

8 Resource insecurity and gendered inequalities in health

A challenge to sustainable livelihood

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Introduction

In September 2000, the governments of 189 countries adopted the United Nations Millennium Development Goals and resolved to “spare no effort to free our fellow men, women, and children from the abject and dehumanizing conditions of extreme poverty, to which more than a billion of them are currently subjected” (UN Millennium Declaration, 2000). Today, over 700 million of the world’s population still live in extreme poverty, with the majority being females (World Data Lab, 2021). Resource insecurity is symptomatic of broader economic disadvantages and social inequalities faced by the poor (Boateng *et al.*, 2021) and quite distinct from resource scarcity (Wutich and Brewis, 2014), although the latter is considered a component of the former.

Resource scarcity has been examined from minimalist, moderate, and maximalist perspectives. Based on the minimalist account, resource scarcity is concerned with the availability of natural resources needed to satisfy basic human needs for food, shelter, and energy. The moderate perspective examines resource scarcity as concerning the availability of resources to satisfy consumption at current or higher levels. The maximalist perspective considers resource scarcity in terms of the actual demand of both human and non-human species exceeding supply (Matthew, 2008). In sum, resource scarcity can be defined as the shortage of resources influenced by a decline in availability, quantity, quality, or efficiency that does not meet current or increased demand, and has implications for sustainability and survival of human and non-human species. While this definition of resource scarcity appears to be holistic, the definition for resource insecurity is more encompassing.

This chapter will adapt Hadley and Wutich’s (2009) definition of resource insecurity with some modifications. For the purposes of this chapter, resource insecurity is defined as a multifaceted concept that encompasses resource scarcity, resource access, and lifestyle concerns that have the potential to impact the survival and sustainability of the human species. The complex and multidimensional nature of resource insecurity makes it a broad concept, requiring the need to identify its scope and scale in this chapter. A previous reflection on resource insecurity focused on food and water shortage, the causes of resource insecurity

at the community level, exploring the coping responses at the household level, and examining its effect on the emotional well-being and mental health at the individual level (Wutich and Brewis, 2014). While that chapter sought to develop a broader theory of resource insecurity at the level of the individual and the household, as well as examine the emotional and mental health effects, it was deficient in the composition of resource insecurity and did not draw adequate attention to the extent to which such insecurities exacerbated the health equity gap. This chapter has a different focus, emphasizing the multiple elements that make up resource insecurity, how it threatens health and sustainable livelihoods, and exacerbates gendered inequalities.

Accordingly, resource insecurity will be examined as a holistic concept made up of a triad, consisting of food, energy, and water insecurity at the household and individual levels. Resource insecurity will not be examined in isolation, as it is important to explore the causes and consequences of resource insecurity. This warrants a synthesis of the literature on some of the factors that influence resource insecurity, as well as consequences. The consequences of resource insecurity will be examined through four pathways, including disease, nutrition, economic, and psychosocial consequences, and how it perpetuates gendered inequalities. Using a transdisciplinary approach, I will examine the co-occurrence of food, water, and energy insecurity, and the multiplicative effect it has on amplifying gender inequality.

Resource insecurity and gender inequality

Resource insecurity in the form of food, water, and energy can be differentiated into unique components. The Food and Agriculture Organization (FAO) of the United Nations states that food security exists “when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO, 1996). This suggests that the absence of any of these components is indicative of food insecurity. Along these lines, the US Department of Agriculture defines food insecurity as “a household-level economic and social condition of limited or uncertain access to adequate food” (US Department of Agriculture, Economic Research Service, 2006). Analogous to the definition of food insecurity, Jepson *et al.* (2017), after a synthesis of existing conceptualizations, defined water security as the ability to access and benefit from affordable, adequate, reliable, and safe water for well-being and a healthy life. Here again, the condition where at least one of these components (affordability, reliability, adequacy, and safety) is significantly reduced, or becomes unattainable and threatens or jeopardizes well-being, provides a description of water insecurity (Jepson *et al.*, 2017). A parallel definition has been given to energy insecurity as the lack of access to adequate, affordable, reliable, acceptable, and clean sources of energy for a healthy and sustainable livelihood (Boateng *et al.*, 2020). Taken together, these definitions highlight key components of resource insecurity to include the lack of access to adequate, affordable, reliable, acceptable, and safe sources of either food, water, and/or energy for an active, healthy, and sustainable livelihood. Access to all three

