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Gender, Famine, and the Female Mortality Advantage

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ABOUT

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Cover Image: Irish Famine Memorial on Cambridge Common, Cambridge, Massachusetts, Maurice Harron. Photo by Bridget Conley

I. Introduction

During times of famine, sex, gender and age differences matter. These factors impact who dies, who lives, and how people suffer; they shape lives and livelihoods before, during and after crises.[1] But precisely how and why these factors intersect with famine conditions is an issue of much debate. This Occasional Paper investigates the evidence and explanations for sex, gender and age differences across 25 famines.

Globally, across their lifespan, women and girls experience hunger—chronically and endemically — more than men and boys. Multiple factors shape this reality: laws and practices that discriminate against females, patriarchal norms that value males over females, lower pay for female labor, fewer property rights for females, biological factors that increase the impacts of hunger (e.g., menstruation, pregnancy, childbirth and lactation), and females' reduced access to educational, financial, political and social resources.[2] This paper explores how and why famine intersects with these gendered disadvantages and advantages.

Gender, according to a definition[3] widely used by national and international agencies and actors responding to armed conflicts, natural disasters and their aftermaths, refers to 'culturally expected behaviours of men and women based on roles, attitudes and values ascribed to them on the basis of their sex.' Sex 'refers to biological and physical characteristics.' As argued by Mazurana, gender can be further understood as: (1) embodied and performed identity (roles, relations, expectations, performance) and (2) structural power relations with deep symbolic significance and institutionalized forms. Gender differences are learned, and, while deeply rooted in every culture, are changeable over time. There is also wide variation within and among cultures, as gender intersects with and is shaped by ethnicity, race, religion, class or caste, sexual orientation and disability. Mazurana writes:

> Gender is a way of categorizing, ordering and symbolizing power, of hierarchically structuring relationships among different categories of people and different human activities in a manner symbolically associated with masculinity and femininity. Gender, at its heart, is a structural power relation that rests upon a central set of distinctions among categories of people, valuing some over others.[4]

In the context of famine, biology plays an unquestionably important role in famine survival and long-term outcomes for men, women, boys and, girls.[5] At the same time, the gendered impacts of famine are also strongly affected by political, social, cultural and economic factors. A range of factors are at play in most situations of famine, coalescing in patterns that are distinctly gendered in each case. In this paper, we analyze the cause of death, biological factors, health outcomes for famine survivors, *in situ* coping strategies, and migration patterns.

Applying our analysis of gendered and age impacts and outcomes of famine to a discussion of accountability, we take into account two further points. First, the gendered nature of coping strategies exposes men, women, boys, and girls to serious, and at times different, risks and harms. In addressing these issues, we move the discussion beyond a binary opposition of dying or surviving, to investigate a wider range of gendered risks and harms for different ages, sexes and genders exposed to famine. Second, we document and analyze the potential long-term gender and age health and socio-cultural risks associated with exposure to mass starvation. The paper concludes by addressing these issues and their implications for protection and accountability.

II. Introduction to Sex, Gender and Famine

Famines are difficult to define and compare across contexts.[6] Differences in pre-existing and crisis patterns in labour, agricultural, socio-cultural practices, disease profile, and response all vary considerably from case to case. Famine mortality is often driven by changing exposure to infectious diseases as a result of social disruption which differentially impacts different social categories and groups.

The impact of gender and age on famine, however, remains understudied. An important gendered finding is that many cases reveal a female mortality advantage (FMA) during famine. The FMA consists of females dying at lower rates than males, notably so for adults in their prime. In one of the few cross-national case studies of gender and famine, Kate Macintyre surveyed the existing literature on famine. Relevant to this topic she found that while gender analyses are infrequently applied to demographic analyses, in most cases there is FMA.[7] However, Macintyre finds that famine researchers rarely 'take the time to analyse why there might be a female advantage, nor do they address what specific factors might explain it.'[8] Macintyre concluded calling for more gender sensitive famine research, with the need for greater attention to: the timing and cause of death, immunological differences, the severity and duration of starvation, policy responses, long- versus short-term impacts, and multi-disciplinary research examining the intersection of cultural and biological factors.

Twenty years after she published her paper, Macintyre's call remains salient today. There continues to be inadequate sex and age disaggregated data collected during famines. Yet, these data are essential for understanding who is being affected, where, when, why, and how. To illustrate, there was no widespread or consistent collection of sex and age disaggregated data for the threatened four famines in recent years: South Sudan (2013-present), Yemen (2015-present), Somali (2010-11; 2017) and Nigeria (2009-present). This failure occurs despite repeated calls by the United Nations and governments for sex and age disaggregated data and increased attention to the specific needs of women and girls as relates to malnutrition and hunger. [9]

We revisited Macintyre's article to determine what we know, and what we still need to know, about sex, gender, age and famine mortality. In cases where the data allows for greater scrutiny, the studies we reviewed do not suggest a single factor, nor even a formula for evaluating combinations of sex, gender and age factors that hold true across famine cases. Instead, various socio-politico-cultural explanations, interacting with biological factors, combine in distinct patterns that vary on a case by case basis. Further, famines are time-constrained events, often occurring during oppression or armed conflict, and are responded to by a range of civil society, non-profit and governmental authorities with varying outcomes. In short, famines are dynamic and can evolve quickly at times with highly gender and age specific risks, responses and implications. Below, we discuss the sex, gender and age factors that appear most salient across cases.

