Why Infectious Diseases Persist: A Rapid Review of the Social Determinants of Malaria, Cholera, Tuberculosis and Yellow fever in Sub-Saharan Africa.

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Abstract

This review highlights the social determinants associated with some infectious diseases in Sub-Saharan Africa (SSA) over the past decade. Guided by PRISMA and Population Concept and Context (PCC), database searches in PubMed, Science Direct Elsevier, Springer Link, Plos One, and Google search were employed to identify relevant studies. For extraction of relevant data from the scripts, Meta-analysis and thematic analysis was used. The results show that few countries in SSA are engaged in the fight against these diseases. More so, Malaria had the greatest social determinants discussed (35%) followed by Cholera and TB (30% and 20% respectively). >80% of the population in the studies were pregnant women, women with children below 5, and children below 5 in rural areas. The social determinants highlighted in the study include amongst others in descending order: social capital, community engagements, health care services, health behaviours/habits, safe drinking water, housing and toilet facilities, personal hygiene, and social groupings. Without underestimating the impact of any of these determinants in the contribution to infectious diseases, this review suggests further and deliberate studies on the effects of each of them on population health. It also recommends a need for policy development in this regard by considering social and biological/medical determinants as a twin tool for the elimination of infectious diseases.

Keywords: Social determinants, infectious diseases, SSA, vulnerable population

Resumé

Cette revue met en lumière les déterminants sociaux associés à certaines maladies infectieuses en Afrique subsaharienne (ASS) au cours de la dernière décennie. Guidées par PRISMA et Population Concept and Context (PCC), des recherches dans les bases de données PubMed, Science Direct Elsevier, Springer Link, PloS One et Google ont été utilisées pour identifier les études pertinentes. Pour extraire les données pertinentes , une méta-analyse et une analyse thématique ont été utilisées. Les résultats montrent que peu de pays d'ASS sont engagés dans la lutte contre ces maladies. Plus, encore, le paludisme avait les plus grands déterminants sociaux discutés (35 %), suivi du choléra et de la tuberculose (30 % et 20 % respectivement). >80% de la population dans les études étaient des femmes enceintes, des femmes avec des enfants de moins de 5 ans et des enfants de moins de 5 ans dans les zones rurales. Les déterminants sociaux mis en évidence dans l'étude comprennent entre autres par ordre décroissant : le

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capital social, les engagements communautaires, les services de soins de santé, les comportements/habitudes de santé, l'eau potable, le logement et les toilettes, l'hygiène personnelle et les groupements sociaux. Sans sous-estimer l'impact de l'un ou l'autre de ces déterminants dans la contribution aux maladies infectieuses, cette revue propose des études plus approfondies et délibérées sur les effets de chacun d'eux sur la santé de la population. Il recommande également la nécessité d'élaborer des politiques à cet égard en considérant les déterminants sociaux et biologiques/médicaux comme un outil double pour l'élimination des maladies infectieuses.

Mots clés : Déterminants sociaux, maladies infectieuses, ASS, population vulnerable.

**This Abstract was translated from English to French using Google Translate and revised by Editor-in-Chief*

1. Introduction

Infectious diseases possess a great challenge to humans as they contribute to increased morbidity and mortality. Africa and Sub-Saharan Africa (SSA) especially, face a continuous resistance and re-emergence of these diseases and bear almost half of the world's burden (C M Michaud, 2009). Estimates showed that by 2022 these diseases would have been eradicated and replaced with non-communicable diseases. Contrarily, infectious diseases persist (C M Michaud, 2009).

One-third of deaths result from infectious diseases with a majority in developing countries. More so, mortality from infectious diseases was highest in SSA with 6.8 million deaths. (C M Michaud, 2009). It is estimated that half of Africa's death (with the greatest burden in SSA) resulted from infectious diseases, and the fear of a rapid wave of infectious diseases in SSA and the world is a call for concern (Nyaruaba et al., 2022).

