take curative health actions. This group of factors is referred to as "illness orientation" (Verbrugge 1982). Two factors related to this aspect might be responsible for the higher female rates of self-reported morbidity in health surveys. First, females may be more sensitive to body discomforts, more likely to perceive an ailment and more likely to consider it painful or bothersome. This may have some biological origin (intrinsic differences in pain sensitivity) but the chief cause is probably social, since boys are taught to ignore symptoms, and men have activities and responsibilities that discourage them from perceiving symptoms (Verbrugge and Wingard 1987). Second, males and females may differ in whether they complain about perceived symptoms. It appears to be more socially acceptable for females to report discomforts to family and friends. They are also more involved in health and health care ever since puberty, starting with more attention to menarche and contraception, and become responsible for the overall health of family members as adult women (see e.g. Verbrugge and Wingard 1987).

People also vary in their readiness to take preventive health actions, whether to prevent the onset of disease and injury or to detect asymptomatic disease. This refers in the literature to the "prevention orientation" concept (Verbrugge 1982). Two reasons related to this aspect might explain why women appear to be sicker than men are. First, females may be more willing and able to seek medical help for health problems and to use medicines for curative purposes. So, at the same time that the female tendency to consult a doctor more often than men is a possible factor for their lower mortality, it can also lead women to have higher rates of visits to doctors, what is usually interpreted as an indicator for higher morbidity. Second, females may be more willing and able to cut down on their usual activities when ill or injured, since they are less active in the labor force, and seldom a family's primary income-earner. Moreover, females can usually be more flexible in their schedules and switch from a job or housework more easily (for more details regarding differences between women and men in illness and prevention orientation see recommended references Lorber and Moore 2002; Verbrugge 1982, 1985; Verbrugge and Wingard 1987).

## **Methodological Artifacts**

As health information comes almost exclusively from surveys, it is also likely that at least a part of the observed differences traces back to methodological aspects of data collection and reporting in surveys. The most common artifacts in the literature regard to sample composition (selectivity), called **sampling bias** and measurement of health, called **reporting bias**.

**Sampling bias.** The survivorship bias (also coined selection bias) is one example of such [type of] bias, and it refers to the extent to which respondents that live long enough to participate in a given survey are systematically different from those that did not. In this regard, gender comparisons are at risk of being biased towards men's greater (or women's lower) mortality. In the case of health, survivorship bias might produce or amplify differences by gender due to men's greater inclination to mortality from life-threatening diseases such as heart disease (Oksuzyan et al. 2008) resulting in a healthier group of surviving men. Women's prevention orientation (see above), on the other hand, might contribute to a survivorship bias as early diagnosis and treatment can contribute to their longer survival, despite being confronted with serious diseases. Consequently, gender comparisons of observed health are biased as deceased respondents' health is not accounted for. Further, because men tend to die at younger ages than women, male populations are typically younger than female populations. As the prevalence of health problems strongly increases with age, this potentially leads to favorable results for men in comparison to women – especially in You can see the editor's comments in the document, so please check the comments regarding your part.open ended age groups where compositional differences are most pronounced.

**Reporting bias.** There can be non-health-related aspects contributing to the gender health gap even if there is no sampling bias at all. For example, the wording and placement of questions and the way interviewers present them and probe for full answers can influence respondents' replies. If men and women differ in their reactions to survey procedures, sex differentials are affected. For instance, if men and women differ in their willingness to report past health events, rates are underestimated for the less-willing group. There are three ways in which health reporting behavior might affect sex differentials. First, health socialization may make women better respondents in health surveys, knowing how to assess and remember their health issues better than men do, as well as more willing to talk about health with an

interviewer (Idler 2003). In contrast, men are less attentive to their health conditions, and are less eager to discuss health with a stranger (the interviewer). Second, the use of proxy respondents can influence morbidity rates in surveys. Proxy respondents are people who report on the health of other household members, and they tend to underreport illnesses and disability of other people, either because they simply do not know about some of the chronic conditions other members have or because they forget conditions of others more easily than their own conditions. Because women often serve as proxy for men, and rarely vice versa, this reduces male morbidity rates. Third, interviewers in health surveys are usually women, which can be comfortable for female respondents, but uncomfortable for males (for more details about female and male reporting behavior see Verbrugge (1982, 1985) and Verbrugge and Wingard (1987)).