III. Factors to Explain Sex , Gender and Age Differentials in Famine Mortality

A. Cause of death

This section examines the gendered dimensions of the cause of death during famine. Famine-related deaths are sometimes caused by biological starvation, but overwhelmingly result from infectious diseases that attack malnourished bodies

with lowered immune systems and spread through migration, displacement, or disruptions in access to clean water, basic health care and good hygiene. Historically, natural disasters played a large role in triggering famines. However, over the past 150 years, famines overwhelmingly coincide and are causally associated with armed conflict and political repression.[10] These violent conditions can further complicate data collection and introduce 'direct violence' as a potentially significant, contemporaneous cause of increased mortality and suffering in famine.

In some cases, the data very clearly indicate cause of death.[11] However, since the end of World War II, both conflicts and famines tend to occur in less developed countries where baseline demographic data collection is weak, populations are displaced and there is armed violence. During periods of repression and conflict, state authorities charged with data collection may have an interest in skewing how causes of deaths are recorded. The Ukrainian famine, the Holodomor, is a signature example: state authorities forbade reference to a typhus epidemic, which was likely the leading cause of death, as a way to silence criticism of state policies.[12]

Across the studies we analyzed (see Appendix A) several insights related to sex, gender, age and cause of death emerge. First, researchers found that the more severe the crisis, especially when extreme hunger (versus disease, for example) becomes a major cause of death, FMA becomes more pronounced. Second, childhood deaths in famine appear to be more sensitive to variations in social norms and in the disease profile (for both male and female children). Third, where FMA manifests, it is proportionately greatest for adults in their prime, seemingly regardless of cause of death.

A rare case in which biological starvation[13] was the primary cause of death was Greece during World War II. As research by Violetta Hionidou (2006) demonstrates, the data are of high quality; disease contributed little to excess mortality; there was no fertility decline early on; women continued breastfeeding even as male excess mortality increased; and due to restrictions on movement by the German and Italian occupation forces, migration played little role.[14] Greek children benefited from school soup kitchens bolstering survival rates among this entire cohort. However, among both adults and the elderly, Greek females not only died in lower numbers than males, but they also died at later stages of the crisis.[15] Discussing the literature on gender and famine, Hionidou agrees that there appears to be a female physiological advantage when starvation (and not disease) is the primary cause of death. Nonetheless, she argues that cultural explanations often play an important role.[16] Her findings resonate with other studies that find adult FMA increases as food insecurity becomes more extreme.[17]

There may be limitations in drawing on data from pre-modern famines, but Healey[18] finds some intriguing and potentially relevant evidence. He examines the early-modern famines in northwest England (1590-1630) and finds no evidence of a female advantage in the 1590s crises. In the crises of the 1620s, he finds that in only one year in one region does FMA appear. Healey largely dismisses averted births, male or female migration, or female-biased relief patterns as explanatory causes for the 12-month anomaly. Based on weather data and failed harvests, he tentatively suggests physiological male vulnerability to starvation as the driving cause of greater adult male death in that single year. This possible FMA is later erased when disease, and not hunger (as food was becoming available), likely became the leading cause of death. At this point, any female advantage disappeared.

Deaths during famine and mass starvation frequently occur due to disease. Epidemiologists find that different diseases can impact males and

females differently. To illustrate, diarrheal diseases have greater incident rates for males (ages 1-5), but higher mortality rates for females at the same age.[19] Acute lower respiratory and infectious pneumonia tend to have higher mortality rates for males.[20] Typhus has been shown to more severely impact males.[21] Cholera does not have a gendered aetiology, but in many cases, the activities that expose an individual to the disease are disproportionately undertaken by females.[22] Tuberculosis impacts males at higher rates and greater severity than females.[23] In many instances and akin to famine outcomes, the share of responsibility attributed to biology versus behavior does not fall entirely on one side or the other.[24]

Applying these insights to famine complicates the picture of how disease might impact a FMA. Researchers have found significant variations. In an examination of five famines in southeast Asia (between 1896-1975), where malaria and/or cholera were the primary causes of death, Dyson found that mortality increased the most during late childhood and adulthood, particularly among males.[25] Ó Gráda finds evidence of FMA in Ireland, where infectious diseases were the leading causes of death.[26] In a study of three Finnish famines, all of which cited the leading causes of death as typhoid fever, dysentery, relapsing fever, Pitkanen found one famine with FMA and two famines without.[27]

Because many cases of mass starvation occur during periods of armed conflict, violent death becomes another factor that skews our understanding of mortality. In most contexts of conflict and repression, direct violence kills males at higher rates than females.[28] Among the eight cases of famine during an armed conflict and three during state repression we examined, three do not find FMA: Finland (1808-1809), Bangladesh (1971) and Ethiopia (1984-1985). There may not have been FMA in these cases, but other factors might be at play. In the Finnish case, for example, soldiers are excluded from the data. In this case, the primary cause of civilian deaths was infectious disease with highest intensity in conflict-affected areas and where soldiers were quartered by civilians.[29] The intermingling of mixed sex civilian and primarily male military populations during an epidemic might suggest that these two groups be studied together to understand gender patterns of famine-related diseases—which certainly would not have spared males just because they were soldiering. Including this group might result in higher male deaths, even if only counting those who died from famine-related diseases.

