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## Experiences among adults and adolescents during the COVID-19 pandemic from four locations across Kenya—Study description

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Experiences among adults and adolescents during the COVID-19 pandemic from four locations across Kenya<sup>1</sup>

Study Description

November 16, 2020

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<sup>1</sup> This document is evolving due to the nature of the COVID-19 response and will be updated as needed.

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DRAFT

## **Abstract:**

To control the spread of coronavirus, the COVID-19 National Emergency Response Committee (NERC) in Kenya, chaired by the Ministry of Health (MOH), has implemented prevention and mitigation measures. To inform the Government of Kenya's shorter- and longer-term response strategies, the Population Council COVID-19 study team utilizes rapid phone-based surveys to collect information on knowledge, attitudes, practices and needs among a longitudinal cohort of heads of household sampled from existing prospective cohort studies. The first was carried out across five Nairobi urban informal settlements; the baseline survey (n=2,009) was conducted March 30-31 with subsequent follow-up surveys conducted April 13-14 (n=1,764), May 10-11 (n=1,750), and June 13-16 (n=1,529) (to be carried out one per subsequent quarter dependent on funding). Adolescents in the Nairobi cohort (n=1,022) were also interviewed in the June round of data collection. The survey was expanded to communities with existing prospective cohort studies in Wajir County (adults n=1,322 and adolescents n=1,234), Kilifi County (adults n=1,288 and adolescents n=1,178), and Kisumu County (adults n=858 and adolescents n=973), adapted for rural settings with the first round conducted between July – August 2020, the second between February – March 2021, and the third between June – August 2021.

Findings on awareness of COVID-19 symptoms, perceived risk, awareness of and ability to carry out preventive behaviors, misconceptions, and fears, as well as the social, health, education and economic effects, will inform the interventions of NERC and the Executive Office of the President's Policy and Strategy Unit (PASU).

In subsequent rounds, new modules may be added to address research questions based on the needs of the MOH or PASU, for specific sites or across. We are committed to openly sharing the latest versions of the study description, questionnaires, datasets, and preliminary results.

## **I. Background**

In the initial stage of the pandemic, sub-Saharan Africa reported some of the lowest [infection rates of COVID-19](#). Numbers began to rise in late March 2020, with confirmed cases increasing across the continent, however, this number may reflect a shortage of tests ("Johns Hopkins Coronavirus Resource Center," 2020). By March 2020, the WHO [detected community transmission](#) in some African countries (including Kenya) and the risk to spreading coronavirus is due in large part to deep challenges in practicing social distancing and frequent handwashing in settings of high population density and lack of running water, as well as the non-specific symptoms of COVID-19 that make it difficult to differentiate from endemic illnesses such as malaria and influenza. Global health experts and African governments have expressed concern about the spread of COVID-19 and potential for more than 2 million deaths in sub-Saharan Africa if no action is taken (Walker et al, 2020). As of September 2020, there have been more than 35,000 cases and more than 600 deaths in Kenya due to COVID-19 ("Johns Hopkins Coronavirus Resource Center," 2020). While Kenya has entered a phased reopening, schools remain closed and curfews in effect. Our surveys and other data show widespread economic and food insecurity, and concerns regarding drop out if school does not resume soon.

Kenya is a large and heterogeneous country; distinct regions of Kenya may experience the pandemic differently. Urban informal settlements are at particularly high risk of transmission and are where COVID-19 has been concentrated to date. They are densely populated, with small informal dwellings, lack of access to clean water, comprised of multi-generational households with shared sanitation facilities, high level of social mixing, and transient residents (Ezeh et al, 2017; Johnstone-Roberston et al, 2011; le Polain de Waroux et al, 2018; Winter et al, 2019). In Wajir County in drought-prone northeastern Kenya, households are largely pastoral and spread out with historical and ongoing food insecurity, and limited health infrastructure, and little to no assistance from government or other institutions. Kilifi, in coastal Kenya, ranks lower than the national average in terms of transition from primary to secondary school and higher in the proportion of girls ages 15-19 who have begun childbearing. Kisumu, in western Kenya, is a hotspot for HIV/AIDS with higher prevalence than national figures. Fragile health systems in all settings will exacerbate the impact of the outbreak and limit the ability to conduct adequate surveillance and control (Makoni, 2020). Implementing personal hygiene and public health behaviors are necessary to curb the spread of coronavirus, such as handwashing and physical distancing, will be challenging if not impossible in densely populated urban settings (Dahab et al, 2020). In rural ones, low access to water will make handwashing near impossible. If movement restrictions from Nairobi to other parts of Kenya are lifted, cases may increase in other settings. In order for prevention and control efforts to be effective, health authorities will need timely and actionable data to design policies and interventions that are easily understood and relevant to the lives of Kenyans in both urban and rural settings, in coastal and inland geographies.

