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Stocking Cholera Prevention Measures among Health Providers and Communities at Kakuma Refugee Camp, Turkana County, Kenya: A Desk Review

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Abstract

Adequate sanitation, good hygiene, and safe water are fundamental to good health and socio-economic development. There is a close relationship between economic empowerment, livelihood factors and societal hygiene. World Health Organization (WHO) reported that each year there are 1.3 to 4.0 million cases of cholera, with deaths between 21000 to 143000. Cholera transmission is closely linked to inadequate access to clean water and sanitation facilities. Typical at-risk areas include peri-urban slums and camps for displaced persons or refugees. In April 2000, a large outbreak of cholera due to Vibrio cholera serotype Ogawa affected the Island of Pohnpei in the Federated States of Micronesia. In Malawi, there were many cholera deaths among refugees, with a case fatality rate of 3.5%, 68% of which mostly occurred within 24 hours of hospital admission. About 10% of the Kenyan population (4.89 million) is living in the 30-combination high-priority sub-counties according to Kenya's new 2022-2030 Cholera Elimination Plan. In 2005, cholera outbreak struck within the Kakuma refugee camp in Kenya; 418 people were treated, and 4 persons died. In this Desk Review Paper, we have explored the presentation in the following sub-themes: Introduction, where we talked about sanitation and matters of Migration and Health from the global scale down to Turkana County, Kenya where Kakuma Refugee Camp is located; the influence of health education among migrants and the local communities on cholera prevention and control; the status of sanitation facilities and their use in cholera prevention and control; how the respective health systems are prepared in terms of human resource on cholera prevention and control including tackling emergencies on displaced populations; existing policies and laws governing the socio-economic space of migrants and host communities in Africa and the

world. We discovered the need for health stakeholders to respond and strive to achieve Sustainable Development Goals (SDGs) No. 1, 3, 6, 10 and WHO Triple Billion Targets and, in particular, prevent fecal-oral diseases among forced populations.

Keywords

Cholera, Refugees, Sanitation and Hygiene, Limited Resources

1. Introduction

Globally, an estimated 2.5 billion people lack access to improved sanitation. Unimproved sanitation increases the risk of morbidity and mortality, especially in protracted refugee situations where sanitation is based on pit latrine use [1]. Safe drinking water and preventing human contact with feces are basic services that all people need for their survival and livelihoods. However, providing them can be an enormous challenge especially in cities, and in the face of climate change, conflict, and the rise of a middle class with more and new needs and expectations. Large and unexpected influxes of migrants and refugees pose yet another constraint to local service providers. But they also provide opportunities to improve services, for example, as migrants bring in new skills and coping mechanisms that can be scaled up or as governments, businesses and other actors experiment with alternative models for the delivery of water, sanitation and hygiene (WASH) services [2]-[4].

Sanitation refers to public health conditions related to clean drinking water and treatment and disposal of human excreta and sewage. Preventing human contact with feces is part of sanitation, as is hand washing with soap.

The meaning of public health as defined by Winslow as "The science and art of preventing disease, prolonging life and promoting physical health and efficiency through organized community for the sanitation of the environment, the control of community infections, the education of the individual in principles of personal hygiene, the organization of medical and nursing services for the early diagnosis and preventive treatment of diseases and the development of social machinery which will ensure every individual in the community, a standard of living adequate for maintenance of health".

Other studies show that the millennial outbreak of cholera in Africa surpassed endemic countries in South Asia including Bengal—which had been long identified as the home of cholera. This was evidenced by a report from the United Nations Environmental Programme [5] that said that Africa has not met her Millennium Development Goals (MDGs) target of half of her population getting access to safe drinking water, a goal which could only be realized 40 years later. The report further states that only 68% of the South African population had access to safe water sources compared to approximately 90% from four Asian regions and

95% recorded in Latin America. African vulnerability to diseases was also discovered by [6] and others in 2007, who said that Sub-Saharan Africa accounts for more than 90% of the total global cholera cases since 2001 despite having only 12% of the world population. [7] defines a migrant as: any person who is moving or has moved across an international border or within a state away from his/her habitual place of residence, regardless of the person's legal status, whether the movement is voluntary or involuntary, what the causes for the movement are and what the length of the stay is. The International Organization on Migration concerns itself with migrants and migration related issues and, in agreement with relevant states or countries/counties with migrants who are in need of international migration services. Studies also conclude that there is a close relationship between economic empowerment, livelihood factors and societal hygiene [8]-[10].

