Africa Research, Implementation Science, and Education (ARISE) Network monitoring surveys to inform response to the COVID-19 crisis and vaccine scale-up across sub-Saharan Africa

Principal Investigator:
Wafaie Fawzi
Professor of Nutrition, Epidemiology, and Global Health
Harvard T.H. Chan School of Public Health
mina@hsph.harvard.edu

Co-Principal Investigators:
Abdramane Soura, University of Ouagadougou, Burkina Faso
Ali Sie, Nouna Health Research Center, Burkina Faso
Ayoade Oduola, University of Ibadan Research Foundation, Nigeria
Emily R. Smith, George Washington Milken Institute School of Public Health, USA
Japhet Killewo, Muhimbili University of Health and Allied Sciences, Tanzania
Mary Mwanyika Sando, Africa Academy for Public Health, Tanzania
Nega Assefa, Haramaya University, Ethiopia
Said Vuai, University of Dodoma, Tanzania
Sulemana Abubakari, Kintampo Health Research Centre (KHRC), Ghana
Till Barnighausen, Heidelberg Institute of Global Health, Germany
Yemane Berhane, Addis Continental Institute of Public Health, Ethiopia

Funding source:
This project is funded by the Harvard Center for African Studies and institutional support from the Heidelberg Institute of Global Health, the Harvard T.H. Chan School of Public Health, Addis Continental Institute of Public Health, and the George Washington University Milken Institute School of Public Health.

Background

As COVID-19 vaccine availability increases, it is critical to understand reasons for vaccine hesitancy and knowledge, perceptions, and beliefs regarding vaccines to inform campaigns to increase vaccine uptake in sub-Saharan Africa (SSA). The Africa Research, Implementation Science and Education (ARISE) Network recently completed a survey to assess drivers of vaccine acceptance and hesitancy and the health and socioeconomic impacts of the pandemic over time among adults, adolescents and healthcare providers across SSA. This survey will provide important data on vaccine hesitancy and consequences of the pandemic to facilitate more effective and targeted interventions and provide decision-makers with data and tools to strengthen vaccination campaigns.

