KINTAMPO HEALTH
RESEARCH CENTRE

ANNUAL REPORT

2022

RESEARCH TO POLICY

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ACRONYMS/ABBREVIATIONS

ACT	Artemisinin-based Combination Therapy
AEs	Adverse Events
AESI	Adverse Events of Special Interest
AFI	Acute Febrile Illnesses
ALT	Alanine amino transferase
AMR	Antimicrobial Resistance
ANC	Antenatal Clinic
AST	Aspartate amino transferase
CEM-gH	Consortium to Evaluate Mosquirix in Ghana
CHPS	Community-Based Health Planning and Services
CO	Carbon Monoxide
COPD	Chronic Obstructive Pulmonary Disease
CTCAE	Common Terminology Criteria for Adverse Events
DHFR	Dihydrofolate reductase
DHPS	Dihydropteroate synthase
DNA	Deoxyribonucleic Acid
DSMb	Data Safety and Monitoring Board
EPI	Expanded Programme on Immunization
FDA	Food and Drugs Authority
FEV1	Forced Expiratory Volume in 1second
gbS	Group B streptococcus
gCS	Ghana Cookstove Study
gHS	Ghana Health Service
gHS ERC	Ghana Health Service Ethical Review Committee
gRAPHS	Ghana Randomized Air Pollution and Health Study
gRIP	Group B streptococcus (GBS), Respiratory syncytial virus (RSV) Influenza, and Pertussis
GSED	Global Scale for Early Development
gSK	GlaxoSmithKline
HAP	Household Air Pollution
HAPIT	Household Air Pollution Intervention Tools
Hb	Hemoglobin
IPTp-SP	Intermittent preventive treatment in pregnancy using sulphadoxine-pyrimethamine
ISAAC	International Study of Asthma and Allergies in Childhood
KHRC	Kintampo Health Research Centre
KHRC IEC	Kintampo Health Research Centre Institutional Ethics Committee
KNUST	Kwame Nkrumah University of Science and Technology
LbW	Low Birth Weight
LPg	Liquified Petroleum Gas

ACRONYMS/ABBREVIATIONS

LSHTM	London School of Hygiene and Tropical Medicine
NC/NT-SAE	Non- communicable and Traumatic Serious Adverse Events
NCDs	Non-communicable Diseases
NHLbI	National Heart Lung Blood Institute
NIH	National Institute of Health
PATH	Program for Appropriate Technology in Health
PE/E	Preeclampsia/eclampsia
PF	Practice Facilitation
PKR	Pyruvate Kinase-Red Blood Cell
PM2.5	Particulate Matter (PM) that have a diameter of less than 2.5 micrometers
PrCr	Protein Creatinine
RCT	Randomized Control Trial
RE-AIM	Reach Effectiveness Adoption Implementation Maintenance Framework
RSV	Respiratory syncytial virus
RTS,S/AS01E	Malaria Vaccine
SAbAUSE	Sociocultural determinants of antibiotic access and use
	Severe Acute Respiratory Infections
SARS-CoV-2	Respiratory Syndrome – Coronavirus 2
SCD	Sickle Cell Disease
SEforALL	Sustainable Energy for All
SP	Sulphadoxine Pyrimethamine
SSA	Sub-Saharan Africa
TASSH	Task Strengthening Strategy for Hypertension Control
TSF	Task Strengthening Facilitation
UC	Usual Care
WHO	World Health Organization
WRA	Women of Reproductive Age
VE	Vaccine Effectiveness
VOC	Vaso-Occlusive Crises

MISSION

Use our expertise and core values to:

• conduct public health and biomedical research that will influence policy direction and programme implementation that seek to significantly improve well-being and reduce ill-health.

• at all times be committed to the conduct of high-quality research that is ethical.

• ensure integrity of data generated.

VISION

Be a centre of excellence that conducts high quality research to shape local and international health policy, programs and practices.

CORE VALUES

• Team work
• Excellence
• Collaboration
• Capacity development
• Integrity
• Accountability
• Innovation
• Equity
• Diversity

GUIDING PRINCIPLES

• Population based research
• High quality and cost-effective research
• Strategic partnerships
• Formidable data management
• Inter sectorial collaboration
• Evidence-based practice.
• Publications and dissemination of findings.

Epidemiology study of malaria transmission intensity in sub-Saharan Africa

(EPI-MAL-005)

Investigators

Dr. Kwaku Poku Asante, Dr. Seyram Kaali, Dr. Prince Agyapong Darko, Dr. Samuel Ekow Harrison

Funder:
GlaxoSmithKline Biologicals

Study duration:
10 years

Project start date:
21st September, 2014

Project end date:
11th March, 2023

Background

This epidemiology study (EPI-MAL-005) is planned to run in parallel with two conservative safety monitoring vaccine studies (EPI-MAL-002 and EPI-MAL-003) which will monitor incidence rate of protocol defined adverse events of specific interest (AESI) and non-communicable and traumatic serious adverse events (NC/NT-SAE).

Objectives

- To obtain longitudinal estimates of P. falciparum parasite prevalence in order to characterise malaria transmission intensity in a standardised way at centres conducting the EPI-MAL-002 and EPI-MAL-003 studies before and after the introduction of the malaria vaccine RTS,S/AS01E in sub-Saharan Africa.

- To obtain longitudinal estimates of the use of malaria control interventions in centres conducting the EPI-MAL- 002 and EPI-MAL-003 studies before and after the introduction of the malaria vaccine RTS,S/AS01E in sub-Saharan Africa.

Methodology

All medications that may influence malaria parasitaemia within 14 days prior to each survey will be recorded. Axillary body temperature of all subjects at the time of the survey will be recorded. A capillary blood sample will be obtained for evaluation of malaria infection by blood slide and Nucleic Acid Amplification Test (NAAT). In the event of measured fever at the time of the visit (axillary temperature ≥37.5°C) or fever reported in the last 24 hours or other symptoms/signs of clinical malaria, a Rapid Diagnostic Test (RDT) will be conducted. If the RDT is positive, treatment will be given according to National guidelines.

If a subject for whom no RDT was required is identified as being parasite positive following microscopy, National guidelines should be followed for clinical management of the subject. Microscopy and NAAT will be used to evaluate the level of asexual and sexual parasitaemia. Serious adverse events (SAEs) associated with the study procedure (capillary blood sampling) will be collected.

Expected Outcomes

- To obtain longitudinal estimates of P. falciparum parasite prevalence in order to characterise malaria transmission intensity.

- To obtain longitudinal estimates of the use of malaria control interventions in centres conducting the EPI-MAL- 002 and EPI-MAL-003 studies.

Progress

The team has conducted 9 out of 10 annual surveys. A total of 7,800 participants aged between 6 months to less than 10 years participated in the surveys. The next survey, that is the last one will be carried out in September 2024. The data analysis of the survey is currently going on.

Figure 1: A section of study staff during the study initiation for epoch 9 survey

A prospective study to estimate the incidence of diseases specified as adverse events of special interest, of other adverse events leading to hospitalization or death, and of meningitis in infants and young children in sub-Saharan Africa prior to implementation of the RTS,S/AS01E candidate vaccine.

(EPI-MAL-002)

Investigators

Dr. Kwaku Poku Asante, Prof. Seth Owusu-Agyei, Mr. Owusu Boahen, Ms. Mathilda Tivura, Dr. Seyram Kaali, Dr. Samuel Ekow Harrison

Funder:

GlaxoKlineSmith Biologicals

Study duration:

6 years, 4 months

Project start date:

9th February, 2016

Project end date:

30th June, 2022

Background

GSK Biologicals is developing a malaria vaccine, RTS,S/AS01E, for routine immunization of infants and children living in malaria-endemic countries of sub-Sahara Africa (SSA). RTS,S/AS01E will be the first vaccine for the prevention of malaria. This will be the first vaccine used in the paediatric population. Most of these SSA countries have no baseline incidence data on rare diseases such as those that may be reported as Adverse Events (AEs) following vaccination.

Lack of baseline data would compromise the interpretation of any Adverse Event detected following the implementation of the RTS,S/AS01E vaccine in the paediatric population. GSK Biologicals has developed a set of studies to address this paucity of data and to ensure optimal collection of information related to the occurrence of those events before and after implementation of the RTS,S/AS01E vaccine. This is one of those studies.

Objectives

- To estimate the incidence of protocol-defined Adverse Event of Specific Interest (AESI) in a setting without existing surveillance systems designed to capture those rare events.

- To estimate the incidence of other Adverse Events leading to hospitalization or death, meningitis and malaria morbidity and mortality at the same time

Methodology

In order to have a synergy with WHO pilot implementation, the study size has been reduced to 30,000 children.

Approximately 30,000 children have been recruited within the collaborating study site into active surveillance. These children were actively followed up through home visits and continuous monitoring of outpatient visits and hospitalizations at all healthcare facilities in the study areas.

The study used multiple data sources, to increase the opportunity to capture the event of interest. Among the 30,000 children, approximately 15,000 children were enrolled in the 6-12 weeks group and approximately 15,000 children were enrolled in the 5-17 months group. The Kintampo site has recruited 11,950 children.

Key findings

Data analysis is currently on going.

Expected Outcomes

To estimate the incidence of Adverse Events of Specific Interest, and of other Adverse Events leading to hospitalisation or death, and an aetiology confirmed meningitis in children prior to implementation of RTS, S/AS01E.

Progress

The study has successfully ended. In all, eleven thousand nine hundred and fifty (11,950) children have been enrolled into the study. Eight thousand nine hundred (8,900) children have been enrolled into the active surveillance and three thousand and fifty 3,050 into the enhanced hospitalization cohort respectively. The enrollment into active surveillance ended in March 2018 and those in the enhanced hospitalization cohort ended in March 2019, however, we continued with the active follow-up visits till we concluded all 11,950 participants in June 2022. Data analysis is currently on going.

A prospective study to evaluate the safety, effectiveness and impact of the RTS,S/AS01E vaccine in young children in sub-Saharan Africa

(EPI-MAL-003)

Investigators

Dr. Kwaku Poku Asante, Dr. Seyram Kaali, Dr. Samuel Ekow Harrison, Dr. Prince Agyapong, Mr. Owusu Boahen

Funder:

GlaxoSmithKline Biologicals

Project start date:

19th March, 2019

Project end date:

31st December, 2024

Background

GSK Biologicals has developed a malaria vaccine, RTS,S/AS01E, for routine immunisation of children living in malaria-endemic countries of sub-Saharan Africa (SSA). RTS,S/AS01E is the first vaccine implemented for the prevention of malaria and is being giving to the paediatric population.

Objectives

Primary objectives

- To estimate the incidence of Adverse Events of Specific Interests (AESI) and of other Adverse Events (AE) leading to hospitalisation or death, in children vaccinated with RTS,S/AS01E.

- To estimate the incidence of aetiology-confirmed meningitis in children vaccinated with RTS,S/AS01E.

Methodology

The study uses multiple data source to increase opportunity to capture the event of interest such as home visits, hospitalization visits and outpatient visits.

Expected outcome

To estimate the incidence of Adverse Events of Specific Interest, and of other Adverse Events leading to hospitalisation or death, and an etiology confirmed meningitis in children vaccinated with RTS, S/AS01E.

Progress

The study is going on well. In all, twelve thousand (12,000) children have been enrolled into the active surveillance arm of the study by the Kintampo Health Research Centre.

In the enhanced hospitalization cohort of the study, the Kintampo Health Research Centre (KHRC) has enrolled a total of eighteen thousand, six hundred and twenty-six (18,626) children into the study.

The enrolment into the enhanced hospitalization cohort for the unexposed cluster ended 31st October, 2022 due to end of pilot of the RTSS vaccine implementation program.

Approximately 45,000 children have been recruited within the collaborating study site into the active surveillance. These participants are being actively followed up through home visits and through continuous monitoring of outpatient visits and hospitalizations at all health care facilities in the study areas.