In three cases of famine during conflict, the available data clearly indicate cause of death, exclude direct violence and reveal a clear pattern of FMA: Greece (1941-1943), Finland (1808-1809), and the Netherlands (1944-1945). These studies suggest that we should consider how war increases male vulnerability in multiple ways, through violent and nonviolent causes.[30] Hionidou explains the case of Greek soldiers, who were predominately male, and were deployed to the Albanian mountains. There, they were inadequately clothed, fed and supplied, and many suffered frostbite. They were defeated, and afterwards many soldiers returned on foot to Greece in a weakened state. A significant number of these returning soldiers found themselves among the urban unemployed, a group that was particularly vulnerable when the famine struck.[31] Hence, their exposure to famine came after a series of deprivations that may have left them physically weakened, malnourished and socially marginalized.

The Netherlands (1944-1945) illustrates the complexity of examining cause of death during overlapping crises. Over the course of several months during World War II, the country experienced high-intensity war and famine, known as the *Hongerwinter.* War-related deaths during this period accounted for 70% of all excess mortality from September through December 1944. Famine took over as the major cause of

death from January through May 1945 (although, war deaths remained at 30%), concentrated in the urban west and including some rural western areas. Throughout the period, males experienced higher mortality rates than females experiencing the same conditions, but the causes of death varied geographically and temporally.[32]

Sex and age data disaggregation is not available in many conflicts and famines. Luka Biong's study of the 1998 famine in southern Sudan[33] provides a glimpse of suspected FMA, but in a context where the data make it difficult to assert how many male deaths can be attributable to direct violence. Biong's data comes from a survey with women in 1999, after the peak of famine, who were asked about household aggregate deaths from 1998, which showed an increase in male mortality.[34] However, given that there was on-going violence within the study area at the same time as the famine, and that the survey did not ask women to specify cause of death, it is likely that some deaths of adolescent and adult males, in particular (though not exclusively), resulted from direct violence, rather than disease or malnutrition.

Another form of violent death, suicide, is referenced in several cases as increasing in incident during famines and impacting males at higher rates, but without much detail. Dyson and Ó Gráda propose that suicide increases during the worst parts of famine and is more likely among men. Similar spikes in suicides during famine are discussed by Dyson in India[35] and Garenne in Madagascar,[36] where overall males died at higher rates than females. However, neither scholar provides gender disaggregated data specifically related to this cause of death so it is unclear how they reach their conclusions on suicide.

Another lesson of studying the data is that patterns of gender and famine from one case cannot necessarily always be extrapolated to others, as illustrated by two studies of the Khmer Rouge period in Cambodia. Researchers tried to estimate cause of death under the Khmer Rouge by drawing on the gender of the deceased. They used a study of famine in Punjab as their model. However, the study of famine in Punjab suggests a rare female mortality disadvantage.[37] Without realizing that they were drawing on an outlier case, Heuveline and de Walque[38] assumed that higher male mortality in Cambodia implied greater use of direct violence. This leap of inference cannot be made. While increased occurrence of violence likely results in more males dying, more males dying does not necessarily imply greater use of violence.

The cause of death—violence, starvation or particular diseases—can be an important source of sex, gender and age differences in mortality. Cross-case examination, however, suggests that this factor alone is unlikely to explain sex, gender and age difference within any single famine case, and certainly not the variations across cases.

B. Biology

Sex and Body Fat

The body fat or body mass index (BMI) and famine survival hypothesis was developed by Rivers, and advanced in later famine scholarship. The premise is that, on average, compared to adult males of their group, adult females (over 18 years of age) have naturally higher BMI, less muscle, are physically smaller and thus have fewer caloric needs to sustain their internal organs. Several authors claim that adult females' higher BMI enables them to draw on fat resources and protect vital organ functions for longer than males and that this is one of the most important biological factors in the FMA during a famine.[39] Similarly, Rivers argues that women need lower fat and protein intake, have lower energy needs, and can withstand on average two degrees lower temperatures than can men.[40]

Yet the data are not clear cut. Indeed, sex-disaggregated anthropometric data are rare and when analyzed are inconsistent in supporting female BMI as the reason for FMA in famine. In the Dutch famine of 1945, Henry concluded that women have a lower minimum BMI level needed to survive compared to men. In the Madras famine of 1877, Aykroid found no difference in weight of the people who died.[41] However, we note the need for more data on the timing of famine deaths. When famine deaths are disaggregated by sex they might provide further insight when there are occurances of FMA despite men and women dying at similar weights.