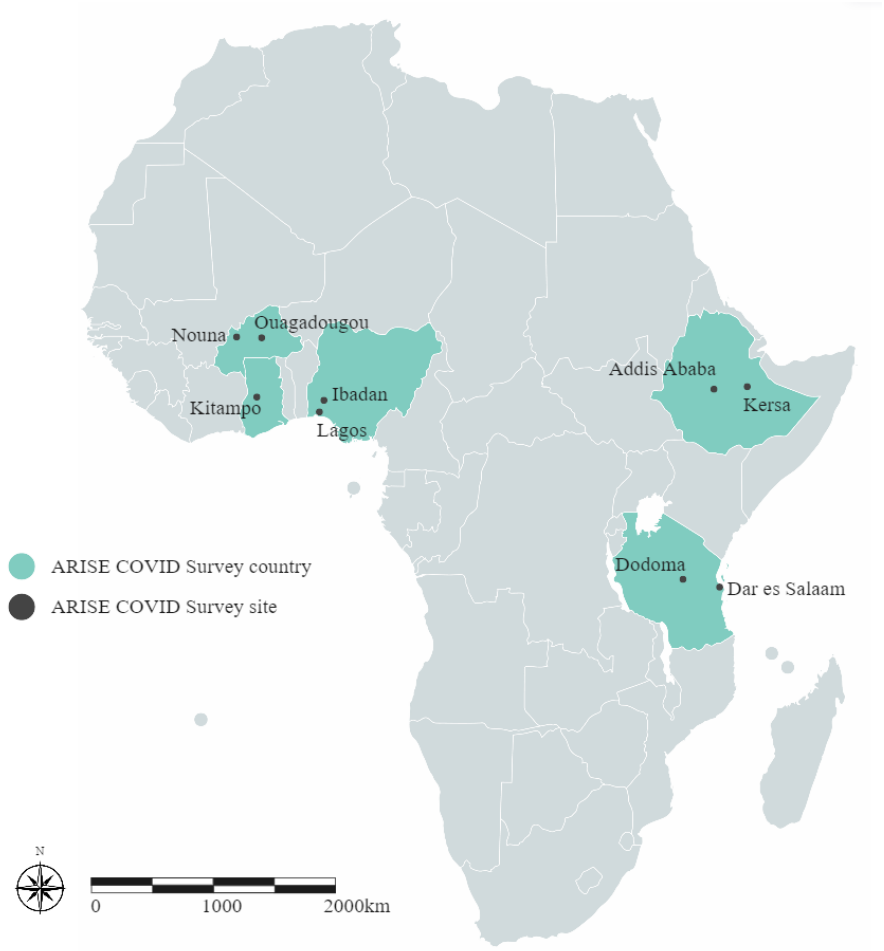
The ARISE Network is a collaboration between Harvard T.H. Chan School of Public Health, Harvard-affiliated Africa Academy of Public Health and public health research and training institutions from nine countries across the African region. As the COVID-19 pandemic spread throughout the globe in 2020, the Network assembled to address important evidence gaps on the pandemic's health and economic consequences in SSA. The Network established a mobile survey platform in Ethiopia, Burkina Faso, and Nigeria to conduct longitudinal surveillance for evidence generation on knowledge and practices related to COVID-19 prevention and management and the impact of the outbreak on other health domains. Using this platform, a baseline survey among healthcare workers, adolescents and adults in six urban and rural sites was conducted. Findings from the baseline survey highlight deficiencies in COVID-19 knowledge, attitudes and practices among these population groups and demonstrate serious consequences of COVID-19 on domains including nutrition and food security; education for adolescents; and healthcare access and utilization. Findings from this survey were published in six manuscripts in the American Journal of Tropical Medicine and Hygiene (linked here) and key results are summarized in five policy briefs (linked here).

In collaboration with the Africa Centres for Disease Control and Prevention (Africa CDC), the Network completed a second survey focusing on vaccine perceptions and hesitancy in Ghana, Tanzania, Ethiopia, Nigeria and Burkina Faso. This second round aimed to survey the same healthcare workers, adolescents, and adults in the urban and rural sites in Ethiopia (Addis Ababa and Kersa), Burkina Faso (Nouna and Ouagadougou), and Nigeria (Ibadan and Lagos) to assess changes in COVID-19 impacts over time. It also included new sites in Tanzania (Dar es Salaam and Dodoma) and Ghana (Kintampo). To address the ongoing rollout of vaccines in Africa, the second survey round included an additional module on vaccine knowledge, perceptions, beliefs; reasons for vaccine hesitancy or acceptance; and trusted sources of information regarding vaccines. These findings will be relevant to policy makers in SSA who are in need of reliable, timely, data to prioritize areas of intervention to reduce vaccine hesitancy and the negative impacts of the pandemic.

Study setting and design

The round 1 survey took place from July to November 2020 and the round 2 survey took place from July to December 2021. The study rationale, sampling strategies, descriptions of the study sites in Ethiopia, Nigeria and Burkina Faso, and the use of computer assisted telephone interviewing to conduct the phone interviews are described in detail elsewhere.[1] Investigators at each site selected the specific study communities, including one urban and one rural area within each country to understand the potentially different impacts of COVID-19 on different settings (with the exception of Ghana, where only a rural site was included). The urban study communities were Dar es Salaam, Tanzania; Ouagadougou, Burkina Faso; Addis Ababa, Ethiopia, and Lagos, Nigeria. The rural communities were Dodoma, Tanzania; Kintampo, Ghana; Nouna, Burkina Faso; Kersa, Ethiopia; and Ibadan, Nigeria (Figure 1).