Figure 1: A group picture of study staff during training on pharmacovigilance and disease surveillance

Figure 2: A group picture of medical study staff

An evaluation of the cluster-randomised pilot implementation of RTS,S/AS01 through routine health systems in Ghana: A Post-Authorization Observation Study

(Malaria Vaccine Pilot Evaluation (MVPE) Ghana)

Investigators

Dr. Kwaku Poku Asante, Dr Abraham Oduro, Prof. Col. Edwin Andrews Afari (rtd), Prof. Tsiri Agbenyega, Prof. Daniel Ansong, Dr Thomas Gyan, Prof. Fred Binka, Prof. Kwadwo Koram, Dr. Abraham Hodgson

Funder:

World Health Organization (WHO)

Collaborators:

Ministry of Health, Ghana Health Service

Project start date:

27th September, 2018

Project end date:

31st March, 2023

Study duration:

5 years

Background

On 1st May 2019, the Consortium to Evaluate Mosquirix in Ghana (CEM-GH) coordinated by Kintampo Health Research Centre of Research and Development Division of Ghana Health Service in collaboration with the Ministry of Health/Ghana Health Service and World Health Organization (WHO) started the pilot evaluation of the RTS,S Malaria Vaccine in Ghana including a series of 3 household surveys, and sentinel hospital and community mortality surveillance, building on routine systems.

The 31st day of December 2022, marked forty-four (44) months of active evaluation activities in six regions of Ghana (Ahafo, Bono, Bono East, Central, Volta and Oti regions). This milestone came at a difficult time as we confronted the threat of the COVID-19 pandemic.

Objectives

The project is evaluating the impact of RTS,S by collecting data to answer the following questions:

1. What is the feasibility of administering 4 doses of RTSS and what is its impact on uptake of other routine immunizations and use of other malaria control measures (Feasibility module)?

2. Are there any safety signals that can be identified in the large administration of RTS,S (Safety module)?

3. What is the impact of administration on all-cause mortality among children (Mortality modules)?

Methodology

This is an observational evaluation of the pilot implementation of RTS,S/AS01 by the Ministry of Health/Ghana Health Service using a cluster-randomized design, with some areas (Districts) introducing RTS,S/AS01 malaria vaccine at the beginning of the programme (vaccinating areas) and other areas, initially without RTS,S/AS01, acting as comparison areas (non-vaccinating areas).

Participants for study includes children living in the vaccinating and in non-vaccinating areas aged less than 5 years of age (Feasibility survey), who are hospitalized in 8 sentinel hospitals (sentinel hospital surveillance) and those whose deaths are reported in the vaccinating and in non-vaccinating areas (community mortality surveillance).

Key findings

On 6th October 2021, the Director General of WHO, Dr Tedros Adhanom announced the WHO recommendations for widespread use of the RTS,S malaria vaccine among children in sub-Saharan Africa and other regions with moderate to high malaria transmission. The recommendation was based on 24-month pooled results from the ongoing Malaria Vaccine Pilot Evaluation (MVPE) in Ghana, Kenya and Malawi. Government of Ghana in collaboration with WHO and other partners plans to expand vaccine access first to children living in non-vaccinating areas and later to rest of the country by 2023.

Expected outcomes

1. Prevalence of children aged 12-23 months who had completed three doses of RTS,S/AS01 at the second household survey.

2. Prevalence of children aged 27-38 months who had completed four doses of RTS,S/AS01 at the third household survey.

3. Number of children admitted with a diagnosis of probable and confirmed meningitis cases.

4. Number of children admitted with a diagnosis of cerebral malaria.

5. Number of deaths of any cause in children aged 1-59 months.

Progress

Evaluation activities will continue through 2023 to understand the added value of the 4th dose, and to measure the longer-term impact of the vaccine on child deaths.

Figure 1: A group picture of the MVPE and WHO teams during a visit to the Central region to monitor ongoing Malaria Vaccine Implementation Programmme activities

Figure 2: Dr Mary Hamel, WHO Senior Technical Officer and Malaria Vaccine implementation Programme Lead interacting with the MVPE and WHO teams

Strengthening the evidence of the RTS,S/AS01 malaria vaccine: assessment of safety and effectiveness using case-control studies.

(Malaria Vaccine Pilot Evaluation-Case Control (MVPE-CC)

Investigators

Dr Kwaku Poku Asante, Dr Thomas Gyan, Dr Abraham Oduro, Prof Tsiri Agbenyega, Prof Daniel Ansong

Funder:

European and Developing Countries Clinical Trials Partnership (EDCTP)

Collaborators:

European Vaccine Initiative (EVI), Germany College of Medicine (CoM), University of Malawi, Malawi African Research Collaboration for Health Limited, Kenya Kenya Medical Research Institute (KEMRI), Kenya London School of Hygiene and Tropical Medicine (LSHTM), United Kingdom PATH, United States

Project start date:

1st April, 2021

Project end date:

30th June, 2024

Study duration:

39 months

Background

The ongoing Malaria Vaccine Pilot Evaluation (MVPE) is being conducted in Ghana, Malawi and Kenya through community and sentinel hospital surveillance systems and a series of household surveys (to measure vaccine coverage). The Malaria Vaccine Pilot Evaluation-Case Control (MVPE-CC) is embedded within MVPE comprising case-control studies of clinical and mortality outcomes. Each case will require four controls, and caregiver informed consent will be required prior to study activities. The observational case control studies are measuring as complementary information to what is being collected through MVPE:

1. Safety among children who received the malaria vaccine, with focus on cerebral malaria, meningitis and severe malaria.
2. The impact of the malaria vaccine on all-cause mortality for boys and girls, and
3. Promote use of case-control approaches by Expanded Programmes on Immunization (EPI) and malaria control programmes.

Objectives

To determine the safety and effectiveness of the RTS,S/AS01 malaria vaccine in vaccinated children to complement the population level measures of impact obtained through the WHO's Malaria Vaccine Implementation Project.

The study aims to answer the following research questions:

1. Are children who receive RTS,S vaccination (at least 1 dose) at increased risk of meningitis compared to unvaccinated children?
2. Are children who receive RTS,S vaccine (at least one dose), or children who receive 3 doses, at increased risk of cerebral malaria compared to unvaccinated children?
3. What is the increase in incidence of severe malaria in children who received 3 doses, but failed to receive a 4th dose, compared to children who did not receive the vaccine (the rebound effect)?
4. What is the effectiveness of RTS,S (following 3 doses, and following the 4th dose) in preventing severe malaria?
5. Is there any evidence that RTS,S vaccine increases mortality in girls, or is less effective in preventing death in girls than in boys?

Methodology

Cases of three types are being studied: children admitted to hospital with meningitis, or with severe malaria, and children who died. The study is limited to children who would have been eligible, based on their date of birth, to have received RTS,S/AS01 vaccine, and who were living in an RTS,S/AS01 implementation

area in catchment area of sentinel hospital. For each case, four control children who were born within one month of the date of birth of the case child will be recruited from the same neighbourhood.

Key findings

Data collection has been ongoing for the past 14 months

Expected Outcomes

Primary outcomes:

1. Excess risk of meningitis
2. Excess risk of severe malaria
3. Excess risk of cerebral malaria
4. Excess risk of mortality
5. Excess risk of mortality among girls

Secondary outcomes:

1. Excess risk of severe malaria in relation to the 4th dose of RTS,S
2. Excess risk of cerebral malaria in relation to the 4th dose of RTS,S
3. Excess risk of mortality in relation to the 4th dose of RTS,S
4. Excess risk of mortality among girls in relation to the 4th dose of RTS,S

Progress

A total of 7,343 participants comprising 1,494 eligible cases and 5,849 controls have been recruited into clinical outcomes and mortality outcome case control studies as at 31st December, 2022 across three countries (Ghana, Kenya, Malawi) as follows:

1. Severe malaria – 709 cases and 2,760 controls recruited
2. Cerebral malaria – 42 cases and 160 controls recruited
3. Meningitis – 18 cases and 69 controls recruited
4. Mortality – 725 cases and 2,860 controls recruited

Figure 1: Monitoring visit by MVPE-CC Ethics Advisor to Kenya

Figure 2: Section of Staff during a refresher training

Figure 3: Visit by study team and partners to Gonu-Koforidua during field data collection

Ghana Malaria Slide Bank

Investigators:

Dr. Kwaku Poku Asante, Prof. Seth Owusu-Agyei, Dr. David Dosoo, Dr. Dennis Adu-Gyasi (KHRC); Nicole Whitehurst (MCDI); Samuel Kaba, Williams Mills-Pappoe (ICD); Ralph Ntumy, Felicia Amoo-Sakyi (Impact Malaria), Mohammed Adams (MCDI)

Collaborating Institutions:

Institutional Care Division (ICD), Ghana Health Service, Impact Malaria, PATH MalariaCare, Improving Malaria Diagnosis (IMaD), Centres for Disease Control & Prevention (CDC), World Health Organisation (WHO), Medical Care Development International (MCDI), United States Agency for International Development (USAID), Partners

Funders:

Kintampo Health Research Center, Medical Care Development International (MCDI); PATH Malaria Care; World Health Organization.

Background

KHRC with support from the collaborating partners has prepared about 6,000 malaria blood slides as an update to the existing malaria slide bank. These new set of slides will be validated and be established for international recognition within the sub-region for training of professionals.

Activities

Continuing the work done in the previous year, after receiving the necessary approvals from the Kintampo Health Research Centre Institutional Ethics Committee (KHRC-IEC), over 6,000 slides comprising negative, p. faliciparum (different densities), P. malariae, P. ovale, and mixed infection have been prepared. These slides are ready for validation to be useful for training and competency assessment.

Currently, slides from the malaria slide bank (MSB) have been used for training of medical laboratory professionals and other institutions. The slides from the MSB have also been used for competency assessments, and Outreach Training and Support Supervision (OTSS) for malaria diagnosis by the Clinical Laboratory Unit of the Institutional Care Division, Ghana Health Service.

Added to the bank are more than 2,000 placental tissue blocks fixed in paraffin wax and the corresponding H & E stained tissues from the placental tissues. These samples were prepared from a birth cohort study that enrolled and followed about 2,000 pregnant women till at least one year after their new born babies.

Mosquito and Tick-Borne Infections Surveillance

Investigators:
Dr. Kwaku Poku Asante, Ms. Dorcas Atibilla, Mr. Yussif Tawfiq, Dr. David Dosoo

Collaborating Institutions:
The Kintampo Health Research Centre (KHRC) collaborated with NAMRU-3, the Noguchi Memorial Institute for medical research (NMIMR), Kumasi Centre for Collaborative Research in Tropical medicine, KCCR and Navrongo Health Research Centre (NHRC).

Background

Geographic difference, climate change among other factors can have adverse effects on the distribution of vectors and vector-borne diseases. There is thus the need to pool data on vector-borne diseases from different geographical areas for analysis to get a clearer picture of the transmission pattern of other emerging pathogens from across the world.

The Kintampo Health Research Centre (KHRC) collaborated with NAMRU-3, the Noguchi Memorial Institute for medical research (NMIMR), Kumasi Centre for Collaborative Research in Tropical medicine, KCCR and Navrongo Health Research Centre (NHRC) to conduct arthropod surveillance effort in Southern, Central Middle belt and Northern Ghana.

KHRC was responsible for collecting samples from the middle belt of Ghana where the vegetation is mainly of the forest-savannah transition type. Collections targeted areas of close contact between human and animal populations. Surveillance centred on ticks and mosquitoes using specific trapping methods and after which samples collected were identified morphologically.

Methods

Sampling Site, Sampling Procedures and Questionnaire Administration.

