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IAFS 4500

Final Paper

April 28, 2022

Sanitation Rights and Menstrual Health in Kibera, Kenya

This paper will focus on sanitation policy in informal settlements and its effect on the menstrual health of women and young girls. Three research questions will guide this analysis. First, the paper will examine the intersection between sanitation policy and menstrual health from an international scope, using research from multiple case studies to answer the question: What are the effects of sanitation policy on menstrual health? Next, the paper will focus on the historical neglect of informal settlement communities by governments, often resulting in the bypassing of residents in the provision of water and sanitation rights. This government disservice disproportionately affects female residents of informal communities, and this paper aims to address these inequalities from a feminist political ecology perspective. The study of additional barriers women face as a consequence of poor sanitation infrastructure systems will be guided by the question: How does a lack of sanitation policy in informal settlements impact menstrual health? Finally, this paper will focus on sanitation policy and menstrual health among women in the informal settlement of Kibera, located outside of Nairobi, Kenya. Kibera is regarded as the largest informal settlement in Africa, with an estimated population of 700,000 to 1 million residents, depending on migration and census criteria (Desgroppes and Taupin, 2011). To effectively analyze the dimensions of menstrual health in relation to sanitation policy in Kibera, I propose the question: How does poor access to sanitation services in Kibera, Kenya impact the menstrual health of girls and women?

Menstrual health is an "integral component of improving global population health, achieving the United Nations' Sustainable Development Goals (SDGs), and realizing gender equality and human rights" (Hennegan, et al., 31). As developed by the Terminology Action Group of the Global Menstrual Collective, menstrual health is defined as "a state of complete, physical, mental, and social well-being and not merely the absence of disease or infirmity, in relation to the menstrual cycle" (Hennegan, et al., 32). By the same definition, achieving menstrual health implies that women, girls, and people who menstruate can access "accurate, timely, appropriate information about menstruation and related self-care and hygiene practices, care for their bodies during menstruation such that their preferences, hygiene, comfort, privacy, and safety are supported, and access effective and affordable menstrual materials," as well as have access to "supportive facilities and services including water, sanitation and hygiene services" that allow them to "wash the body, change menstrual materials, and clean/dispose of used materials" (Hennegan, et al., 32). Other components of menstrual health include the right of women to "experience a positive and respectful environment in relation to the menstrual cycle, free from stigma and psychological distress, including the resources and support they need to confidently care for their bodies and make informed decisions about self-care throughout their menstrual cycle" (Hennegan, et al., 32). Lastly, achieving menstrual health includes women's ability to "decide whether and how to participate in all spheres of life, including civil, cultural, economic, social, and political, during all phases of the menstrual cycle, free from menstrual-related exclusion, restriction, discrimination, coercion, and/or violence" (Hennegan, et al., 32).

Research in the field of women's health has shifted in recent decades following the 1994 International Conference on Population and Development in Cairo (Harlow and Campbell, 142). Family planning and reproductive health have historically dominated this research field, though

the importance of women's self-perceived health needs has come to the forefront (Harlow and Campbell, 142). New priorities in health and population research were motivated by case study investigations in multiple countries, revealing that women are predominantly concerned about their menstrual and genitourinary health. Unfortunately, resources and intervention programs have been slow to address and understand women's menstrual health complaints (Harlow and Campbell, 142). Often, concerns about menstruation are perceived as "minor health concerns" and are categorized as irrelevant or unimportant in public health agendas, especially for women in developing countries (Harlow and Campbell, 142). Regardless of this negligence, research demonstrates the importance of menstrual health as a crucial component of the health of women globally. Untreated menstrual disorders, poor menstrual health hygiene, and low health literacy among women in developing countries significantly impacts their work, social, sexual, and family lives, and limits their life opportunities (Harlow and Campbell, 193). This is particularly true for women in societies whose "activities are proscribed" during menstruation, which often accompanies intense social and cultural stigma that leaves women with few tools to properly manage and better understand their menstrual health and bodily needs (Harlow and Campbell, 193). These facts highlight the paramount importance of addressing menstrual health, especially in developing nations, with the ultimate goal of improving the livelihoods of women and their health with the same resources and attention given to women in more privileged societies.