Figure 1. Map of study sites included in the ARISE COVID-19 Round 2 Survey, 2021



Household survey: To survey adults and adolescents, sites used different sampling frames, depending on the platforms available, including the following: existing Health and Demographic Surveillance Systems (HDSS) in Burkina Faso, Ghana, Tanzania and rural Ethiopia (Kersa); Nigeria Living Standards Survey (NLSS) 2018–2019 and telephone service providers in Nigeria; and a household survey we established in urban Ethiopia (Addis Ababa) during round 1. Eligible potential participants in all communities were randomly selected from household and household member sampling frames derived from the HDSS or other recent census records (except for Addis Ababa, where a new census was conducted during round 1) to achieve a target sample size of 300 adults and 300 adolescents per site. From each household, we selected one adult 20 years or older and one adolescent 10 to 19 years of age if there was at least one adolescent regularly residing in the household. Adolescents who were aged 19 during round 1 and aged 20 during round 2 were also eligible to participate in the round 2 survey. Verbal informed consent was provided from all participants.

Healthcare workers: The sampling frames for healthcare providers were constructed by obtaining lists from medical professional associations and healthcare facilities in each country and narrowing the lists to focus on providers in urban areas in Tanzania, Burkina Faso, Ethiopia and Nigeria (Dar es Salaam, Ouagadougou, Addis Ababa, Lagos, and Ibadan) and in a rural area in Kintampo, Ghana. Providers from each country were randomly selected from each sampling frame and called until the target sample size of 300 providers per site

was reached. We chose to focus on providers only in urban areas because of practical considerations of higher numbers of providers in urban areas and increased availability of contact information for these providers compared with those in rural areas. However, in Ghana, sufficient numbers of providers were available in Kintampo, so we included this rural area. Healthcare workers were eligible to be included in the study if they were currently working in a healthcare setting. Clinicians from both public and private health facilities were recruited; there were no restrictions regarding medical specialties or whether they were providing COVID-19-related services. Dentists, pharmacists, and other allied health professionals (such as therapists and dietitians) were excluded.

Participant sampling and recruitment

In round 1, 900 healthcare workers, 1,797 adolescents, and 1,795 adults from the six urban and rural sites were included. In round 2, participants included in the round one survey in Ethiopia, Burkina Faso and Nigeria were re-contacted, asked if they would like to participate in the round two survey and re-consented. Participants who declined to participate were replaced with new participants in each country. Study sites in Tanzania and Ghana were added during the second survey and therefore all participants in these sites were new participants who had not participated in the first survey round**. Figure 1, Figure 2** and **Figure 3** show the total number of participants sampled, contacted and interviewed in each country for adults, adolescents and healthcare providers, respectively. A total of 2,830 adults, 2,840 adolescents and 1,499 healthcare providers were included in the second survey round. Among countries included in round 1 (Burkina Faso, Nigeria and Ethiopia), the retention rate was 64% for healthcare providers, 58% for adults and 48% for adolescents (**Table 1**).

Table 1. Retention rate across ARISE COVID-19 Survey rounds 1 and 2[1]

Survey	**Burkina**		**Ethiopia**		**Nigeria**		
	Nouna	*Ouaga*	*Kersa*	*Addis*	*Ibadan*	*Lagos*	*Total*
Healthcare providers	NA	222/300 (74%)	NA	208/300 (69%)	147/300 (49%)		577/900 (64%)
Adults	215/297 (72%)	176/300 (59%)	181/297 (61%)	167/288 (60%)	147/304 (48%)	161/311 (52%)	1047/1797 (58%)
Adolescents	185/297 (62%)	181/300 (60%)	109/294 (37%)	198/296 (67%)	120/365 (33%)	31/243 (13%)	854/1795 (48%)

1. Number of R1 participants interviewed in round 2 divided by the total sample size for each group from round 1

Figure 1. ARISE COVID-19 Survey Round 2 participant flowchart for the adult household survey across five countries, 2021