The study was conducted in Kintampo North Municipality. Tick collections have so far been in the cattle market, the main Kintampo Abattoir, Kraals in Babator, Bui Power Distribution station area and Ahenakom all in Kintampo North Municipality. Communities where mosquito trappings were done include: Kintampo KHRC premises, Chiranda, Surounoasi Techira number 1 and Techira number 2. These communities were randomly selected from the Kintampo Health Demographic Surveillance System (KHDSS) listings. All information pertaining to the tick data were collected using structured questionnaires to capture basic information about the cattle, age, origin, the vaccination records as well as parts of the animal where ticks were picked. Ticks were collected with assistance from cattle herdsmen to pick ticks mainly from the ear, stifle, brisket, fore flank and tail. Compound identification numbers of households, humidity and GPS readings using a simple hand- held GPS receiver (GARMIN series) ArcGIS 9.2 version were the main information recorded during trapping.

Mosquito and Tick Collections

The Centre for Disease Control (CDC) light traps were used to collect mosquitoes in rooms of randomly selected households as well as outdoors trappings. Mosquitoes were trapped six days in a month and sometimes two weeks depending on the numbers collected in each month using CDC Light traps and Biogent (BG) traps as per the protocol.

Consent was sought from household heads and occupants of each room. All mosquitoes collected were identified and stored in silica gel and Aedes aegypti and Culex quinquefasciatus stored in RNA later. The ticks however, were collected twice in each month depending on the availability, identified and preserved in RNA later (Sigma, Life Science). All tick samples have since been stored in the -80 freezer for later processing.

Logistical support

The team received some equipment to support the work. These include: Two boxes of 12 volts and 6 volts rechargeable batteries, a dry ice making machine, a dissecting microscope, a desktop computer and modem as well as Laboratory chill table.

Results

Mosquitoes

For the period under review, a total of 7,242 mosquitoes were collected.

Table 1 shows details of the species collected with their respective percentages. All mosquitoes were collected mainly using the BG trap and the CDC light traps.

Table 1: Monthly collection of mosquitoes and species distribution from January 2021 to December 2021 in Kintampo

Month	Mosquito Species							
	Culex quin.	Mansonia uniformis	An. gam	An. Funestus	An. Pharoensis	An. Rufipis	Aedes aegypti	Totals
Jan	129						3	132
Feb	57						2	59
Mar	62						3	65
Apr	74	3	4	10			4	95
May	65	27	133				16	241
Jun	108	74	472	2			18	674
Jul	70	106	1368			14	11	1569
Aug	179	44	667			16	3	909
Sep	138	14	2580		3	38	6	2779
Oct	60	174	251	4	2	48	4	543
Nov	91	4	7					102
Dec	74							74
Total	1107	446	5482	16	5	116	70	7242
Percentage	15.29%	6.15%	75.70%	0.22%	0.07%	1.60%	0.97%	100%

Ticks

From the month of January 2021 to December 2021, a total of 4,026 ticks have been handpicked from cattle. Table 2 shows details of the species collected as well as percentages.

Conclusion

Insect collections are still ongoing. A lot of samples have been stored awaiting training and analysis. The study site is promising with high species richness when it comes to mosquitoes. The entomology team has improved on the technical capacity through the various training and hands on experience.

Table 2: Total number of ticks collected from January 2021 to December 2021 in Kintampo

Month	Tick Species			
	Repi boo. Geigyi	Hylomma trun	Amblyomma var.	Totals
Jan	210	20	15	245
Feb	128	75	54	257
Mar	118	194	76	388
Apr	37	63	313	413
May	2	6	197	205
Jun	157	94	18	269
Jul	164	53	59	276
Aug	141	72	8	221
Sep	385	13	9	407
Oct	227	139	18	384
Nov	269	117	142	528
Dec	348	18	67	433
Total	2186	864	976	4026
Percentage	54.29%	21.46%	24.24%	100%

Assessment of COVID-19 infection burden and its impact on the diagnosis of febrile illness among patients receiving health care in three hospitals in Ghana

Investigators
Dr. Kwaku Poku Asante, Dr. Nicholas Amoako, Dr. Patrick Ansah, Dr. John E. O. Williams

Funder:
Ministry of Health-Ghana

Collaborators:
Kintampo Health Research Centre (lead institution), Navrongo Health Research Centre and Dodowa Health Research Centre

Project start date:
May, 2022

Project end date:
November, 2023

Study duration:
18 months

Background

Coronavirus disease (COVID-19) is a febrile respiratory illness and has been described as one of the biggest pandemics of all time. Apart from its direct effects on mortality, it also impacts on the diagnosis and management of acute febrile illnesses (AFI) including malaria due to overlap in clinical presentation and diagnostic challenges. Conflicting reports about burden and predisposing risk factors of COVID-19 is well known and non-availability of simple point of care test to discriminate COVID-19 from diseases presenting with similar symptoms usually result in a significant delay in the diagnoses and management of other AFI.

This study seeks to employ a combination of laboratory and clinical methods to differentially diagnose the disease-causing pathogens in febrile patients in a cross-sectional survey, to determine the COVID-19 infection burden and associated co-morbidities, as well as the predisposing risk factors among febrile patients seeking treatment from in three selected hospitals across Ghana.

Objectives

To determine the burden of COVID-19 among febrile patients and assess how the current management of COVID-19 impacts on the diagnosis of acute febrile illness (AFIs).

The study seeks to achieve the following specific objectives;

Specific objectives

Specific objective 1: To determine the burden of COVID-19 disease by accessing COVID-19 infection prevalence, hospitalization rate and deaths among patients presenting with fever.

Specific objective 2: To determine risk factors for COVID-19 transmission, disease severity and death.

Specific objective 3: To determine the correlation between coinfections and their role in the exacerbation of severe disease in COVID-19 patients leading to fatal outcomes.

Specific objective 4: To determine the impact of the COVID-19 pandemic on diagnosis of AFIs in the three participating hospitals.

Specific objective 5: To evaluate the diagnostic performance of three FDA approved RDTs (V-chek SARS-CoV-2 Ag rapid RDT, Lumiradx SARS-CoV-2 antigen Ag RDT and Huihai 2019 nCoV antigen RDT test kit) using reverse transcriptase-PCR as gold standard.

Methodology

This cross-sectional study is taking place in three hospitals located in three geographically distinct localities with different disease burden in Ghana, namely; the Kintampo Municipal hospital, Kintampo in the Bono East region, War memorial hospital in Navrongo in the Upper East region and Shai Osudoku District Hospital, Dodowa in the Greater Accra region of Ghana.

The study is recruiting individuals of all ages and sexes (except newly born babies or neonates) and having fever (axillary temperature >37.5oC). Every participant is tested for COVID-19 using RDT and PCR and malaria by microscopy and malaria RDT. Clinical and demographic data is collected using RedCap and all diagnosis made are documented.

Expected outcomes

This seeks to determine prevalence of coronavirus of COVID-19 infections, hospitalization rate and deaths as burden of COVID-19 and create a database of COVID-19 comorbidities and outline predisposing risk factors that lead to severity of COVID-19.

The performance of the three COVID-19 RDTs would have been determined and recommendation made to the Ghanaian health authorities for point of care testing. The impact of COVID-19 pandemic on the differential diagnosis of AFIs would be documented.

Progress

A total of 1,263 study participants are expected to be enrolled, out of which 592 (46.9%) participants have been enrolled in a period of 7 months from the three recruiting sites (Kintampo, Navrongo and Dodowa) as shown on the table below.

INSTITUTION	NO. EXPECTED	NO.ENROLLED	%
KHRC	411	317	75.3
NHRC	411	185	43.9
DHRC	411	90	21.4
Total	1,263	592	46.9

Preliminary analysis from the three recruiting sites has shown COVID-19 positivity rate of 9.3% with malaria as the most common diagnosis among all participants. The study is progressing well but plans are far advanced to carry out further testing with collaborating universities namely UHAS and KNUST in the first quarter of 2023.

Different sample types (whole, plasma sputum) have been stored in -20oC freezer awaiting molecular screening for viruses, bacteria and other protozoans with additional funding being sought from the relevant sources and collaborators.

COVID-19 vaccine effectiveness against severe acute respiratory infections (SARI) hospitalizations associated with laboratory-confirmed SARS-CoV-2 in Ghana

(COVID-19 Vaccine Effectiveness Study)

Investigators

Dr. Kwaku Poku Asante (PI), Dr. Abraham Oduro, Dr. Nicholas Amoako, Dr. Prince Agyapong, Prof. Seth Owusu-Agyei, Prof. Kwabena Duedu, Prof. William Ampofo, Prof. Ernest Kenu, Prof. George Obeng Adjei, Dr. Ali Sambah, Prof. Ellis Owusu Dabo, Dr. John Amuasi, Dr. Franklin Asiedu-Bekoe, Dr. Dennis Laryea, Dr. Francis Kasolo, Dr. Sally-Ann Ohene

Funder:

World Health Organization (WHO)

Collaborators:

Kintampo Health Research Centre(lead institution), Noguchi Memorial Institute for Medical Research, University of Health and Allied Sciences, Kwame Nkrumah University of Science and Technology/KCCR and WHO Ghana Office

Project start date:

January, 2022

Project end date:

September, 2022

No cost extension:

October 2022-March 2023

Study duration:

12 months

Background

The emergence of the novel severe acute respiratory syndrome – Coronavirus 2 (SARS-CoV-2), which resulted in COVID-19 disease in late 2019, affecting almost every country in the world. Following that, World Health Organization (WHO) advised the affected countries who have already WHO implementing the sentinel surveillance for severe acute respiratory infections (SARI) for influenza to use such systems to also monitor severe SARS-CoV-2 cases by collecting data that would allow for the measurement of COVID-19 Vaccine Effectiveness (VE).

Evaluating the performance of COVID-19 vaccines post-licensure is critical as a number of factors can impact on the real-world VE, including transportation and storage conditions, vaccines administration, advanced age, underlying medical conditions and also previous SARS-CoV-2 infection.

In addition, post-licensure evaluations of the pandemic vaccines allow public health authorities not only to understand the duration of protection of the vaccines but also advise the need for re-vaccination where applicable.This study was initiated to utilize the hospital-based influenza surveillance sentinel sites scattered across all the 16 regions of Ghana, to recruit individuals diagnosed with SARI and to collect clinical and vaccination data to inform estimates of the COVID-19 vaccine effectiveness against SARI in persons of the vaccination target groups in 21 selected SARI sentinel sites in Ghana.

Objectives

The primary objective is to measure overall and product-specific COVID-19 vaccine effectiveness (CVE) against laboratory-confirmed SARS-CoV-2 in hospitalized SARI patients belonging to the target group(s) for COVID-19 vaccination.

Study Design

The study which is still ongoing is a case-control, test-negative design (TND) being conducted in hospitals recruiting Severe Acute Respiratory Infection patients in Ghana. The TND design has been used in the past 10 years for estimating annual influenza VE worldwide including Ghana. The principle behind this design is to evaluate SARS-CoV-2 laboratory results among persons who meet the standard SARI case definition. The design categorize SARI patients who test positive for COVID-19 as “cases” and those with a negative test result as “controls”.

Expected outcomes

The outcome of interest is SARS-CoV-2 detection in patients of age group eligible for vaccination and hospitalized with SARI symptoms. SARS-CoV-2 infection is defined as laboratory-confirmed by PCR techniques either on admission at the hospital or within 10 days before admission. Secondary outcomes include genetic variants of SARS-CoV-2 in hospitalized SARI patients of the vaccination target age groups (15 years and above) and markers of severity of disease during hospitalization, length of

stay (LOS), oxygen therapy, intensive care unit (ICU) admission, mechanical ventilation, in-hospital death, clinical signs of pneumonia, severe respiratory rate > 30 breaths/min, severe respiratory distress, acute respiratory distress syndrome (ARDS), oxygen saturation <90% on room air, sepsis and septic shock.

Progress

A total of 1,110 study participants are expected to be enrolled (with 12 months), out of which 910 (81.9%) participants have been enrolled in a period of 7 months (June 2022-December 2022) as shown in the table below.