of these components would imply resource security. While each of these components have been examined at the international, regional, and national levels, the impact of this triad, particularly food and water insecurity at the household and individual levels, have gained the attention of academics and policy makers, with energy insecurity considered a burgeoning field of study. All three are inextricably linked to each other and have the capacity to amplify the effects of each other via a shortage in one (Boateng *et al.*, 2020). Resource insecurity in its current characterization is at the heart of human development and is intricately tied to the attainment of several of the sustainable development goals (SDG) including the reduction of poverty (goal 1); ending hunger (goal 2); ensuring healthy lives and promoting well-being (goal 3); achieving gender equality and the empowerment of women and girls (goal 5); ensuring access to affordable, reliable, and sustainable energy (goal 7); reducing inequalities (goal 10); making human settlements safe resilient and sustainable (goal 11); ensuring sustainable and production patterns (goal 12); and combating climate change (goal 13) (United Nations Department of Economic and Social Affairs, 2015).

Current estimates before COVID-19 show that nearly 690 million people, or 8.9% of the world's population, were food insecure or hungry. More than 250 million of the food insecure live in Africa, where the number of undernourished people is growing faster than the rest of the world (FAO, 2020b). Globally, the prevalence of moderate or severe food insecurity is higher among women than among men (FAO, 2020b). Equally, water insecurity estimates show that about 3.2 billion people live in agricultural areas with high to very high-water shortages or scarcity, and 1.2 billion of this number (roughly one-sixth of the world's population) live in severely water-constrained agricultural areas. The most at risk are the poorest and most vulnerable groups, including women (FAO, 2020a). Water shortages and scarcity have been found to jeopardize the environment that is necessary to enable and ensure access to food for millions of hungry people in many parts of the world (FAO, 2020a).

The estimates of energy insecurity are no different. The 2017 international Energy Agency report on transitions from poverty to prosperity shows that one in five people in the world lack access to electricity and about 2.8 billion lack access to clean cooking (International Energy Agency, 2017). Future projections show that by 2030, about 600 out of the 674 million people in SSA will still be without access to electricity (International Energy Agency, 2017). Here again, the impact is particularly severe for women and girls, who are typically responsible for securing and using energy resources (Boateng *et al.*, 2020).

The current statistics of resource insecurity are indicative of a growing problem, as the prevalence of each of the three components continues to increase, with the worst affected living in SSA. The situation is estimated to be worsened by the COVID-19 pandemic, as several thousands of people around the world plunge deeper into poverty. Spatial inequalities in food, energy, and water access have resulted in differential health, disease, psychosocial, and nutritional effects for several populations. This is particularly the case for women and children across space and time, leading to social and health disparities. While there is ample

evidence of gender inequality in resource access (Kassie, Ndiritu and Stage, 2014; Wutich and Brewis, 2014; Tibesigwa and Visser, 2016; Quinonez, de Sousa and Figueroa, 2019; Botreau and Cohen, 2020), few studies have explored the relationship between resource insecurity and gender inequality.

Gender equality is not only a fundamental human right but also a necessary foundation for a peaceful, prosperous, and sustainable world. While some progress has been made over the last few decades, there are pervasive challenges which have made stagnate social progress, and have kept women bearing the severe consequences of resource insecurity. Globally, women and girls perform a disproportionate share of unpaid domestic work (United Nations Department of Economic and Social Affairs, 2015). They are responsible for ensuring there is sufficient food, energy, and water resources at home, in spite of the disproportionate time they spend in acquiring and using these resources. This gendered division of labor is influenced by socioeconomic and political processes that structure hierarchical power relations between men and women. These factors determine who has what (material and other assets), who does what (division of labor between market and reproductive labor), who decides what (political participation and law), and who is valued for what (social norms, ideologies) (George *et al.*, 2020). These factors ensure the practice and perpetuity of gender inequality. In fact, gender norms govern what is considered acceptable for men and women. These norms legitimize patriarchy and conceal its unfairness; it is also what legitimizes the differential roles of men and women (George *et al.*, 2020). This creates a situation where women begin to experience inequality at birth, following them all through their lives.

