

Research Article

RESPONSE OF THE SOCIAL SYSTEMS TO COVID-19 IN MOZAMBIQUE, TANZANIA AND ZAMBIA: A SYNTHESIS OF THE CHALLENGES AND OPPORTUNITIES

* Emmy Metta^{1,2}, Sérgio F Mahumane^{2,3}, Doreen Chilolo Sitali^{2,4}, Tumaini Nyamhanga⁵,
Leonard E.G. Mboera², Gasto Frumence^{2,5}, and Mark Rweyemamu².

¹Department of Behavioral Sciences, School of Public Health and Social Sciences, Muhimbili University of Health and Allied Science, P.O. Box 65015 Dar es Salaam, Tanzania

²SACIDS Foundation for One Health, Sokoine University of Agriculture, Morogoro, Tanzania

³Programa de Políticas e Sistemas de Saúde, Instituto Nacional de Saúde, Maputo, Mozambique

⁴Department of Health Promotion and Education, School of Public Health, University of Zambia, Lusaka, Zambia

⁵Department of Development Studies, School of Public Health and Social Sciences, Muhimbili University of Health and Allied Science, Dar es Salaam, Tanzania

Received 24th November 2020; Accepted 20th December 2020; Published online 15th January 2021

ABSTRACT

Objective: This synthesis aimed to assess prevailing social systems and behaviours to identify challenges and opportunities towards COVID-19 responses in Mozambique, Tanzania and Zambia. **Methods:** We searched information using set of broad topic-related terms to include articles and documents reporting country specific information on the identified factions of the social systems. The sources included country specific websites, Pub-Med, Google and Google scholar, with full text documents retrieved from HINARI. **Results:** The challenges identified include media's overemphasis of contagious nature of the disease leading into resentment of the infected people in the community; the cultural practices such as greetings by shaking hands and large gatherings in weddings and funerals which are likely to increase risks of transmission of COVID-19; limited access to water challenging hand washing practices; and unreliable income sources to majority of the community members leading to reliance on daily informal activities to earn a living. All such activities make physical distancing less practical. The opportunities included involvement of religious institutions in provision of health education; enhancing risk communication with the public through different digital and traditional media channels; and the extended family living arrangements as protection to vulnerable elderly population. **Conclusion:** The synthesis has identified several challenges and opportunities of the social system in COVID-19 response in Mozambique, Tanzania and Zambia. The opportunities should be capitalized upon to inform context specific preventive measures and challenges be addressed for prompt prevention of infection transmissions..

Keywords: COVID-19, social systems, Mozambique, Tanzania, Zambia.

INTRODUCTION

The world is currently experiencing an unprecedented outbreak of Corona virus disease 2019 (COVID-19), first identified in Wuhan City, China in December 2019 (1). In China, within a relatively short period the number of cases overwhelmed the capacity of the health system and new hospitals had to be rapidly built to accommodate the excess load of patients (2). As the number of infected people increased in China, the infection rapidly spread to other countries leading to the World Health Organization declaring the outbreak a public health emergency of international concern in January 30, 2020 (3) and by March 11, 2020 the spread of this infection was declared a pandemic (4). Africa initially had very few COVID-19 cases (5). However, by mid July 2020 there were 664,359 cases reported from 54 countries and the number of infected people in some countries was increasing very rapidly (<https://africanarguments.org/2020/04/21/coronavirus-in-africa-tracker-how-many-cases-and-where-latest>). COVID-19 is caused by a novel virus, Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2). This virus is mainly transmitted through close contact often via small droplets produced when coughing, sneezing or talking (6). On average symptoms appear after an incubation period of about 5.2 days (7) and those exposed during this period can spread the infection despite the absence of observable symptoms (8). The median time from onset of symptoms to clinical recovery for mild cases is approximately 2 weeks and up to 6 weeks for patients with severe symptoms (4).

The most commonly observed symptoms include fever, loss of sense of smell and taste, cough, sore throat, fatigue, sputum production, headache, haemoptysis, diarrhoea, dyspnoea, and lymphopenia (9-11). Currently there is neither specific treatment nor vaccine for COVID-19. Non-pharmaceutical interventions are the main COVID-19 preventive measures available. The interventions aim to limit transmission potential of the infection (12). This is done by isolating confirmed cases and identifying their contacts in order to quarantine them for at least 14 days (13). In practice, the recommended preventive measures include reducing physical distance by discouraging participation in large gatherings such as conferences, meetings, religious events, sport events, concerts, and schools (9). In Africa, various levels of lockdowns, with varying impacts, were introduced to minimize local transmission (14, 15). At individual level, people are encouraged to avoid hand shaking and hugging, and to practice frequent hand washing with soap and running water or the use of alcohol-based sanitizers. People are also advised to avoid touching their eyes, nose and mouth when their hands are not clean and should practice respiratory hygiene when coughing(16). Since the COVID-19 virus transmission is associated with human behavior including social interactions (17) it is important to assess the prevailing social systems and behaviors to identify challenges and opportunities for halting transmission of the condition in the community in Mozambique, Tanzania and Zambia. Such information is critical for containment and prevention of transmission of the infection in the community. In this article social system refers to an arrangement consisting of individual actors interacting in a culturally structured system based on shared norms and values (19).