The Government of Kenya (GoK) has launched the COVID-19 National Emergency Response Committee (NERC), chaired by the Ministry of Health, to implement initial prevention and mitigation measures. NERC, in addition to the Executive Office of the President's Policy and Strategy Unit (PASU), is collaborating with the Population Council Kenya to rapidly gather information on the knowledge, attitudes, and practices and needs of households in these four counties in Kenya, for both adults and adolescents, in a series of phone-based surveys. This will inform the development and planning of behavior change campaigns, COVID-19 tracking, and other interventions as needed throughout the pandemic.

## **II. Research Questions**

Collecting knowledge, attitudes, and practices (KAP) surveys among at-risk populations is useful to inform prevention, control and mitigation measures during epidemics. A recent example is from the Ebola response, where KAP surveys yielded critical information to guide response and recovery efforts, health education, and social mobilization. KAP surveys during Ebola identified the prevalence of misconceptions about Ebola transmission and prevention, the need to prevent stigmatization of Ebola survivors, and to foster safer case management and burial practices (Jalloh et al, 2017). Information from these surveys is pivotal for policymakers and program implementers to use only during the outbreak and the recovery stages. We are undertaking a series of KAP surveys among people living in selected locations in Kenya to answer the following questions:

1. What is the current knowledge, attitudes, and practices reported by households related to COVID-19? How do these change over time?
2. What are the main barriers to adoption of key behaviors for COVID-19 prevention (handwashing, social isolation)?
3. What are the social, health, education and economic effects of COVID-19 prevention measures on adults and adolescents?
4. What behavior change messages promoted in new interventions are the most effective at changing the behaviors adopted in these households?

### III. Study Design

To inform the Kenya COVID-19 Taskforce strategy and others, this study will deploy rapid phone-based KAP surveys of households sampled from participants from existing Population Council prospective cohort studies across five Nairobi urban informal settlements, 79 villages in Wajir County, three sub-counties in Kilifi County, and two areas in Kisumu County. In Nairobi, iterations of the survey were initially conducted every 2-4 weeks, beginning in late March 2020, and then are planned to be conducted on a quarterly basis based on funding availability and MOH interest and priorities. Data collection was expanded beyond Nairobi in July with surveys conducted in July-August 2020 and February 2021.

Each survey will last ~45 minutes and be conducted on the phone with a locally based research assistant. Baseline KAP findings on awareness of COVID-19 symptoms, perceived risk, awareness of and ability to carry out preventive behaviors, misconceptions, and fears will inform Taskforce interventions. Each iteration of the survey will include new or modified questions to better understand the social, economic, and secondary health effects of the pandemic. Questions regarding educational plans, food security, gender roles, and time use are also critical.

#### *Embedded studies*

**SMS Effectiveness:** In the June 2020 round of the Nairobi survey, we first randomly assigned three versions of an SMS regarding COVID-19 related stigma. Participants received them twice the week prior to the survey. In that survey we added questions to assess exposure to the SMS, recall of the message, and whether the SMS led to any behavior change. We are analyzing the results to better understand the type of SMS that will have more of an effect on reducing COVID-19 related stigma.

#### *Potential future directions*

After the outbreak, to complement these self-reported data, we can potentially conduct antibody testing to see if the behavior-change messaging actually reduced exposure to COVID-19. Future surveys can assess how the specific mitigation measures, and duration of these measures, impact a range of indicators including health, mental health and well-being, educational attainment and literacy, and economic status. For example, how social distancing influences household consumption patterns and the impacts on income generated.

### *Target population*

Across the four main locations, we have sampled from existing cohort studies for both adult heads of households and adolescent participants. Special care has been taken for calls with adolescents by re-obtaining both their assent and a parent's consent.