Addressing the menstrual health needs of women in informal settlements is inextricable from the politics of sanitation and water provision. As rapid global urbanization continues alongside a lack of efficient political responses by national and municipal governments, "urban poverty, informal settlements, and health inequities in cities of the global south" persist (Corburn and Karanja, 258). As cited in research by Corburn and Karanja, the World Health Organization

estimates between 50 to 80% of urban populations in Sub-Saharan Africa currently live in informal settlements, and this number is expected to increase with time. Living conditions in informal settlements perpetuate health inequalities and are worsened by political efforts to further marginalize groups that do not fit into the bounds of society and are thus restricted from municipal services provided to residents with more social power and higher socio-economic status. This uneven access to resources that, if provided, would positively impact population health, is highlighted by the United Nations Habitat program's definition of an informal settlement, which classifies an informal settlement as "an area with inadequate access to safe water, sanitation, and other infrastructure, poor structural quality of housing, overcrowding, and in-secure residential status" (Corburn and Karanja, 259). Additionally, the UN defines a slum as a "household or group of individuals in an urban area that lack access to adequate sanitation in the form of a private or public toilet shared by a reasonable number of people" (Corburn and Karanja, 259).

Inadequate sanitation infrastructure contributes to "disproportionate burdens of infectious and chronic diseases" among informal settlement populations (Corburn and Karanja, 259). One significant component of sanitation infrastructure is access to clean water, which is essential for human survival as well as other distinct needs including cleaning, livestock raising, and agriculture, all of which have multifaceted impacts on human health, the environment, and overall quality of life and wellbeing" (Rautenen, et al., 179). Water pollution, poor water quality, water scarcity, as well as the politics of water distribution, become matters of life and death (Rautenen, et al., 179). Cholera, giardia, typhoid fever, and various other water-borne pathogens contribute to billions of deaths per year, all resulting directly from poor sanitary conditions (Rautenen, et al., 179). In informal settlements where lacking sanitation infrastructure and

consequential diseases and illnesses have become the norm, major health disparities between those with and without access to sanitation services become evident. Residents of informal settlements are far more likely to contract diseases from pathogens in water and food as a result of fecal particle contamination, including diarrheal diseases that lead to extreme dehydration and death, as well as mineral and vitamin deficiencies, malnutrition, stunting, and helminths (worms) that have been shown to limit cognitive and brain development and lower long-term disease immunity (Corburn and Karanja, 264). Exposure to contaminated water is particularly detrimental for children in informal settlements, as waterborne illness and malnutrition results in poor cognitive development and poor performance in school (Corburn and Karanja, 264). These health risks are particularly evident for women and girls who are disproportionately affected by inadequate sanitation infrastructure, as restricted toilet usage increases the likelihood of women developing urinary tract infections (UTIs), chronic constipation, and ultimately inhibits their ability to seek privacy, safe sanitation facilities, and menstrual product access and disposal (Corburn and Karanja, 264). Poor sanitation infrastructure, including limited access to clean water sources, ultimately contributes to poor overall health outcomes for residents of informal settlements, and is directly linked to poor menstrual health hygiene among women in these contexts.

Based on this evidence, this paper argues that colonial-era infrastructure and racism, in combination with corruption and poor governance by the Kenyan Central Government, has created an in-humane, non-sustainable, and simply cruel system of neglecting Nairobi's poorest and most susceptible populations in the provision of resources crucial for human survival. Further, women and girls in Kibera are the most vulnerable to these poor infrastructural conditions, and poor menstrual health contributes to their vulnerability. Without adequate

solutions for addressing the compounding vulnerabilities of women and girls in informal settlements, significant impacts to the livelihoods and health of women in these contexts prevail.