While defining the two types of migration as internal and international, it was added that there are push and pull factors influencing migration [11]. Pull factors refer to environments or conditions that encourage voluntary migration, like mobility for studies and employment, while push factors account for involuntary migration, like fleeing one's country or county due to floods, political upheavals, etcetera.

There was a question about whether the health of undocumented and uninsured immigrants is covered by the respective laws. Resolution No. 64/292 (2010) of the United Nations General Assembly recognizes human rights in all aspects, including access to water and sanitation. This was also extended in the Sustainable Development Goals (SDGs) No. 6 which requires countries to achieve universal and equitable access to safe and affordable drinking water in adequate quantities including equitable sanitation and hygiene, by the year 2030. These goals have been and are still being followed by the Kenyan Government, which repealed [12] in line with [13].

Secondly, the World Health Organization (WHO) Health and Migration Programme (PHM) works with countries to promote the human right to health and access to quality, culturally appropriate health services with adequate social and financial protection. One partner in the team is the Organization for Economic Cooperation and Development (OECD). OECD is an international organization that works to build better policies for better lives. Her goal is to shape policies that foster prosperity, equality, opportunity and well-being for all. According to the World Organization, cholera in Africa was associated with high fatality rates, thereby necessitating the need for cholera surveillance and awareness all over Africa [14]-[16].

Kenya hosts over 500,000 refugees drawn from countries in the Great Lakes Region, the East and Horn of Africa Region and even the Middle Eastern Region. Having been a safe asylum heaven, refugees have lived in Kenya for decades. A legal and policy framework that guides state and non-state actors and empowers refugees to live as other humans is imperative. Concerning policies and legislation on immigration and emigration, Kenya has made tremendous strides over the years. On

16th May 1966 and 13th November 1981, Kenya signed the 1951 UN Convention and its 1967 Protocol respectively. Later, on 23rd June 1992, Kenya ratified the 1969 OAU Convention on Refugees. To actualize international law, she had to adapt it to her local settings. It was only in 2006 that Refugee Act [14] was enacted. The Act, however, had some limitations. It was not compatible with the Constitution of Kenya 2010 and that of SDG Nos. 1, 3, 6 & 10 and the WHO triple billion targets of Universal Health Coverage (UHC), Health emergencies and promoting healthy populations. However, the Act provided special protection for refugee children born in Kenya. It also legislated the encampment policy of the Kenya Government. For about ten years, refugee protection organizations have advocated for a review of the Refugees Act 2006. It was only in November 2021 that the President of Kenya assented to the Refugees Bill 2019 [14].

In economic terms, Kenya loses an estimated KES 27 billion (USD million) annually which is about one percent of the national GDP, due to poor sanitation in terms of open defecation costs. Kenya spends US$ 88 million per year—yet eliminating the practice would require less than 1.2 million latrines to be built. At over 17 USD per person each year, open defecation is the most costly, unimproved sanitation practice [17].

2. Management of Refugees

The United Nations High Commission for Refugees (UNHCR), the UN Refugee Agency, is a Global organization dedicated to saving lives, protecting rights and building a better future for people forced to flee their homes because of conflict and persecution. The UNHCR works closely with the Department of Refugee Services (DRS), the County Government of Turkana, the National Police Service as well as more than 40 implementing and operational partners, sister UN agencies including development and private actors to provide protection and assistance to refugees, asylum-seekers and the host community. There are also about 60 refugees and community led organizations offering support. Kakuma is the Swahili word for "nowhere." But for the more than 160,000 refugees and asylum seekers who live in the Kakuma Refugee Camp in north-western Kenya, it is their only home. Established in 1992, the Kakuma camp was originally built to provide shelter to "the Lost Boys of Sudan" with humanitarian aid [18].

3. Some Kenya Immigrants Statistics

Report from [19] Kenya Chapter shows that there was a total of 577,492 refugees and Asylum-seekers in Kenya distributed in three sites namely: Dadaab 233,828 (41%); Kakuma 252,066 (43%) and Urban areas 91598 (16%). As can be seen, 88% of the immigrants live in camps and only 16% live in Urban areas. On demographics, the report indicates that 51% were males and 49% were females distributed in the following age-cohorts: 0 - 17 yrs, 50%; 18 - 59 yrs, 47% and only 3% were the elderly 60 yrs and above. These statistics depict a growing and expanding community with 50% of children below 17 years. On a wider scale, even

though all of us are potential candidates for migration, whether voluntary or involuntary, the case of forced populations must be critically addressed. On the other side of the coin, the so-called "pull factors" that determine voluntary migration include trade, employment, social, and education, among others. Mount Kenya University has, to date, hosted approximately 3493 international students drawn from over 32 countries of the world [20].