**Nairobi:** Our target population is households enrolled in the [Adolescent Girls Initiative – Kenya \(AGI-K\)](#) and [NISITU: Engaging Men and Boys in Girl-Centered Programming](#) studies in five urban informal settlements in Nairobi. AGI-K was comprised of adolescents from 2,565 households in Huruma and Kibera, and NISITU was comprised of adolescents from 4,519 households in Dandora, Kariobangi, and Mathare. In this study, we are collecting data from heads of household. These five study sites are representative of the diversity of informal settlements in Nairobi, although our sample is not fully representative; to be eligible for AGI-K or NISITU, households had to have at least one adolescent residing there (therefore, households with only older residents or only very young children are not included). The last round of data collection for AGI-K was conducted in mid-2019 and for NISITU in late 2019, so phone numbers are up to date.

**Wajir County:** In Wajir, we also contacted households enrolled in the [Adolescent Girls Initiative – Kenya \(AGI-K\)](#) study in 79 villages. Located in northeastern Kenya, Wajir County is an arid region that suffers from chronic and cyclical drought and has high levels of malnutrition and households receiving food assistance. Communities are largely pastoral.

**Kilifi County:** In Kilifi, the sample was drawn from households enrolled in the [Evaluating the Nia Project](#) study in three sub-counties. The Nia Project was an intervention focused on the effect of a menstrual and sexual and reproductive health curriculum on girls' educational attainment.

**Kisumu County:** In Kisumu, the sample was drawn from the DREAMS study cohort; we started with a short household listing and sampled households. The study will take place in Nyalenda and Kolwa East in Kisumu County. Nyalenda is one of the largest informal settlements in Kisumu. It is an established informal settlement suburb and an electoral ward in the Kisumu Town East Constituency. Kolwa East is a peri-urban area.

### *Survey instruments*

**Heads of household:** The first survey will serve as a baseline, asking participants about their awareness of COVID-19, perceived risk of infection, identification of high risk groups, awareness of promoted behaviors, misconceptions regarding treatment and disease spread, and will ask questions about channels through which they receive information, trust in those sources, and perceived ability to carry out preventive behaviors by themselves and their community. The COVID-19 Taskforce has requested questions focused on myths, misconceptions, and fears. Our much larger datasets from AGI-K, NISITU, and Nia data collection in 2019 (and prior) can complement these rapid phone-based surveys, adding additional context (such as household location, household socio-economic status, household composition, cooking indoors, transportation options, and gender perceptions). Subsequent rounds of data collection will ask some of the same questions to see how knowledge, attitudes and practices change over time, and may include new modules to gain more insight into long-term challenges including school drop out, mental health, and economic loss.

The COVID-19 Taskforce requested that the second round of data collection measure information on changes from COVID-19 on daily life, and adjustments to prevention behaviors. The second iteration of the survey added questions about barriers and facilitators to implementation of handwashing, hand sanitizer, and mask-wearing behaviors. Additional questions regarding changes to daily life included whether the household had received assistance in the form of cash vouchers, hand sanitizer, or food, accessed health services, and fears of future disruptions due to COVID-19.

**Adolescents:** In the fourth round of Nairobi data collection, and in the first round of Wajir, Kilifi and Kisumu data collection, we added a survey for a randomly selected adolescent participant that lived in the house of the surveyed adults. Questions were tailored to the adolescent experience, including questions regarding time use, mental health, child marriage, sexual and reproductive health, employment, abuse, and how school closures may have affect their educational plans.

**Social mixing module (sub-study):** In the third round of data collection we administered an extended survey module on social mixing to a subset of survey participants (n=214) in order to inform Centers for Disease Control and Prevention – Kenya (CDC-Kenya) and the Kenya Medical Research Institute (KEMRI)/London School of Hygiene and Tropical Medicine (LSHTM) models.

**SMS intervention module (sub-study):** All Nairobi participants in June received an additional short module of questions related to the SMS intervention. Added questions assessed exposure, knowledge, and attitudes related to the content of the SMS.