Socio-economic and political processes also influence who has what. Structures, such as discrimination in land, property, inheritance laws, access to low-cost credit, and access to other economic opportunities, disproportionately affects women who are responsible for the management of food, energy, and water resources in the household (George *et al.*, 2020). Gender norms also influence who does what. It determines the role of women at the household and community level. It supports early marriage and positions women and girls as responsible for the household and care work, which often limits their completion of education, participation in the labor force, and upward economic mobility. This denies women the autonomy and the capacity to engage in decision-making at the household level. In 18 countries, husbands can legally prevent their wives from working; in 39 countries, daughters and sons do not have equal inheritance rights; and 49 countries lack laws protecting women from domestic violence (United Nations Department of Economic and Social Affairs, 2015). In sum, these factors create a situation where women and girls are disproportionately impacted by resource insecurity, which negatively impacts their well-being and sustainable livelihood. These differential effects are set to increase as resource insecurity grows with accelerated planetary climate change, population increase, protracted weather conditions, biodiversity loss, mass extinctions of plants and animals, destruction of ecosystems and natural habitats, and increase in extreme poverty due to the COVID-19 pandemic (Barnosky *et al.*, 2012; Campbell *et al.*, 2017; Hasegawa

et al., 2018). Beyond the impact of COVID-19, the capacity of countries, especially, those in SSA to recover from the reversal in the progress made on the SDGs, is worrisome. As extreme poverty deepens, the access to resources such as food, water, and energy become protracted, resulting in widening of the gender inequality gap.

The remainder of this chapter explores the current state of knowledge about the different pathways by which resource insecurity impacts on disease, nutrition, economic, and psychosocial well-being of males and females in most low- and middle-income countries.

I cannot exhaustively review the extant knowledge about these pathways across the different disciplines. Rather, I focus on four main domains for which the evidence is undisputable. Next, I will discuss the syndemic effect of resource insecurity in perpetuating the cycle of poverty and the gendered inequalities in health. Finally, I will identify possible strategies that could be used to mitigate these effects.

Resource insecurity and differential health effects

The literature on resource insecurity has provided ample evidence on the deleterious consequences of food, energy, and water insecurity at the individual and household levels. However, fewer studies have explored how this insecurity exacerbates and perpetuates gender inequality. This section examines the evidence on the disease, nutrition, economic and psychosocial consequences of food, energy, and water insecurity, and how it differs across sex (Table 8.1).

Disease pathway

Resource insecurity, whether in the form of food, energy, or water insecurity, has deleterious health consequences on individuals and households, with women and girls experiencing the worst effects. Food insecurity is a major cause of malnutrition in low-income countries, with maternal and child undernutrition contributing to more than 10% of the world's disease burden (Alaimo, Chilton and Jones, 2020). Among children under five years, a recent review of food insecurity and nutrition indicators revealed the positive significant association between food insecurity and stunting, child wasting, low birthweight, and anemia (Maitra and Food and Agriculture Organization of the United Nations, 2018). Among adults, food insecure households are more likely to be overweight and obese due to the decreased intake of fruits, vegetables and fiber, together with an increased intake of energy dense foods, including foods that are rich in fat and sugar (Shariff and Khor, 2005; Popkin, 2011; Castillo *et al.*, 2012). However, the prevalence of food insecurity induced obesity is greater among women and adolescents, and not men (Ivers and Cullen, 2011). This has implications for an increased risk of diet-sensitive chronic diseases, including hypertension, dyslipidemia, diabetes, and cardiovascular diseases (Gundersen and Ziliak, 2015). Food insecurity during pregnancy also increases the risk of weight gain and gestational diabetes mellitus