4. Overview

In this Desk Review Paper, we have explored the presentation in the following sub-themes: Introduction, where we talked about sanitation and matters of Migration and Health from the global scale down to Turkana County, Kenya, where Kakuma Refugee Camp is located.

Most of the discussions in the reviewed literature border on the following research questions:

What is the influence of health education among migrants and the local communities on cholera prevention and control? What is the status of sanitation facilities and their use in cholera prevention and control [21]? How are the health systems prepared in terms of human resources for cholera prevention and control? What policies and laws govern the socio-economic space of migrants and host communities in Africa and the world? And what opportunities, strengths, and weaknesses lie among the immigrants and the host communities that are in line with economic development and disease prevention.

5. The Concept of Migration Health

The migration process can be regarded as a social determinant of Health. A lot of progress has been made in studying and documenting health conditions across the globe and in Africa. However, there still remains a disproportionate burden of disease in sub-Saharan Africa. [22] explains the interrelationship between health conditions of migrants and their socio-economic factors. The author borrows [23] *Sindemic model* of tripartite (intertwined circles), showing how socio-economic factors of an individual migrant are acerbated either positively or negatively by a number of health conditions met *before*, *during* and *after* the migration **Figure 1**. The figure summarizes the trio as: Health Condition A, Health Condition B and the socio-economic factors.

The analogy is supported by a quote from [24] who said that "Epidemics do not just happen. They are not random events. They have histories". Lack of employment for unmarried youth and hence inability to earn cash to meet basic needs prompts one to process travel documents abroad or board a bus to an urban center (Health condition A). Salary, health at workplace and or living conditions (Health Condition B) will influence socio-economic factors of the individual migrant. On the other hand, political upheavals, such as floods, droughts, or hurricanes (Health Condition A), may prompt an individual or group or family to move. Health Condition B may start manifesting along the journey in the form of a need

for food and shelter, cold or high temperatures, overcrowding, and eventually acceptance (or lack of it) in the host countries. The outcome of health condition B could be separation from loved ones, happiness, disease or death. All these influence socio-economic factors positively or negatively.

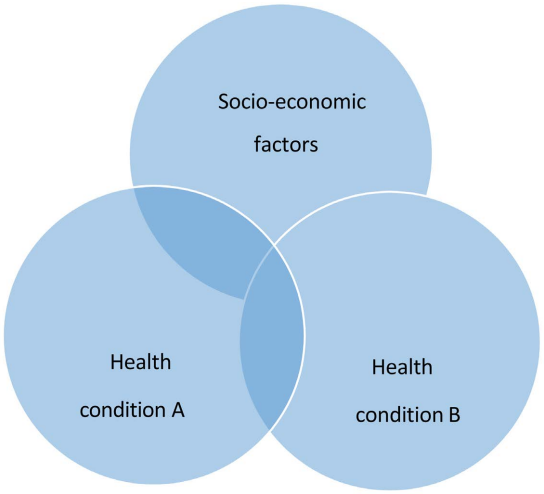

Figure 1. Sindel model (Merrill Singer, 2009).

The author explores the reasons behind the imbalance and also offers alternative frameworks for understanding the prevalence of epidemics in Africa adding that "epidemics do not occur in a context-free vacuum". [25], the same book also supports the argument by describing how diseases often interact with one another and are exacerbated by the social, economic, environmental, and political situations of affected populations (**Figure 1**). The syndemic model challenges conventional thinking and medical understanding in the push for a more multifaceted approach that acknowledges the context of illness on the continent. Further, the authors argue that the syndemic view will assist in the development of inclusive public health policies that are likely to trigger probabilities of effective interventions.

In the same vein, Africa's vulnerability to disease was highlighted by [26]-[28] who agreed that the factors of disease epidemics are a function of historical, political, environmental and economic forces. The authors concluded that efforts to counter outbreaks of disease and epidemics in Sub-Saharan Africa needed to be expanded beyond the biomedical approach. They pointed out specific moves that fuel vulnerability to diseases as historical interventions such as exclusionary urbanization like forcing certain populations out of their homes and displacing them into areas where they are vulnerable to disease which is commonly created by the state through poor governance and/or by the private sector in its quest for accumulation and industrialization.

6. Sanitation

Sanitation refers to public health conditions related to clean drinking water and treatment and disposal of human excreta and sewage. One practice is hand wash-

ing with soap [3] [4] [29]. Attention to the health of migrants is timely as the whole world advances universal health coverage (UHC) and the Sustainable Development Goals (SDGs) [30]. Reports from [31] indicate that cholera in Africa was associated with high fatality rates, thereby necessitating the need for cholera surveillance and awareness in the entire region.