Perhaps the most robust study is Collins'[42] investigation of severe adult malnutrition and famine oedema during the 1992-1993 famine in Somalia. He found that compared to adult females, adult males had higher rates of severe famine oedema and a worse prognosis at any grade of severity.[43] However, Collins concluded that it was unclear whether there is a sex difference in the lowest level of BMI compatible with life. He flags a potential gendered data bias in that men who could no longer walk were often carried into the clinics where his study was conducted, whereas most women in the clinics had walked in under their own power, and hence, may have been in better health upon entry to the clinic.[44]

More often, scholars of famine make a claim that sex-related BMI differences result in FMA but provide no direct evidence for the particular famine under study.[45] One of the most widely cited famine scholars, Dyson, claims in all five major famines in South Asia he studied that adult females' higher BMI and male outmigration were among the primary reasons adult men died at much greater rates than adult females. While he documents the male outmigration link, he provides no direct evidence from the five famines to support his sex, BMI and FMA claims.[46]

Macintyre's gendered analysis of the literature on famine discusses the body fat hypothesis.[47] Macintyre finds no actual cases of research on famines in which adult females higher BMI is shown to contribute to their survival advantage. She discusses Collins' research and concludes, as does he, that the survival advantage attributed to body fat is questionable given the gender bias of who was able to reach the clinic where he was conducting the research and in what condition. She points out that any such impact of body fat and caloric needs are likely, if at all, only two factors amongst many other particularly gendered socio-cultural and political factors that are in play in producing a female survival advantage in a famine if and when it does occur.[48]

Finally, using a validated mathematical survival model for total starvation to compare adult males and females to test the body fat hypothesis, Speakman further questions the body fat hypothesis.[49] Running the model with sex-disaggregated data from 48 countries at the low end of the obesity spectrum he predicted that in the complete absence of food adult females would survive for 98 days, and males 68 days, thus females survived 40% or one month longer than adult males. This is due to females lower resting metabolic rates, lower muscle composition and smaller body stature. Interestingly, Speakman uses the same model to test his hypothesis that using the same reasoning, older adults should live longer than young adults, but the model does not find this. Speakman concludes that body fat may be a factor, but it cannot explain the range of outcomes in actual famines: 'These data emphasize the complex nature of famine mortality and suggest that a simple model of energy utilization alone is inadequate to explain the major aspects of this phenomenon.'[50]

Sex, Gender, Age and the Immune System

Human males' immune systems are disadvantaged as compared to human females and may weaken them during famine and under some other conditions. The male sex hormone testosterone

has an adverse effect on the ability of the body's immune system to respond. In men, this results in a weaker immunologic response and more difficulty fighting pathogens and resulting diseases. Furthermore, the X chromosome, of which females have two (XX) and males have only one (XY), are encoded with the most 'immune-related' genes, which likely contributes to females' overall stronger and better coordinated immune responses.[51]

Age is also a crucial factor. Death rates in famines are often highest for children under 5-years-of-age and the elderly. Young children die from birth complications and common childhood illnesses that are exacerbated by malnutrition and poor hygiene. Among neo-natals, when the mothers are under stress from natural and man-made crises, political upheaval and armed violence, male fetuses are more likely than females to spontaneously abort.[52] At a biological level, older people often have a combination of multiple chronic diseases that make them more susceptible to malnutrition and disease.[53]

Sex and gender are closely connected, and gendered behaviour has biological and physiological effects. Worldwide, men's greater likelihood to participate in health-impairing behavior such as smoking and drinking alcohol can suppress their immune systems and contribute to a variety of diseases. Men are also significantly less likely to seek medical care compared to women. Women are more likely to be the primary providers of caregiving and ensuring the health of their families and they are more likely to engage in health seeking and health maintaining activities. These sex and gender-related behaviours help shape and explain what appear as solely biological disadvantages for males in surviving famine.

Fertility

Fertility is another factor that is often mistakenly treated solely as a biological factor, when it is in fact both a biological and social factor. Several famine scholars cite decline in pregnancies during famines as a key contributor to extending adult female life expentancy.[54] In some cases, the loss of menstruation during times of extreme malnutrition and famine, and women's decreased fertility rates[55] are attributed to both biological and socio-cultural reasons.

Biological explanations include: loss of menstruation due to severe stress; malnutrition and or low body weight that causes the hypothalamus and pituitary gland not to function properly; increased miscarriages; and physiological sterility. In both the Great Irish Famine[56] and the 1984-1985 Ethiopian famine fertility rates declined by approximately 25%.[57] In the early 1940s in Bengal, there was a clear decline in conception rates with almost five years of lower than normal conception rates from 1941 to 1946.[58]

Socio-cultural explanations include: the decision to abort pregnancies, decrease marriage rates, separation of the sexes during times of conflict, intensive migration (discussed below in greater depth), and decreased sexual desire.

In some case studies, biological and socio-cultural factors appear simultaneously. In Greece and China, for example, miscarriage and abortion are discussed as reasons for female survival. Valaoras describes abortion as a decision that Greek women made in order to survive during the 1941-1942 Greek famine.[59] Cai and Feng document how Chinese women spoke openly about abortions during the Great Leap Forward.[60]

C. Gendered Coping Strategies: Accessing Food

Famine foods

Several scholars have explored if women's and girls' knowledge of wild edible foods may benefit them in a famine.[61] For example, de Waal[62]

discusses how in Darfur, Sudan in 1984-85, the gathering and preparing of wild foods was in the grandmothers' area of expertise. He explains that because of the rarity of major famines, it was commonly older women who had the knowledge about these foods, which might have been neglected for decades during better times. Anecdotally, he found that one of the problems that young men had when herding animals in the wild was that they didn't know what wild food to collect or how to prepare it. Further, eating wild food was considered shameful to young men striving to be adult men. De Waal's account suggests that it is a combination of gendered knowledge, skill, and socio-cultural norms that may contribute to women and older girls having a survival advantage during a famine.