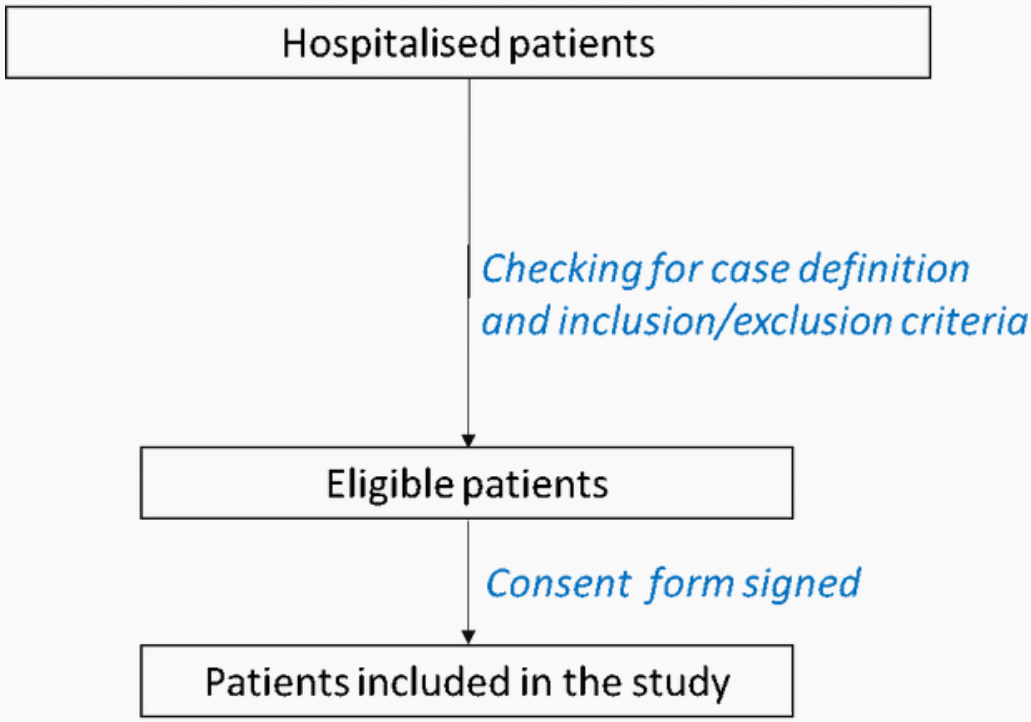

Figure 1: Inclusion algorithm for systematic screening of all admitted patients

PERIOD	TOTAL PARTICIPANTS ENROLLED	TOTAL SAMPLES COLLECTED AND PROCESSED	SARS-COV-2	
			NUMBER TESTED POSITIVE	POSITIVITY RATE (%)
(23rd June - 7th Dec, 2022)	910	910	120	13.3%

Table 1: Enrollment statistics for the Ghana COVID-19 vaccine effectiveness study

Although the study is progressing well in terms of enrollment, there has been a general decline in the number of reported cases of COVID-19 in Ghana since August 2022. There were only 24 active COVID-19 cases in November 2022 as reported by the Ghana Health Service with a positivity rate of 12.4% which is close to the positivity rate of 13.3% obtained in our study within the same period. The COVID-19 vaccine doses administered by 18th November was 20,869,800 with persons fully vaccinated being 28.3% of the total population.

This low vaccine coverage coupled with the declined number of reported cases, would potentially affect the vaccine estimates and has given a clear indication that more study patients would have to be screened than initially anticipated/calculated in order to obtain to satisfy the vaccine estimates projections.

As a results of that, no cost extension has been granted by WHO to end the study at December 2023 whilst additional funded is being sought for the study continuity.

Figure 2: Training of focal persons for data collection

A phase III trial of two SARS-CoV-2 Adjuvanted Recombinant Protein Vaccines for prevention against COVID-19 in adults 18 years of age

(Sanofi COVID-19 Phase III Vaccine Trial)

Investigators

Dr. Kwaku Poku Asante, Dr. Seyram Kaali, Dr. Samuel Harrison, Dr. Prince Agyapong Darko, Dr. Cynthia Yaa Bema, Dr. Felicia Serwah, Mr. Elvis Ato Wilson, Dr. Afia Korkor Opare Yeboah, Mr. Peter Anlaaku, Mr. Owusu Boahen, Mr. Zakariah Buwah, Mr. Francis Kornu Mensah, Dr. David Dosoo, Dr. Dennis Adu-Gyasi, Mr. Kingsley Kayan, Mr. Elisha Adeniji, Mr. Richard Boakye

Funder:
Sanofi Pasteur Inc.

Collaborators:
Kumasi Centre for Collaborative Research and Navrongo Health Research Centre

Project start date:
1st September, 2021

Project end date:
30th June, 2024

Study duration:
3 years

Background

The outbreak of COVID-19 in late 2019 has caused significant morbidity and mortality and disruption of socioeconomic activities all over the world. To date, there have been approximately 1,700 cases and close to 1,500 deaths in Ghana. The pandemic exacerbated exiting inequities in access to healthcare between and within countries with minimal access to COVID-19 vaccines in Low and Middle Income Countries including Ghana. Against this backdrop, Sanofi Pasteur is developing two candidate vaccines for active immunization and prevention of SARS-CoV-2 infection and COVID-19 disease.

Objectives

This Phase III study will assess how well the study vaccines protect against infection and illness caused by the SARS-CoV-2 virus. It will also assess how safe the vaccines are and how well the body's immune system is activated by the vaccines to fight SARS-CoV-2 infection.

Methodology

The study is recruiting adults aged 18 years and above and randomly assigning them in a random manner to receive the study vaccine or the placebo. Following informed consent and after an initial assessment for eligibility, participants receive two doses of the vaccine or placebo three weeks apart and are followed up over a period of about 13 months to assess the occurrence of COVID-19-like illness. The study team also assess participants for any illnesses or injuries they may experience in the course of the study. Nasopharyngeal and blood samples are collected at planned visits to help make these assessments.

Key Findings

Interim analysis showed that the vaccine was highly protective against severe COVID-19 and moderately protective against moderate disease. At the same time the vaccine was found to have an acceptable safety profile.

Expected Outcomes

The outcomes include efficacy, safety and immunogenicity of the candidate vaccines administered as a two dose primary vaccination series with or without a booster.

Progress

The main study has been completed and a crossover-booster phase is about to begin.

Figure 1: Training of field workers and supervisors on study protocol

An Adaptive, Randomized, Placebo-controlled, Double-blind, Multi-center Study of Oral FT-4202, a Pyruvate Kinase Activator in Patients with Sickle Cell Disease

(PRAISE)

Investigators

Dr Prince Agyapong, Dr Seyram Kaali, Dr Kwaku Poku Asante, Dr Samuel Harrison, Dr Bema Cynthia, Dr Serwah Felicia

Funder:

Forma Therapeutics, Inc

Background

Sickle cell disease (SCD) is a chronic hemolytic anemia caused by inheritance of an abnormal form of hemoglobin (Hb). In Africa, sickle cell disease (SCD) is a major public health problem. In Ghana, approximately 15,000 (2%) of Ghanaian newborns are diagnosed with SCD annually. The global burden of SCD is increasing. Forma Therapeutics, Inc. is developing a strong, oral drug called FT-4202, which is a pyruvate kinase-red blood cell (PKR) activator, with the goal of treating people with sickle cell disease.

The clinical theory is that PKR activation will lower the rate of sickle cell polymerization and enhance the function of red blood cells (RBCs), hence lowering cell sickling and hemolysis (breakdown), two features of sickle cell disease process that lead to vascular blockage and anemia. Vascular blockade is responsible for the pain (called vaso-occlusive crisis) associated with sickle cell disease.

Objectives

To assess the efficacy and safety of FT-4202 in adolescents and adults with SCD as compared to placebo as measured by improvement in hemoglobin (Hb) and vaso-occlusive crises (VOC) events.

Methodology

This study is a placebo-controlled, double-blind, multicenter Phase 2/3 study of patients with SCD aged 12 to 65 years. Patients will be randomized 1:1:1 to one of two dose levels of FT-4202 or placebo. All patients, after completion of 52 weeks of double-blind treatment may enter a 52-week FT-4202 open-label extension period.

Expected Outcomes

Change from baseline in Hb level and rate of annual VOC events during the treatment period

Progress

All ethical and regulatory approvals have been obtained. The site initiation visit (SIV) is scheduled for early March 2023.

A Phase 1 Randomized, Blinded, Placebo Controlled, Dose-Escalation and Dosing Regimen Selection Study to Evaluate the Safety and Immunogenicity of rVSV-Vectored Lassa Virus Vaccine in Healthy Adults at Multiple Sites in West Africa

(Lassa Fever Phase I study)

Investigators

Dr. Seyram Kaali, Dr. Kwaku Poku Asante, Dr. Samuel Harrison, Dr. Prince Agyapong Darko, Dr. Felicia Serwah, Mr. Elvis Wilson, Dr. Afia Korkor Opare Yeboah, Dr. Dennis Adu-Gyasi, Mr. Kingsley Kayan, Mr. Farrid Boadu, Dr. David Dosoo, Mr. Zakariah Buwah, Mr. Francis Kornu Mensah, Mr. Elisha Adeniji, Mr. Richard Boakye

Funder:

Emergent Product Development Gaithersburg, Inc.

Collaborators:

Navrongo Health Research Centre

Project start date:

1st September, 2022

Project end date:

31st August, 2023

Study duration:

12 months

Background

Lassa Fever is an acute viral illness caused by the Lassa virus. The disease occurs in many West African countries including Ghana. The illness begins gradually with non-specific symptoms such as fever, general weakness and malaise followed by headache, sore throat, muscle pain, chest pain, nausea, vomiting, diarrhea cough and abdominal pain. Complications include bleeding, shock, seizure and hearing loss. About 80% of infections are asymptomatic or mild. There is currently no specific treatment or approved vaccine to protect against disease caused by the Lassa fever virus, and 15% of hospitalized cases succumb to the disease.

The study is testing multiple doses of a candidate vaccine for the first time in humans to ascertain its safety and immunogenicity and to select an appropriate dosing regimen for testing in subsequent phases of clinical trials. The candidate vaccine consists of a harmless virus called vesicular stomatitis virus that has been genetically engineered to produce antigens of the Lassa virus when injected into the body.

Objectives

The primary safety objective of the study is to evaluate the safety and tolerability of increasing dose levels of the investigational vaccine. The primary immunogenicity objective is to evaluate the antibody response to the vaccine at various dose levels.

Methodology

This is a first-in-human multi-part, randomized double-blind, placebo-controlled, sequential-group, dose escalation study. The study is being conducted in two parts: part A will evaluate the safety, tolerability and immunogenicity of three-dose levels of the investigational vaccine. Part B will select two dose regimens from part A for further evaluation of safety and tolerability. Healthy adults will be screened and randomized to receive the study vaccine or placebo. Participants will then receive the study vaccines or placebo and followed up for approximately 7 - 8 months.

Key Findings

The low and medium dose levels of the investigational vaccine have been found to be safe 15 days following injection with the second dose.

Expected Outcomes

Safety outcomes include incidence of reactogenicity events occurring within 7 days of each vaccination, incidence of adverse events, serious adverse events and adverse events of special interest. Immunogenicity outcomes include levels of Lassa virus neutralizing antibodies Lassa virus specific T cell responses.

Progress

The study has completed enrollment into part A of the study. Eighteen participants were enrolled in Kintampo. All participants are currently in the follow up phase.

Targeted subsidy for LPG adoption study

Investigators

KHRC: Dr. Kwaku Poku Asante, Dr. Sulemana Watara Abubakari, Ms. Theresa Tawiah, Mr. Seidu Iddrisu

Columbia University: Darby Jack

University of California Santa Barbara: Kelsey Jack

Funder:
Columbia University

Project start date:
September, 2021

Project end date:
June, 2022

Background

Globally, nearly 3 billion people cook with traditional stoves and fuels. These inefficient and polluting energy sources produce one-quarter of all black carbon emissions globally. Household air pollution also represents the largest energy-related health risk, leading to nearly 2.3 million preventable pollution-related deaths per year. Recognizing the costs associated with the use of biomass fuels for cooking, the Government of Ghana has committed to giving 50 percent of Ghanaian households' access to LPG fuel for cooking, but progress towards this goal has been slow.