*Corresponding Author: Emmy Metta,

Department of Behavioral Sciences, School of Public Health and Social Sciences, Muhimbili University of Health and Allied Science, P.O. Box 65015 Dar es Salaam, Tanzania

METHODS

This analysis aimed to address the roles played by the factions of the social systems such as demographic, socio-economic, cultural, religion, family and household structures, and disparities in social services access in the context of COVID-19 pandemic response in Mozambique, Tanzania and Zambia. The ultimate goal is to identify challenges and opportunities to strengthen the context specific social system responses to COVID-19. We searched information using a set of broad topic-related terms to include English written articles and documents reporting country specific information on the identified factions of the social systems. The sources included country specific websites, Pub-Med, Google and Google Scholar, with full text documents retrieved from HINARI. We also performed targeted grey literature search for the specific countries. The search terms used were: religiosity, risk communication, family and household structure, cultural norms and values, water and sanitation, demographic, social and wealth status, access to social services. All search terms included "AND" COVID-19 "AND" either Tanzania or Zambia or Mozambique. The synthesis of the analysis is presented focusing on the pre-identified factions of the social system with a focus on their role, challenges and opportunities in COVID-19 pandemic responses.

Ethical considerations

As this was a review of the literature, no human subjects were involved in the design of the study or data collection.

RESULTS AND DISCUSSION

Religiosity

Whereas Tanzania and Mozambique are circular states (18, 19) Zambia is officially a Christian nation (20). The former two countries provide freedom of worship to all people provided that their religious practices do not break the laws of the land. Thus, several religious denominations are recognized and are grouped into three main categories, namely: Christianity, Islam, and traditional domain (21). The key opportunity in relation to health is that in all the three countries, religious institutions enjoy respect and exerts significant influence on the population. Experience shows that religious engagement plays a vital role in the prevention and control of infectious diseases. Religious institutions have been crucial partners in advancing health promotion activities in terms of prevention and control of infectious diseases such as HIV/AIDS. They have also played important role in advocating for improved maternal and child health, as well as in immunization campaigns (22). A study in central Tanzania reported that religious leaders are among the most reliable providers of health education (23). As such religious institutions complement government efforts as they assume social responsibility of offering health and educational services. Likewise, in the context of COVID-19, the religious institutions remained key players. In prevention of COVID-19, the role of religious institutions depended on approach taken by the specific country in responding to the pandemic. In Zambia and Mozambique where religious congregations were suspended, the institutions had a duty to comply and encourage their followers to fully implement control measures.

In Tanzania where religious activities continued (<https://www.wsj.com/articles/tanzanias-leader-urges-people-to-worship-in-throngs-against-coronavirus>), the institutions had a duty to ensure that religious congregations were conducted in manner that minimized the risk of transmitting the COVID-19. The religious institutions ensured availability of alcohol-based hand sanitizers and or soap and running water for hand washing, encouraged masses to observe physical

distancing and persuade wearing of face masks during religious gatherings. Across the three countries the religious institutions and public health authorities were actively working together on effective responses to the pandemic including providing health education to the masses on COVID-19 preventive measures (<https://www.oikoumene.org/en/press-centre/news/>).

Another dimension of religious faith and COVID-19, is the institutionalization of the power of prayers in combating the pandemic. In Tanzania for example, the Government stated clearly that the number one intervention against COVID-19 is seeking God's healing power. This declaration was very well received by the religious leaders and their followers. The government declared a three-day national prayer requesting church and mosque followers to pray for God's protection and to wipe off COVID-19. This was later followed by another 3-day thanks giving sessions that God has responded to the national payers with the government declaring the end of COVID 19 epidemic in the country during early June 2020 (<https://www.bbc.com/news/world-africa-52966016>). Given that religious traditions, beliefs and institutions play important roles in everyday life for the majority of people and the teachings stress on obedience and respect to leaders' it excavates strong respect and obedience that they express to the religious and government leaders. This presents an opportunity to continue using the religious institutions to strengthen the public awareness and responses to epidemics such as COVID-19. However, occasionally concerns have been raised among and between church followers regarding the use of preventive measures such as wearing of face masks urging that God's protection is adequate. In Tanzania for example, some religious followers became skeptical in wearing face masks as they considered it as disrespect to God expressing that "God doesn't stink, why should cover our noses?" As such the challenge remains that with the existing strong autonomy to religious beliefs it may complicate disease prevention efforts if messages are not well conceptualized and delivered.