Luka Biong Deng's analysis of the 1998 famine in Bahr el Ghazal, Southern Sudan[63] similarly reports that stigma against older boys and adult men collecting wild foods. Thus, unlike women, girls and younger boys, they did not make as much use of this important coping mechanism during the famine. He notes in particular that among the Dinka, there are certain wild fruits that are high in caloric value that women, girls and younger boys collect and eat, but which are considered shameful for adolescent and adult men to eat.[64]

Lisa Cliggett[65] provides among the most detailed ethnographic account of gender, age, famine and survival strategies in her study of the Gwembe Valley Tonga people in southern Zambia. In the 1950s, the Gwembe Valley Tonga people were forcibly displaced onto land that could not sustain their agro-pastoral livelihoods, often resulting in severe food shortages and at times famine. Cliggett documents how older women and men secured access to material (i.e., food, housing, farming tools, agricultural fields, gardens, and cattle) through social and cultural power to ensure their survival and well-being under the groups' precarious living conditions. Although the Gwembe Valley Tonga people are matrilineal, older women's food security and housing needs remained insecure. Indeed, women had to engage in a life-long process of maintaining their social networks to ensure that in times of food scarcity or famine they can access food and shelter. Older men on the other hand spent a lifetime acquiring material assets and maintaining a good social standing so that in times of famine they could survive. Cliggett finds that older men controlled the most materially profitable assets and were able to better manipulate social networks to access labor and wealth than are older women and were thus better able to secure their survival and well-being during famine.

As we discussed above, there are only a few studies that specifically and deeply engage the multi-layered gender dimensions of accessing food during famines. These studies suggest that access to food in times of famine is mediated by how age, class, gender, family and support networks intersect in powerful and complex ways to shape knowledge, skill, norms, access to material goods, and social and cultural power to leverage the means to survive a famine.

Transactional sex, prostitution and forced marriage

Transactional sex, prostitution, forced marriage (including child marriage), and other related sexual practices were imposed upon and or used by women, girls and their families during times of famine. Scholars refer to these practices to explain, in part, the FMA in some famines.[66] Perhaps the most robust study on the commodification of female sexuality during famine is Edgerton-Tarpley's analysis of the Northern Chinese Famine of 1876-1879.[67] Edgerton-Tarpley discusses prostitution as a key reason women and girls were able to survive at higher rates than men and boys during this famine. A large portion of Edgerton-Tarpley's discussion around prostitution and survivability comes from Westerners who were in China during that time and reported their observations; one key observation made

by a missionary stated that, 'women would be purchased before they starved since wives were scarce, 'this shortage created a market for women that expanded during hard times.'[68] Sue Gronewold furthered this supposition that more women and girls were driven into prostitution as a result of families' efforts to survive famine in her book *Beautiful Merchandise: Prostitution in China.*[69] She finds that prostitution was not common in China prior to the famine, but that the famine led the practice to be common and public. Recently, there is evidence of a rise in child brides in wartorn Yemen, as families seek ways to keep themselves and their daughters fed.[70]

The North Korean Famine, also called the March of Suffering, occurred from 1994 to 1998. Robinson et al. investigate forced marriage and the 'bride trade' on the border of North Korea and China as a means for thousands of unmarried North Korean female migrants sent away by their families to minimize the burden and as a survival mechanism during the famine.[71] The demographics of those crossing the border between North Korea and China show that 46.6 percent of women crossing the border were single as compared to 34.6 of men.[72] This disparity speaks to not only the pressure felt within the country for women to migrate if they were a burden on their families, but on the potential for becoming part of the 'bride-trade.' In the early 1990s, many of the women crossing the border went in search of food, shelter, and or employment and were often offered marriage by 'ordinary Korean Chinese farmers and businesses peddlers.'[73] However, as the famine intensified in the late 1990s, this began to shift to traffickers kidnapping and selling women crossing the border or within North Korea.[74] The shifting nature of women's status on the China/North Korean border speaks to the complexity of using 'prostitution' or 'transactional sex' as a catch-all for why older girls and women might survive famine, without also discussing how much agency they have and whether or not they even made a 'decision' to engage in 'survival sex' or 'prostitution.'

Importantly, both Edgerton-Tarpley and Robinson *et al.* discuss what participating in coercive sexual exchange during the famines meant for the women's and girls' future in their societies. During and after the Northern Chinese Famine, songs were written in praise of, and statues erected to celebrate, women who chose to adhere to strict Confucian norms of morality (and self-sacrifice to their husbands), instead of being forced to use sex as a means of ensuring their own survival.[75] Alternatively, those women and girls that were part of sexual exchange, by choice for forcibly, were resoundingly criticized and ostracized by their communities, with allegedly promiscuous women blamed and persecuted as a cause of the famine.[76] In North Korea, Davis found that women that fled to the Chinese border and were forced into the illicit sex trade were not welcome back to North Korea. Women who returned or were forced back to North Korea after engaging in any kind of transactional sex, forced or not, were often imprisoned and forced into labour camps, and their so-called `mixed race' pregnancies terminated and resulting children killed.[77]

Finally, in our study of the 25 famines, we commonly found blanket statements backed by no data about women and girls participating in sexual exchange as a way to cope with and survive famine. For example, statements exclaim that 'through prostitution women are able to get extra resources.'[78] However, these remain unsubstantiated claims and more rigorous research is needed into this complex and multi-faceted, gendered practice.