For the past decade, infectious diseases with stringent public health challenges include Malaria, Tuberculosis, Measles, Yellow fever, Rift Valley fever, Cholera, outbreaks and epidemics with world impacts such as Ebola Virus, Zila virus and Chikungunya virus and the recent acute respiratory syndrome coronavirus 2 (Fenollar & Mediannikov, 2018; Nyaruaba et al., 2022). Among these diseases, Malaria and Tuberculosis are the leading causes of morbidity and mortality in Sub-Saharan Africa (Groth & May 2017).

Generally, the health sector in SSA has shown some improvement with a decline in infant and maternal mortality and an increase in life expectancy, thanks to medical aid. However, the burden of infectious diseases is still very much felt (Groth & May 2017). This is because the impact of these diseases has gone far beyond the health sector, presenting challenges to all other sectors (Boutayeb, 2010). One of the reasons is the default in some of the foreign drugs creating increasing resistance and persistence of infectious diseases. EDCTP recommended new strategies both technologically and socio/economically within an African context in fighting infectious diseases (EDCTP, 2018).

There is therefore an increase in the magnitude of the effects and management of infectious diseases. Meeting the SDG's goals might be further slowed down if addressing infectious diseases does not incorporate other sectors than the health sector (Boutayeb, 2010; EDCTP, 2018; King et al., 2006, Office, 2018).

To enable policymakers to re-strategize to this effect, this review seeks to identify social determinants of persistent(re-emerging) infectious diseases in SSA. To achieve this, we will be finding out the study settings (vulnerable population, location, infectious diseases and strength of

research over the years) of social determinants, and the social determinants of these diseases.

2. Method

In carrying out this review, a search was made online for papers containing the key terms "social factors /determinants of infectious diseases". To widen the search, a search was made for "Africa" and "SSA" then only papers from countries in SSA were selected. For infectious diseases, a search was made for each ("malaria", "tuberculosis", "cholera" and "yellow fever") and not "infectious diseases", this was also to broaden the search. The search of articles was done online from databases in PubMed, Science Direct Elsevier, Springer Link, Plos One, and Google search. The first two were crucial because they are scientific journals that address health issues worldwide with a large database. For Malaria, the search was carried out on the first 10 pages of 25 results in PubMed, Science Direct Elsevier and Google, thereafter, irrelevant papers (not having analysed any social factor or discussed social factors as determinants to infectious diseases, or did not involve any a particular infectious disease in the study) and duplications. For the other infectious diseases, we did not exceed 5 pages for all search engines for the same reasons. For the other search engines, we did not exceed three pages. An advance option limiting the time frame of 2011-2021 was also included.

Meta-analyses were used in classifying and analysing research settings of social determinants and thematic analysis was used in deriving themes for social determinants of infectious diseases and their discourse in the SSA.

- SSA was chosen for this study because it carries about half of the world's burden of infectious diseases (C M Michaud, 2009) and
- The choice of infectious diseases was based on the number of countries in SSA that recorded these diseases, re-occurrence and the impact on health (mortality and morbidity). Malaria, Tuberculosis, Cholera and Yellow fever were selected for the study (WHO, World Malaria Report, 2021, WHO, Global Tuberculosis Report, 2021, Nyaruaba et al., 2022, ECDG,2022).
- A ten years retrospective time frame is chosen based on the WHO publication of infectious diseases in 2020 for over 10 years. The intersection of this review in this time frame will enable policymakers to re-strategies for the future.

2.1. Eligibility Criteria (inclusion and exclusion)

Articles selection was based on the PCC (Population, Concept, Context) framework: - **Population**: All age groups and the population within SSA were considered for the study; - **Concept**: the articles involved research methods in social science (quantitative, qualitative, mixed-methods or pragmatics) that measure social factors as independent variables, dependable variables such as differences in outcomes of clinical trials, responses to treatments, prevention, population reception and perceptions of the implementation of medical innovations were included; and **Context-** the studies considered were within the time frame of 2011 to 2021 and falls within study designs in social science.

The following criteria automatically led to the exclusion of a paper from the study: Peer reviews, studies based strictly on drugs or vaccines performance, abstracts, books chapter, editorials, commentaries, letters and conference reports, preface; and publications in any other language than English.