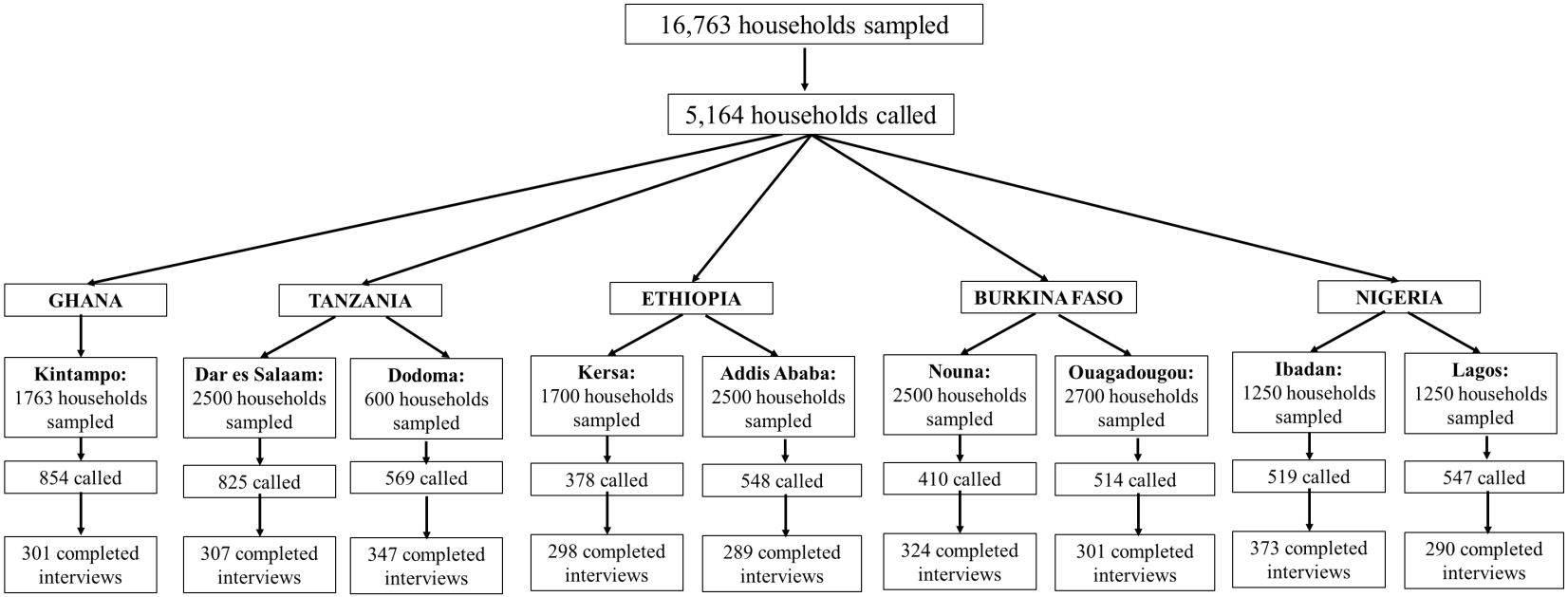


Figure 2. ARISE COVID-19 Survey Round 2 participant flowchart for the adolescent household survey across five countries, 2021

