Enteric Infections in Kibera

Policy Brief

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Key Facts

HEALTH

Life Expectancy in Kibera is 30 years [4].

The Infant Mortality Rate (IMR) is 19%, driving the low life expectancy [4].

The leading cause of death and DALYs in children aged 5-14 are enteric infections, causing >1k DALYs per 100k [9].

Typhoid fever causes the most DALYs amongst children <5yo. Diarrheal diseases cause the greatest amongst children 5-14yo[9].

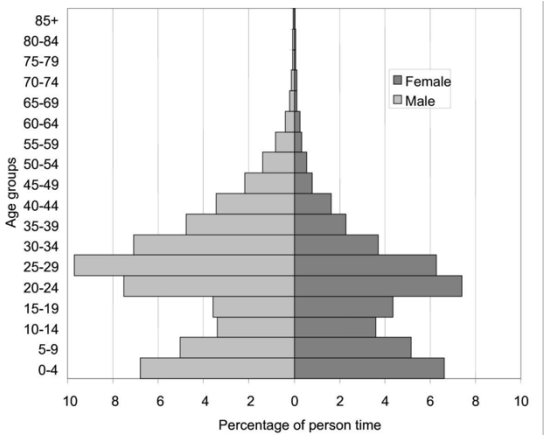
43% of people tested have some form of enteric infection[2].

ECONOMIC

Kibera is the largest, densest slum in Africa with over 250k people [3].

The average monthly income is $22 [4].

SOCIAL



Population Pyramid, Kibera [7]

Summary

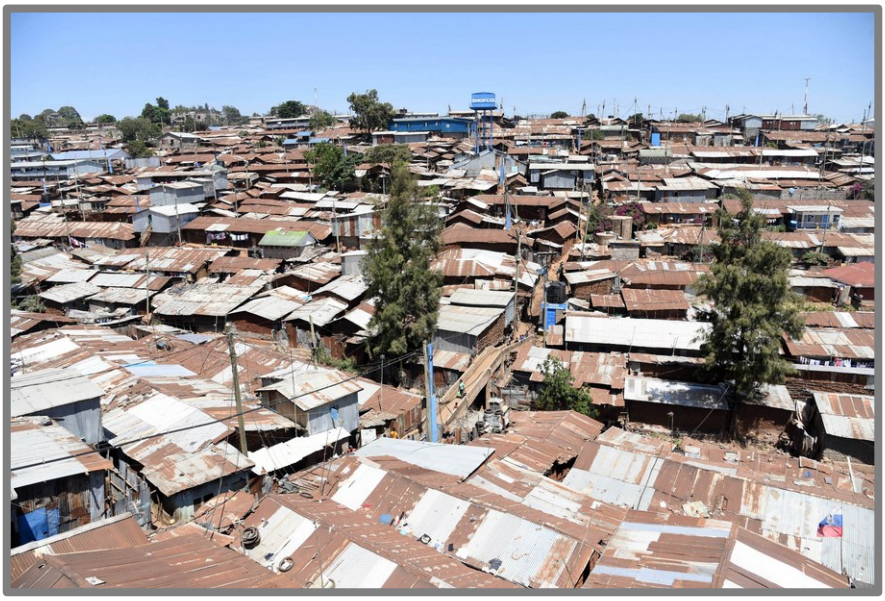
Kibera is one of the largest informal settlements in the world. Kibera is in the southern region of Nairobi, Kenya. Home to >250k people[1], the region is plagued with high rates of disease, poverty, and crime. The lack of formal infrastructure results in inadequate sanitation and limited access to clean water. The primary cause of DALYs among 5- to 14-year-olds are **enteric infections**, exacerbated by the lack of proper sanitation infrastructure. This policy brief focuses on 5- to 14-year-olds, while making references to the impact on other age groups.

Policy makers have an imperative to reduce the prevalence of enteric infections in Kibera.

World Data Lab, a World Bank subsidiary dedicated to data-informed policy, has an opportunity to explore systemic solutions to reducing child mortality amongst the most marginalized communities in Kenya. While the World Data Lab focuses on macroeconomic indicators, health of the community influences the practicality of economic growth.