Previous efforts in other countries to drive clean fuel transitions by targeting subsidies to the poor have largely been unsuccessful. Adopting a "smart subsidy" approach, this project relies on targeting strategies that aim to balance the heavy cost of subsidization with the social benefits of clean fuel use. In the context of a randomized controlled trial in Techiman, Ghana, the project will evaluate the role of smart subsidies in increasing LPG use among the poor, characterize the intrahousehold distribution of air pollution reduction benefits, and assess gender dynamics in the context of energy-related decision making.

The results of this study will inform the Government of Ghana's energy policy efforts, which are currently focused on improving the country's LPG distribution system.

Specific aims

This study will be structured around the following specific aims:

1. **Aim 1**: Assess the feasibility and effectiveness of a targeting strategy designed to increase LPG uptake among poorer households in Techiman, Ghana.

2. **Aim 2:** Quantify the air pollution reduction benefits from LPG adoption and characterize gender-dependent distribution of air pollution exposure within the home.

   Sub-aim 2A: Measure stove use to assess the contribution of cookstove emissions to personal exposure.

3. **Aim 3**: Comparatively evaluate men and women household heads' motivations for selecting household energy sources, and assess their implications for decision-making related to clean fuel adoption.

Methods

The study will use randomized controlled trial (RCT) to design (Aim 1) and test (Aim 2), the feasibility and effectiveness of a pricing mechanism designed to target larger LPG subsidies to poorer households. We also aim to disaggregate based on gender the air pollution reduction benefits that can be obtained through LPG adoption (Aim 3) and the motivations for clean fuel adoption (Aim 4). The results of this RCT will inform the design of policies aimed at increasing the uptake of clean cooking technologies among the poor.

The study in total sample of about 1,200 households in Techiman town will be randomly assigned to two treatment arms and a control group.

Expected outcomes

The proposed study is to generate data that will allow the Government of Ghana to create efficient subsidy mechanisms to maximize LPG uptake by low-income households.

This study is also expected to increase understanding of the distribution of HAP reduction benefits within the home, which is currently poorly characterized.

Progress

Stage one

The following key milestones were all completed as part of stage one:

- A smart subsidy package, designed as a targeting strategy to increase LPG adoption and use in Techiman, was implemented between March 2022 and October 2022. In all, a total of 524 households were involved.
- Personal exposure to air pollution monitoring for both men and women across 175 households were conducted between August and December 2022.
- These measurements were done at two time points – baseline and endline, with the goal to characterizing the gender-dependent distribution of air pollution reduction benefits that can be achieved through LPG adoption.
- Four focus group discussions, held separately for men and women were also undertaken to understand households' motivations for purchasing clean cooking technologies and the dynamics of intra household decision making on clean fuels.

Stage two

Stage two design is now finalized and preparations are underway to launch field activities in January, 2023.This phase of the study essentially aims to test the feasibility and effectiveness of the smart subsidy package that was implemented in stage one.

An important feature of this study is that both stage 1 and 2 are treated as complementary steps, with Stage 2 leveraging the findings of Stage 1 to provide a restricted set of subsidy options to participants and thus maximizing separation between wealthier and poorer households.

Figure 1. One of the four LPG exchange depots in Techiman

Reducing Household Air Pollution in Ghana through Community-Level Transitions to Clean Cookstoves and Fuels

Investigators

KHRC: Dr. Kwaku Poku Asante, Dr. Sulemana Watara Abubakari, Mr. Edward Anane Apraku, Ms. Theresa Tawiah, Ms. Martha Ali

Columbia University: Darby Jack

University of California Santa Barbara: Kelsey Jack

Funder:
Columbia World Projects

Project start date:
November, 2019

Project end date:
November, 2024

Background

Globally, nearly 3 billion people use traditional cookstoves and fuels. In Ghana, about 70% of the population generates energy for cooking by burning biomass and other solid fuels in open fires. These inefficient energy sources produce one-quarter of all black carbon emissions globally, and lead to nearly four million preventable pollution-related deaths per year, including half a million children under the age of 5 years who die from pneumonia. Women are also particularly impacted, both because of their exposure in the home and because the burden of collecting firewood and other fuels falls to them.

A number of interventions over the last decade have not significantly reduced the negative impact of the use of traditional cookstoves. Study participants continue to use polluting energy systems, and emissions from neighbors, effectively negate the health benefits of any one household's transition to clean energy systems. This study consolidates past experiences with clean household energy – with a particular focus on behavioral and cultural questions – and also draws on novel insights into both clean cooking technologies and behavioral antecedents to their sustained use.

Objectives

The primary objective is to reduce household air pollution exposure by promoting community-level transitions to clean cooking with the target of achieving WHO health-based air quality targets. Specifically:

- Develop and integrate new – but evidence based – behavior change approaches that consider decision-making within the home and at the community level to encouraging exclusive, sustained use of clean cooking technologies.
- Develop a portfolio or stack of clean options (fuels, stoves, and practices) that together can fully displace traditional open fires in homes and small businesses, and enable exclusive, sustained use of clean alternatives.
- Aim to transition entire communities towards clean alternatives, rather than being focused on the number of households affected, in order to achieve anticipated air-quality improvements.
- Identify broader energy system changes that will support and sustain household- and community-level transitions.

Methods

The project will have two main phases: an assessment phase and an intervention phase. The assessment phase will develop a detailed quantitative picture of Ghana's current household energy systems, and will evaluate constraints and opportunities. To accomplish this, four main tasks will be carried out:

- Nationally representative household energy use survey. This will entail a detailed questionnaire, to be designed in close consultation with Government of Ghana partners, to understand household energy needs, strategies for meeting those needs, and expenditures on household energy.
- National-level assessment of exposure to household air pollution. In a subset of households surveyed, we will deploy both personal air pollution monitors and neighborhood air pollution monitors.

Figure 1: Dr. Sulemana Watara Abubakari and CWP collaborators

- Evaluation of behavioral constraints and opportunities surrounding adoption and sustained use of clean household energy. We will carry out a series of studies that will provide novel insight into factors including but not limited to cost.
- Systematic review of potential household energy technologies. Previous experience with clean household energy in Ghana has centered on LPG. We will assess the feasibility and cost of ethanol, electricity, and processed biomass (pellets) to coexist with LPG in the Ghanaian market. We will also assess the viability of novel business models for fuel delivery.

In the intervention phase we will deploy a set of promising technologies, business models and behavior change approaches in a carefully monitored, large scale test program in a to-be-determined set of communities in Ghana. This will give us the opportunity to evaluate how well the technologies and business models meet household energy needs, and also to track the costs and logistical challenges associated with delivering clean energy services at scale.

Expected outcomes

Nationally representative dataset with a strong empirical, understanding of energy use patterns, prices end users are currently paying, and spatial distribution of air pollution risk. It is expected that behavior change intervention will improve clean cookstove adoption and sustained use.

Progress

We have successfully organized a stakeholder virtual dissemination workshop in July 2021, and an in-person workshop that included policy makers in November 2021. Three abstracts from the CWP National survey data were submitted by Dr. Sulemana Watara Abubakari, Messrs. Edward Anane Apraku and Seidu Iddrisu to and accepted for presentation at the ISEE African Chapter Virtual Conference which was held between 26th and 27th July, 2022. In addition, Dr. Sulemana Watara Abubakari attended and presented at the 2022 Global ISEE conference in Athens, Greece from 18th to 21st September, 2022.

The team is currently developing six manuscripts for peer-reviewed publication. Two out of the six manuscripts under development have been submitted to peer-reviewed journals whilst the team continue to work on the others.

Next steps

The implementation of the second phase of the study is expected to commence in 2023. However, the team is currently in the preparatory phase where discussions around the implementation, logistics, and personnel is underway.

Antenatal, Intrapartum and Postnatal Care: A Prospective, Longitudinal Study of Maternal and Newborn Health of the Pregnancy Risk Stratification Innovation and Measurement Alliance

(PRISMA study)

Investigators

PI: Dr. Kwaku Poku Asante. **Co-PIs**: Prof. Sam Newton, Mrs. Charlotte Tawiah Agyemang

Project/Study Coordinators: Mrs. Irene Apewe Adjei, Mrs. Ellen Boamah-Kaali, Mr. Lawrence Gyabaah Febir, Mr. Kenneth Wiru

Data Managers: Mr. Seeba Amenga-Etego, Mr. Eliezer Ofori Odei-Lartey.

Statistician: Ms. Stephaney Gyaase

Biomedical Scientist/Laboratory Technologist: Dr. Dennis Adu-Gyasi, Mrs. Veronica Agyemang and Mr. Dennis Konadu Gyasi.

Funder:

Bill and Melinda Gates Foundation (BMGF)

Collaborators:

George Washington University: Dr. Emily Smith, Jamie Marquis and Megan Talej.

Columbia University: Dr. Blair Wylie

Project start date:

November, 2020

Project end date:

December, 2025

Background

Quality antenatal and postnatal care services are important and gaining recognition with increasing antenatal care coverages in low- and middle-income countries. However, the ANC coverage rate is much lower among more vulnerable populations (e.g. lower quintile, rural regions), and the quality of care that women receive is inconsistent, often poor, and frequently fails to detect risks in a timely fashion or to prepare women for the birth process. While most women access skilled antenatal care at least once during pregnancy, there is poor continuity of care and only about 60% of women receive the recommended four ANC visits by WHO.

From a surveillance perspective, there is a lack of robust population-level burden data to inform global and local estimation of key risk factors, vulnerabilities and morbidity and mortality outcomes among pregnant women and mother-infant pairs during the duration of antenatal and postnatal care. Robust data on pregnancy risks, including medical history, clinical symptoms and diagnostics, social determinants, as well as antenatal and intrapartum care are critical to developing strategies to effectively manage pregnancy risk and improve outcomes, within resource-constrained environments.

Objectives

The goal of this study is to develop a harmonized data set to improve our understanding of pregnancy risk factors, vulnerabilities, and morbidity and mortality and to estimate the burden of these risk factors and outcomes in Low and Middle-Income Countries. Ultimately, these data will inform the development of innovative strategies to optimize pregnancy outcomes for mothers and their newborns.

Methodology

The Pregnancy Risk Stratification: Innovation & Measurement Alliance (PRISMA), is a longitudinal study of maternal and newborn health, with emphasis on the pregnancy risk factors and their associations with adverse pregnancy outcomes, including stillbirth, neonatal mortality and morbidity, and maternal mortality and severe morbidity. This is a multi-country population-based study involving five countries in Sub-Saharan Africa and South east Asia: Ghana, Kenya, Zambia, Pakistan and India.

A total of 16,000 pregnant women are to be enrolled from all sites on the study. The target enrollment for Ghana is 3,500. Pregnant women whose gestational ages are less than 20 weeks will be enrolled into the study and scheduled visits will be made throughout

their antenatal (ANC), intrapartum (IPC) and postpartum (PNC) periods up to 1 year after delivery. A harmonization phase is proposed where the protocol will be implemented uniformly across sites, with special effort to ensure that the primary health outcomes and related risk factors are assessed using standardized methods.

For the harmonization an additional 20,250 pregnant women (cohort 2) will be recruited across sites in 3 years with 3,000 from KHRC. We will identify, screen, and enroll pregnant participants through pregnancy surveillance systems, with a goal of identifying pregnancies prior to 20 weeks of pregnancy.

Pregnant women will be assessed at <20, 20, 28, 32, and 36 weeks' gestation, at labor and delivery, and at 3 days and 1, 4, 6, 26, and 52 weeks postpartum. Infants will similarly be assessed at 3 days and 1, 4, 6, 26, and 52 weeks of age.