In comparison with the global upsurge of cholera cases, Kenya recorded its highest cases between 2005 and 2009 [31]. The second influx happened in 2011, when about 130,000 refugees fleeing drought and famine in Somalia arrived. Kakuma Refugee Camp is currently home to over 200,000 refugees who are mainly from Sudan and Somalia. However, these figures might be even seriously underestimated because of under-reporting, lack of surveillance and inconsistencies in case definition [31]-[33].

Sanitation is critical for human health in densely populated areas, and yet is often absent from Urban planning and investment, especially in developing countries. Rapid urbanization is putting pressure on inadequate, existing sanitation systems. Improving sanitation in cities is even more urgent in the face of acute migration—the sudden arrival of refugees and internally displaced people to a city [2]. Adequate sanitation, together with good hygiene and safe water, are fundamental to good health and socio-economic development. Cholera transmission is closely linked to inadequate access to clean water and sanitation facilities [3] [4] [34].

The [35] presented at CAREED Conference of 2021, indicate a wide coverage of latrines and water taps throughout Kakuma Camp and Kalobeyei Settlement, however, latrine and water tap data were not available for Kakuma Town or Kalobeyei Town. The same report says that 77% of refugees in Kakuma and Kalobeyei had latrines in proximity to their shelters and 89% had access to household latrines, as opposed to communal latrines. Despite this, open defecation was still a significant problem, with the same report indicating that 7.3% of refugees still practised open defecation despite having toilets within their compounds. This call for health education and health promotion strategies like enhancement of Community-Led Total Sanitation (CLTS) in the affected region or other hygiene approaches like Participatory Hygiene and Sanitation Transformation (PHAST). CLTS is an integrated approach to achieving and sustaining open defecation free (ODF) status. The approach entails provision of information through observation and participation in an assembly of villagers led by an external facilitator. The villagers analyse their sanitation profile, their practices of defecation and the consequences of using bush, thereby culminating in a reaction of disgust, which eventually leads to collective action to become ODF. Participatory hygiene and sanitation transformation is an educational package to promote sanitation and hygiene among target groups who are expected to cascade the knowledge within their respective families, households and communities [36]-[40].

7. Involuntary and Voluntary Migration

Migrants are heterogeneous and migration patterns and pathways are varied and

complex; therefore, a lifecycle approach and epigenetics at the individual level must be considered. Forced displacement has become one of the most significant challenges confronting the world. According to the latest statistics [19], the size of the refugee population across the globe was a record 25.9 million at the end of 2018 [41]. In addition to the staggering number of refugees, the duration of their exile has also been prolonged. A larger proportion in the Global South remained in protracted displacement long after the initial emergency phase of a crisis had ended. The average time period is now estimated to be more than two decades [42]. However, as displacement becomes more protracted and an urban phenomenon, stakeholders and researchers need to gain a more critical mass to shift focus, funding and institutional commitment to address today's urban displacement problems.

There has been a mass exodus of Africans who have been successful in applying for Green Cards to live with their families in the United States and other countries. Labor movements take a larger portion of the bargain where, especially Saudi Arabia hosts a larger portion of African nationals as domestic workers. While few cases of domestic workers enjoy their stay in the host countries, the majority of them experience mistreatment by their employers to the extent of some of them returning back to their host countries disillusioned or in coffins.

Understanding the social dynamics that lead to cholera risk can inform control strategies, leading to better strategies and the possibility of eliminating cholera from any affected community or location. Several studies have been done connecting disease demographics, knowledge, socio-economic status, and access to adequate water, sanitation, and hygiene (WASH) infrastructure [2]. That study concluded that Urban/rural geography and socio-economic status play a larger role in cholera risk factor prevalence than nationality, indicating that cholera outbreaks reported among vulnerable communities worldwide are confounded by contextual factors. The following studies [34] [43] [44] submit that populations in informal settlements with inadequate water supply and improper sanitation infrastructure are at risk of epidemics such as cholera. However, regular operational research is required to highlight the ideal situations on the ground. Another study done by [45] to determine the disparities in vaccine preventable disease (VPD) burden and immunization coverage between migrants and refugees and their host populations has been described in numerous countries worldwide. The study also concluded that effective strategies are required to reduce the health disparities and immunization inequities experienced by migrants and refugees. This is in line with International Health Regulations (IHR) of providing cholera vaccination and other notifiable diseases to international travelers. The emigration of healthcare workers from resource-constrained countries is a double burden due to regional disparities.