### **Key research findings**

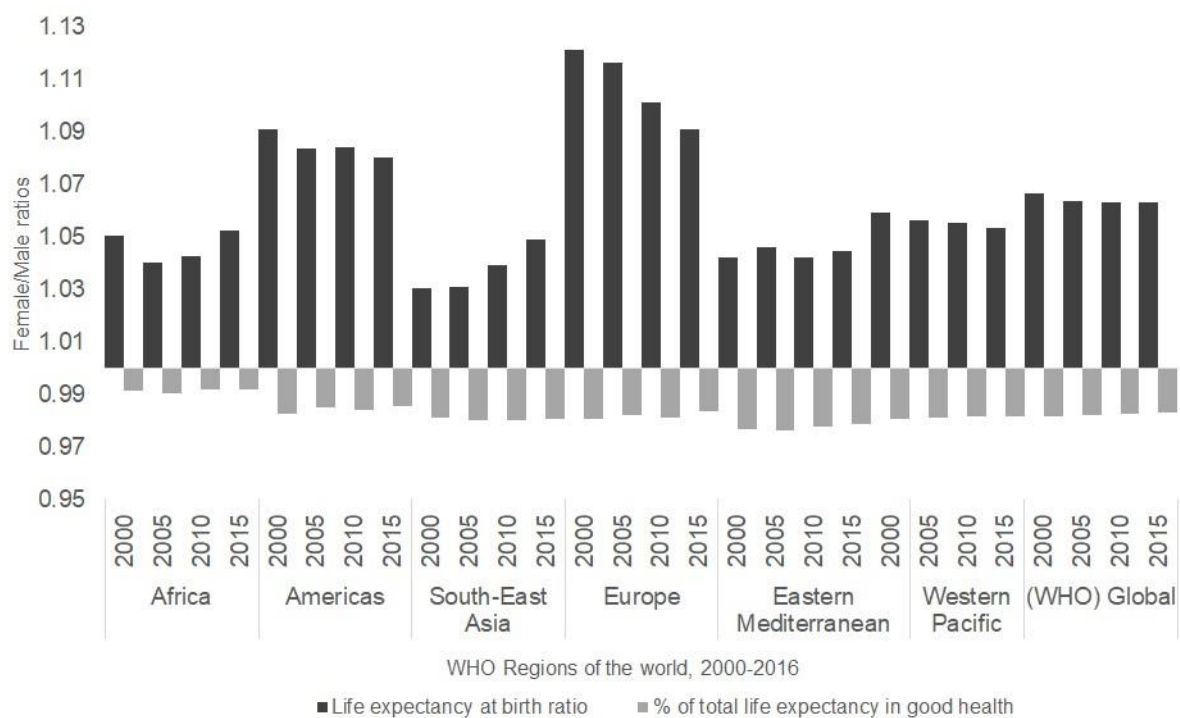
Women routinely show higher morbidity from acute conditions and nonfatal chronic diseases and more short-term disability, even when reproductive conditions are excluded (Green and Pope 1999; Verbrugge 1985). Further, women show a greater rate of decline in physical function and they are less likely to recover from disability (Leveille et al. 2000; Beckett et al. 1996). Women restrict their activities for health problems (acute and chronic combined) about 25% more days each year than men do, and they spend about 40% more days in bed per year on average (Verbrugge and Wingard 1987). Moreover, women report to have a higher utilization of health care services (Green and Pope 1999; Redondo-Sendino et al. 2006) and they generally use more prescription and nonprescription drugs relative to men (Roe et al. 2002; Verbrugge 1982). In addition, measurements of physical power reveal that men are stronger in all ages, with men outperforming women on handgrip tests (Leong et al. 2015), and on walking speed or standing balance (Keevil et al. 2013). Finally yet importantly, cross-national comparisons show consistent advantages for female survival but disadvantages in terms of physical health, self-rated health and cognition at older ages, with the exception being the pattern of sex differences in depressive symptoms, which appears to be more country-specific (Oksuzyan et al. 2010).

However, several studies have shown that these gender differences in health vary by age, morbidity measure, time and social context, requiring further investigation. Despite the efforts of many demographers, epidemiologists, socio-medical scientists and others, still very little is

understood about the reasons for the paradox or its underlying mechanisms (Oksuzyan et al. 2018). At present, the suggested explanations for differences between women and men in health and mortality include biological factors, risks acquired through social roles and behaviors, types and severity of illnesses and disability, illness and prevention orientation, and methodological artifacts. Biological factors and acquired risks seem to explain male excess mortality, while types and severity of illnesses and disability, illness and prevention orientation and health reporting behavior from methodological artifacts are factors that may cause female excess morbidity.

## Summary

At present, there is still no conclusive understanding about the reasons for the male-female health-mortality paradox or its mechanisms. Some of the aforementioned explanations present conflicting evidence. While some studies confirm an overall excess in female symptom reporting, others have found no sex differences in pain or symptom reporting, or even that men are more likely to complain. There is also contradictory evidence in the literature regarding women’s higher use of health services compared to men and sex differences in the reporting of health problems or in the readiness to mention symptoms (Oksuzyan et al. 2018).





**The Male-Female Health-Mortality Paradox, Fig. 2** Female-Male ratios of proportion of total life expectancy spent in good health and total life expectancy at birth, WHO regions, 2000-2015. Female-male ratios of life expectancy at birth and of proportion of total life expectancy spent in good health, WHO regions, 2000–2015. (Source: Own elaboration using Healthy Life Expectancy (HALE) and Life Expectancy estimates for years 2000–2015 from the Global Health Observatory data repository, WHO/World Health Organization)

According to both the life expectancy and healthy life expectancy at birth (HALE) estimates performed by the GHO (Global Health Observatory, World Health Organization, 2018), the gender paradox can be regarded as a global phenomenon: in all regions of the world, women live longer than men, but experience a lower proportion of total life expectancy in good health, as shown in Figure 2. In addition, the differences remain when one considers years 2000-2015.

Nonetheless, there is a great diversity in the magnitude of these differences and in the relationship between the mortality gap and the health gap, as not necessarily those countries with the highest gender gap in life expectancy are the ones with the highest gender gap in health expectancy.

All of the above leaves the male-female health-mortality paradox an unexplained phenomenon that yet deserves further research and investigation.

#### **Cross-references:**

- Gender disparities in health in later life
- Self-reported ageism
- Aging and health disparities
- Disability trend
- Disability measurement
- International Classification of Functioning, Disability, and Health
- Rheumatic diseases among older adults
- Vascular diseases of aging
- Gender issues in age studies

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**Acknowledgements:**

This project has received funding from the European Research Council (ERC) under the European Union’s Horizon 2020 research and innovation programme (grant agreement No 725187). PI: Marc Luy