Progress

Recruitment into the cohort 1 (PRiSMA I) was halted in July 2022, however, participants already enrolled into the study are being followed-up. As at 14th December 2022, a total of 3,163 potential participants were screen and 2,285 participants were consented and enrolled into the PRiSMA I study. One-thousand nine-hundred and ninety-five (1,995) of the enrolled participants have delivered. Out of the recorded deliveries, 1,995 were live births, 24 fresh still birth and 19 macerated still birth.

The study protocol was amended to include the harmonization activities (cohort 2). There was a site initiation visit by Guosa Life Sciences (GLS) on 7th December, 2022 to assess the readiness of the team for the PRISMA II study.

Ethical approvals from the Kintampo Health Research Centre's Institutional Ethics Committee and the Ghana Health Service Ethics Review Board were obtained in December 2022. Enrollment into cohort 2 (PRISMA II) begun on 29th December, 2022.

Figure 1: Monitoring of field activities

Figure 2: A section of study team members

Redefining Maternal Anaemia in Pregnancy and Postpartum (ReMAPP): A multicenter, international, population-based study to establish global haemoglobin thresholds for maternal anaemia

(Anaemia Sub-Study (ReMAPP)

Investigators

Dr. Kwaku Poku Asante, Mrs. Charlotte Tawiah Agyemang, Prof. Sam Newton, Mrs. Veronica Agyemang, Dr. Amma Benneh-Akwasi Kuma, Prof. Emily Smith, Ms. Sasha Bauman.

Funder:

Bill and Melinda Gates Foundation (BMGF)

Collaborators:

Prof. Emily Smith, Ms. Sasha Bauman (George Washington University, United States)

Dr. Amma Benneh-Akwasi Kuma (Korle Bu Teaching Hospital)

Project start date:

1st October, 2021

Project end date:

31st September, 2024

Study duration:

3 years

Background

Anaemia is a deficiency in oxygen-rich blood, characterised by low blood haemoglobin concentration and/or low red blood cell (RBC) count insufficient to meet physiological needs. Women of reproductive age (WRA) especially pregnant and lactating are disproportionately affected by anaemia affecting about 613 million and this is associated with increased risk of adverse outcomes for both mother and newborn.

The burden of anaemia is more pronounced in low and middle-income countries (LMICs). The World Health Assembly aims to reduce anaemia in WRA by 50% by the year 2025. The causes of anaemia are multifaceted, however, iron deficiency accounts for over 50% in WRA. The overarching objective of this study is to leverage the Antenatal/Postnatal Research Collective (ARC) network to advance clinical knowledge of anaemia during pregnancy and contribute high quality, globally representative data toward establishing haemoglobin thresholds linked to functional outcomes.

Objectives

Three primary aims of this study will be:

Aim 1: To define normal haemoglobin values in healthy women during pregnancy and within 42 days postpartum and estimate related statistical thresholds for anaemia diagnosis in these populations;

Aim 2: To establish haemoglobin thresholds for anaemia diagnosis in pregnancy based on the link with adverse maternal, foetal, and newborn health outcomes.

Aim 3: To determine the underlying contributing factors to anaemia during pregnancy.

Methodology

The study is nested within a subset of ARC sites (Ghana, Kenya, Zambia, India and Pakistan) implementing a Pregnancy Risk Stratification Innovation and Measurement Alliance (PRiSMA) Maternal and Newborn Health (MNH) Study, with Ghana (Kintampo Health Research Centre) being the coordinating site. Each participating site will recruit 1,600 to 2,000 pregnant women from the MNH study into the Aim 2 cohort at gestational age 14 weeks. Serial haemoglobin measurements will be done during the antenatal period (13 weeks, 20 weeks, 28 weeks, 36 weeks) and 42 days postpartum.

A sub cohort of 1,200 to 2,000 women from the Aim 2 cohort will be further screened to identify a healthy pregnant population of 600 participants for the Aim 1 (establishing reference values). Aim 3 will include a cross-section of 300 women (100 per trimester), randomly sampled from those screened for the Aim 1 sub-cohort, to participate in a biomarker intensive sub-study to determine the underlying contributing factors to anaemia.

Expected Outcome

The study will contribute to informing new global guidelines for diagnosing maternal anaemia and identifying high-risk pregnancies based on haemoglobin values.

Progress

Recruitment into the study began in December 2022.

Figure 1: Visit by KHRC ReMAPP Team to Hyperfine at Aga Khan University, Pakistan

Figure 2: Visit by Dr Benneh to KHRC

The impact of maternal anaemia on neurodevelopmental outcomes among infants: a prospective maternal-infant birth cohort follow up study in low-and middle-income countries

(Infant Neurodevelopment Study)

Investigators

Ghana: Dr. Kwaku Poku Asante, Dr. Kenneth Ae-Ngibise, Mr Solomon Nyame, Ms Veronica Agyemang, Ms Stephaney Gyaase, Mrs Charlotte Tawiah

USA: Dr Emily R. Smith.

Kenya: Dr. Dickens Onyango, Dr. Bernard Awuonda, Dr. Victor Akelo

Zambia: Dr. Joan Price, Dr. Jeff Stringer, and Dr Margaret Kasaro India: Professor Beena Koshy, Professor Venekata Raghava Mohan, Professor Santosh Benjamin

Pakistan: Dr. Zahra Hoodbhoy, Dr. Imran Nisar, Dr Fyezah Jehan

Funder:

Bill & Melinda Gates Foundation

Collaborators:

Ghana: Kintampo Health Research Centre, Ghana Health Service

Kenya:Kenya Medical Research Institute (KEMRI)-Center for Global Health Research (KEMRI-CGHR)

Zambia: University of Zambia School of Medicine, UNC Global Projects Zambia, University of North Carolina School of Medicine

India: Christian Medical College, Vellore

Pakistan: Aga Khan University USA: George Washington University

Project start date:

1st, June 2022

Project end date:

31st December, 2024

Study duration:

2 years

Background

Women of reproductive age (WRA), especially pregnant and lactating women, are disproportionately vulnerable to anaemia. Globally, 33% of WRA, or about 613 million, are estimated to be anaemic. Prevalence of anaemia among WRA is highest in low- and middle-income countries (LMICs). In 2016, the World Health Organization (WHO) estimated the prevalence of anaemia in South-East Asia and sub-Saharan Africa (SSA) to be 46% and 39% respectively among WRA.

The Infant Neurodevelopment Sub-Study is a prospective observational study which aims to assess the impact of maternal anaemia on infant neurodevelopment and brain morphology among a birth cohort study in Ghana, India, Kenya, Pakistan and Zambia. The Global Scale for Early Development (GSED) alongside a portable Swoop Magnetic Resonance Imaging (MRI) will be used to characterise structural and functional brain development patterns among children under 12 months of age.

Objectives

To assess the impact of maternal anaemia on infant neurodevelopment by GSED scores at 3, 6 and 12 months of age. The study also aims to assess the impact of maternal anaemia on infant brain volumetry and microstructure at 3 and 12 months of age.

Methodology

This is a prospective birth cohort follow-up sub-study under Redefining Maternal Anaemia in Pregnancy and Postpartum (ReMAPP). About 1,600 mother and infant's dyad will be recruited per site into the study (minimum of 8,000 sample expected in total). Pregnant women who are recruited into the aim 2 of ReMAPP will be included in this study. After delivery, medical information about the mother and child will be extracted from the mother study. Infant neurodevelopment will be assessed at 3, 6 and 12 months of infant age.

Expected Outcomes

To characterize the association of maternal anaemia with infant neurological developmental outcomes and brain microstructure of infants at 3, 6 and 12 months of age and evaluate the impact of maternal anaemia on both. The study will further generate data to support the use of the GSED scale for assessing infant neurodevelopment.

Progress

Study protocol submitted for scientific and ethical approvals at KHRC.

Assessing the relationship between gender disparity and anemia among pregnant women in sub-Saharan Africa and South Asia

(Gender disparity and Anemia study)

Investigators

Dr. Kwaku Poku Asante, Mr. Lawrence Gyabaa Febir, Ms Martha Ali Abdulai, Dr. Samuel Afari- Asiedu, Ms. Stephaney Gyaase, Mrs Charlotte Tawiah Agyemang, Prof Sam Kofi Newton

Funder:

Bill and Melinda Gates Foundation (BMGF)

Collaborators:

Kenya- Kenya Medical Research Institute (KEMRI)
India- Christian Medical College (CMC), Vellore.
India-Society of Applied Sciences (SAS), Delhi: subject to the approval of the Bill and Melinda Gates Foundation
Pakistan- Vital Pakistan Trust (VPT), in collaboration with Aga Khan University (AKU)

Project start date:
1st January, 2020

Project end date:
31st December 2023

Study duration:
2 years

Background

Anemia results from a lack of red blood cells or dysfunctional red blood cells in the body. This leads to reduced oxygen flow to the body's organs. Anemia is very common among women from poor socioeconomic backgrounds, especially in rural areas and urban slums. A woman's socioeconomic situation affects her access to and distribution of opportunities, resources, products, and services, exposing her to anemia's determinants.

Low- income women are more prone to anemia and infection. Women from low socioeconomic backgrounds may be at risk from anemia due to poor sanitation, pregnancy-related illness, and sexually transmitted diseases. For example, when compared to uneducated women, educated pregnant women are more likely to eat a balanced diet, go to antenatal care on a regular basis, and follow malaria prevention measures like sleeping under insecticide-treated nets and taking multiple doses of sulphadoxine-pyrimethamine for intermittent preventive treatment of malaria in pregnancy.

In the intra-household allotment of food and micronutrients, women and girls receive less than their fair share. Women are socialized to prioritize others' needs over their own, and they frequently eat last or from leftovers. Again, in patrilocal norms, mothers-in-law have a lot of power over younger women in their houses when it comes to health and food issues.

Anemia is prevalent during pregnancy; findings from studies, however, suggest that anemia is not considered a severe health risk in women's social circles as anemic pregnant women have healthy babies. Studies have shown that women who are offered Iron and Folic Acid (IFA) tablets frequently believe that taking the recommended dose may hurt them or result in a "large baby" and a costly caesarian birth. Indeed, the increased focus on the issue stems from the realization that some gendered socio-cultural beliefs, perceptions and practices influence anemia and consequently negatively affects maternal and child health outcomes. This therefore requires an understanding of socio- cultural determinants of gender disparity and anemia among pregnant women and their gatekeepers.

Objectives

- To explore socio-cultural beliefs around food for women especially during pregnancy.
- To explore contextual (social, cultural and economic) factors and behaviours that influence gender disparity and anemia.
- To understand the perception of pregnant women on anemia and its associated outcomes.
- To explore gender disparity and anemia mitigation strategies among pregnant women and gatekeepers.

Methodology

This study will use qualitative methods of data collection (In-depth Interviews (IDIs) and Focus Group Discussion (FGDS), which will throw more light on context specific issues such as culture, eating habits during pregnancy, and perceptions of pregnant women on anemia. The study will be sequenced and conducted in three stages.

Phase 1: FGDs will be conducted among pregnant women, and husbands/partners. Also, IDIs will be conducted among fathers/mother in-laws, and community opinion leaders, midwives, ANC nurses, community volunteers and TBAs where applicable. FGDs and IDIs will explore cultural, social, and economic factors that influence gender disparity and anemia, and beliefs around food for women especially during pregnancy.

Phase 2: Information from FGDs and IDIs from phase 1 will be used to design participatory action research among pregnant women and husbands/partners on how they perceive anemia related outcomes using community participative ranking methodology.

Phase 3: FGDs and IDI will be conducted among pregnant women to validate emerging themes from data gathered from phase 1 and 2.

Expected Outcomes

- Socio-cultural beliefs around food for women especially during pregnancy.
- Contextual (social, cultural and economic) factors and behaviors that influence gender disparity and anemia.
- Perception of pregnant women on anemia and its associated outcomes.
- Gender disparity and anemia mitigation strategies among pregnant women and gatekeepers.