8. The Dinka Study

Refugee populations are often culturally and ethnically diverse. Concerning pro-

vision and use of sanitation facilities by communities and health providers, [1] did a study on Dinka and Somali residents. Twelve pre-implementation focus group discussions (FGDs) were conducted with Dinka and Somali residents to understand sanitation practices, perceptions, and needs. Focus Group Discussions (FGDs) and a supplementary pre-other implementation survey informed the development of an innovative sanitation management system that incorporated the provision of urine and liquid diverting toilets, which separate urine and fecal waste, and a service based sanitation system that included weekly waste collection. This study used qualitative and quantitative methods to design, implement, and pilot a novel sanitation system in Kakuma refugee camp in Kenya. Those who did the experiments for the new sanitation system reported high levels of user satisfaction. Reported benefits included odor reduction, insect/pest reduction, sitting design, appropriateness for special populations, and waste collection. However, urine and liquid diversion presented a challenge for users who perform anal washing and for women who have experienced female genital mutilation. Using residents' input to inform the development of sanitation solutions can increase user acceptability and provide opportunities to improve sanitation system designs based on specific needs. This study emphasized socio-cultural determinants more; however, it did not cover disease risks, especially cholera and other gastrointestinal tract infections. Nevertheless, the practice resonates well with current market economies where both urine and feces waste products still undergo recycling [37].

On the page of socio-economic activities of refugees and host countries, [8] wrote on comparative analysis to offer an overview of the diverse economic activities employed by refugees in both the camp and urban setting in Kenya—highlighting a number of institutional factors that distinguish the economic lives of refugees from those of members of the host population. Some of the livelihood issues addressed are not applicable exclusively to refugees, but affect their economic lives. The empirical findings suggest that while some Kenyans are encumbered by challenges comparable to those facing refugees, the myriad political, legal, and policy-related factors that are popular with refugee life are nonetheless particular in their impacts on livelihoods. There is a close relationship between economic empowerment, livelihood factors and societal hygiene [46].

9. Demographic, Environmental, and Migration-Related Factors

A study conducted by [37] [47] [48] found that the intertwining of environmental factors and migration related factors have significant effects on population health, including infectious disease. This predominantly leads to the amplification and alteration of migration pathways, thereby changing the ecology and transmission dynamics of infectious diseases [47]. This study argued that climate change and other environmental factors at interplay with drivers for migration likely contribute to the changing profiles of infectious disease [49] [50].

A study was conducted to examine the factors associated with cholera in Kenya

based on cross-district analysis of cholera occurrence. These results revealed that cholera was associated with open defecation, use of unimproved water sources, poverty headcount, and the number of health facilities. This study also revealed an inverse relationship between cholera and improved water sources, suggesting that improved water sources reduce the risk of cholera. These findings are similar to a study conducted by [51] that found no significant relationship between cholera and access to piped water. This, therefore, means that access to piped water does not necessarily guarantee a clean water supply. Moreover, the results of this study suggested that cholera is highly associated with poverty. Other studies have referred to cholera as the "disease of the poor". Historically, rural areas tend to be less developed in terms of healthcare systems and social amenities. This increases the risk of cholera and the effects of disease burden [52] [53].

In a study to understand the interaction between climatic, environmental and demographic factors of cholera outbreak in Kenya, [54] found that bordering a large waterbody, lack of health facilities, and rainfall seasons were associated with increased cholera cases in Kenya. The most commonly cited risk factors for cholera outbreaks worldwide were water source contamination, rainfall and flooding, and refugee settings, mainly in the context of complex emergency situations. The most often mentioned issues in this study of East Africa were water source contamination and refugee settings [55]. The occurrence of cholera is strongly affected by climatic factors such as rainfall, sea surface and water temperatures, and El Niño Southern Oscillation events. The El Niño years have been strongly linked to cholera epidemics in East Africa, which were made worse by the region's low socio-economic position, shoddy healthcare systems, lake water for drinking, and unsanitary infrastructure. Studies have shown that cholera cases are more common in tiny, rural communities with high rates of poverty, low levels of urbanization, and poor sanitation than in highly urbanized, densely inhabited places near water bodies. Both groups had low levels of education, and environmental factors especially the availability of water and how human waste is disposed of "have a big impact on cholera outbreaks". Moreover, this study offered comprehensive evidence of cholera and rainfall. It's interesting to note that seasonal variations affected the direction of these connections. Areas with more rainfall between October and December had a higher risk of cholera, whereas areas with higher rainfall between April and June had a lower risk. The long rainy season, which runs from late March to May, and the short rainy season, which runs from October to December, are the two time periods that correlate to the two rainy seasons in Kenya. These findings are in line with earlier research that showed cholera outbreaks were both more likely and less likely to occur as rainfall rose over the different rainy seasons. This study speculates that an inadequate amount of precipitation throughout the protracted rainy season could lead to an inadequate reduction in the salt of the water supply, hence creating ideal conditions for the copepod population to thrive and contributing to a rise in cholera cases. On the other hand, excessive precipitation during the brief rainy season can cause protracted flood-

ing, which concentrates people in dry areas and erodes sanitary conditions, increasing the risk of cholera spreading along the more direct fecal-oral route. The authors recommended the need for future research by saying the qualities of water bodies linked to physio-chemical and biological characteristics are important due to the ecological nature of the environments.