Labor

Famine, in Amartya Sen's revolutionary proposition, is not merely the crisis of inadequate food supply, it is a collapse in some people's ability to produce or exchange goods and labour for basic sustenance.[79] In this formulation, labor is central to famine. Addressing gender, Sen noted

that during non-famine periods in India, females experienced malnourishment more frequently than males in the same household, a fact he tied to deterrents on women's abilities to gain employment outside the home.[80] Anticipating that females that are disadvantaged during normal times would face even worse outcomes in famine, Sen was surprised when presented with evidence of FMA in some famines. He surmised, wrongly, that something must be incorrect with the data.[81]

Nearly 40 years later, connections between pre-existing female discrimination, labour entitlements and famine remain largely underexplored issues. An exemplary study of these connections is found in Leela Sami's comparative study of two Indian famines:[82] Madras (1876-1878) and Punjab (1896-1897). In Madras, overall, there was a FMA for children over 10, most notably in those aged 15-44,[83] but Sami found significant differences between caste and labor groups. Notably, females did not experience an advantage among Brahmin/landowning castes. However, among the lower caste/agricultural workers, where girls and women participated in labor at higher rates, female chances of survival during famine outpaced that of males. These findings seemingly complicate and, in broad strokes, confirm Sen's insights correlating labor with valuing (and hence preserving) female lives. In Punjab, Sami found evidence of endemic male preference in sex ratios across socio-economic groupings during non-famine periods, and a parallel across-the-board advantage for males during famine. In Punjab, 'discrimination at a variety of levels enfeebled girls and women in their ability to withstand a sudden collapse in their entitlement to food during famine.'[84] In other words, the lethal discrimination women and girls faced during the Punjab famine resulted in one of the few cases where we see a male mortality advantage.

Of course, labor is not always freely exchanged. Conditions of famine can be entangled with forced labor, both in terms of response and the oppression that often contributes to producing famine. The 1876-1878 famine in Madras, under British colonial rule provides such an example. Sir Richard Temple, chastened by criticism that he had spent 'so much money to save a lot of black fellows,'[85] in a previous famine relief effort, was tasked with economizing the British response. He did so by imposing onerous work requirements for those seeking relief. The starving had to migrate to relief work camps and were ineligible for relief aid until they could prove themselves physically incapable of labor. The infamous 'Temple Wage' was a ration of rice for hard labor with a caloric value lower than that which German forces provided at Buchenwald concentration camp during World War II.[86] Unsurprisingly, mortality rates soared. Temple responded that death was a fate that victims brought upon themselves, with their 'lives of idleness and too often crime.'[87] Unfortunately, the account we found does not address the gender of these laborers.

Other studies have discussed gender and forced labor, arguing that work conditions imposed disproportionately on males may have contributed to their higher death rates during famines in Finland in 1860s[88] and The Netherlands in 1944-1945.[89] However, research on Greece and North Korea[90] found no substantial gender differences in terms of the demands made upon workers, and nonetheless found evidence of higher rates of male mortality.

A related study of high-mortality populations compared gender outcomes in conditions of slavery in Trinidad (19th century); the Ukrainian famine (1933), the Swedish famine (1772-1773), Icelandic epidemics (1846, 1882), and the Irish famine (1845-1850). Zarulli, Virginia et al. found that 'life expectancy was higher for women than for men for all populations, with the partial exception of the Trinidad slaves for whom, according to the lower-bound life table, males lived slightly longer than females.'[91] In short, males only outlived females under extremely

harsh living conditions when authorities' primary concern was extracting their labor.

Labor migration is another significant factor, discussed in more detail, below. The cases reviewed above suggest that both labor demands and opportunities function as indicators of larger social processes that convey value unto human life with highly gendered, ethnic, race, caste and class implications. Contextualizing these processes, rather than assessing labor as a stand-alone factor, helps to reveal insights regarding people's suffering, survival and death during famine.

Charity and Relief Policies

In the cases of the Indian (1943) and Irish famines (1845-1850) under British colonial rule, labour requirements were disproportionately imposed for males who sought famine relief, whereas various forms of charity privileged female recipients.[92] Similarly, Sami found that in the famine in Madras (1876-78), consistently higher numbers of women from *ryot* castes (lower caste) sought help in poor houses. Social stigma made males reluctant to seek such support, but 'female status thus seems to have followed not quite the same rules as male status.'[93] Healey finds tentative evidence that women heads of households benefitted most from poor relief in England 1590-1630, but notes that he could not find sufficient evidence to determine the extent of influence played by this factor.[94] Lindtjørn and Alemu likewise noted a trend in Ethiopia during periods of want, whereby men stayed behind to try to salvage agriculture, while women went to relief centers.[95] Deng also notes the role that international aid played in reducing the severity of famine in Sudan (1984-1985), arguing that women's better chances of surviving were to some extent the result of targeting through aid.[96]

D. Migration

Above we addressed some key components of migration in relation to sex trafficking, labor and relief centers. Most famine researchers that discuss migration do so without making clear which genders and ages are migrating. They implicitly propose that most people that out-migrate are adolescent and adult males, whose flight exposes them to risk on a daily basis. Indeed, illness and death rates in migrant populations can be exacerbated by crowding together of populations in areas of poverty and poor sanitation (thus leading to rapid transmission of communicable diseases). Migrants' vulnerabilities can then be compounded by a lack of public policies and infrastructure to support populations, conditions frequently exacerbated in countries experiencing hardships such as conflict and famine.