Funders like the Bill and Melinda Gates Foundation should consider funding R&D for cheap sanitation options.

Findings from this policy brief can be applied to other slum dwellers in Nairobi, which make up 60% of the city population [3].

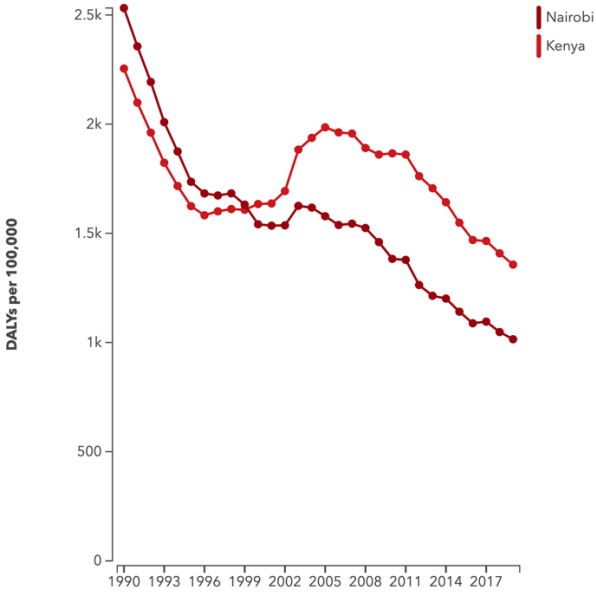


Kibera, 2023, UN-Habitat [8]

Establishing the Problem

Residents in Kibera have an average life expectancy of 30 years, largely driven by a high infant mortality rate where 19% of children die before their 5th birthday [4]. 40% of these deaths are diarrheal diseases [4]. Enteric Infections have been decreasing (reduced by 60% since 1990), but they remain the leading cause of death and DALYs for 5- to 14-yo. These enteric infections include (ordered by prevalence) typhoid fever, diarrheal diseases, salmonella, paratyphoid fever, and other infections [9].

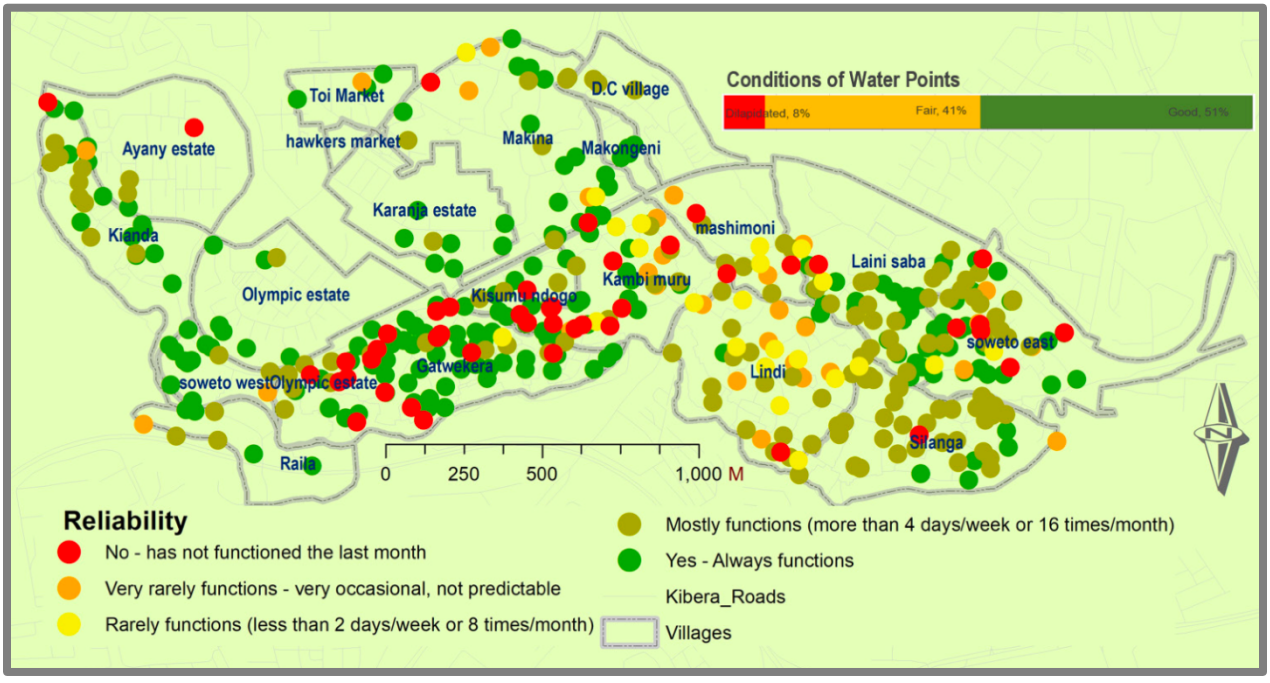
Causes of Death < 5yo [7]	YLL	% YLL	Rank
Pneumonia	3463	22.8	1
Diarrhoeal Diseases	2969	19.5	2
Stillbirths	2480	16.3	3
Malnutrition and Anaemia	1275	8.4	4