10. The Immigrant Factor in Cholera Morbidity

Cross-border cholera outbreaks are a major public health problem in Sub-Saharan Africa, contributing to the high annual reported cholera cases and deaths. According to [56], the Democratic Republic of Congo and the Republic of Mozambique are among the countries with the highest cholera burden in the African region. This study confirms the ability of cholera to spread among neighboring communities. According to the weekly surveillance reports provided by [56] in their research, they revealed that a total of 603 cholera cases with 5 deaths were recorded in the Malawi and Uganda border during cross-border cholera outbreaks involving the communities along common borders of Malawi-Mozambique-Uganda, and DRC. This clearly shows how other populations can be vulnerable to contracting cholera based on the migration factor. According to [56], the possibility of acquiring cholera is always eminent when one interacts with a cholera patient or a contaminated environment. This study concluded that cross-border outbreak of cholera contributes to the high annual reported cholera burden yet the immigration factor is barely considered, with the immigrants marginalized and poorly identified by cholera actors. Since the population of the study area (Kakuma Refugee camp) consists mainly of immigrants from Somalia and Sudan, which are considered part of sub-Saharan Africa, there is a high risk of disease cholera transmission. One major weakness of this study was that the data analysis relied on the accuracy of the epidemiological reports; therefore, this meant that misclassification and misreporting could not be fully detected.

Another study conducted by [57] using a meta-populational model to describe the spread of cholera between communities by migratory movement discovered that immigrants can significantly impact cholera morbidity through several mechanisms related to transmission dynamics. A significant way is introduction of disease characterized by immigrants moving from cholera-endemic regions to areas with poor health infrastructure which can fuel the transmission of cholera bacteria to non-infected areas. This introduction is often facilitated by cross-border movements where health monitoring may be inadequate. Additionally, a higher magnitude of outbreaks can occur in overcrowded and poorly managed settings where many immigrants settle [57]. Refugee camps, urban slums, and informal settlements often have high population densities, which facilitates the rapid spread of cholera. These areas typically suffer from inadequate sanitation, limited access to clean water, and poor hygiene practices, all of which are critical factors in cholera transmission. Moreover, immigrants may face significant barriers to healthcare access, including language barriers, lack of documentation, and fear of deporta-

tion, leading to delayed diagnosis and treatment.

11. Assessment of Status of Health Systems in the Provision and Use of Sanitation Facilities

Cholera, a waterborne disease caused by Vibrio cholerae, poses significant public health challenges, especially in displaced populations living in camps. Assessing the health system and environmental factors in these settings is crucial for effective cholera prevention. The availability and accessibility of healthcare services in camps are often limited, which impedes cholera prevention and control. Primary healthcare services, including disease surveillance, diagnosis, treatment, and vaccination programs, are frequently inadequate in these settings [58]. According to [59], continuous disease surveillance is essential for early detection and control of cholera, thereby emphasizing the importance of establishing strong surveillance systems in camps to monitor and report cholera cases. [60], records that cholera outbreaks can only be confirmed when specimens from suspected cases test positive by culture or PCR at the reference laboratory.

Additionally, efficient data collection and management systems are crucial for tracking cholera outbreaks and informing public health intervention. [61] [62], health education programs and initiating technology-based solutions are crucial pointers to the status of health and the ability of the health system to handle the prevention and treatment of infectious diseases. Therefore, refugee settings and overcrowded places are generally identified with poor healthcare access and infrastructure, thereby contributing to poor status of health. This confirms that health status is a significant indicator and risk for disease. In general, assessing the status of health in camps is essential for cholera surveillance and prevention. Key areas include enhancing healthcare access, promoting healthcare education, and ensuring adequate wash facilities. These studies conclude that areas with strong health systems reduce cholera risks by improving surveillance and management of cholera cases [63].

Safe water is water which is free from disease-causing agents and does not have any significant risk to health over a lifetime of consumption. The term potable water is also sometimes used; potable means safe to drink. A related but different term is palatable water, which means water that is pleasant to drink. Palatable water is at a desirable temperature, completely transparent and free from tastes, odors and colors, but is not necessarily free from disease-causing agents. Safe drinking water is suitable for all usual domestic purposes, including personal hygiene.