However, most of the famine literature that speaks to migration as a vulnerable point for male famine victims presents limited, if any, sex and age disaggregated data on populations that migrated and for those who stayed. For instance, in the 1992 famine in Somalia,[97] thousands of people within the Bay region migrated to the regional capital. This displaced population recorded one of the highest ever death rates within a civilian population. Despite the staggering rates of mortality amongst the civilian population in the Bay area during the famine, there is limited discussion on who the migrants were beyond their status as adults or children.

In Finland, Pitkänen and Miekle[98] note there were poor harvests in 1867 leading to a famine, particularly in the northern region. Upwards of 5% of the total population began to migrate. This led to deaths in relief centers that reached 'catastrophic proportions.'[99] Migrants were, they argue, overwhelmingly male and between the ages of 10 and 29, and hailed from the region's most severely impacted by harvest failures.[100]

Numerous historical discussions on famine note that migration rates in and out of certain regions potentially skews an understanding of famine

mortality. Dyson acknowledges the discrepancies in famine mortality data and migration data saying that healthier males may have migrated out leaving a 'less healthy resident population.'[101] If true, then perhaps what some data capture is not FMA, but the profound vulnerabilities of the men who remained.

It is important to recognize that migrants are not exclusively male. In some cases, females are those who out-migrate during famines. In the Ethiopian Rift Valley, where famine plagued the region in the 1970s and 1980s, key survival strategies included migration, not just for men. Lindtjørn and Alemu found that women and children in Ethiopia were the initial migrants.[102] In the Irish famine (1845-1850), there were several migration movements: to rural areas to cities (notably Dublin and Belfast), to the UK, and to the United States. There was a signifacnt increase in the share of entires families emigrating to the United States (Jackson, 1984). However, exodus to America did not guarantee survival; many died on the voyage, as is reflected in the reference to trans-Atlantic ships as 'coffin ships.'[103]

In North Korea, Davis details the unique burden of being a girl or woman fleeing famine across the China border.[104] North Korean women migrating into China were at increased risk of trafficking and sexual enslavement. The potential for harm for a female North Korean migrant was severe, as upwards of 80% were believed to be sold into sexual slavery.

It is clear that migration is a gendered factor at play in famines and that the case specific contexts matter regarding which genders and ages suffer which risks and harms.

IV. Sex, Gender, Age and Surviving Famine

The gravity of famine is often measured by its mortality rate. Yet the enormity of the negative physical and mental health, social, educational and economic costs of famine on survivors, their children and grandchildren make clear that a focus on mortality alone misrepresents the true toll of famine.[105] Indeed, the effects of surviving famine last well beyond the famine's end and vary for different ages, sexes and genders.

Long-term Health Effects

Exposure to severe malnutrition can result in debilitating long-term physical and mental health outcomes for survivors of famine. Health shocks and or environmental stressors usually negatively affect the survival rates of males more severely than females.[106] In part, scholars posit this is due to environmental and nutritional stressors that trigger the miscarriage or spontaneous abortion of weaker males but not females *in utero*, thus producing fewer but more vigorous male births. This male 'culling effect' helps explain why the literature in general tends to find more significant long-term health effects of famine and other shocks for women than for men. Indeed, the surviving males often show a greater range of health advantages in their later life compared to their female cohort.[107]

Additionally, studies find that the effects of famine in early life are more harmful to surviving adult women than men.[108] This is due to what is referred to as 'scarring,' in which those who survive birth or early infancy, while obviously healthier than those that perish, carry with them effects that can permanently impair their health as they age.[109]

Furthermore, undernutrition in fetal and infant life may result in the human body making adaptions that can manifest as chronic disease in adulthood.[110] Due to its brief duration, studies of the Dutch famine (1944-1945) clearly identify

the growth and developmental periods of human life and how undernutrition at those points affects individuals' long-term health. Studies find those exposed to famine in early life suffered an increased risk of being overweight and having diabetes, coronary heart disease, chronic obstructive pulmonary disease and asthma.[111] Studies of the Dutch famine also found that prenatal exposure to famine was associated with antisocial personality disorder in adolescence,[112] major affective disorders,[113] and schizophrenia[114] in adulthood, and higher BMI in adult women.[115]

Researching the health outcomes of the Great Famine in China (1959-1962), several scholars[116] found significant stunting in infants and children exposed to the famine. Stunting is associated with underdevelopment of the brain and resulting reduced mental ability and learning aptitude, poor school performance, increases of malnutrition-related chronic disease, including diabetes, hypertension and obesity. Females that were exposed to the Great Famine while they were *in utero* or infants were more likely to miscarry as adults and experience stillbirths than women who were not exposed to famine in their early years.[117] Studies on mental health and the Great Famine also found prenatal exposure to famine significantly increased the risk of developing schizophrenia in both adolescence and adulthood.[118]