Background:

Understanding sanitation policy and its effects on menstrual health requires a historical analysis of colonialism in Kenya. The development and continuation of informal settlements in Kenya are inextricable from the country's colonial history and city-planning, as well as its post-independence governance (Corburn and Karanja, 262). British colonization of Kenya began in the 19th century, motivated by Britain's interests to protect its commercial interests in East Africa. British colonialist policies "racially segregated Africans and Indians living in Nairobi, pushing non-white groups to the most marginal and "risky" areas of land outside the city's center" (Corburn and Karanja, 262). The British justified these practices as necessary measures for "protecting Europeans from exposure to native diseases" (K'Akumu and Olima, 2007, cited in Corburn and Karanja, 262). Very few settlements for African people were allowed in Nairobi; communities were designed for a small, fixed number of residents and were created as "temporary" settlements without proper planning for population growth (Home, 1997, cited in Corburn and Karanja, 262). Africans and Indians pushed to the outside bounds of Nairobi's land and society were further marginalized by Britain's refusal to finance and engineer basic services including water and sanitation to these communities, and infrastructure created to service white populations was built to intentionally limit pipes and water systems to the city's center. Instead, infrastructure in African settlements was created for the sole purpose of "resource and commodity extraction," without any plans for "intra-city service provision or mobility" (Obudho, 1997, cited in Corburn and Karanja, 262). Following the Mau Mau uprising and Kenya's

subsequent trajectory for independence and a black majority government, British imperialism in Kenya was replaced by President Jomo Kenyatta, the country's first prime minister. Post-colonial Kenya adopted a centralized government, in which power was concentrated to the President and left municipal governments, including the Nairobi City council, powerless under centralized rule (Corburn and Karanja, 262). Under this system, the Kenyan Central Government used its power to "control urban land, and instituted taxation and infrastructural development for political patronage" (Wrong, 2009, cited in Corburn and Karanja, 262). Corrupt public officials saw informal settlements created by the British as a lucrative opportunity for exploitation, and used their power to control land, collect rent from "illegal dwellers," and negotiated systems for receiving payments from strongmen and cartels who provided informal services to residents of informal settlements in the absence of government provision of these services (Corburn and Karanja, 262). This centralized governance continued until 2010, when Kenya underwent major constitutional changes and devolution. Devolution gave more power to city governments and officials, yet many of these uneven power structures and exploitative systems still exist.

Lack of infrastructure for water and sanitation service delivery in Kenya's informal settlements is a lasting consequence of the country's history of colonization. Very little government presence exists in Kibera, Kenya's largest informal settlement, even as its population consists of almost 1 million people at any given time (Migiro and Mis, 2014). The Kenyan Central Government has generally taken a "laissez-faire approach to the rapid growth of informal settlements" in the country and has been unsuccessful in delivering basic services to settlements due to "complex socio-political factors combined with corruption, policy discrimination against the poor, and a general inability to understand and effectively respond to citizen-articulated service needs" (Umande Trust, 2007). Various attempts to improve basic

infrastructure in Kibera with human and financial resources have had very little impact on residents ability to meet their basic needs (Umande Trust, 2007). Even as the 2002 Water Act recognized inequities to water and sanitation by the poor, new water management institutions are controlled by the state and have thus been entangled in the dysfunctional bureaucratic politics of the Kenyan central government, rendering this recognition of inequality virtually inefficacious for improved access and rights for Kibera's residents (Umande Trust, 2007). Further, even as the Water Act was incorporated with the Nairobi Water and Sewage Company (NWSC) in 2003, very few gains have been made in extending access to water and sanitation to Kibera, and services from the Nairobi City Council (NCC), which functions to provide solid waste disposal services, have proven to be unorganized and sporadic (Umande Trust, 2007).

Since the 2002 Water Act, Kenya's 2010 Constitution recognizes every Kenyan's right "to accessible and adequate housing, and to reasonable standards of sanitation," and the 2007 National Environmental Sanitation and Hygiene Policy states "as a basic human right all Kenyans should enjoy a quality of life with dignity in hygienic and sanitary environments and be free from suffering any ill health caused by poor sanitation" (Kenya Ministry of Health, cited in Corburn and Hildebrand, 2015). Even after these proclamations, Kenya's investment in sanitation was only "2.6% of the total internal investment for water and sanitation included in the internal development budget" from 2003 to 2005, and by 2012, "Kenya's sanitation investments ranged from just 0.1% to 0.5% of the country's GDP" (Water and Sanitation Program, cited in Corburn and Hildebrand, 2015). Besides policy declarations made by the Kenyan Government and indications of its commitment to utilizing a "rights-based approach to development" stated in the National Resource Management Strategy, very little indication of a clear focus and plan to ensure these rights exists and no campaigns have been undertaken, despite the clear link between

sanitation and “improved health, development, and well-being for poor households” (Corburn and Hildebrand, 2015 and Umande Trust, 2007).