Table 8.1 Resource insecurity and differential health and economic outcomes

<i>Domains</i>	<i>Resource insecurity</i>	<i>Consequences</i>
Disease	<i>Food Insecurity</i>	Cardio-metabolic disease; type 2 diabetes; dyslipidemia; hypertension; frequent sickness of children, anemia, stunting, wasting, low birth weight deliveries
	<i>Energy Insecurity</i>	Chronic disease; cardio-metabolic disease; hypertension; acute lower respiratory infection; anemia; myopia; chronic obstructive pulmonary disease; chronic bronchitis, ischemic heart disease; hypothermia; hyperthermia; pneumonia; Gastrointestinal disease; diarrhea; hepatitis A; bodily injuries
	<i>Water Insecurity</i>	Gastrointestinal diseases; water borne diseases; cholera; dysentery; diarrhea; typhoid and paratyphoid enteric fevers; hepatitis A, malnutrition; anemia; hemorrhage; food poisoning
Nutrition	<i>Food Insecurity</i>	Malnutrition; stunting; wasting; severe caloric deficiency; poor dietary diversity; low intake of micronutrients; starvation; undernutrition; unbalanced diet; unhealthy dietary patterns; water insecurity
	<i>Energy Insecurity</i>	Low food production; lower dietary diversity; food poisoning; water poisoning; fewer food choices; energy expenditure
	<i>Water Insecurity</i>	Poor food quality; lower caloric intake; energy expenditure; lower dietary diversity; lack of nutrient rich foods; increased food insecurity; dehydration
Economic	<i>Food Insecurity</i>	Impairment or delays in cognitive development; poor academic performance; lower productivity; unemployment; low production levels; deficiency in human capital formation; human capital deficits; decreased life time earnings; school readiness, lower educational attainment; high rates of school absenteeism and repeating grades; lower life-time earnings; low work capacity; increased out of pocket payments for hospitalization
	<i>Energy Insecurity</i>	Low food production; income generation activities; household income; school absenteeism; poor academic performance; increased energy expenditures; decrease in productivity
	<i>Water Insecurity</i>	Decreased income generation activities; increase water expenditures; increased expenditures on health; increased school absenteeism; lateness to school; human capital deficits; food insecurity; decreased productivity
Psychosocial	<i>Food Insecurity</i>	Anxiety and depressive symptoms; mood disorders; anxiety disorders; stress; emotional health; elevated mental distress; impaired mother to child interactions; impaired mother to child attachment; child neglect and abuse; low self-esteem.
	<i>Energy Insecurity</i>	Stress; depression; anxiety; social exclusion; feelings of exhaustion; shame; low self-esteem; reduced maternal-child interactions
	<i>Water Insecurity</i>	Stress; depression; worry, anger, reduced maternal-child interactions; deficiency in infant cognitive development; intimate-partner violence

(Laraia, Siega-Riz and Gundersen, 2010), as well as low birth weight. The persistence of food insecurity means the goal of ending all forms of malnutrition and ending hunger as well as ensuring access by all people, in particular the poor and people in vulnerable situations by 2030 has become illusive. Thus, vulnerable populations such as women and girls would experience the severe effects of food insecurity.

Equally, water insecurity contributes to the spread of infections and water-borne diseases. The WHO's recent report on drinking water shows that water and poor sanitation are associated with the transmission of diseases such as cholera, diarrhea, dysentery, hepatitis A, and typhoid (Tarrass and Benjelloun, 2012; WHO, 2019). The lack of access to safe water means households are compelled to use surface water, which may contain *E. coli* and other pathogens that increase the risk of gastrointestinal diseases (Collins *et al.*, 2019). About 829,000 people are estimated to die each year from diarrhea as a result of unsafe drinking water, sanitation, and hand hygiene (WHO, 2019). Diarrheal diseases are a major contributor to malnutrition and death. Diarrheal diseases stem from anorexia, reduced absorptive function, and mucosal damage, in addition to nutrient exhaustion, the latter of which is associated with each episode of diarrhea (Ferdous *et al.*, 2013). Pregnant women who have to carry heavy water containers may also increase the risk of uterine prolapse and hemorrhage (Gjerde *et al.*, 2017). These effects say little about the progress made by most SSA countries on achieving universal and equitable access to safe and affordable drinking water for all by 2030. Without access to safe and affordable drinking water, it is difficult to imagine what progress could be made in achieving equity in sanitation and hygiene for women and girls.