Healthy diet and exercise are essential for normal growth and development and are especially important during childhood and adolescence. Fransen's study of the Dutch famine found that being exposed to famine as a girl led to those females as adults adopting unhealthy behaviors, including increased smoking and being physically inactive.[119] The association was dose-dependent - the greater the exposure to famine to the girl, the higher levels of smoking and inactivity when she became a woman. These unhealthy behaviors are known to contribute to many non-communicable diseases.[120] Several studies find that the relationships between exposure to famine and being overweight as an adult is more pronounced in female famine survivors then males.[121]

Compared to their male counterparts, women born during the Great Chinese Famine are more likely to be stunted, obese, illiterate and under or unemployed.[122] They also have fewer years of schooling and are less likely to have completed secondary school than their male counterparts. These effects are stronger based on their mothers' exposure to famine, as compared to their fathers' famine exposure.[123]

The higher disease burden in female survivors of famine compared to men has significant and important implications in shaping post-famine, gender-equitable provision of health insurance and care. Policy interventions that promote adequate nutrition for girls and women, and pre-natal, maternal and postnatal health will be essential to disrupt the intergenerational effects of poor health on future generations' developmental, educational, economic and social outcomes.[124]

V. Conclusion: Towards Greater Gender Awareness in Protection and Accountability

We draw seven conclusions from our analysis of the existing data on sex, gender, age and famine.

First, famine mortality and the long-term health outcomes are gendered. Our research reinforces the evidence of a FMA, which is determined by the interplay of biological, social and political factors. Precisely how these gendered factors take shape in a given context will ultimately determine whether and to what extent there is a FMA—including, as we have noted throughout, instances where females experience no such advantage.

Where armed conflict, political repression and famine co-exist, we can anticipate that neo-natal, adolescent and adult males are most at risk of immediate death, for the variety of reasons we detailed above. Better understanding how the violence is orchestrated, by who, when, where, and against whom will be essential to protecting the lives of the adolescent and adult males and their family members. International, government and humanitarian services should also be attuned to the heightened, immediate vulnerability and risk of males of differing ages during conflict-induced famine and should factor this into their planning and carrying out their political and relief efforts. For humanitarian actors, gendered decisions about who among the family goes to access relief, who outmigrates and who stays behind need to be understood to ensure agencies reach those most vulnerable and in need. Heightened adolescent and adult male vulnerability in famine from all causes should not be overlooked or disregarded.

Most famines, and particularly conflict-induced famines, produce populations in which many adolescent boys and adult men in their prime have died and or been killed. They will leave behind young families that will likely struggle economically and socially in their absence. Many families may now be headed by women who themselves are weakened due to the conflict and famine and in disadvantaged positions due to patriarchy and other discriminatory systems and practices. Efforts will need to be directed at enabling these families to rebuild their lives and livelihoods and may range from updating inheritance and property laws to enable women to inherit and own property (especially important in places where male heads of household are missing) to offering free legal services to women to enable them to remain in their homes, on their land, and to keep their children; for their children to attend school for free with no hidden fees; to economic recovery and livelihood programs that fully take into account the new kinds of families and bread-winners that emerge after conflict induced famines.

Considering the negative long-term, inter-generational impact that is occurring among famine survivors, national leaders, humanitarian actors and policymakers need to direct substantial resources towards their long-term health and educational needs. The higher chronic disease burden in female survivors of famine compared to males has significant and important implications in shaping post-famine, gender-equitable provision of health care. Policy interventions that promote adequate nutrition for girls and women, and pre-natal, maternal and postnatal health will be essential to disrupt the intergenerational effects of poor health on the developmental, educational, economic and social outcomes of future generations–and particularly girls. Extra attention and support should be provided to children and affected pregnant mothers. The type of support would depend on the identified need, but could include complementary feeding, micronutrient supplementation (for children and pregnant mothers), zinc supplementation, vitamin A supplementation, iron-folic supplementation for pregnant mothers, and maternal calcium supplementation. Without directed and sustained efforts, the intergenerational effects of famine will continue to be felt through future generations of the survivors' families.

As this paper shows, famines are highly gendered crises that cause the living to suffer and increased mortality across populations. They cause families to be violently and irrevocably torn apart. They cause the unborn to be spontaneously aborted, or to be born with serious health conditions that will plague them and their family members for the rest of their lives. These children then become adults who are more likely to pass on their chronic health problems to their own children. Those responsible for famines are conducting crimes whose harm is inter and multi-generational and will continue to harm future generations unless strong and sustained direct health, educational, economic and

political efforts are made on their behalf.

It is crucial that perpetrators be held accountable for creating the conditions in which survivors must face terrible choices. Many coping strategies, from the foods people eat, to decisions about who eats, and undertaking 'shameful' activities in order to survive leave survivors with enormous sense of guilt. Invariably, as noted throughout this chapter, these decisions are weighted with gendered differences that can exacerbate pre-existing inequities.

Finally, it is unacceptable that in the four most recent famines, there continues to be a lack of sex and age disaggregated data on the victims and survivors. As we have shown, human suffering and responses to suffering are influenced by gender. Gender and age analyses are key analytical tools for informing policy and response and one cannot adequately understand or respond to famines without such analyses. International and national organizations must ensure that strong sex and age disaggregated data and gender and age analyses are conducted.

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