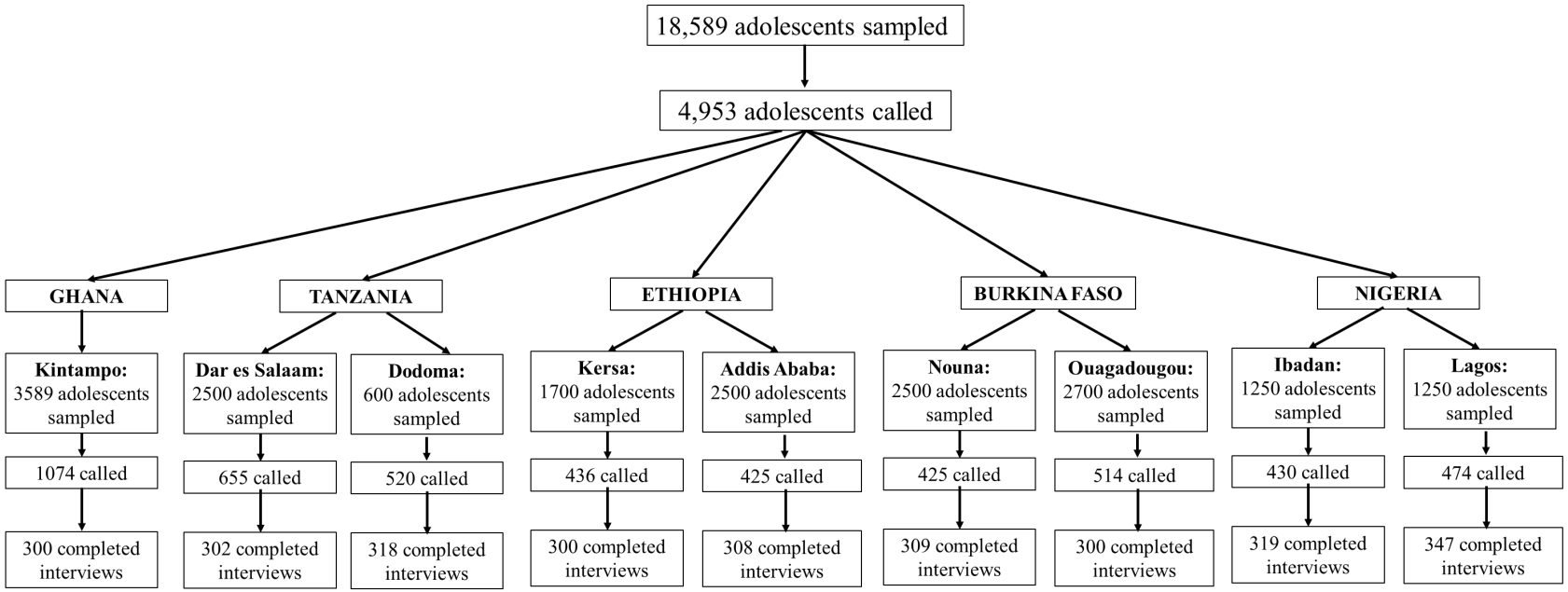
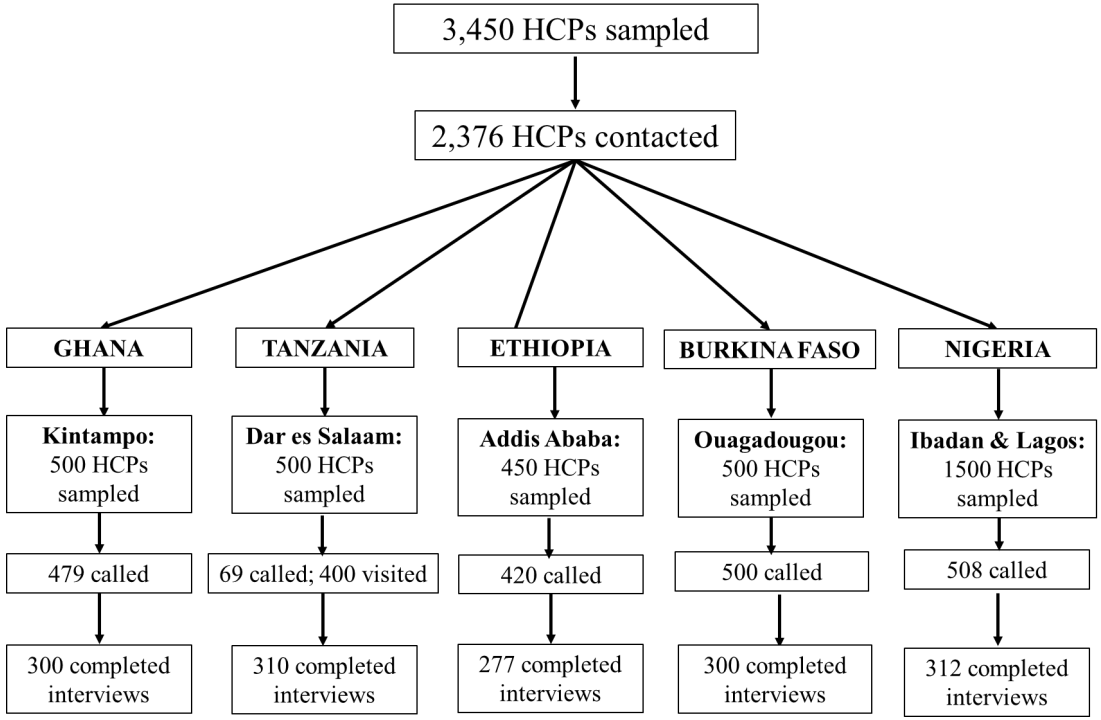