Comparably, the burgeoning literature on household energy insecurity suggests both direct and indirect health consequences. Particularly, energy insecurity in most low-income countries has necessitated the reliance on unprocessed solid fuels for cooking, leading to household indoor air pollution and an increase in accidental deaths (Dherani *et al.*, 2008; Wilkinson *et al.*, 2009; WHO, 2014). Through indoor air pollution, households' members are exposed to high concentrations of particulate matter, gases, and other pollutants. This is due to coal burning in open fires, or low efficiency stoves, both which result in acute lower respiratory infections, chronic obstructive pulmonary, and ischemic heart diseases (Cook *et al.*, 2008; Wilkinson *et al.*, 2009; Boateng *et al.*, 2020). Women and girls are at a particularly high risk of carbon monoxide, sulfur and nitrous oxides, and hydrocarbon poisoning. This may be attributed to the gendered roles specific to household responsibilities, requiring women to spend more time cooking indoors with their girls (Boateng *et al.*, 2020). Also, the lack of energy resources has resulted in the use of salt for the preservation of foods, which has also led to an increase in chronic diseases, particularly, hypertension. Women sleep thirsty so their children will have water to drink. These consequences do not match the goals of SDG 7. Any progress in eliminating the deleterious effects experienced mostly by women and girls in the area of energy insecurity might require a

proactive measure to ensure universal access to affordable, reliable, and modern energy services.

By examining all three components of resource insecurity, it is obvious that any deficiencies in the achievement of key targets related to SDG 2, 6, and 7 may have a greater effect in the reduction of poverty (Goal 2) and ensuring health lives (Goal 3). With a reversal in the progress made on achieving resource security, resource insecurity manifesting in the form of food, energy, and water insecurity will continue to have disproportionate consequences on women and girls than men.

Nutrition pathway

Resource insecurity in its current description has been associated with nutritional consequences among low-income earners. In most low-income countries, food insecurity is associated with negative nutritional outcomes and it is experienced differently by women and men. Generally, food insecurity is associated with severe caloric deficiency, poor dietary diversity, low intake of micronutrients, starvation, unbalanced diet, and unhealthy dietary patterns (Sen, 1977). Among the elderly, food insecurity has also been found to be significantly associated with lower intakes of energy, protein, carbohydrate, saturated fat, niacin, riboflavin, magnesium, iron, and zinc (Lee and Frongillo, 2001). Among women, food insecurity is associated with changes in body composition during lactation. A longitudinal study in Uganda showed that food insecurity was associated with lower body weight at 6, 9, and 12 months postpartum (Widen *et al.*, 2017). A related study in Kenya showed that food insecurity was inversely associated with arm muscle area and mid-upper arm circumference among postpartum women (Widen *et al.*, 2019). More recently, greater food insecurity was found to be significantly associated with lower breast milk intake among infants in western Kenya (Miller *et al.*, 2019).

Water is life, as it represents a critical nutrient for survival. However, the absence of water has dire consequences for households, particularly for women and children. In many low-income settings, water insecurity has been associated with dehydration in adults and children (Popkin, D’Anci and Rosenberg, 2010; Rosinger, 2018). The worst form of dehydration was reported by Krumdieck *et al.* (2016), who found women sleeping thirsty in Kenya due to lack of access to water. Again, among adults and children, dehydration has also been associated with disruptions in mood and cognitive functioning. Inadequate intake of fluids is associated with increased prevalence of constipation (Popkin, D’Anci and Rosenberg, 2010). Water insecurity is also reported to decrease the quality, quantity, and the diversity of food consumed, and is shown to increase energy expenditure for women (Collins *et al.*, 2019). Indeed, in a longitudinal study of postpartum women in Kenya, water insecurity was established as an important determinant of food insecurity (Boateng, Workman *et al.*, 2020).