Enteric Infections, Both sex, 5-14 years [9]

Risk Factors

Population growth and lack of adequate water, sanitation, and hygiene (WASH) exacerbate the prevalence of enteric infections. Other risk factors such as economic conditions and density of living contribute.



Quality of Water Distribution Sites, Kibera, Nairobi [6]

Risk Factors

The **economic conditions** of the residents are dire. The average Kiberan resident is making 22 dollars a month[3]. Approximately 45% of Kiberan residents are unemployed [3]. Most Kiberans have some form of informal, irregular employment.

The **density** of Kibera is very high. The settlements of Kibera are at a higher risk of infectious disease spread because of the population density. The average home measures 12ft by 12ft and fits more than 8 people. The population density is 80 times greater than the city of London [4]. In addition to residential homes, the community is brimming with businesses, communal open areas, and places of worship.

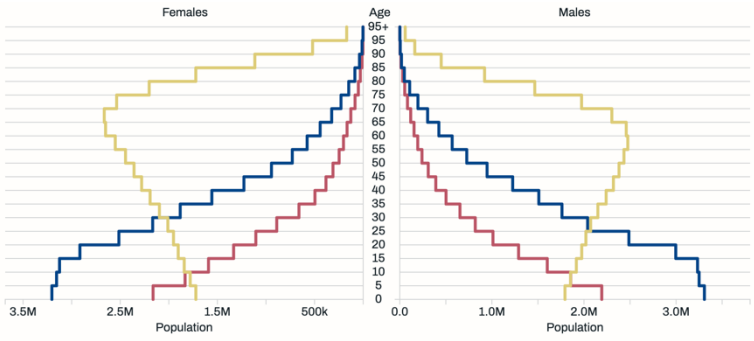
The **sanitation infrastructure** is drastically lacking. Many of the public toilets charge for usage, which often is not an option for Kiberan residents. The drop toilets require more maintenance and upkeep than is often provided. They were often overflowing. In combination with illegally and poorly constructed water tapped pipes, enteric infectious diseases area able to spread more easily. Food handlers are notoriously undertrained for food safety procedures. Out of 283 respondents in an informal settlement in Nairobi, Kenya, 12% reported passing some form of food safety training[2].

Clean water Infrastructure is several lacking. 49% distribution points don't reliably function and 8% are completely unusable [6]. Most are concentrated in dense areas, but some areas have no access to a water point, especially the poorer areas (such as Ayany).

Context

Kenya is early in its demographic transition. The population is at 50.2M, 71% of which live in informal settlements [10,3]. The population doubled between 1990 and 2017 [10]. The fertility rate is 3.0.

HIV/AIDS is the overall leading cause of death. The largest risk factors are malnutrition, unsafe sex, and WaSH.