As the Kenyan Central Government bypasses residents of Kibera in municipal service delivery, residents are forced to rely on informal, non-sustainable, and unregulated solutions to meet their everyday needs. Residents of Kibera have no formal water connections and are completely cut off from any municipal water and sanitation infrastructure. To acquire the necessary water to survive, residents illegally tap government water lines using rubber hoses and pipes. While police presence in the settlement is minimal, random annual searches often result in arrests and the cutting of these illegal lines, leaving residents without any access to water for days at a time (Migiro and Mis, 2014). Various entrepreneurs and development programs in the area work to engineer water into large tanks, turning water into a commodity that can be sold by vendors for an often cost-prohibitive price of 20 shillings per 20 liters of water, placing a significant burden on the poor. A “mafia-like” system of water vendors operates in Kibera, in which vendors pay between $1000 and $3000 to lay down kilometers of pipes from main lines to the tap and then must ferry materials on foot through narrow alleyways to tanks (Migiro and Mis, 2014). Becoming a water vendor is a highly coveted form of work in Kibera, and the informal industry is fiercely protected and regulated by other vendors to reduce supply, thus increasing demand for their water. Along with contamination, poor water quality and sporadic and unreliable availability, residents of Kibera must also contend with these “water mafias” for access to the essential good. According to survey data and interviews with residents, water is the biggest household expense, especially as “most people earn less than the equivalent of $1.25 USD per day” (around 113 Kenyan Shillings), and “spend up to one third of this on water” (Migiro and Mis, 2014).

Without assistance from the government, residents of Kibera must create their own sanitation infrastructure. Informal sanitation facilities are often fabricated using large pieces of corrugated metal, built and maintained by residents under "owners" of these facilities who charge around 5 shillings per person per use. Other toilet facilities exist, including trench toilets, pit latrines, and ablution blocks, though trench toilets operate only during certain hours of the day when a water connection can be obtained, impeding users' ability to practice personal hygiene (Kim, et al., 2022). Further, 77.4% of people living in Kibera have limited Water Sanitation & Hygiene (WASH) facility accessibility and opportunity, and Kibera has the worst overall WASH accessibility and opportunity when compared to other informal Kenyan settlements examined in this study (Kim, et al., 2022). According to the researchers, the most significant study result is that of the consequential public health policy implications for Kibera's residents due to poor sanitation and water infrastructure. Additionally, the COVID-19 pandemic highlights the major underlying issue at hand; residents of informal settlements are disproportionately vulnerable to public health issues due to their inability to properly care for their health and personal hygiene in the absence of reliable, functional, safe, and clean water and sanitation facilities.

A Feminist Political Ecology Perspective of Sanitation Rights in Kibera:

These previously discussed risks are particularly evident for the population of women and girls living in Kibera. Inadequate, unsafe, and unhygienic urban sanitation disproportionately burdens women, resulting in compounding health, economic, and social impacts. The impacts of poor sanitation conditions on the social determinants of women's health include inhibited ability to seek privacy, social and cultural stigma that exists around menstruation and leads to indignity,

constrained bodily autonomy and economic and educational attainment, and exposure to unique health risks. The relationship between environmental sanitation and social determinants of women's health in informal settlements has been studied in a variety of countries, though it is increasingly important in Kenya as global burden of disease data identifies inadequate sanitation as the sixth leading cause of decreased life expectancy for Kenyan women aged 15-49 over the past two decades (Corburn and Hildebrand, 2015). For Kenyan girls under 5, inadequate sanitation conditions are the fourth leading cause of death (Corburn and Hildebrand, 2015). These statistics underline the "importance of sanitation in shaping health outcomes for women in Kenya," especially as an increasing concern in the past two decades that has significantly influenced "morbidity and mortality rates with particular significance for women and girls" (Corburn and Hildebrand, 2015). Women's health, dignity, and human rights must be considered when analyzing sanitation in Kibera, and in proposing solutions to sanitation-related issues in other parts of the world.