The nutritional consequences of energy insecurity for women and children are quite significant. Energy is critical for food production, improving the quality and safety of food and water, and increasing the variety of food accessible

to households. Homes lacking access to energy are likely to have fewer food choices, greater food-borne illness due to undercooking, and more food poisoning due to improper refrigeration (Hernández, 2016; Boateng *et al.*, 2020). In fact, energy insecurity can be considered a determinant of food insecurity. Beyond the household, energy is required for food production and processing, particularly, in the irrigation process amidst extreme temperatures. The absence of such energy means low food production, which has implications for child malnutrition or undernutrition.

The nutrition effects of resource insecurity challenge the possibility of achieving four (1, 2, 3, 6) of the 17 sustainable development goals. For instance, the lack of micronutrients suggests ending all forms of malnutrition, whether stunting or wasting in children under five years of age by 2025 (Goal 2) is far from reality. Also, with protracted weather conditions and the drying of water bodies, women have had to sleep thirsty so that their children would have water to drink due to the lack of access to sufficient and safe water in Madagascar. This global inequality in water access begs the question whether universal and equitable access to safe and affordable drinking water for all (Goal 6) would be achieved in time to ameliorate the physical, economic, and psychological burden experienced by women.

Economic pathway

The economic consequences of food, water, and energy insecurity are significant and disproportionately impact the livelihoods of women and children, with life-long consequences.

Starting with children, food insecurity has been found to prevent children from attaining their full potential (Cook and Jeng, 2009). Thus, children who are consistently hungry may experience development impairments which limit their physical, intellectual, and emotional development (Cook and Jeng, 2009). This has other related effects, such as delays in school readiness and limited learning or academic achievement, which in turn impacts their educational attainment, lifetime earnings, and determines their standard of living (Cook and Jeng, 2009). One of the key mechanisms to this poor performance is absenteeism. The evidence in a longitudinal study in Ethiopia and a cross-sectional study in Ghana (Belachew *et al.*, 2011; Baiden *et al.*, 2020), respectively, has shown that children from food insecure households are more likely to be absent from school with consequences on their academic performance (Shankar, Chung and Frank, 2017). This problem is not only limited to Low- and Middle-Income Countries (LMICs) but also prevalent among children from food insecure households in high-income countries (Shankar, Chung and Frank, 2017). Among adults, workers who experienced hunger as children are not well prepared physically, mentally, emotionally, or socially to perform effectively in the workforce (Cook and Jeng, 2009). Also, hunger has been found to increase the healthcare costs of families. A society that privileges males over females might put enough resources into supporting the male child. Furthermore, the experience of hunger by children has been associated with greater absenteeism, presenteeism, and turnover in the work environment, which

is costly to employers. As women are predominantly responsible for care roles in the families, sick children often lead to parent–employee absenteeism (Cook and Jeng, 2009), which mostly have adverse consequences on career development and mobility of women in the workplace.

The economic effects of water and energy insecurity are somewhat related. With climatic changes, drought, and the short spells of rainfall, women and girls have to walk long distances to collect water and energy resources. Women in Kenya spent between two and 10 hours a week collecting water for the household (Boateng *et al.*, 2018). Women in India spend approximately 374 hours every year, and up to 20 or more hours per week, collecting firewood in India; in fact, they spend four hours every day cooking when using traditional stoves (Clean Cooking Alliance, 2015). This takes away from the productive activity of these women and girls. For women, it means a shortfall in their economic activity and their capacity to generate income, which drives gender inequality within the household (Wutich and Brewis, 2014). For girls, it leads to lateness to school and, in some dire cases, absenteeism from school several times in a semester (Wutich and Brewis, 2014; Collins *et al.*, 2019). This has the potential to impact: the academic performance of these girls, their ability to pursue further education, and their career prospects in the long term. Consequently, a perpetual cycle of poverty and gender inequality at the household level is created, which raises the importance of achieving the SDGs that aim to end poverty for all and empower women and girls (Goals 1 and 5). It also calls for greater attention to be paid SDG 10, specifically, on the empowerment and promotion of social, economic, and political inclusion of all, in this case, women and girls. In addition, SDG 10 calls for ensuring equal opportunity and reducing inequalities of outcomes. These targets will trigger efforts toward the achievement of full and productive employment and decent work for all women and equal pay for work of equal value (Goal 8, target 5).