Figure 3. ARISE COVID-19 Survey Round 2 participant flowchart for the healthcare provider household survey across five sub-Saharan African countries, 2021



Description of Study Sites added in Round 2

Please see Hemler EC et al[1] for a description of urban and rural sites included in survey round 1 in Burkina Faso, Ethiopia and Nigeria.

Dar es Salaam, Tanzania. Dar es Salaam is the largest city in Tanzania and the country's business and financial center. The Dar es Salaam Urban Cohort Study (DUCS) Health and Demographic Surveillance System (HDSS) is in the Ilala region in the Ukonga and Gongo la Mboto wards, about 20 km from the city centre.[2] The HDSS includes 14,754 households comprised of 143,452 household members of which 30,446 are adolescents aged 10 to 19 years. For this survey, the team randomly selected 2,500 households with adolescent members and called selected households until the final target sample size of 300 adults and 300 adolescents was reached.

For the healthcare providers' data collection, names and telephone numbers were obtained from 19 public healthcare facilities through regional and local government authorities. The lists obtained included 338 nurses and 384 physicians/doctors. It was challenging to reach healthcare providers over the phone and complete interviews; only 9 successful interviews were completed after calling 69 healthcare providers. Therefore, to reach the final sample size of 300 healthcare providers, the majority of HCPs were visited physically and interviews were conducted face to face in healthcare facilities after setting appointments by phone. The household and healthcare provider surveys were conducted in September and October 2021.

Dodoma, Tanzania. The Dodoma HDSS is situated in Dodoma region, central Tanzania. Dodoma has seven districts namely Bahi, Chamwino, Kondoa, Mpwapwa, Kongwa, Chemba and Dodoma Urban with a population of 2,083,588 people.[3] The HDSS has been implemented in two wards of the Chamwino district and covers a total of 5,266 households with 23,785 individuals.[4] Chamwino has a total area of 8,742 km^2 with 777 hamlets, 78 villages and 32 wards which together aggregate into five (5) divisions. The implementing wards Mlowa barabarani (containing three villages) and Makang'wa (containing two villages) are located alongside a highway from Dodoma to Iringa approximately 52 km from Dodoma municipal.

Telephone numbers of the HDSS members were collected during baseline and first round of the data collection in 2018 and 2019. For the COVID-19 study, 600 households were randomly selected from the list of 2,450 households with telephone numbers and called until the target sample size was reached for adults and adolescents. Data collection took place in October 2021.