The health of women correlates with the health of entire communities. Women are tasked with the responsibility of child-rearing and play key roles in economic and community activities. Women and girls are often responsible for acquiring water for their households each day, as well as cooking, cleaning, washing clothes, caring for children, the elderly, and the sick. These tasks also make women particularly dependent on the "water mafias" with whom they must regularly interact and negotiate with for daily water supply to support their entire households (Migiro and Mis, 2014). Heavy reliance on unregulated water vendors in the absence of formal water connections forces women to pay unfair prices for water and makes them particularly susceptible to intimidation and threats from vendors, with no avenues to report these encounters (Migiro and Mis, 2014). Charities working to help women access cheaper water sources often find their water

connections cut or vandalized, and violence as a form of retaliation is common among water mafias (Migiro and Mis, 2014). There is also a significant physical burden on women that accompanies the collection of water, as water containers can be incredibly heavy, potentially impacting normal growth patterns of young girls due to pelvic deformities (Migiro and Mis, 2014). These pelvic deformities affect women during childbirth, causing birth complications and in some cases, birth defects in infants.

Other physical implications of poor sanitation for women exist and are important to consider. A study conducted by Corburn and Hildebrand surveyed women and girls in Nairobi's informal settlements. Women respondents self-reported physical complaints including "violence, respiratory illness/cough, diabetes, diarrhea, fever, malaria, typhoid, skin rash, HIV," and half of respondents reported that a child in their household had been "ill with one of five diseases (diarrhea, malaria, typhoid, skin infections, or respiratory tract infections) in the past six months" (Corburn and Hildebrand, 2015). Fecal contamination of water in urban informal settlements exacerbates many of these reported health complaints. Research by the African Population Health and Research Center found that 30% of women in Kibera reported at least one episode of diarrheal disease within the past month, and of the 19,500 reported annual deaths due to diarrheal disease, 90% were related to poor sanitation and 65% of deaths were of women and girls. The Centre for Microbiology Research in Nairobi found that 12-25% of women living in informal settlements have at least one intestinal parasite related to poor sanitation (Corburn and Hildebrand, 2015).

Among the responses to Corburn and Hildebrand's population survey, the most frequently reported complaint was violence, which is a key concern for women and girls in informal settlements who are vulnerable when using public toilet facilities that often lack proper

lighting and locks on doors. Most women must walk around 50 kilometers to the nearest toilet facility, and fear of rape, especially during the evening, may contribute to women drinking fewer fluids to limit trips to the toilet, thus contributing to higher rates of chronic constipation (Corburn and Hildebrand, 2015). Corburn and Hildebrand reference another study conducted in Kibera among female residents, which identified high rates of sexual violence compared with formal settlement communities. Thirty-six percent of women in this study reported being forced to engage in sexual acts of some capacity, compared with 14% of all Kenyan women (Swart, 2012, cited in Corburn and Hildebrand, 2015). Evidence from Swart's study suggests the majority of sexual violence in informal settlements occurs in the context of toilet facilities, bathing, and/or menstrual hygiene. In addition to the sexual violence that occurs in these settings, increased anxiety levels and a sense of powerlessness, hopelessness, marginalization, and stigmatization were reported by female residents in Kibera (Swart, 2012, cited in Corburn and Hildebrand, 2015). Survey data across multiple studies indicates that women feel "generally less safe than men" in informal settlements, and the relationship between feelings of insecurity and reduction of women's mobility results in restricted personal freedom and access to employment, health and education, as well as decreased participation in political and recreational activities (Corburn and Hildebrand, 2015). Without police presence and intervention, "gender-based violence goes unpunished," and this too "significantly contributes to making and keeping women vulnerable" (Corburn and Hildebrand, 2015).