Psychosocial pathway

There is ample evidence to suggest that resource insecurity has deleterious psychological consequences on households and their members. Several studies, including systematic reviews and meta-analyses, showed that food insecurity was associated with depression, stress, and poor emotional health (Bruening, Dinour and Chavez, 2017; Perkins *et al.*, 2018; Pourmotabbed *et al.*, 2020). Female-headed households have frequently been found to be more food insecure than male-headed households (Jung *et al.*, 2017); however, a study of food insecurity and mental health in 149 countries using Gallup polls shows that the psychological effects were similar for men and women (Jones, 2017). Nonetheless, women in this study scored more poorly on the mental health indices than men.

The psychosocial effects of water and energy insecurity are no different. Several studies have provided evidence for the effect that water insecurity has on emotional distress, psychological distress, psycho-emotional, psychosocial stress,

and other forms of mental health (Wutich and Ragsdale, 2008; Aihara *et al.*, 2015; Stevenson *et al.*, 2016; Workman and Ureksoy, 2017a). Other psychosocial effects of water insecurity, based on the lived experiences of women in Kenya, consisted of anxiety, worry, shame, anger, and fear (Collins *et al.*, 2019). The women reported feeling ashamed when they were unable to maintain the hygiene of household members, or provide water as a gesture of hospitality (Collins *et al.*, 2019). In a comparative study between the experiences of males and females, Wutich (2009) found that women were more likely than men to be burdened with everyday water responsibilities; however, there were no significant differences between the experiences of males and females during household water emergencies and reports of worry, anger, and annoyance with family members (Wutich, 2009). A related study by Tsai *et al.* showed important intra-household gender differences in perceptions of water insecurity. Comparatively, women reported each aspect of water insecurity as being more severe than men (Tsai *et al.*, 2016). While these findings may suggest the existence of gender inequality in the effects of water insecurity, it is important to affirm that the disproportionate emphasis on women may explain the current results. Analogous to food and water insecurity, recent evidence from Ghana and Nigeria shows that women experience stress and anxiety, and may sometimes get depressed from carrying the disproportionate burden of securing adequate energy resources for the household. Participants reported experiencing more specific adverse consequences, including worry, shame, frustration, stigma, and quarrels (Boateng *et al.*, 2020). These psychological effects highlight the inextricably nature of resource insecurity in its effect and the urgent need to reduce poverty (Goal 1), end hunger in all forms (Goal 2), ensure the availability and equitable management of water resources (6), and make sustainable and modern energy affordable and available to all (Goal 7).

Taken together, resource insecurity has deleterious consequences in disease, nutritional, economic, and psychosocial pathways, in ways that widen the health gap between males and females to a greater extent. But most critically, it highlights the urgent need to address at least 10 of the 17 sustainable goals in SSA, without which the gender gap in access to food, water and energy would only deepen, with deleterious consequences on women's health.

Individual and syndemic effects of resource insecurity

Syndemic theory was introduced by anthropologists to explain the synergistic interaction of two or more co-existing diseases that amplifies excess burden of disease (Singer and Clair, 2003). Much earlier, Milstein (2001) described syndemics to occur when health-related problems cluster by person, place, or time. The problems, along with the reasons for their clustering, define syndemic and differentiate one from another. To circumvent a syndemic, Milstein argues that one must prevent or control not only each disease but also the forces that tie those diseases together. Biologically, the syndemic of diseases have been found to account for excess mortality (Singer and Clair, 2003). Following these explanations, Singer and Clair, in conceptualizing syndemic within the social context,