Kintampo, Ghana. Kintampo is one of the municipalities of the Bono East region located in central Ghana. The Kintampo Health and Demographic Surveillance System (Kintampo HDSS) was established in 2003, and covers mainly rural communities.[5] Currently, it has three sites (Kintampo, Techiman and Nkoranza) that cover a population of about 430,722 individuals and 98,040 households in six out of 11 administrative municipalities and districts in Bono East region.[6] Kintampo HDSS routinely collects data on events including pregnancy, birth, and in- and out-migration every six months; other household characteristics including socio-economic status and telephone numbers are also collected.[7]

The Kintampo site including 163,182 individuals and 39,134 households served as the sampling frame for both adults and adolescents in this survey.[6] From this sampling frame, 1,763 adults were sampled and 854 were called to reach the final sample size of 301 completed adult interviews. For

adolescents, 3589 were sampled and 1074 were called to reach the final sample size of 300 completed adolescent interviews. For the healthcare worker survey, names and contact numbers of 1,783 healthcare workers were obtained from 25 government health facilities in Kintampo, Techiman and Nkoranza Municipal Health Directorates, Ghana Health Service and seven private health facilities within the Kintampo HDSS area. From this list, 500 healthcare workers were sampled and 479 were called to reach the final sample size of 300 healthcare workers. All surveys were completed between July and October 2021, during the rainy season.

Appendix 1. ARISE COVID-19 Survey Round 2 Adult Household Survey Questionnaire

Appendix 2. ARISE COVID-19 Survey Round 2 Adolescent Household Survey Questionnaire

Appendix 3. ARISE COVID-19 Survey Round 2 Healthcare Provider Questionnaire

References:

1. Hemler EC, Korte ML, Lankoande B, Millogo O, Assefa N, Chukwu A, Workneh F, Tinkasimile A, Lyatuu I, Soura A, Wang D, Madzorera I, Vuai S, Bärnighausen T, Sando MM, Killewo J, Oduola A, Sie A, Berhane Y, Fawzi WW. Design and Field Methods of the ARISE Network COVID-19 Rapid Monitoring Survey. Am J Trop Med Hyg. 2021 Jun 23;105(2):310-322. doi: 10.4269/ajtmh.20-1618.

2. Leyna GH, Berkman LF, Njelekela MA, Kazonda P, Irema K, Fawzi W, Killewo J, Profile: The Dar Es Salaam Health and Demographic Surveillance System (Dar es Salaam HDSS). Int J Epidemiol, 2017 June; 46(3): 801–808. https://doi.org/10.1093/ije/dyw324.

3. Tanzania National Bureau of Statistics, 2012. Population Distribution by Age and Sex. http://tanzania.countrystat.org/fileadmin/user_upload/countrystat_fenix/congo/docs/Population%20Distribution%20by%20Age%20and%20Sex%20Report-2012PHC.pdf

4. 3. Ismail A, Darling AM, Mosha D, Fawzi W, Sudfeld C, Sando MM, Abdallah Noor R, Charles J, Vuai S. Prevalence and risk factors associated with malnutrition among adolescents in rural Tanzania. Trop Med Int Health. 2020 Jan;25(1):89-100. doi: 10.1111/tmi.13331.

5. Abubakari, S., Enuameh, Y. A., Mahama. E., Nettey, O. E. A., Adjei, G., Nuamah, G. F., *et al.* (2015) Adolescents' Willingness and Intentions to Use Contraceptives in Rural Ghana. Open Journal of Social Sciences, 3, 239-249. http://dx.doi.org/10.4236/jss.2015.311029

6. KHRC. Kintampo Health Research Research Centre Annual Report [Internet]. Kintampo North Municipal; 2020. Available from: https://kintampo-hrc.org/wp-content/uploads/2021/03/khrc-annual-report-2010.pdf

7. Owusu-Agyei, S., Nettey, O. E. A., Zandoh, C., Abubakari, S., Adda, R., Amenga-Etego, S., et al. Demographic patterns and trends in Central Ghana: baseline indicators from the Kintampo Health and Demographic Surveillance System. Glob Health Action. 2012;5(June 2014):1–11.