Women in informal settlements also bear a significantly greater burden of managing HIV than men. This is explained, in part, by cultural norms allowing men to engage in monogamy and high rates of sex work among women in informal settlements, as well as biological and anatomical factors. Women in informal settlements in Nairobi have a "38% higher prevalence of

HIV than men" (Corburn and Hildebrand, 2015). Poor sanitary conditions are particularly dangerous for individuals living with HIV, as people with HIV/AIDS are susceptible to intestinal parasites causing poor nutrient absorption and malnutrition, as well as diarrheal diseases, and have increased risk to other infectious diseases and opportunistic infections, all of which can be lethal for people who are immunocompromised due to HIV (Corburn and Hildebrand, 2015). Diarrheal diseases also contribute to reduced effectiveness of antiretroviral treatment drugs given to people with HIV, which can speed the progression of HIV to AIDS (Corburn and Hildebrand, 2015). In addition to these health risks, residents of informal settlements with HIV require an "additional 20-80 liters of water daily and frequent access to secure sanitation facilities" (Corburn and Hildebrand, 2015).

Menstruation and the health needs of women during menstruation contribute to their vulnerability in informal settlements. Inadequate sanitation during menstruation is a "leading contributor to school absenteeism among girls," as most schools in informal settlements also lack sanitation facilities that provide safe, hygienic spaces for girls to manage their menstrual needs (Corburn and Hildebrand, 2015). Girls often miss school to avoid the "indignity of public bleeding, finding a private place to change a sanitary product, and ridicule by peers when forced to share toilets with their male classmates" (Freeman and Greene, 2012, cited in Corburn and Hildebrand, 2015). Women may have to miss work because of these same concerns, especially when their job is located in or near the informal settlement in which they live, thus limiting their opportunity to seek privacy during the workday. Missing school or work "exacerbates gender inequities and may contribute to greater health vulnerability" and poor outcomes for women later in life (Corburn and Hildebrand, 2015).

Economic burdens for women due to pay-per-use sanitation facilities are worsened during menstruation. Women must pay a small fee for each use of a public toilet facility, and menstruation may result in more trips to the bathroom to change and dispose of menstrual products. Inadequate sanitation leading to diarrheal disease also results in more frequent need to visit toilet facilities, thus representing a significant economic burden on people experiencing diarrheal diseases who must pay for increased use of toilet facilities. Women caring for sick family members also carry the financial burden of health care and medical costs, in the case of oral rehydration therapy or antibiotic drugs, for example (Corburn and Hildebrand, 2015). Decreased wages for women who are forced to miss work due to menstruation or to care for the sick significantly impacts their household monthly income. The Water and Sanitation Program of the World Bank estimate that inadequate sanitation costs Kenya $2.7 million annually from lost productivity due to sanitation-related illness and disease, and $51 million is spent annually on healthcare and treatment related to inadequate sanitation (Water and Sanitation Program, 2012, cited in Corburn and Hildebrand, 2015).

Policy Recommendations:

The global humanitarian community has increased its focus on menstrual hygiene management (MHM) in informal settlements (Sommer, 2012). Most obviously, a major contributor to increasing menstrual health, and health in general, is increased access to safe, clean, and private latrines in informal settlements. Governments are often apprehensive about installing the sewage and water systems necessary for connecting residents of informal communities to municipal water and sanitation services and cite resident's inability to pay for this installation as evidence against future infrastructure projects. In the absence of government

support and resources, scholars recommend solutions that may be more feasible, and are oriented at the community level for instigating change. Many sanitation facilities are owned and managed by the community, or by a "vendor" with the power to improve the facilities. Vendors could be financially incentivized by governments, development programs, or even non-governmental organizations, to add locks and lights to latrine facilities to reduce the likelihood of violence against women in these settings. Culturally appropriate sanitary materials could be subsidized by governments or other non-state actors and given to women and girls in informal settlements to reduce absenteeism due to menstruation, and proper, discrete containers should be added to sanitation facilities to allow women to dispose of their used menstrual products in a way that does not publicly "out" them and does not simply add to large piles of waste on streets and around homes. Potential solutions and recommendations for menstrual waste disposal are proposed in research conducted by Marni Sommer, who advocates for "socially and environmentally appropriate means of disposal of used sanitary napkins," potentially through burning or burying this waste (Sommer, 2012). These solutions would increase women's ability to discreetly dispose of waste entirely, but burning and burying used menstrual products still has effects on the environment. Sommer's analysis of additional research highlights recommendations for development programs to organize consultations with women in the community about their needs and suggestions and use these responses to guide future programs and projects. Women should also be included in conversations about community sanitation and water supply matters, giving them the space to advocate specifically for their needs in the community, and should be given decision-making power in these groups. As cited by Sommer, the UNHRC's Handbook for the Protection of Women and Girls proposes widespread distribution of separate basins for washing menstrual-related cloths and pads to minimize social

and cultural stigma regarding menstruation and menstrual materials (Sommer, 2012). This solution would allow women to semi-privately wash their menstrual products without fear of others, especially men, seeing.