Access to safe and affordable water is considered as a basic human right (https://www.ohchr.org/en/special-procedures/sr-water-and-sanitation/international-standards accessed 06272024). The Water Poverty Index (WPI), which comprises five components (resources, access, use, capacity, and environment), is used as a tool for monitoring and comparing water sectors between countries. Out of the five components, access to safe water has been the most representative wa-

ter-related indicator in the WPI. However, since there is no standard definition of access to safe water, the validity and reliability of the index are questionable.

12. Integrated Disease Surveillance and Response (IDSR)

Disease surveillance is crucial for assessing the prevalence of diseases in any environment, tracking variations in rates of morbidity and mortality, promptly identifying outbreaks, and developing, executing, and overseeing appropriate responses to them. Good leadership in disease surveillance and response supports governments in mitigating the indicator gaps in the sustainable development goals (SDGs). According to [64], most countries rely on the hospital-based surveillance of diarrheal disease to compute the burden of cholera. In 1998, nations within the WHO-Africa area implemented the Integrated Disease Surveillance and Response (IDSR) approach with the aim of improving surveillance for critical public health illnesses, ailments, and incidents, such as cholera. Every national IDSR plan is built around the administrative capabilities, disease priorities, and procedures unique to that country [64]. Kenya conducts national cholera surveillance as a component of its integrated disease surveillance and response (IDSR) strategy. In 1998, the African Regional Office of the World Health Organization implemented the IDSR strategy and has continued to review it over the years. This strategy aims to enhance the ability to monitor and control various diseases, particularly those that are communicable and prone to epidemics. It achieves this by improving surveillance, confirming diagnoses through laboratory testing, and implementing timely and appropriate public health interventions [65] and [66]. During the initial stages of IDSR implementation in Kenya, the process of gathering surveillance data was not yet well-established. However, a lot has improved in the implementation of IDSR for example: the ability to gather, organize, and analyse data has been enhanced, and there has been a gradual improvement in adherence to and promptness of reporting [67]. In summary, the key drivers to cholera outbreaks are: displaced people due to conflicts, overcrowding in refugee camps or other places of refuge like schools, churches, mosques, climate change and unmanaged urbanization.

13. Cholera Prevention and Control

We cannot exhaustively discuss cholera epidemic without mentioning [68], a London practicing obstetrician/anesthesiologist who conducted a detailed epidemiologic investigation of London cholera epidemic adjacent to the now famous. The Broad Street Pump. When another cholera epidemic struck London from August to September in 1854, primarily in the Soho area adjacent to Broad Street, Snow investigated it and traced some 600 cholera deaths occurring in a 10-day period. He discovered that most deaths involved the people living near the well and using the well water. He observed the sudden decline of cholera cases after his experiment of convincing the local leaders by removing the pump handle and thereby diverting the Soho population to other uncontaminated waters. He concluded his

study that the source of the epidemic was the contaminated broad street pump well and successfully advised the civic authorities to completely remove the pump handle to avert more deaths.

The World Health Organization Technical Working Group on Cholera dubbed Global Task Force on Cholera Control (GTFCC) summarizes the collaborative effort strategies for Cholera epidemic prevention and Control in tripartite arrangement of Prevention and Control: Emergency Preparedness; Coordination of Operational Support, local and global, resourcing technical expertise delivered by GTFCC and Focus on hotspots by endemic cholera multispectral approach (**Figure 2**).

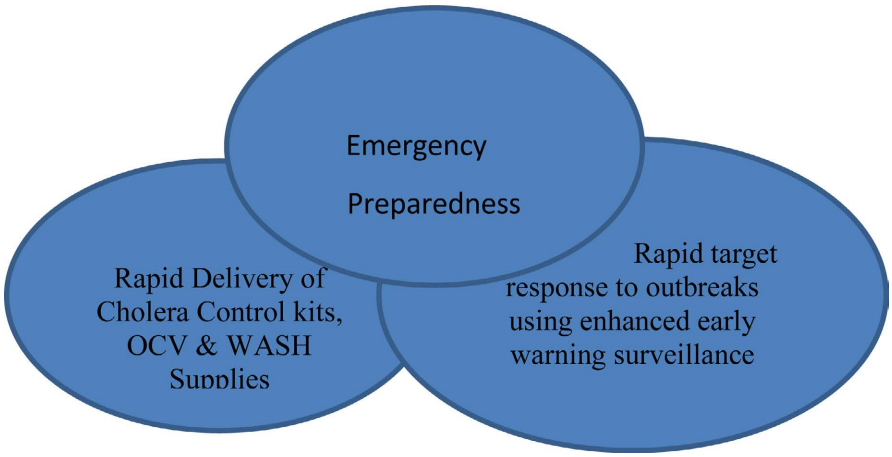

Figure 2. Cholera prevention and control measures.