Risk communication

Risk communication is an important aspect in public health and in disease outbreak responses and control (24). It involves effective and accurate exchange of information about health risks and hazards often during emergency to create risk awareness and understanding as well as promote health protective behaviors among individuals, communities and institutions (25). The news on the first cases of COVID-19 in Tanzania (16th March 2020), Zambia (18th March, 2020), and Mozambique (22nd March 2020) was widely communicated to the general public through different digital and traditional media channels. While social media provide opportunity for effective wider coverage communication in real-time and on-the-go information, its development process is critical for prompt preventive actions (26). Moreover, engaging the social media to the delivery of critical public health information carries the risk of losing control of the messages, giving credence and credibility to "junk science"(27). Since COVID-19 was first reported, conspiracy theories, misinformation and disinformation emerged about its origin, scale, prevention, treatment and other aspects of the disease which have potential implications on community perceptions and adaptation to the recommended preventive measures (28). Furthermore, the way the epidemic is portrayed by the media and other sources of information may make infected people and their contacts be resented by other community members particularly when they assume that such people are infectious even after being discharged from the healthcare facilities. The challenge remains on identification and implementation of effective and reliable information for systematic and efficiency responses to the conditions.

Family and household structure

The family size in Tanzania, Zambia and Mozambique is dominated by extended family structure comprising of the married couple, their children as well as uncles, aunts, cousins and grandparents. The communal philosophy that guides relations within and between families cultivated the culture of helping each other, thereby encouraging related people to seek living together under one roof. The roles and benefits of extended family include shared socialization of children and upbringing, assisting each other at the times of need and potentially act as a safety net to members. The extended family strengths lies on its ability to reinforce the spirit of togetherness and providing protection to its members from unfavorable social conditions including diseases and economic hardships (29). As such collectivism as opposed to individualism is what characterizes many of the African families. The average household size in Tanzania and Zambia is 4.9 people per household, while in Mozambique it is 4.4. (30-32). Larger households are generally challenged with crowding in the dwelling as majority of the members shares not only food and eating plates but also rooms, and beddings. In most urban settings people rent rooms, and share common facilities including washrooms. Further, these countries have fast growing cities characterized by overcrowded slums with substandard housing. With such a background a challenge remains as to how people in those settings should respond to highly contagious diseases such as COVID-19 especially as it is advocated to self-isolate or to observe physical distancing and isolation of sick family members. Physical distancing, sanitation and hand washing practices maybe difficulty to attain in high density urban and rural areas, compared to low density urban settings (33), due to overcrowding, lack of running water and proper waste disposal facilities (34). About 43% of the African continent's population lives in overcrowded settings, with up to 77% in major cities where 8–12 people may live in dwellings with only two rooms. Studies have associated overcrowded housing with increased risk of infectious diseases, such as tuberculosis, influenza, meningococcal disease, pneumonia, and other acute respiratory infections (35). As such, the crowded housing conditions provide an ideal scenario for the rapid spread of COVID-19. This will make it difficult to implement targeted measures aimed at reducing effective contact in rural and high-density urban settings. However, giving these issues sufficient thought is a prerequisite to finding acceptable and efficacious solutions in halting spread of pandemics.

Therefore, public health experts should provide accurate predictions that will prepare African governments and political leaders with information that will guide them to design control measures at different health facilities, regional and national levels. Concerns have been raised regarding the severity of illness from COVID-19 among old age groups. In 2018 elderly population in Mozambique, Tanzania, and Zambia represented 2.8%, 3.1% and 2.3 of the total population, respectively (32, 36). Furthermore, physical distancing, has been cautioned to be taken with care due to the likelihood of putting older adults at great risks of depression and anxiety (37). The opportunity in the three countries lies on the fact that elderly people are integrated into the extended families where they stay with either their own children or grandchildren, looked after and supported by their family members and are trusted and respected as the cornerstones in cementing families. To many families, the elderly play essential roles like babysitting their grandchildren and socializing them to the family and societal norms and practices. The elderly in Mozambique, Tanzania and Zambia, live with their family and have relatively restricted movements beyond their own homes and close neighborhood. Therefore, they would be less exposed to the "epidemic in old people homes" as reported from high-income countries (38, 39).