Another key component of improving general sanitation in Kibera is community-wide education about water contamination, health risks, and menstrual health among women. Men have the majority of social and decision-making power in Kenya and are often blind to the specific health needs of women in their communities. Improving general health literacy among the population of Kibera may help people understand the risk of contaminated water supply, and programs that teach people about harm reduction practices such as boiling all water before use and handwashing after using toilet facilities may help decrease rates of diarrheal diseases. In schools, educating young men and women about menstruation and menstrual health may work to decrease social and cultural stigma surrounding menstruation, and would give girls the tools to better understand their bodies and health needs. Schools could also work to separate toilet facilities in some way, as well as provide discreet solutions for disposing of menstrual products to encourage girls to continue attending school during menstruation, which in turn, would give girls more autonomy and mobility later in life as they are able to obtain higher levels of education.

Community level solutions may have small impacts on improving sanitation and menstrual health in Kibera, but the sustainability and influence of these solutions is variable and questionable without government action. Even small improvements, both in recognition of the needs of informal settlement populations by the Kenyan government and funding for fixing poor sanitation conditions, would significantly decrease sanitation-related health issues for every person in Kibera, and would be especially beneficial for Kibera's women and girls.

Conclusion:

While various institutions within the Kenyan government recognize the right of all people to "accessible and adequate housing, and to reasonable standards of sanitation," (Constitution of Kenya, 2014) and maintain that "as a basic human right all Kenyans should enjoy a quality of life with dignity in hygienic and sanitary environments and be free from suffering any ill health caused by poor sanitation" (Kenya Ministry of Health, 2007), residents of the informal settlement of Kibera are refused access to the water and sanitation services provided to wealthier populations in Nairobi. This neglect by the Kenyan government significantly impacts the health of Kibera's residents, contributing to disproportionately higher burdens of chronic and infectious diseases, malnutrition, and death when compared with the population of Nairobi as a whole. Women and girls in Kibera are the most vulnerable to the impacts of poor sanitation infrastructure, and experience drastically higher rates of sexual violence, social and cultural stigma, indignity, and decreased educational attainment, all of which intersect to inhibit their life opportunity and generate poor overall health outcomes. Bridging the gap between municipal resources provided to residents of informal settlements and residents of wealthier communities is the most obvious solution to this problem, but a multitude of barriers including corruption and policy discrimination against the poor, combined with a general lack of prioritization of this population, has proved this solution to be highly unlikely. Development research proposes a few solutions to improve sanitation quality in informal settlements, mostly consisting of approaches targeting the community level. These solutions include small improvements to shared facilities, including lights and locking doors to ensure the safety of users, as well as education programs aimed at improving health literacy among young people, and the incorporation of women into

community decision-making spaces, though these solutions have limited capacity to produce change without financial and legislative support from the central government. This paper focuses on the components of Kibera's inadequate sanitation policy and infrastructure and the associated health implications on Kibera's population, though many of the findings of this paper relate to other informal settlements facing similar barriers to sanitation and menstrual health. Informal settlements around the world are denied access to municipal services, and the impacts on human health are relatively consistent among countries. Menstrual health is impacted by inadequate sanitation infrastructure in all informal settlements, and in some countries, instances of sexual violence and social and cultural stigmatization of menstruation may be even higher. The suggestions for improved sanitation conditions and related effects on menstrual health included in this paper can be applied to informal settlements around the world, as menstruation is a universally shared experience among women. Increased research, funding, and education about the effects of poor sanitation on the menstrual health of women will only work to improve the health of women globally, and should be considered of the utmost importance to the global public health community.

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