Progress

Ghana: The team has received full ethical clearance from the KHRC Institutional Ethics Committee to commence data collection.

Kenya: The team has submitted to the Scientific Ethical Review Unit (SERU) of Kenya Medical Research Institute (KEMRI) for ethical clearance and are awaiting feedback.

India: The CMC Vellore team has received full ethical clearance from their IRB, awaiting clearance from the Minister of Health.

The SAS team has commenced ethical submission process but their final inclusion will be determined by the Bill & Melinda Gates Foundation.

Pakistan: The team has commenced submissions for ethical clearance, awaiting feedback from the ethics committee.

Programme for the Effective Promotion of maternal psychosocial WELLbeing (PREPWELL)-intervention development study

(PREPWELL Study)

Investigators

Kintampo Health Research Centre: Mr. Solomon Nyame; Dr. Kenneth Ae-Ngibise; and Dr. Kwaku Poku Asante

University of Ghana: Dr. Benedict Weobong; Professor Philip Adongo; Professor Angela Ofori-Ata; Professor Joseph Osafo

London School of Hygiene and Tropical Medicine: Professor Betty Kirkwood

Funder:

University of Ghana, School of Public Health

Collaborators:

University of Ghana: Dr. Benedict Weobong: Professor Philip Adongo; Professor Angela Ofori-Ata; Professor Joseph Osafo

London School of Hygiene and Tropical Medicine: Professor Betty Kirkwood

Project start date:

22nd August, 2020

Project end date:

31st January, 2023

Study duration:

2 years

Background

It is now established that the burden of perinatal depression in low and middle-income countries (LMIC) (11.3% during pregnancy and 18.3% after birth) is higher than in developed countries (10.2% during pregnancy and 12.9% after birth). Maternal psychosocial well-being is a concept that defines the psychological and social aspects of motherhood. At one of its extremes, this concept encounters maternal perinatal depression, a condition that is now recognized as a major public health issue world-wide.

Objectives

The objective of the study is develop interventions that will address perinatal depression. Also, the other goal of PREPWELL study is to check whether this intervention would be a good idea (acceptability). Also, we want to know what should be included in this programme to make it work or beneficial to mothers (feasibility)

Methodology

The team conducted in-depth interviews as well as participatory workshops were done among key stakeholders. In all, three different participatory workshops was done among women in the prenatal and post natal period. In-depth Interviews (IDIs) with key stakeholders: Health Directors, Public Health Nurses, Midwives, Community Psychiatric Nurses, Clinical Psychologist, Community Mental Health Officers, Community Psychiatric Officer, CHPS Coordinators, Disease Control Officers.

Participatory workshops:

Pregnant women, women who have recently delivered, and Consultative meeting with key stakeholders for the intervention development.

Field testing

Field-testing was done in New Longoro to systematically evaluate the comprehensibility of the PREPWELL approach and content, and its feasibility, acceptability, and saliency through case-series experiments with a small group (8 pregnant; 8 recently delivered mothers) of the target population using all elements of PREPWELL. Once, recruited two healthcare workers serving the catchment area were also oriented and linked to the participants for the field testing.

The primary outcome of interest for the field-testing stage is feedback on the comprehensibility (how understandable the sessions/messages are), feasibility (recruitment, follow-up, delivering PREPWELL over mobile phone), acceptability (session uptake, engagement, safety), and saliency (how relevant, useful, and how applicable the Behavioral Activation (BA) skills are to mothers) of PREPWELL. For all quantitative data, simple descriptive statistics will be employed to summarize the data by means (standard deviation), medians (interquartile range), or numbers and proportions as appropriate, using STATA.

Thematic analysis will be done based on feasibility, comprehensibility, acceptability, and saliency. The PREPWELL intervention was deployed in the following way:

- The messaging campaign was developed by KHRC and optimized for Interactive Voice Response by Viamo.
- It had 8 sessions which was deployed on a weekly basis according to the preferred day and time of the week indicated by the participant.
- The campaign was translated and recorded in Twi (widely spoken local language in the area).
- An SMS was sent to nurses (prompt) who had mothers under their care reporting bad mood per each session.
- A sensitization workshop was conducted by PREPWELL where mothers and nurses were guided on what to expect during sessions.
- At the sensitization workshop, the selected participant suggested that we call the intervention Ɔbaatanpa.
- All concerns or questions were shared with VIAMO and addressed accordingly before the launch of the intervention.

Platform preparation and Pre-launch

- Viamo's Platform was set up to send the sessions through IVR to allow all 16 mothers to appreciate and understand prenatal and postnatal care.
- Content and platform testing was done internally (within Viamo) and externally with KHRC staff and nurses.
- The platform was integrated into 3 three retry patterns, 5 minutes apart when calls were scheduled.
- In instances where mothers are unable to complete 2 consecutive sessions, they were dropped off from participating in the subsequent sessions.
- An inbound line was set where mothers were able to call in anytime to continue from where they left off or take the sessions if they ever missed a call Content Launch, Monitoring and Reporting.
- The survey was launched between 2nd September and 27th October 2022.
- Completed sessions per week were shared with the research team to monitor the progress from session to session and complete the required weekly assessment.
- Monitoring of call engagement done regularly to check for and address any technical issues every week.
- Weeks when mothers reported experiencing bad moods, contacts are shared with nurses to reach out to them.

The evaluation was be based on:
a) Viamo platform usage data.
b) Assessments using the Patient Health Questionnaire-(PHQ-9) before and after PREPWELL to check safety (no severe symptom deterioration).
c) Feedback gathered through case series structured interview guide

Key findings

1. Intrinsic characteristics of the intervention must offer tangible benefit to address an unmet need.

2. All stakeholders must be engaged, trained, and motivated to implement a new initiative.

3. The technical profile of the intervention should be simplicity, adaptable and acceptable.

4. Focus area is the policy environment in which the digital healthcare intervention is intended to function.

5. The extrinsic factors should also be considered.

The purpose of this field testing was to evaluate the feasibility of conducting a future randomized control trial (RCT) by evaluating the critical components of the acceptability of the intervention. Findings show that it is feasible for women within the perinatal period to go through a mobile intervention that seeks to improve their psychosocial wellbeing.

The findings show that changes are needed to improve the practicality of collecting follow-up data before scaling up to a full RCT, even though evidence suggests that Ɔbaatanpa intervention is acceptable. Both recommendations for further study and potential consequences for practice and policy will be considered

During the conduct of the future RCT, the team should also focus on investigating if deploying Ɔbaatanpa intervention will be cost-effective.

Expected Outcomes

The expected outcome is the development of a behavioural activation intervention to prevent and address perinatal depression.

Progress

The final report has been submitted.

Figure 1 and 2: Workshop with mothers to develop key components of the Ɔbaatanpa intervention

Uptake of Task-Shifting Strategy for Blood Pressure Control in Community Health Planning Services: A Mixed Method Study.

(Uptake TASSH)

Investigators

Kintampo Health Research Centre: Dr. Kwaku Poku Asante, Mr. Solomon Nyame, Mr. Kwame Adjei, Dr. John Amoah

Kwame Nkrumah University of Science and Technology: Prof. Kweku Bedu-Addo, Kezia Gladys Amaning Adjei, Mr. Kingsley Apusiga

New York University: Prof. Gbenga Ogedegbe, Dr. Joyce Gyamfi, Prof. William Chaplin, Dr. Angela Aifah, Deborah Onakomaiya

Saint Louis University: Prof. Juliet Iwelunmor

Funder:

National Institute of Health through National Heart Lung Blood Institute

Study duration:

39 months

Project start date:

31st, May 2017

Project end date:

30th April, 2024

Background

In countries like Ghana, hypertension, once a rare disease, has become a major public health problem, and the second leading cause of morbidity in adults at the various hospitals. A study on hypertension conducted between October 2015 and December 2016 as part of the Kintampo Non-Communicable Disease Initiative revealed that the prevalence of hypertension was 24.6%. Also, approximately 55% of those with hypertension did not know that they have the condition, hence, were not on any medication. Thus, intervention was needed.

One of the challenges for hypertension control in sub-Saharan Africa (SSA) is the acute shortage of healthcare workers. The World Health Organization (WHO) launched a series of evidence-based practices for low middle-income countries including WHO Cardiovascular Disease (CVD) Risk package utilizing the Task Shifting strategy to improve the shortage of health workers for CVD prevention and control.

These strategies of using non-physician health workers, such as community health workers and nurses are proven to be viable and cost-effective. Therefore, a multi-component intervention (Figure 1) was developed with the various stakeholders. The practice facilitation intervention had three components:

1. Formation of a steering committee to help identify barriers and facilitators of implementing TASSH at the CHPS zones (national committee); and to help with implementation of the program at the CHPS zones (local committee).

2. Development of the Task Strengthening Facilitation (TSF) strategy. The TSF strategy includes: training of task strengthening facilitators (TSFs) on coaching strategies (Encouraging, Engaging and Enhancing) to help CHOs perform their tasks; training the CHOs on Identifying, Counseling and Referring (ICR) of adults with HTN to the health centers using the 5 As counseling strategy (ask, assess, advise, assist and arrange); and creation of a community learning environment that will support learning opportunities for the CHOs and TSFs.

3. Engagement of the community to create a community urgency and persistency of the importance of HTN screening and referral for adults.

Objectives

1. To see if community health nurses will adopt the TASSH strategy which involves a coaching component (Practice Facilitation).

2. To know how the TASSH strategy has been used to control and manage hypertension at the Community Health Planning Services (CHPS level).

3. To determine whether the coaching strategy has been effective compared to what is usually done at the various facilities.

Methodology

This mixed-methods, "Hybrid Type II" Effectiveness-Implementation study will take place in three (3) contiguous districts in the Brong Ahafo of Ghana (Kintampo North, Kintampo South, and Nkoranza North). A culturally acceptable practice facilitation strategy will be developed based on recommendations from key stakeholders guided by Damshroeder's Consolidated Framework for Implementation Research (CFIR). Community Health Officers will be trained based on the practice facilitation strategy developed. Seventy (70) CHPS zones will be selected and randomized into intervention and control groups.

The intervention group will implement the practice facilitation strategy whereas the control group will provide the usual care in the first year. In the second year, the usual care group will implement the facilitation strategy whereas the implementation group will provide the usual care. At the post-implementation phase, the study team will evaluate the adoption and sustainability of TASSH in participating CHPS zones using the Reach Effectiveness Adoption Implementation and Maintenance (RE-AIM) framework.

Key Findings

Practice Capacity Survey

The study team assessed the capacity for the management of hypertension within six contiguous districts (Techiman North District, Techiman Municipality, Nkoranza North District, Nkoranza South Municipality, Kintampo North Municipality and Kintampo South District). This practice capacity survey was guided by the Consolidated Framework for Implementation Research (CFIR).

A total of 179 CHPS zones were surveyed. The survey result revealed that 78.77% of the respondents did not know the first line Hypertension (HTN) medication. Respondents' characteristics such as participants training (p=0.001) and years of HTN management (p=0.033) were significantly associated with diastolic Blood Pressure (BP) threshold for initiation of HTN treatment.

Furthermore, in terms of the BP threshold (both systolic and diastolic) for initiation of HTN treatment, participants training (p=0.028) and number of years of HTN management (p=0.019) was significantly associated with correct responses. Results also showed that there was high level of receptivity (75.42%) for the proposed intervention, high confidence (82.68%) and participants are highly prepared (82.68%) to use the proposed study intervention.

Concept Mapping Exercise

We developed a concept map, consisting of 46 strategies needed for implementing evidence based TASSH, organized into 6 clusters: 1) Referral Systems; 2) Availability of Equipment; 3) Protocols and Guidelines; 4) Capacity Building/Training; 5) Policy Reform, and 6) Technical Support and Supervision.