In summary, to prevent cholera in the community, stakeholders need to: increase funding for water and sanitation activities; increase investments in clean water and sanitation infrastructure; enhance epidemiological and biological surveillance, e.g., mapping cholera hotspots; improve access to timely treatment; strengthen cross border surveillance; promoting community engagement and use of Oral Cholera Vaccine [16].

14. The Sustainable Development Goals (SDGs)

[69] The Sustainable Development Goals (SDGs) Goals and targets will guide global development cooperation over the years towards 2030 in the areas of: 1) People: Ending poverty and hunger, in all their forms and dimensions 2) Planet: Protecting the planet from degradation, including through sustainable consumption and production; 3) Prosperity: Ensuring that all human beings can enjoy prosperous and fulfilling lives; 4) Peace: Fostering peaceful, just and inclusive societies which are free from fear and violence; 5) Partnership: Mobilizing the means required to implement this agenda through a revitalized Global partnership for sustainable development. World Health Organization (WHO) member countries have adapted the seventeen SDGs targets within their respective health priorities towards 2030, 2050 and 2063 goals. Kenya reports progress made in the imple-

mentation of SGDs in her devolved governments in a document dubbed *Localization of Sustainable Development Goals by County Governments in Kenya* [70] [71]. SDGs agenda in countries/Counties is not a stand-alone item, but an integral component of the Performance Management Framework for County Governments. Country/County Governments have mainstreamed SDGs in their County Integrated Development Plans (CIDPs) and a monitoring and evaluation framework to support tracking of implementation of the goals. County Governments have also institutionalized SDGs coordination through the appointment of County SDG champions to support coordination and monitoring of implementation progress. The same has been established at Mount Kenya University and led by the Principal of Corporate Affairs, Prof. Peter Wanderi. The coordination between the National Government and County Governments has been reinforced with the establishment of an SDGs Unit at the Council of Governors and the National SDGs Coordination Directorate at the National Treasury, Planning Department. The document further states that partnership is the key and active engagement of governments (national and county), as well as civil society, the private sector, partners, and the United Nations system, which is necessary to domesticate the implementation of SDGs. In this Review Paper, SDGs Nos. 1, 3, 6 & 10 stands out.

15. Conclusions

Migration health involves the development of public health interventions to prevent, detect and respond to health challenges in the context of human mobility. It also involves identifying and prioritizing public health measures that need to be strengthened.

Gender-sensitive foreign policies are required for female migrants who are rapidly outnumbering their male counterparts across all labor sectors who are many times trafficked or smuggled and subsequently become enslaved.

Stakeholders in migration and health need to explore and develop good practice approaches to maximize access to healthcare, particularly for undocumented and uninsured migrants.

Investigating (formally or informally) the factors that limit access to and utilization of health services and develop migrant-friendly services and strategies to increase coverage and uptake, for example, in outreach, information about services and involvement of migrant communities in service design and delivery.

Noting the multidisciplinary approach required in migration and health, training institutions to expand the knowledge by developing culturally sensitive curricula and modules targeting all personnel employed or unemployed to provide skills and competencies on specific needs of migrants and refugee populations.

The majority of the literature reviewed emphasized the importance of interventions that address the heterogeneity within and between migrant, refugee populations and host communities. However, we noted that considerable variation in practice remains, especially when we found that immigrants are sometimes more

educated than aliens. Therefore, more evaluation studies or related interventions like operational research were needed to inform policy and programme decision-making. Our study also points to the need to focus on political economy plans affecting refugee livelihoods, demonstrating how they are constrained, mediated, or enabled, especially laws covering uninsured immigrants and confidentiality issues. We conclude that refugees are human too, and current interventions should focus on the humanitarian development of the immigrants rather than humanitarian assistance.

As Health stakeholders strive to keep measures (post COVID-19 and other related severe acute respiratory syndrome (SARS)), we need to continue with the evaluation and monitoring of health systems, even to the extent of employing machine learning algorithms (read artificial intelligence) to aid planners in early predictions so that we can narrow the indicator-gaps in the Sustainable Development Goals (SDGs) 1, 3, 6 & 10 and the WHO triple billion targets of Universal Health Coverage (UHC), Health emergencies and promoting healthy populations.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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