argue that syndemic is “a set of intertwined and mutually enhancing epidemics involving disease interactions at the biological level that develop and are sustained in a community because of harmful social conditions and injurious social connects” (Singer and Clair, 2003, p. 429). Using this framework, it is possible to see the syndemic relationships between food, energy, and water insecurity amplifying the associated health consequences and widening the health equity gap between males and females. Beyond this understanding, it has the potential to support policy makers and program implementers in improving population health (Tsai, 2018). Several studies have attempted to examine the syndemic relationships between the different components of this trifecta; however, none has explored the three together. A number of qualitative studies have provided evidence for the co-occurrence of food and water insecurity amplifying health outcomes. Workman and Ureksoy (2017b) in a study in Lesotho found that water insecurity, food insecurity and changing household demographics, likely resulting from HIV/AIDS epidemic, were all associated with increased anxiety and depression. The co-occurrence of food and water insecurity has quantitatively been associated with an increase in depression symptomatology (Boateng, Workman *et al.*, 2020) and undernutrition (Brewis *et al.*, 2020). From these studies, it is evident that the individual effects of food and water insecurity get compounded when they occur together. Thus, the co-occurrence of food, water, and energy insecurity would have a greater adverse effect on the household, and more severely on women and girls. The underlying force causing this insecurity is poverty. Households deep in poverty are more likely to experience food, water, and energy insecurity concurrently. This also means the effects as explained earlier, whether disease, nutrition, economic, or psychosocial, are compounded for women and girls who are disproportionately affected. Beyond poverty, other structural factors, including gender ideology, have a way of complicating the effects of food, water, and energy insecurity. For example, the gendered effects of resource insecurity lead to worst health and economic conditions for women; this, in turn, limits their access to resources, creating a cycle of poverty and perpetual gender inequality. In sum, the underlying force – poverty – is key to addressing resource insecurity, enhancing sustainable livelihoods, and reducing the health equity gap. Hence, ending poverty in all its forms everywhere in this context is particularly tied to ending hunger, and achieving food security and improved nutrition for women and girls (Goal 2); ensuring healthy lives and the promotion of well-being for women and girls at all ages (Goal 3); ensuring inclusive and equitable quality education for all (Goal 4); achieving gender equality and the empowerment of women and girls (Goal 5); achieving universal and equitable access to safe and affordable drinking water for all (Goal 6, target 1); ensuring universal access to affordable, reliable, and modern energy services (Goal 7, target 1); achieving full and reproductive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal values (Goal 8, target 5); and ensuring equal opportunity and a reduction of inequalities in income (Goal 10, target 3) for women. Thus, the achievement of two or more of these goals would significantly reduce the health equity gap.

Conclusion

This chapter provides a synthesis of peer-reviewed articles to show how resource insecurity, in the form of food, water, and energy insecurity, influences gender inequalities in health. Each component has been discussed as having idiosyncratic effects on both households and individual members. Beyond these individual effects, resource insecurity using this triad has a synergistic effect on poverty. It is important to note that while each dimension may have an effect, the presence of either two or all three may worsen the experiences of those most disadvantaged and at risk. This amplification of effects therefore worsens the experiences of women, whether one considers the consequences (disease, nutrition, economic and/or psychosocial) of food, water, and energy insecurity independently or together. This makes the risk of morbidity and mortality, while precarious even with food insecurity only, much more complicated when experienced in the presence of water and energy insecurity. Interventions that target just one component of resource insecurity may not be efficient as all three facets are inextricably related with each other. To ensure sustainable livelihoods and reduce the gender inequality gap created by resource insecurity, it is important to examine the structural and intermediary determinants of health and health inequity. First, addressing poverty cannot be done in isolation; as complex as it may be, it requires macroeconomic, social, and public policies specifically targeted to vulnerable populations in order to transition them out of poverty. Most critically, cultural and societal values that undermine the role of women and the future of girls may need to be changed to promote gender equity. These structural factors will not only address poverty but also reduce the health inequities experienced by women. As already established, poverty reduction as a Sustainable Development Goal is not possible without the achievement of the other 16 Goals. This makes the achievement of Goal 5, which is aimed at gender equality and the empowerment all women and girls critical for sustainable development. Second, a focus on intermediary social determinants of health, such as the material circumstances of the most vulnerable, behavioral, and biological factors, as well as psychosocial factors, may be important at all levels to ensure gender equality in health. Finally, using a syndemic approach, it is important not only to separately address food, water, or energy insecurity but also to address the economic and political forces that actually tie them together.

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