### *Limitations*

During the COVID-19 outbreak, it will not be possible to collect data or conduct behavior change campaigns in person, to protect health workers and field-based staff. Behavior change messages will have to rely on channels that do not require face-to-face interaction, such as SMS/WhatsApp, phone calls, radio, television, and social media. Working with the COVID-19 Taskforce, we will investigate the potential to randomly assign these behavior change messages and quickly evaluate self-reported reactions to these messages (including understanding of the message, changes in behavioral intentions) to help tailor the next iteration of the campaign. However, due to the urgency around the COVID-19 response, there may not be time to randomize these messages. Randomization requires extensive coordination that may not be a priority for the Taskforce at this time. For example, the MOH may push out one general behavior change message to the whole country, or the whole city of Nairobi at once. In this case, we cannot compare the effectiveness of one type of message to another. However, we can still conduct additional rounds of rapid surveys to assess exposure to and awareness of government messaging campaigns (and campaigns run by other public health partners) and we can use causal inference statistical approaches (propensity score matching, potentially others) to determine the effectiveness of that campaign. Baseline responses can be analyzed cross-sectionally, but longitudinal approaches will be applied to evaluate changes in individuals over time. The outcomes explored in early stages will be self-reported awareness and self-reported uptake of promoted behaviors.

#### IV. Progress to date

##### *Data collection and preliminary results*

**Nairobi informal settlements:** The baseline survey was conducted March 30-31 and included a cohort of 2,009 individuals (63% female) evenly distributed across the five informal settlement locations. Brief highlighting results [here](#).

The second survey was conducted April 13-14 and reached 1,764 respondents from the initial cohort (88% response rate). Brief highlighting results [here](#).

The third survey was conducted May 10-11 and reached 1,750 respondents from the initial cohort (87% response rate). Brief highlighting results [here](#).

The fourth survey was conducted June 13-16 and reached 1,529 respondents from the initial cohort (76% response rate). Brief highlighting results [here](#).

The adolescent survey was conducted June 13-16 and reached 1,022 adolescent respondents. Brief highlight results [here](#).

**Wajir County:** The first survey in Wajir County was conducted July 16-30 with 1,322 adults and 1,234 adolescents. Brief for adults [here](#) and for adolescents [here](#).

**Kisumu County:** The first survey in Kisumu County was conducted from August 15-19 with 858 adults and 973 adolescents. Briefs for adults [here](#) and adolescents [here](#).

**Kilifi County:** The first survey round in Kilifi County was conducted from August 15-19 with 1,288 adults and 1,178 adolescents. Briefs for adults [here](#) and adolescents [here](#).

Multisite brief on the most recent rounds of data collection from June and August among adolescents across all sites [here](#).

##### *Peer-reviewed manuscripts – published and in progress*

1. M Quaife, K van Zandvoort, A Gimma, K Shah, N McCreesh, K Prem, E Barasa, D Mwangi, B Kangwana, J Pinchoff, CMMID COVID-19 Working Group, J Edmunds, CI Jarvis, K Austrian. 2020. The impact of COVID-19 control measures on social contacts and transmission in Kenyan informal settlements, *BMJ Medicine* 18(136). <https://doi.org/10.1186/s12916-020-01779-4>
2. K Austrian, J Pinchoff, JB Tidwell, C White, T Abuya, et al. COVID-19 Related Knowledge, Attitudes Practices and Needs of Households in Informal Settlements in Nairobi, Kenya. WHO Bulletin. (Under review); preprint available: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3576785](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3576785)
3. J Pinchoff, W Avis, K Austrian, T Abuya, R Ochako, M Nzioki, F Mbushi, S Bartington. Impacts of the COVID-19 global pandemic upon domestic cooking fuel availability, usage and implications for household air pollution exposure in Nairobi, Kenya. *World Development special issue "Pandemics, COVID-19, and sustainability and development"* (under review)
4. J Pinchoff, K Austrian, N Rajshekhar, T Abuya, B Kangwana, R Ochako, JB Tidwell, D Mwangi, E Muluve, F Mbushi, M Nzioki, TD Ngo. Gendered social, health and economic effects of the COVID-

19 pandemic and mitigation policies in Kenya: evidence from a prospective cohort survey in Nairobi informal settlements. *BMJ Open*. (under review)

5. M Bellerose, M Diaw, J Pinchoff, B Kangwana, K Austrian. 2020. Influence of Pre-pandemic Characteristics on Girls' Transitions to Adulthood During COVID-19. *Girlhood Studies: An Interdisciplinary Journal*. 13 (3).
6. J Pinchoff, C Kraus-Perrotta, K Austrian, JB Tidwell, T Abuya, D Mwanga, B Kangwana, R Ochako, E Muluve, F Mbushi, M Nzioki, TD Ngo. Mobility patterns during COVID-19 travel restrictions in Nairobi informal settlements: who is leaving home and why. *Urban Health*. (under review)
- 7.