2.2. Data extraction, analysis and limitations

A review of topics and abstracts to further eliminate irrelevant scripts was effected, followed by sorting free full text that matched our inclusion criteria. The search yielded about 40,123 papers in Africa", limiting to SSA,1797 articles were obtained". An advanced option of 10 years left

us with 1268 articles. Further elimination of abstracts and conference presentations landed us 604 papers. Opting for free full-text papers, 93 articles were left. This was followed by a careful and objective reading through the abstracts of which 62 articles were irrelevant and eliminated. However, some of these studies were used as references in this study. With 13 duplicates 24 articles were left from which we extracted our data. Fig1 presents a summary of the selection process.

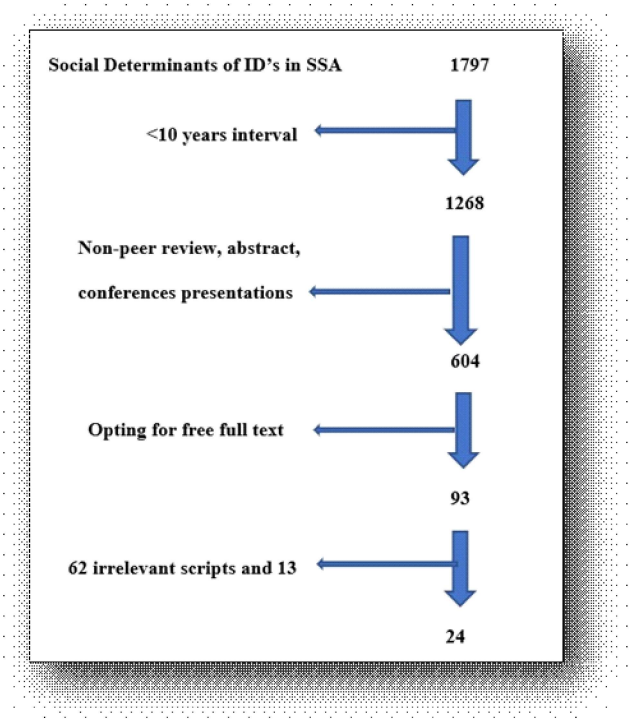

Figure 1: Diagram showing selection methods

Data were extracted based on our research questions and thematic analysis was implemented in the extraction of themes, sub-themes and global themes by summarizing and coding the findings of every article manually. After obtaining social determinants, the weighting of the frequencies was made by multiplying the frequencies by the weighted value (number of papers each determinant appeared in).

3. Results and Discussion

3.1. Reviewed articles Study Settings

3.1.1. The trend in Research on Social Determinants of IDs

Out of 24 papers, 12 countries of 46 in SSA were represented. Most of the research articles were from Nigeria and Malawi with 18% and 14.2% respectively as seen in Fig 2. However, all the Sub-Regions of Sub-Saharan Africa were represented in the study with 1/3rd of the articles from East Africa. This reveals that few countries in SSA seem to be engaged in the fight against infectious diseases. With the migratory nature of these diseases (Bwire et al., 2021, C M Michaud, 2009), it is important to comply with all countries within this region to be engaged. However, this has not been the case in SSA (Office, 2018).

Also, the trend of research on this subject area is on the decline, out of the 24 scripts, the highest number of publications were made in 2018 (no reasons were attributed to this in this study but the drastic decline as of 2018-2020 that is from 28-12%, however, could be accounted for the focus on COVID-19) as seen in Fig 3. Despite the increase in infectious diseases, the decreasing trend is seen as of 2018