Cultural norms and values

Mozambique, Tanzania, and Zambia are homes to a diverse range of ethnic groups with cultural diversity (40). Nevertheless, there are some customs that are common across ethnic groups within and between the countries. Notably, greetings in different ethnic groups involve physical contact, either through shaking of hands, or kissing the other person's palm. Hugging has become a common norm in urban areas due to western influence. These practices are deeply rooted in peoples' day to day ways of life, yet posing a challenge in implementing advocated COVID-19 preventive measures such as physical distancing. Another common cultural practice across the three countries is the large gatherings that take place during traditional weddings and funeral ceremonies. During such occasions, it is customary to prepare large amounts of food and homemade beer. This follows with singing and dancing in crowded grounds. For instance, in the Zambian culture, with the passing away of loved ones, grief is expressed with wailing, singing and dancing, and shaking of hands with each other, that makes it a very emotional ceremony. The cultural norms during the mourning period in the three countries include staying in groups such that men stay outside the house and the women stay inside the house of the deceased. Burials are attended by large crowds of people who turn up to show social support to the bereaved family. This makes physical distancing, and hand hygiene very challenging. Additionally, in these countries, it is a common cultural practice for men and women to socialize after a day's work by going to drinking speers. Drinking places are usually characterized by close interaction of people, sometimes coupled with sharing of drinking utensils, music, dancing and other kinds of physical contacts. While such practices have a role to play in terms socializing, if not well handled, it can challenge realization of the benefits calling for adopting COVID-19 preventive measures. Overall, such social crowding is similar to the Pub and restaurant culture in Europe and the Americas.

The evidence on the influence of cultural belief system on the community's response to health and ill health is well documented. It is reported that when people are faced with unfamiliar illnesses such as COVID-19, they turn to the cultural meaning systems on the prevailing conditions to inform their response practices (41), thereby affecting health facility attendance and health seeking behavior in general. As such understanding of the cultural beliefs that shape health and illness in the communities is critical for better understanding of the observable behaviors when people are responding to their health and health risks. COVID-19 is a new disease which presents with symptoms that are also perceived as common manifestations of many other infectious diseases such as malaria and other acute respiratory infections, which are prevalent across SSA (42-44). The non-specificity of the COVID-19 symptoms is likely to challenge community members' responses to the condition especially so in settings where people cannot access diagnostic facilities to confirm the disease. Understanding how the prevailing cultural norms on infectious diseases shape the conceptualization of COVID-19 in the community is one of the important steps towards addressing the condition. The aspects that inform the decision making process when people respond to such illnesses is critical for informing cultural and context specific interventions and strategies against the pandemic.

Personal hygiene and sanitation practices

Hand hygiene practices including regular hand washing with soap and water is among the recommended vital practices in the fight against transmission of COVI-19 (45). In response, health officials and national public health agencies in Tanzania, Zambia and

Mozambique have been promoting hand washing practices and immensely encouraging people to adhere to the recommendation as a means to curbing the spread of COVID-19. While the awareness on the importance of hand washing practices in the prevention of COVID-19 infection may be high in these countries the challenge is how to put that awareness into practice especially when and where access to water is limited. Fifty-one percent, 41%, 39% of the households in Mozambique, Zambia, and Tanzania, respectively do not have access to safe water (30, 46). Further, inequalities in water access between rural and urban dwellers are high. About three quarters of the urban dwellers have access to an improved water source compared to less than half of their rural counterparts (30, 46). The percentages on water access within the households are even alarming. For instance, it is only 10% of the Tanzanians who can access piped water in their homes and this is higher in urban (26%) than rural areas (4%) (47). In Mozambique, of the households with access to drinking water, 84% are in urban and 37% in rural areas (48). Evidence also shows that access to water is more complex, there are cases when people are forced to obtain water from a variety of sources, including some that are contaminated with salt or sewerage (47). Similar to many other SSA countries, access to water in the three countries is also a gender issue. Women are disproportionately affected because they are the ones mainly responsible for ensuring availability of water for the cooking, cleaning, bathing and for other household needs (49). The limited access to water is likely to challenge efforts geared towards controlling the spread of COVID-19. It is high time now we assess the hand washing practices in the community in the context of COVID-19 and limited access to water to be able to identify best practices for informed decision making and development of targeted interventions. Moreover, though sanitizers are available, majority of people in these countries cannot afford to have them.

Socio-economic context and vulnerability

Poverty levels in Zambia, Tanzania, and Mozambique are considerably high. About half of the populations in these countries live below the \$1.90 per person per day (the international poverty line) (50). As such, informal work accounts for two-thirds of non-agricultural employment in sub-Saharan Africa, with Tanzania, Zambia, and Mozambique having even higher figures of 75%, 83.9%, and 90%, respectively (51-53). This means, the majority of working people need to physically go out daily to earn their living. Poverty influences individuals to make unhealthy life adjustments, thus making compliance to the requirements of staying at home impossible to implement. In such poverty context challenges for assessing the recommended preventive measures such as face masks and hand sanitizers become the norm. People are faced with choices of either going hungry and buying face masks and sanitizers or buying food and leave the rest to take care of itself. Furthermore, in these countries the public transport system is such that majority of the people uses public buses, or small lorries in extreme situations, where physical distancing is a dream concept and very difficult to observe. Despite this fact, the government of Tanzania ordered level sitting and provision of sanitizers or hand washing facilities by bus operators which added extra cost and reduced income of the owners (51). The poor living social conditions put together create serious challenges for governments to decisively implement such strict non-pharmaceutical measures.