## **V. Contribution to Response**

### *Partnership with MOH*

The MOH in Kenya is the chair of the COVID-19 National Emergency Response Committee, and Population Council-Kenya has been approached as an evidence partner to gather critical information to support prevention and mitigation policies and interventions. Specifically, NERC is requesting data on COVID-19 related knowledge, attitudes, and practices of urban informal settlement dwellers. NERC requires rapid, actionable data in near real-time. We will continue to work with NERC, in addition to PASU, to ensure our work is accessible and useful to their planning.

### *Partnership with the Executive Office of the President Policy and Strategy Unit (PASU)*

PASU is partnering with Population Council-Kenya on the adolescent component of the study as part of their efforts to guide investments in adolescent girls in the country. The work will include a road map for investment in Kenyan girls that includes information on the situation of girls pre-COVID, what happened to girls during COVID, and what evidence-based investments should be made in and with girls during the COVID recovery period.

### *Other partnerships*

The CDC-Kenya and KEMRI/LSHTM are developing epidemiological models that project the trajectory of COVID-19 transmission, morbidity and mortality in Kenya. Some of the data in these models is based on assumption from non-African settings. Therefore, we are collaborating with CDC-Kenya and KEMRI/LSHTM<sup>2</sup> to provide social mixing data to inform their modeling efforts in the Kenyan setting. We adapted a social mixing module with input from these groups. Together, these efforts aim to produce more accurate models for Kenya that can inform decision-making.

We have also partnered with the Quantitative Measurement of Gender Equality and Empowerment (EMERGE) project at the University of California at San Diego and the Global Early Adolescent Study at Johns Hopkins University to inform and collaborate on the adolescent surveys and gender component of the adult surveys.

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<sup>2</sup> See more information on LSHTM's Centre for the Mathematical Modelling of Infectious Diseases <https://cmmid.github.io/topics/covid19/>

### *Gender lens*

Women and girls are highly vulnerable during an epidemic or crisis, it is critical to disaggregate by gender in all of our analyses. In many settings, women and girls are at increased risk during an epidemic because they are responsible not only for caring for the elderly and children, but because they often make up more than half of the healthcare workforce (Wenham et al, 2020). Financial opportunities and access to resources, information, and support will be severely affected as schools and businesses close and social distancing measures are put in place. Sexual and gender-based violence is already very prevalent in these communities. In humanitarian emergencies and noted in China after COVID-19 lock down, risk of gender-based violence increases (Wanqing, 2020). Our ongoing evaluations in Nairobi, AGI-K and NISITU, are both designed to address gender specific needs. Our adolescent surveys are exploring the effects of gender on time use, mental health, experience of violence, hunger, and likelihood of returning to school.

### **Open access**

We are committed to openly sharing the latest version of this study description, questionnaires, datasets, and preliminary results. Please visit the Population Council COVID-19 Research & Evaluations [page](#) on Dataverse regularly for updates.

### **References**

- Dahab, M., van Zandvoort, K., Flasche, S., Warsame, A., Spiegel, P. B., Waldman, J., & Checchi, F. (2020, March 20). *COVID-19 control in low-income settings and displaced populations: What can realistically be done?* <https://www.lshtm.ac.uk/newsevents/news/2020/covid-19-control-low-income-settings-and-displaced-populations-what-can>
- Ezeh, A., Oyebode, O., Satterthwaite, D., Chen, Y.-F., Ndugwa, R., Sartori, J., Mberu, B., Melendez-Torres, G. J., Haregu, T., Watson, S. I., Caiaffa, W., Capon, A., & Lilford, R. J. (2017). The history, geography, and sociology of informal settlements and the health problems of people who live in informal settlements. *Lancet (London, England)*, 389(10068), 547–558. [https://doi.org/10.1016/S0140-6736\(16\)31650-6](https://doi.org/10.1016/S0140-6736(16)31650-6)
- Ioannidis, J. P. A. (2020). Coronavirus disease 2019: The harms of exaggerated information and non-evidence-based measures. *European Journal of Clinical Investigation*, n/a(n/a), e13223. <https://doi.org/10.1111/eci.13223>
- Jalloh, M. F. (2017). Knowledge, Attitudes, and Practices Related to Ebola Virus Disease at the End of a National Epidemic—Guinea, August 2015. *MMWR. Morbidity and Mortality Weekly Report*, 66. <https://doi.org/10.15585/mmwr.mm6641a4>
- Johns Hopkins Coronavirus Resource Center*. (2020). Johns Hopkins Coronavirus Resource Center. <https://coronavirus.jhu.edu/>
- Johnstone-Robertson, S. P., Mark, D., Morrow, C., Middelkoop, K., Chiswell, M., Aquino, L. D. H., Bekker, L.-G., & Wood, R. (2011). Social Mixing Patterns Within a South African Township Community:

Implications for Respiratory Disease Transmission and Control. *American Journal of Epidemiology*, 174(11), 1246–1255. <https://doi.org/10.1093/aje/kwr251>

le Polain de Waroux, O., Cohuet, S., Ndazima, D., Kucharski, A. J., Juan-Giner, A., Flasche, S., Tumwesigye, E., Arinaitwe, R., Mwanga-Amumpaire, J., Boum, Y., Nackers, F., Checchi, F., Grais, R. F., & Edmunds, W. J. (2018). Characteristics of human encounters and social mixing patterns relevant to infectious diseases spread by close contact: A survey in Southwest Uganda. *BMC Infectious Diseases*, 18. <https://doi.org/10.1186/s12879-018-3073-1>

Makoni, M. (2020). Africa prepares for coronavirus. *The Lancet*, 395(10223), 483. [https://doi.org/10.1016/S0140-6736\(20\)30355-X](https://doi.org/10.1016/S0140-6736(20)30355-X)

Prem, K., Liu, Y., Russell, T.W., Kucharski, A.J., Eggo, R.M., Davies, N., Centre for the Mathematical Modelling of Infectious Diseases COVID-19 Working Group, Jit, M., & Klepac, P. (2020). The effect of control strategies to reduce social mixing on outcomes of the COVID-19 epidemic in Wuhan, China: a modelling study. *The Lancet Public Health*, 5(5), E261-E270. [https://doi.org/10.1016/S2468-2667\(20\)30073-6](https://doi.org/10.1016/S2468-2667(20)30073-6)

Vigdor, N. (2020, March 24). Man Fatally Poisons Himself While Self-Medicating for Coronavirus, Doctor Says. *The New York Times*. <https://www.nytimes.com/2020/03/24/us/chloroquine-poisoning-coronavirus.html>

Walker, P., Whittaker C., Watser, O., et al (2020). The Global Impact of COVID-19 and Strategies for Mitigation and Suppression. WHO Collaborating Centre for Infectious Disease Modelling, MRC Centre for Global Infectious Disease Analysis, Abdul Latif Jameel Institute for Disease and Emergency Analytics, Imperial College London. <https://www.imperial.ac.uk/media/imperial-college/medicine/sph/ide/gida-fellowships/Imperial-College-COVID19-Global-Impact-26-03-2020.pdf>

Wanqing, Z. (2020, March 2). *Domestic Violence Cases Surge During COVID-19 Epidemic*. Sixth Tone. <https://www.sixthtone.com/news/1005253/domestic-violence-cases-surge-during-covid-19-epidemic>

Wenham, C., Smith, J., & Morgan, R. (2020). COVID-19: The gendered impacts of the outbreak. *The Lancet*, 395(10227), 846–848. [https://doi.org/10.1016/S0140-6736\(20\)30526-2](https://doi.org/10.1016/S0140-6736(20)30526-2)

Winter, S., Dzombo, M.N. & Barchi, F. Exploring the complex relationship between women’s sanitation practices and household diarrhea in the informal settlements of Nairobi: a cross-sectional study. *BMC Infect Dis* 19, 242 (2019). <https://doi.org/10.1186/s12879-019-3875-9>

Wong, G., Liu, W., Liu, Y., Zhou, B., Bi, Y., & Gao, G. F. (2015). MERS, SARS, and Ebola: The Role of Super-Spreaders in Infectious Disease. *Cell Host & Microbe*, 18(4), 398–401. <https://doi.org/10.1016/j.chom.2015.09.013>

World Health Organization. (n.d.). *Coronavirus Disease Situation Reports*. Retrieved March 25, 2020, from <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>