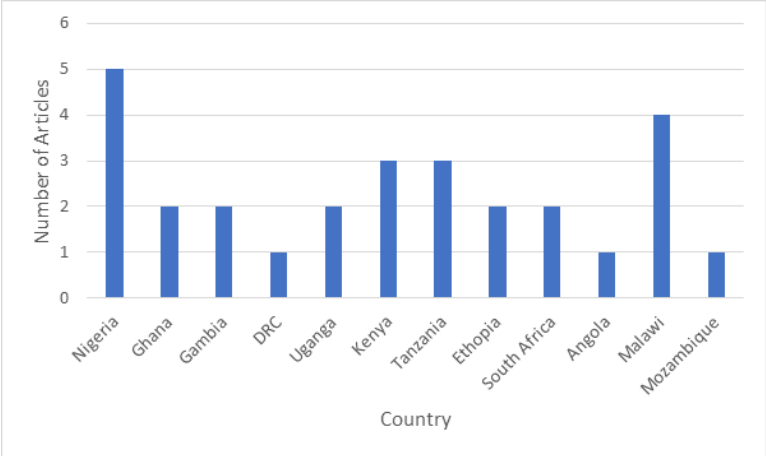

Figure 2: Country's representation in the study

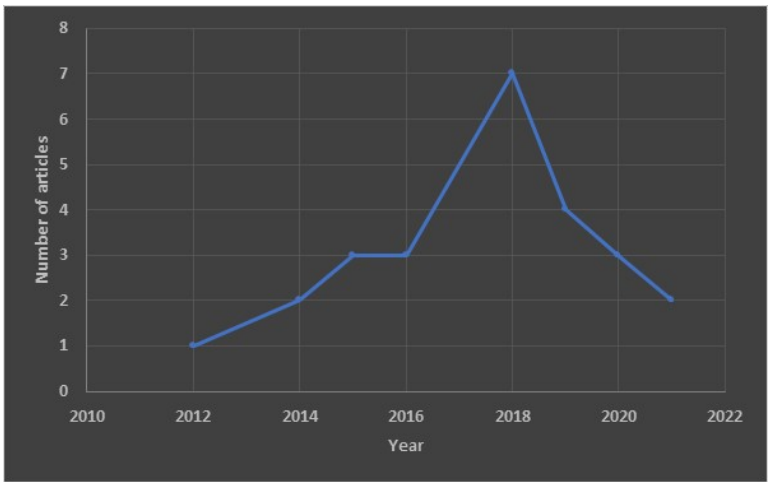

Figure 3: Trend in Research on Social Determinants of Infectious Diseases between 2011 and 2021

3.1.2.Percentages of discussions ofsoci l determinants on Malaria, TB, Cholera and Yellow fever

Further results as illustrated in table 1, show that Malaria has been well discussed on most determinants at 35%, fairly discussed on some determinants at 18% and not discussed on others at 11,75%. In a similar way, the table equally indicates that 26% of determinants have been discussed in TB, 44% of determinants fairly discussed and 11.76 of determinants have not been discussed. Also, Cholera is well discussed for some determinants with 30% coverage, fairly discussed with 18% and 18% not discussed. Yellow fever, however, has the least discussions on determinants with 9% and fairly discussed in some determinants with 11% and not discussed in about 53% of the determinants. The undermining of Yellow fever in the studies is a call for concern as it propagates the spread. Even though the severity of Malaria cannot be underestimated because of its global effects as revealed in this study (Xia et al., 2020), yellow fever seems to be regarded as "eliminated" meanwhile it is still very much present (Chimbatata et al., 2017).

Table 1:Social Determinants and their impact on Malaria, Tuberculosis, Cholera and Yellow Fever

Determinants	Malaria	Tuberculosis	Cholera	Yellow fever
Safe drinking water				
Housing and Toilet facilities				
Health Care Services				
Community Activities				
Community engagement				
Community Refuse Management				
Social Groupings				
Social Capital				
Ivp				
Personal Hygiene				
Beliefs				
Behaviours and Habits				

Not discussed
Fairly discussed
Discussed

3.1.3. Vulnerable Population

>80% of the target population in the studies analysed falls under the vulnerable population. They are pregnant women and women with children under-five and children below the age of five. This target falls in place with the SDG Target 3.2 to end or reduce infant and child mortality to 12 per 1000 by 2030 in SSA (WHO, Child Mortality and causes of Death, World Health Statistics, 2022). This said, is very important, however, there is a need to address other groups of the population.