Demographic, social and wealth status

Population pyramids for Tanzania, Mozambique, and Zambia are very similar, all showing young population age structures with median ages of 17.1, 17.3, 17.6 years, respectively (54-56). About 45% of the

population is aged below 15 years, 50% are aged 15–64 years, and only very few (less than 5%) are aged 65 years and above. The population pyramids also depict a higher percentage of females compared to males. Women and youths belong to most vulnerable community groups. Women are vulnerable because of several practices that have adverse effects to them including unemployment, customs, norms, values, taboos, unhappy marriages, domestic and gender-based violence, low income, lack of education and skills, and lack of clean and safe water (57). Similarly, youths who make majority of population in the three countries are also vulnerable social groups because of high level of unemployment making them economically deprived and insecure, drunkenness and drug abuse, low income, and low education (58). Statistics indicate that 14.9%, 10%, and 6.81% of the youths in Tanzania, Zambia, and Mozambique respectively are not employed (59). The crisis of youth unemployment is higher among educated than uneducated ones and the situation is worse in urban than in rural areas (59, 60). In respect to COVID-19, women and youths in urban settings are more vulnerable as in the course of seeking their daily income they use public transport and go out to crowded markets and streets where they engage in vending or serve as casual laborers. Due to their low incomes, they have limited opportunities to access clean water, sanitizers, masks and health services.

Accessibility to social services

Disparities in the in healthy infrastructure and other resources exist between the urban and rural areas in Mozambique, Tanzania and Zambia (60, 61). While the major cities and towns in these countries have much improved healthcare infrastructure and skilled health professionals, most of the rural areas are characterized by weak health systems (62-64). People in rural areas have to cover long distances to reach the nearest health facility. There is also a problem of delivery of medical supplies and other necessary items. Therefore, people in rural areas are likely to have limited access to diagnostic facilities and medical care if COVID-19 was to break out in their communities. These areas are also without local storage points for stocking emergency supplies. As such they may not be able to provide high-quality products to all service locations during peak requests due to stocks running out, failure to properly forecast future demands, and delayed responses (65). Past experiences in controlling communicable disease outbreaks in sub-Saharan Africa have highlighted frequent delays between the acquisition and transportation of diagnostic samples to laboratories and the notification of test results back to health facilities (66, 67). With the poor road network in the rural areas, this is likely to be a big problem and is likely to have a negative impact on treatment outcomes. Such a weak sample handling and referral system could represent another impediment for conducting prompt COVID-19 case detection and clinical management (65). The application of the prevention measures in poorly resourced rural communities, such as heightened surveillance, rapid identification of cases, patient transfer to isolation, rapid diagnosis, and tracing and follow-up of contacts may be difficult and expensive and likely not to be sustainable. However, it is likely that the use of innovative ways, such as mobile technologies, where possible, may make it easier and cheaper to implement disease surveillance and contact tracing, though the efficiency of this warrants an assessment(68). Community engagement and participation initiatives are recommended as key enablers in response to infectious diseases both in low and lower-middle income countries (69, 70). The practice is reported as more efficient in settings with overstretched public health care systems where collective capacity of the communities remain pertinent opportunity for effecting behavior change to improved health outcomes (71). For instance, the experience from Tanzania suggests that community engagement and

participation in health promoting initiatives promotes trust among the health system and the communities, enhances health service utilization, increases effectiveness and efficiency of disease prevention and management interventions and promotes sustainability and community self-reliance (72). It is critical for the African countries to learn from the previous success stories to identify mechanisms of ensuring engagement of the communities in preventing COVID-19 and other epidemics, especially in the context of physical distancing.

CONCLUSION

The synthesis has identified several challenges and opportunities of the social system in COVID-19 response in Mozambique, Tanzania and Zambia. To our knowledge this is the first synthesis describing the social systems in the African settings in the context of COVID-19 and recognizes the available opportunities to mitigate the pandemic. Given the faith and trust embedded in religious institutions, churches and mosques have played a significant role in strengthening the public awareness and responses to COVID-19. However, there are social systems actors which are challenges to the COVID 19 responses. These include large family and household structure which is characterized by extended family; poor access to safe and clean water; informal settlement, unemployment, commuter transport, large gatherings that take place during traditional ceremonies, older people, poverty and disparities between urban and rural areas in accessing health services. The government, religious institutions and other stakeholders should design strategies to strengthen social system and address these challenges in order to improve responses against pandemic.

Competing interest

The authors declare that they have no competing interests.