IHME Population Pyramid, Kenya

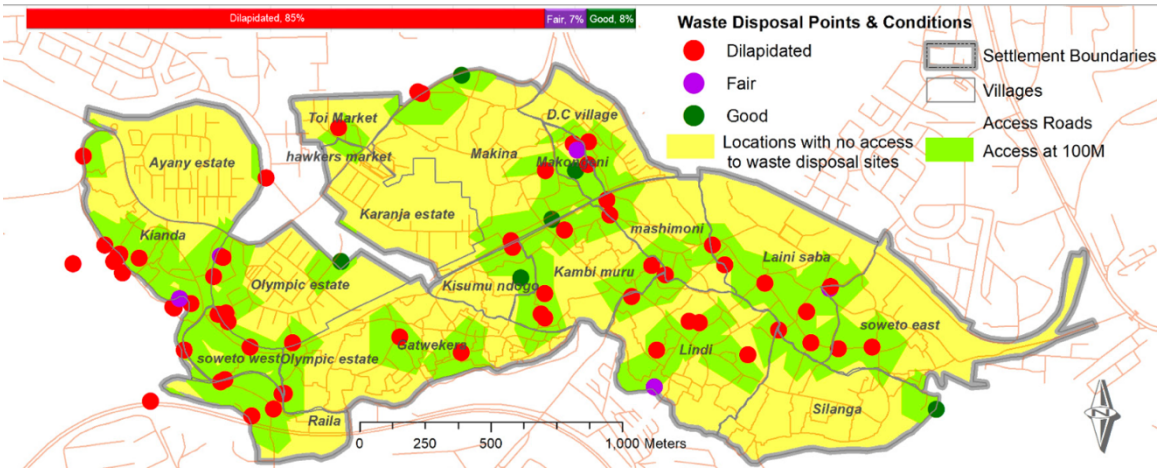
Health Infrastructure

The health infrastructure in Kenya covers most of the medical costs for registered people. Development assistance covers approximately 18% of healthcare costs.

However, many residents in Kibera don't have access to this health infrastructure [10]. The health system capacity in Kibera is primarily run by philanthropic agencies, non-profits, or international governmental organizations.

Tackling the Problem

Waste Disposal Points, Kibera, Nairobi [6]



Several Health Sector and Non-Health Sector Responses have had mixed results.

1. **Telehealth Clinics**: In 2014, UN-Habitat introduced teleheathcare medical clinic in Kibera[5]. The center provided services to over 70,000 people. An average of 500 people received free medical check-ups per day. These services included physiotherapy for the disabled, family planning, music therapy, cancer screening and vaccinations, and general consultations. The effort required funding from multiple sources, including UN, BASF, and donations from CISCO and Orange Telkom, proving to be unscalable.
2. GEMS (Global Enteric Multicenter Study) intervened in 2014 to offer rotavirus vaccines and found that a follow-up visit after initial treatment could dramatically improve health outcomes. The project was funded by the Bill and Melinda Gates Foundation. The project identified the top diarrhea-causing pathogens and found that follow-up visits were key to reducing diarrheal rates.
3. KEMRI/CDC (2013) found that household ceramic water filters helped remove Cryptosporidium from drinking water, which was a parasite not eliminated by traditional chlorine treatment.

Recommendations

While health sector responses can prove to be helpful, they often rely on unsustainable sources of funding. Establishing sanitation infrastructure requires upfront higher costs but could reduce enteric infection prevalence for more people in the long run. I recommend a WaSH approach.

Introduce more solid waste toilets or sewage infrastructure. The solid waste management sites are seriously lacking in the region. The vast majority (85%) are dilapidated or unusable. There are only 6 usable solid waste management sites that are in good quality in the entire area. Reducing the solid waste in public is key to reducing the spread of enteric infections in Kibera.

Establish more clean water distribution sites: Water distribution sites are not evenly distributed across the region. Poorer neighborhoods have less access to clean water. Establishing more formal water distribution sites here would reduce the need to illegally tap, which introduce contamination risks. Maintenance is difficult and would require continuing costs. The solution can be measured with an RCT before and after the establishment of these new water sites on enteric infections, as well as measuring water usage.

References

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