Furthermore, most of the studies were carried out in rural areas with locals engaged in farming activities. This reveals a gap in research in urban areas despite the rapid population growth alongside urban poor and inequalities (World Bank,2020, Nwani & Osuji, 2020, Xia et al., 2020, Güneralp et al., 2018).

3.2. Social Determinants of Infectious Diseases in SSA

3.2.1. Social determinants, themes, exposure/remedy, and target population

Social determinants derived were classified under four global themes which are, structural, community, interpersonal and personal factors as seen in Table 2. Furthermore, the majority of the social determinants in this study act as major exposures to infectious diseases and very few remedies for the alleviation of these diseases. These determinants are important in understanding routes of reinfections and resistance to these diseases. Table 2 also presents the target population considered vulnerable population (discussed in 3.1.3 above).

3.2.2. Weight and discourse of social determinants in the study

The weight of each determinant of the study was obtained by multiplying the frequencies by the weight value (number of studies). The greater the number of studies in which the determinant appears, the greater the weight and the lesser the number of studies in which the determinant appears, the lesser the weight. The assumption here is that more than one study will involve more than one country, different populations and environments. This creates a greater impact on that determinant and shows its importance.

As seen in Table 3 and illustrated in Fig 4, the frequencies, weight and ranking of the determinants show that the social determinant with the high impact is social capital, community engagement and health services, while others are of less impact.

Social capital

Social capital is a major exposure factor. It explains the power of relationships and the role they play in health outcomes in the studies (Ouden, 2018; Chilanga et al., 2020; Moshi et al., 2018; Jaiteh et al., 2016; Id et al., 2021).

Community engagement

Also, community engagement appears as a major determinant which involves associating the community with health projects and activities. It helps in improving knowledge, reduces incidences, builds trust, facilitates diagnosis, and enables clarifications of procedures (Madon et al., 2018; Id et al., 2021; Angwenyi et al., 2014; Bucyibaruta et al., 2018; Angwenyi et al., 2014; Nkosi-guide et al., 2018; Chimbatata et al., 2017; Engelbrecht et al., 2019). Our studies reveal that communities that were engaged in health activities tend to have fewer incidences than communities that did not.

Health care services

Healthcare services including health institutions, accessibility and quality of health workers were also seen as one of the major exposures to these diseases. Some of the factors discussed were late diagnosis and inequality in accessibility (Nkosi-gondwe et al., 2018; Gyaase et al., Ndong et al., 2019). Also, most caregivers, especially at home lack adequate knowledge, and those at medical services, have poor training, lack of supervision, and work overload (Gyaase et al., 2021; Nkosi-guide et al., 2018; Engelbrecht et al., 2019).

Behaviours and habits

Behaviours and Habits also play a role in increasing the incidence of infectious diseases. This accounts for the fact that patients isolate themselves due to perceived uncleanliness of diseases, laxity in adhering to medical instructions and poor habits (poor ventilation, coughing and sneezing without covering, not washing hands after using and indiscriminate defecation) (Kasa et al., 2019;

Table 2: Factors, Determinants, Themes, Exposures/Remedies and Vulnerable population

Factors	Determinants	Themes	Exposures/Remedy	Target population
Structural Factors	Safe drinking water	Addressing identified populations in need than the general population	Remedy	Children below five, SSA Region
		Optimising water alongside vaccines	Remedy	
		Open defecation in water bodies	Exposure	Children below five years and pregnant women
	Housing	Number of people living in a house	Exposure	Pregnant women and rural communities
		Architectural house designs	Exposure	
	Toilets	Unimproved toilets	Exposure	
		Shared toilets	Exposure	
	Health care services			Poor (low-income), rural communities and pregnant women
	Health institutions and accessibility	Inadequate structures	Exposure	
		Increases inequality (those who are really in need don't have access	Exposure	
	Quality of Health givers	Poor staff performance, lack of adequate knowledge	Exposure	
		Over workload	Exposure	
Community Factors	Community engagement and community refuse management	Health promotion activities	Remedy	Rural communities
		Sensitisation	Remedy	
		Health campaigns	Remedy	
		Refuse Management	Remedy	
	Community activities	Ceremonies and traditional rights	Exposure	Pregnant women and children below 5
	Social groupings	Sensitisation	Remedy	
		Easy communication	Remedy	
Interpersonal Factors	Social Capital	Influence of mother and mother-in-law	Exposure	Pregnant women and the rural population
		Old parents as caregivers	Exposure	
	IVP	Lack of childcare policies	Exposure	
		School dropouts	Exposure	
Personal Factors	Personal hygiene	Lack of hand washing	Exposure	Patients, Pregnant women and the rural population
	Beliefs	Prayers	Exposure	
		Native doctors	Exposure	
		Non-existence of diseases	Exposure	
	Behaviours and habits	Coughing without closing the mouth	Exposure	Rural communities
		Open defecation	Exposure	
		Waste disposal	Exposure	