Authors' contributions

MMR and EM conceived the idea. EM, SF, GF, TN, DS searched the literature and screened for the emerging evidence. EM drafted the earlier version of the manuscript. EM and LEGM drafted successive versions of the manuscript and coordinated inputs from all coauthors. All authors commented on subsequent versions of the manuscript and approved the final version. EM attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted

Acknowledgements

This study is part of the broader research activities under SACCID Foundation with financial support from Skoll Foundation, Grant Number 20-45012

REFERENCES

- Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. *J autoimmunity*. 2020;102433.
- Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. *JAMA*. 2020;323(13):1239-42.
- World Health Organization. COVID 19 Public Health Emergency of International Concern (PHEIC). Global research and innovation forum: towards a research roadmap. 2020.
- Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. *Acta bio-medica: Atenei Parmensis*. 2020;91(1):157-60.
- Gilbert M, Pullano G, Pinotti F, Valdano E, Poletto C, Boëlle P-Y, et al. Preparedness and vulnerability of African countries against importations of COVID-19: a modelling study. *The Lancet*. 2020;395(10227):871-7.
- Shereen MA, Khan S, Kazmi A, Bashir N, Siddique R. COVID-19 infection: Origin, transmission, and characteristics of human coronaviruses. *J Adv Res*. 2020;24:91-98.
- Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. "Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia." *N Eng J Med* 2020;382:119-1207.
- Lai C-C, Liu YH, Wang C-Y, Wang Y-H, Hsueh S-C, Yen M-Y, et al., Asymptomatic carrier state, acute respiratory disease, and pneumonia due to severe acute respiratory syndrome coronavirus 2 (SARSCoV-2): Facts and myths. *J Microbiol, Immunol Inf*, 2020;53(3):404-412.
- Ren L-L, Wang Y-M, Wu Z-Q, Xiang Z-C, Guo L, Xu T, et al. Identification of a novel coronavirus causing severe pneumonia in human: a descriptive study. *Chin Med J* 2020;133(9):1015-1024.
- Wang W, J. Tang, and F. Wei, Updated understanding of the outbreak of 2019 novel coronavirus (2019-nCoV) in Wuhan, China *J Med Virol* 2020.92(4):p.441-447.
- Bai Y, Yao L, Wei T, Tian F, Jin D-Y, Chen L, et al. "Presumed asymptomatic carrier transmission of COVID-19." *JAMA* 2020.323(14):1406-1407.
- Casella M. "Features, evaluation and treatment coronavirus (COVID-19)." StatPearls Publishing, 2020. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK554776/>.
- Hellewell J, Abbott S, Gimma A, Bosse NI, Jarvis CI, Russel TW, et al., Feasibility of controlling COVID-19 outbreaks by isolation of cases and contacts. *Lancet Glob Health*, 2020;8(4)e488-496.
- Mboera LE, Akipede GO, Banerjee A, Cuevas LE, Cypionka T, Khan M. Mitigating lockdown challenges in response to COVID-19 in Sub-Saharan Africa. *Int J Infect Dis* 2020;96:308-10.
- Haider N, Osman AY, Gadzekpo A, Akpede GO, Asogun D, Ansumana R. Lockdown measures in response to COVID-19 in Sub-Saharan Africa: A rapid study of nine countries. *BMJ Glob Health* (in press)doi: <https://doi.org/10.1101/2020.07.09.20149054>.
- World Health Organization. Rational use of personal protective equipment for coronavirus disease (COVID-19): interim guidance, 27 February 2020. 2020
- Telles CR. Influence of countries adopted policies for COVID-19 reduction under the view of the airborne transmission framework. *BMJ medRxiv*. 2020. doi: <https://doi.org/10.1101/2020.05.20.20107763>
- Mchome H.J.L. "Assessment of Article 30 (5) of constitution of United Republic of Tanzania as to whether it promotes Human Right in Tanzania". Available at: <https://www.academia.edu/37772848/>.
- Constituição da República de Moçambique. Vol. 2. 2005: Plural Editore.
- O'Brien J, Palmer M. The atlas of religion: Univ of California Press; 2016.
- Lawi YQ, Masanja P. African Traditional Religions in Tanzania: Essence, Practice, and the encounter with modernisation. Justice, rights and worship: Religion and politics in Tanzania Dar es Salaam: E & D Limited. 2006.
- Ruijs WL, Hautvast JL, Kerrar S, Van der Velden K, Hulscher ME. The role of religious leaders in promoting acceptance of vaccination within a minority group: a qualitative study. *BMC public health*. 2013;13(1):511.