Table 3: Frequencies, Weighting and Ranking of Social Determinants of Infectious Diseases

Factors	Determinants	Frequency of Appearances	Weight Value (derived from the number of papers the variable appeared in)	Weight of Each Determinant	Percentage Weight for each Determinant	Ranking Determinants
Structural factors	Safe drinking water	8	3	24	7.384615385	6
	Housing and toilet facilities	6	5	30	9.230769231	5
	Health care services	10	4	40	12.30769231	3
Community factors	Community activities	4	2	6	1.846153846	10
	Community engagement	10	5	50	15.38461538	2
Interpersonal factors	Community refuse management	6	3	18	5.538461538	7
	Social groupings	5	3	15	4.615384615	8
	Social capital	10	6	60	18.46153846	1
Personal factors	Ivp	4	2	8	2.461538462	9
	Personal hygiene	8	3	24	7.384615385	6
	Beliefs	6	3	18	5.538461538	7
	Behaviours and habits	8	4	32	9.846153846	4
	Total	85	43	325	100	

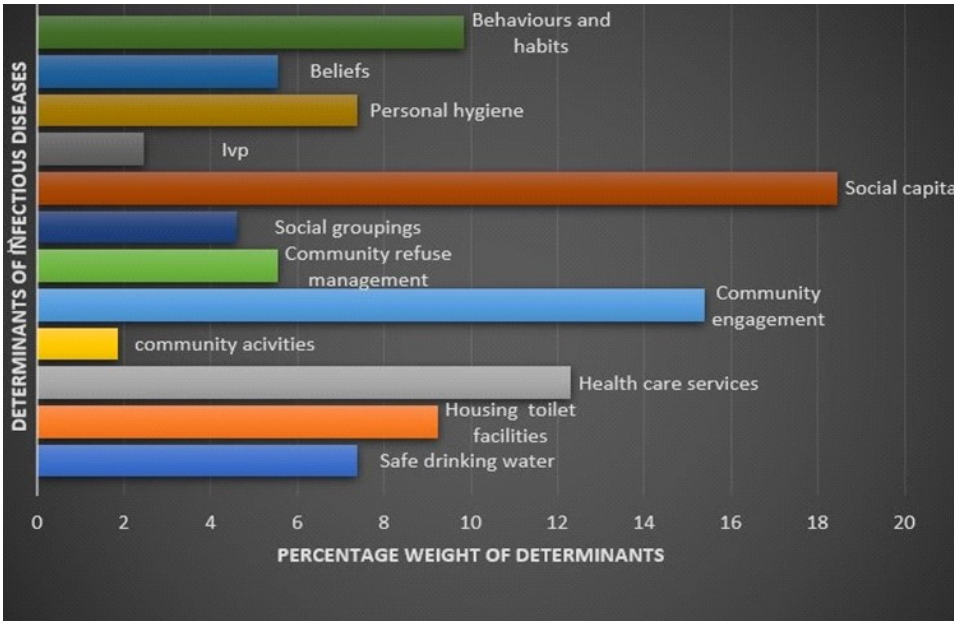

Figure 4: Illustration of the different impact levels of social determinants of infectious diseases

Mboma et al., 2018; Bwire et al., 2016; Dan-for et al., 2019; Madukaku et al., 2012). This factor exacerbates the pressure on the fight against these diseases as it facilitates re-contaminated among persons.

Housing and toilet facilities

Housing and toilet facilities cannot be ignored as it also acts as one of the determinants and exposure. The housing designs, the management of doors and windows and the number of household members in SSA contribute to the increasing trends of these diseases (Madukaku et al., 2012; Pinder et al., 2016; Mawuli et al., 2018; Gyaase et al., 2021; Dan-for et al., 2019). Also, poor toilets and toilets shared by more than five persons were a major determinant and increases incidences, especially among children below 5 (Office, 2018; Oyugi, 2015). These unimproved toilets were associated with smell, insects, poor management, and increased growth of bacteria (Nakagiri et al., 2016).

Safe drinking water

Safe drinking water as remedy addresses resources and policy development geared towards the general population seen as problematic in resolving water crises (Bogale, 2020), In this study, identifying hotspots with specific needs proved to be more effective (Bogale, 2020; Lee et al., 2019). Also, optimizing drinking water and sanitation in a targeted area accompanied by vaccination proved to be more effective and registered fewer incidences (Lee et al., 2019). This, therefore, ascertain that both social and biological factors should be developed simultaneously.

On the other hand, open defecation is a major source of contamination of water bodies and contributes to increased cases of illnesses especially Cholera (Bwire et al., 2021, Dan-for et al., 2019).

Personal hygiene

Poor hand hygiene is significantly associated with outbreaks of some infectious diseases like Cholera (Dan-nwafor et al., 2019). WHO reports that just about 19% of the population wash their hands frequently and 14% is out of Africa (OMS, 2016). Personal hygiene is therefore very vital to the alleviation of infectious diseases.

Beliefs

The belief in traditional healers, witch doctors and prayers with regards to health, still holds a firm ground in SSA. The outcome of these beliefs on health is that: they increase the resistance to drugs, prayers are preferred over medicine and disbelieve in the diseases themselves (Chimbatata et al.; 2017 Kasa et al., 2019).

Community activities

Another determinant with the least impact is community activities. This determinant acts also as an exposure. It highlights the fact that the African community is characterised by different celebrations (religious, traditional, life course etc) which usually extend into the night and increase exposure, especially to mosquito bites (Bwire et al., 2016; Madon et al., 2018) and increases incidences of malaria diseases.

Social groupings

Social groups are of less importance as revealed in this study. Nonetheless, approaching social groups is considered vital and more effective in reducing incidences of diseases as it facilitates communication, improved knowledge and increases sensitization, especially in rural communities. (Omale et al., 2021).

4. **Limitation of the Study**

One of the limitations of this study is that it does not take into account the heterogeneity of social dynamics within countries in the SSA in terms of practices, cultures and policies and therefore

considers these factors homogeneous. Research in this domain should be encouraged in each country, taking into consideration its specificity.

5. Conclusion and Recommendation

The fight against infectious diseases seems unending. The need for solutions that are sustainable is vital. This rapid review has brought out some social determinants from 24 articles which affect the performances of these diseases. Using meta-analysis and thematic analysis, our findings showed that fewer countries in SSA are involved in the fight against these diseases, also a retrogressive trend is seen in addressing social issues relating to infectious diseases. More to that, the vulnerable population addressed in the studies involved women and children below five years which of course ties in with the SDG goals. Our study also reveals that the highest impact of these determinants is felt in malaria more than any other disease. For the social determinants derived, social capital had the highest impact followed by community engagement and the least which are community activities and social groupings.

There is therefore the need for intense research to be carried out on these determinants and the role they on the resistance to these diseases especially those with greater impact. Also, there is a need to enlarge research on the least determinants in this study for an elaborate understanding of its functioning in propagating or eliminating infectious diseases. There is also a need to re-direct policies that will consider social factors alongside medicine. This is clear in the case of Cameroon where the country has been declared free of Poliomyelitis, still, Polio vaccine campaigns are still ongoing because of the fear of the re-emerging of Poliomyelitis why? because the social determinants of the population have not been addressed.

6. Acknowledgement

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7. Conflict of Interest

The author, Agweibab Florence conceived and wrote this article and declares no conflict of interest.

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