23. Mboera LEG, Rumisha, S.F., Senkoro, K.P., Mayala, B.K., Shayo, E.H. et al., Knowledge and health information communication in Tanzania. *East Afr J Public Health*, 2007;. 4(1): 33-39.
24. Berry D. Risk communication and public health. New York: Open University. 2004.
25. Dickmann P, Sarkar, S, Wysocki, P, Cecconi, S, Apfel, F, Nurm, U.K. Risk communication as a core public health competence in infectious disease management: development of the ECDC training curriculum and programme. *Eurosurveillance* 2016; 21(14): 30188.
26. Pulido CM, Redondo-Sama G, Sordé-Martí T, Flecha R. Social impact in social media: A new method to evaluate the social impact of research. *PloS one*. 2018;13(8):e0203117.
27. Lefebvre RC, Bornkessel AS. Digital social networks and health. *Circulation*. 2013;127(17):1829-36.
28. Tangcharoensathien V, Calleja N, Nguyen T, Purnat T, D'Agostino M, Garcia-Saiso S, et al. Framework for Managing the COVID-19 Infodemic: Methods and Results of an Online, Crowdsourced WHO Technical Consultation. *J Med Internet Res*. 2020;22(6):e19659.
29. Tanzania Demographic and Health Survey and Malaria Indicator Survey (TDHS-MIS). Ministry of Health, Community Development, Gender, Elderly and Children, National Bureau of Statistics, Office of the Chief Government Statistician, and ICF, 2016.
30. Ministry of Health CD, Gender, Elderly, Children MoH, National Bureau of Statistics, Office of the Chief Government Statistician, ICF. Tanzania Demographic and Health Survey and Malaria Indicator Survey (TDHS-MIS) 2015-16. MoHCDCGEC, MoH, NBS, OCGS, and ICF Dar es Salaam, Tanzania, and Rockville ...; 2016.
31. Average Household Size in Zambia, access at: <https://www.africageoportal.com/datasets/cef0ebbbd96747048860d276650cc09b>.
32. Koff WC, Williams MA. Covid-19 and immunity in aging populations—a new research agenda. *N Eng J Med* DOI: 10.1056/NEJMp2006761. 2020.
33. Otu A, Ebenso B, Labonte R, Yaya S. Tackling COVID-19: Can the African continent play the long game? *J Glob Health*. 2020;10(1).010339
34. Armah FA, Ekumah B, Yawson DO, Odoi JO, Afitiri A-R, Nyieku FE. Access to improved water and sanitation in sub-Saharan Africa in a quarter century. *Heliyon*. 2018;4(11):e00931.
35. Dicker D, Nguyen G, Abate D, Abate KH, Abay SM, Abbafati C, et al. Global, regional, and national age-sex-specific mortality and life expectancy, 1950–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The lancet*. 2018;392(10159):1684-735.
36. Onder G, Rezza G, Brusaferro S. Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. *JAMA* 2020;323(18):1778-1776.
37. Armitage R, Nellums LB. COVID-19 and the consequences of isolating the elderly. *Lancet Public Health*. 2020;5(5):e256.
38. Bedford J, Enria D, Giesecke J, Heymann DL, Ihekweazu C, Kobinger G, et al. COVID-19: towards controlling of a pandemic. *Lancet*. 2020;395(10229):1015-8.
39. Kunz R, Minder M. COVID-19 pandemic: palliative care for elderly and frail patients at home and in residential and nursing homes. *Swiss Med Wkly*. 2020;150(1314).
40. World Health Organization, Progress on household drinking water, sanitation and hygiene 2000-2017: special focus on inequalities. 2019:
41. Metta E, Bailey A, Kessy F, Geubbels E, Hutter I, Haisma H. "In a situation of rescuing life": meanings given to diabetes symptoms and care-seeking practices among adults in Southeastern Tanzania: a qualitative inquiry. *BMC public health*. 2015;15(1):224.
42. Madhi SA, Klugman KP. Acute respiratory infections. In: Jamison DT, Feachem RG, Makgoba MW, Bos ER, Baingana FK, Hofman KJ, Rogo KO (eds). *Disease and Mortality in Sub-Saharan Africa*. The International Bank for Reconstruction and Development/The World Bank: Washington, DC, 2006.
43. Kishamawe C, Rumisha, S.F., Mremi, I.R., Bwana, V.M., Chiduo, M.G., Massawe et al., Trends and patterns of respiratory disease mortality among inpatients in Tanzania, 2006-2015. *Tropical Med & Int Health* 24 (1): 91-100.
44. World Malaria Report, 2019. World Health Organization, Geneva, Switzerland. 2019.
45. Chen X, Ran L, Liu Q, Hu Q, Du X, Tan X. Hand Hygiene, Mask-Wearing Behaviors and Its Associated Factors during the COVID-19 Epidemic: A Cross-Sectional Study among Primary School Students in Wuhan, China. *Int J Environ Res Public Health*. 2020;17(8):2893
46. World Health Organization. Progress on household drinking water, sanitation and hygiene 2000-2017: special focus on inequalities: World Health Organization; 2019.
47. Smiley SL. Complexities of water access in Dar es Salaam, Tanzania. *Appl Geogr* 2013;41:132-8.
48. ROSC. O Direito a Água e ao Saneamento como um Pilar Chave para o Desenvolvimento Humano. Policy Brief N° 3 | Setembro de 2014. Accessed at: <http://www.rosc.org.mz/index.php/documentos/policy-brief/9-policy-brief-3-o-direito-a-agua-e-ao-saneamento-como-um-pilar-chave-para-o-desenvolvimento-humano-setembro-2014/file>.
49. Brown R. Unequal burden: water privatisation and women's human rights in Tanzania. *Gender Dev* 2010;18(1):59-67.
50. World Bank. Tanzania Mainland Poverty Assessment. Executive Summary. 2019. file:///C:/Users/Hp/Documents/TWORLD%20BANK%20anzania_Mainland_Poverty_Assessment_Report.pdf. Accessed June 5, 2020.
51. Nawa M, Hangoma P, Morse AP, Michelo C. Investigating the upsurge of malaria prevalence in Zambia between 2010 and 2015: a decomposition of determinants. *Malaria journal*. 2019;18(1):61.
52. Tanzania seeks to quantify the informal economy accessed at: <https://oxfordbusinessgroup.com/analysis/easy-does-it-measured-approach-formalisation-getting-positive-results>.
53. Mozambique joins Portuguese-speaking countries to address transition to formal economy accessed at: http://www.oit.org/africa/countries-covered/zambia/WCMS_462681/lang-en/index.htm.
54. Tanzania Population Worldometer. <https://www.worldometers.info/world-population/tanzania>. Accessed on June 10, 2020.
55. Mozambique Population Wordometer. <https://www.worldometers.info/world-population/mozambique>. Accessed on June 10, 2020.
56. Zambia Population Wordometer. <https://www.worldometers.info/world-population/zambia> Accessed on June 10, 2020.
57. Krishnan S, Dunbar MS, Minnis AM, Medlin CA, Gerdtts CE, Padian NS. Poverty, gender inequities, and women's risk of human immunodeficiency virus/AIDS. *Ann NY Aca Sci*. 2008;1136:101.
58. International Monetary Fund (IMF). Tanzania Poverty reduction strategy paper Available at : www.imf.org
59. Global Employment Trends for Youth 2020: Technology and the Future of Jobs. International Labour Office, Geneva. 2020.

60. Strasser R. Rural health around the world: challenges and solutions. *Family practice*. 2003;20(4):457-63.
61. Duboz P, Boëtsch G, Gueye L, Macia E. Self-rated health in Senegal: A comparison between urban and rural areas. *PloS one*. 2017;12(9):e0184416.
62. Shemdoe A, Mbaruku G, Dillip A, Bradley S, William J, Wason D, et al. Explaining retention of healthcare workers in Tanzania: moving on, coming to 'look, see and go', or stay? *Hum Resour Health*. 2016;14(1):2.
63. Kombe G, Galaty D, Mtonga V, Banda P. Human resources crisis in the Zambian health system: a call for urgent action. 2005. Abt Associates Inc: Bethesda, MD.
64. Ferrinho P, Siziya S, Goma F, Dussault G. The human resource for health situation in Zambia: deficit and maldistribution. *Hum Resour Health*. 2011;9(1):30.
65. Quaresima V, Naldini MM, Cirillo DM. The prospects for the SARS-CoV-2 pandemic in Africa. *EMBO Mol Med*. 2020:e12488.
66. Grobbelaar AA, Weyer J, Moolla N, van Vuren PJ, Moises F, Paweska JT. Resurgence of yellow fever in Angola, 2015–2016. *Emerg Infect Dis* 2016;22(10):1854.
67. Nouvellet P, Garske T, Mills HL, Nedjati-Gilani G, Hinsley W, Blake IM, et al. The role of rapid diagnostics in managing Ebola epidemics. *Nature*. 2015;528(7580):S109-S16.
68. Karimuribo ED, Mutagahywa E, Sindato C, Mboera L, Mwabukusi M, Njenga MK, et al. A smartphone app (AfyaData) for innovative one health disease surveillance from community to national levels in Africa: intervention in disease surveillance. *JMIR public health and surveillance*. 2017;3(4):e94.
69. Farnsworth SK, Böse K, Fajobi O, Souza PP, Peniston A, Davidson LL, et al. Community engagement to enhance child survival and early development in low-and middle-income countries: an evidence review. *J health commun* 2014;19(sup1):67-88.
70. Kaneko A, Taleo G, Kalkoa M, Yamar S, Kobayakawa T, Björkman A. Malaria eradication on islands. *Lancet*. 2000;356(9241):1560-4.
71. Cornish F, Priego-Hernandez J, Campbell C, Mburu G, McLean S. The impact of community mobilisation on HIV prevention in middle and low income countries: a systematic review and critique. *AIDS and Behav*. 2014;18(11):2110-34
72. Madon S, Malecela MN, Mashoto K, Donohue R, Mubyazi G, Michael E. The role of community participation for sustainable integrated neglected tropical diseases and water, sanitation and hygiene intervention programs: A pilot project in Tanzania. *Soc Sci & Med* 2018;202:28-37