Availability of equipment was rated as the most important strategy (mean 4.80 out of 5) needed to implement evidence based TASSH, while Capacity Building/Training was rated as the most feasible strategy (mean 4.20 out of 5) to address. Although important (mean 4.40 out of 5), Policy reform was rated as the least important and feasible strategy to address.

These findings demonstrate strategies that can help inform future interventions focused on the adoption and sustainability of evidence based TASSH within Ghana's CHPS zones. Also, national, regional and district health stakeholders can support healthcare workers by facilitating access to equipment and strategies for enhancing capacity and training with implementing evidence-based task-shifting hypertension interventions in Ghana.

Participant recruitment

Across the 70 CHPS zones they have screened a total of 9,995 community members and identified 2,484 community members with hypertension. The best practices are; creation of community awareness; training and Refresher trainings of CHOs and PAs; provision of logistics, identifying people with high blood pressure and linking them to care as well as crystalizing critical gaps within the health systems and proffer solutions through dialogue with the leadership of the health services.

Through the study we have identified key health system level and patient level challenges. Which we are discussing with the leadership to address these critical challenges.

Figure 1:TASSH team participated in a World Heart Federation activity of improving hypertension care in Ghana

Expected Outcome

Primary Outcome:

The rate of adoption of TASSH at the CHPS compounds. The primary outcome will be assessed by the following measures:

1. The number of newly detected hypertensive patients by the CHOs using the WHO Risk Prediction Chart

2. Proportion of patients who received lifestyle counseling by the CHOs

3. The proportion of eligible patients that were referred to physicians and specialist for further care.

Secondary Outcomes:

1. The between-group difference in systolic BP
2. Mediators of adoption of TASSH at the CHPS compounds.
3. The sustainability of TASSH uptake.

Progress

The study team is currently following up on the 700 participants that were recruited during the baseline phase.

Figure 2: Community health fair to screen for hypertension

Figure 3: Regional/District Technical Advisory Group for the TASSH study

Revision and validation of the short 10/66 dementia diagnostic assessment for older populations in Kintampo, Ghana.

(Dementia Diagnostic Validation study)

Investigators

Dr. Maëlenn Guerchet, Mr. Solomon Nyame, Mr. Richard Tetteh, Dr. Kenneth Ae-Ngibise, Dr. Naana Agyeman, Dr. Kwaku Poku Asante, Prof. Pierre-Marie Preux

Funder:

Global Brain Health Institute

Collaborators:

Dr. Maëlenn Guerchet and Prof. Pierre-Marie Preux

Project start date:

15th, March 2021

Project end date:

15th February 2024

Study duration:

2 years

Background

Dementia is a word used by doctors to describe problems with memory, concentration and thinking if they become serious enough to affect day to day life. This is a problem that affects older people in particular; around one in 20 of all those aged 65 years and over. It can be caused by several different disease processes, the commonest of which is Alzheimer's disease.

We are keen to understand more about dementia, from Ghana, where the problem has been little studied. One of the reason why it has been little studied in Ghana, and other parts of African and the world, is that it is difficult to evaluate the symptoms present in the older person using its language and taking into account where they live.

Instruments allowing this evaluation need to be adapted and validated to be sure we are taking into account the environment where older people live. Symptoms might seem common for an old person and not reported or seen by their family. They might also present differently in Ghana than they do in other parts of the world. We aim at investigating how we can improve our evaluation and make it adapted and efficient for older people in Kintampo and in Ghana.

Objectives

1.To make changes in the diagnostic assessment and explore assessment quality as well as deviations from protocol.

2. To check whether the revised version of the 10/66 short-form dementia diagnostic assessment is able to identify individuals with dementia in Kintampo.

Methodology

The study will take place in Kintampo North and South. The study setting is predominantly rural, and data suggest that the population group of 60 years and above forms about 7% of a population of about 151,898. This cross-sectional validation study will use mixed methods approach to collect data that will answer the research objectives. A quantitative approach will validate the 10/66 short-form dementia diagnostic assessment.

A qualitative approach will explore concept elicitation, cognitive debriefing, and usability testing. Eligible older residents aged 60 years and over drawn from the register in the catchment area will be included. Caregivers / close family members (preferably, spouses and/or adult children) living with them will also be asked to answer part of the assessment.

For aim one, we will conduct 30 pilot interviews, 30 pilot administrations of core measures after basic training (using the standard approaches, applied in previous surveys), and cognitive interviewing of the translated versions of the instruments. Pilot administration will be digitally recorded to assess fidelity of administration and rating, and problems with comprehension. Particular attention will be given to technical issues of administration (e.g. how to distinguish between 'often' and 'sometimes' in the CSI-D informant) and translation (following the WHO recommendations for translation and adaptations of instruments).

For aim two, 160 individuals will be interviewed in the two districts.

Key Findings

Currently, community screening activities are ongoing in the two districts. So far, about 1,263 community members 60+ years have been contacted and 1,038 of them have been screened using a prescreening instrument designed using ODK and installed on Samsung android tablets.

Expexted Outcomes

Outcomes from this project will be a culturally adapted and validated version of the 10/66 short-form dementia diagnostic assessment and algorithm, alongside development of protocols for enhanced training and protocols for supervision methods to ensure high standards of fidelity of administration and rating. The instrument's revision and validation will be published in an open-access international journal.

Progress

Community screening is currently ongoing with the aim of identifying community members who are living with probable dementia.

The team made two presentations to disseminate findings from the first dementia prevalence study. The first presentation was made virtually at 6th International Conference of Research on Aging. The second presentation was made at the Dementia in LMICs Symposium held in person in Kenya.

Figure 1 and 2: Field team conducting assessment

Antimicrobial Resistance Studies

Investigators

Dr. Kwaku Poku Asante, Dr. Samuel Afari-Asiedu, Ms Martha Ali Abdulai, Ms Theresa Tawiah, Dr. Dennis Adu Gyasi, Mrs Latifatu Abubakar Alhassan

Funder:

Wellcome Trust, UK

Collaborators:

Kintampo Health Research Centre (KHRC), Radboud University Medical Center, Netherlands, National Antimicrobial Resistance Platform/Ministry of Health, Ghana

Project start date:

July, 2020

Project end date:

July, 2023

Community-level antibiotic access and use (ABACUS II)

Inappropriate antibiotic use is still a major driver of antimicrobial resistance (AMR) especially in low and middle income countries (LMIC) due to easy access without prescription. As part of the ABACUS II project, KHRC continued to conduct studies to understand the context of antibiotic access and use in 2022. ABACUS II is building on findings from the previous study (ABACUS-Scientific Publications – ABACUS project (abacus-project.org) to explore the case for a standardized appearance of oral antibiotics ABACUS II project in Africa and Asia.

The study which was expected to end in August, 2022, received one year cost extension from wellcome trust due to COVID-19 related delays. The study is therefore expected to end in July, 2023. Below are updates on the four sub-studies under the project.

Assessing the potential impact of and obstacles to standardizing the physical appearance of commonly used oral antibiotics

Through round table discussions, this sub-study explored the perspective of experts and stakeholders to inform the co-creation of an international system to facilitate the recognition of oral antibiotics. A total of six round table meetings were held in Africa, Asia and Europe.

The report for this sub-study was completed in 2021 and shared with experts who participated in the meeting.

Health economics analysis related to inappropriate identification of oral antibiotics.

Findings from this sub-studies was published in April, 2022 as part of KHRC's collaboration with Raboudumc to explore the economic impact of inappropriate antibiotic use using example of upper respiratory tract infections (URIs) in Ghana. The analysis included data collected in Ghana during the ABACUS I project (household surveys and exit-interviews among consumers buying antibiotics), scientific literature and stakeholder consultations. Cost saving projections were computed based on potential effects of future interventions that improves antibiotic use.

This study revealed that inappropriate antibiotic use leads to substantial economic costs in a low- and middle income countries (LMIC) setting that could have been prevented. We recommend investment in novel strategies to counter these unnecessary expenditures. As the projections indicated, this may result in considerable cost reductions. By tackling inappropriate use, progress can be made in combating antibiotic resistance.

https://aricjournal.biomedcentral.com/articles/10.1186/s13756-022-01096w#:~:text=This%20study%20indicates%20that%20inappropriate,result%20in%20considerable%20cost%20reductions.

Assessing how identification of oral antibiotics impacts appropriate community-based antibiotic use

This sub-study continued to assess the potential impact of and obstacles to standardizing the appearance of commonly used oral antibiotics. The qualitative study involved two phases of data collection. Phase I of data collection was completed in 2021 where 17 in-depth interviews were conducted with medicine dispensers and seven focus groups with community members. Analysis conducted in 2022 revealed that medicines including antibiotics could be redesigned with unique identifiers to help with easy identification and appropriate use.

Using information gleaned from phase I, another round of data collection were conducted to further explore the potential impact of changing drug appearance from June to December, 2022. A short prototype video (about minutes) highlighting confusion in identification of antibiotic due to colours and possible ways of improving identification was used to facilitate the discussions. A total of six in-depth interviews were conducted with medicine dispensers and four focus groups with community members.

Findings from this study revealed that colour of medicines were major facilitators of identification of medicines including antibiotics. Another important facilitator of identification of medicine is the image on the pack or box of medicine. Reference were made to specific examples on the Ghanaian market such as mosquitoes for malaria medicines, and a picture of someone holding the head for pain killers. Generally, community members were of the opinion that standardizing / harmonising the appearance of antibiotics will facilitate recognition and identification. Suggestions on the sort of uniformity in appearance revolved around the use of symbols, colours and images showing indications for the medicines. However, there were divergent views on where symbols or pictures should be placed for easy identification.

Whilst some respondents indicated that identifiers should be on the box, others thought that is should be placed on the blister packs. Interestingly others thought that is should be in three layers i.e the box, blisters and tablet/capsules. QR codes were largely consider by both dispensers and community members as potentially a good way of identifying medicines in future as not everyone has a smartphone at the moment. Some respondents however, suggested using short codes as a starting start point and gradually move to the use of QR codes.

Dispensers and community member generally thought that engaging pharmaceutical companies as key stakeholders is one of the major facilitators of standardizing the appearance of medicines including antibiotics. Whilst some respondents indicated that that standardizing the appearance of antibiotics will increase antibiotic use without prescription, others are of the view that standardization will help users to be more careful about antibiotic use.

Assess the proportion of substandard and falsified oral antibiotics among three commonly sold antibiotics

Data collection for this sub-study was conducted from October to December, 2022 after training of mystery shoppers in August, 2022. The primary objective of this sub-study is to estimate the quality of three essential antibiotics in four LMIC including Ghana, using laboratory tests against reference criteria. About 8,400 dosages units of antibiotics (Amoxicillin, Ciprofloxacin and Cotrimoxazole) were sampled using mystery shoppers where possible, or an overt approach in dispensing outlets where medical examination is required. These samples have been stored in the cold room of KHRC and will be shipped for analysis in a central laboratory (Mission for Essential Drugs and supply) in Kenya.

Figure 1: Study team labelling samples of antibiotics collected through mystery shopping

Assessing the health seeking behavior and developing pathways for the uptake of vaccination among nomadic populations in the Upper West, Savannah, Bono East, and Ashanti regions of Ghana

(Nomadic study)

Investigators

Dr. Kwaku Poku Asante, Dr. Samuel Afari-Asiedu, Mr. Lawrence Gyabaa Febir, Mrs Charlotte Tawiah

Funder:
UNICEF, Ghana

Project start date:
April, 2022

Project end date:
December, 2022

Globally, vaccination has contributed to reduction of illness, disability and death from diphtheria, tetanus, whooping cough and measles. In spite of the improvement in global vaccination coverage over the years, there are hard-to-reach populations such as nomads and migrant who are exposed to vaccine-preventable diseases especially in sub-Saharan Africa. Nomads who are largely pastoralists are virtually excluded from health services including vaccination because the provision of health services are not usually adapted to their way of life.

This study explored the health seeking behaviour and developed a framework for the uptake of vaccination among nomadic populations in selected districts in the Upper west, Savannah, Bono east, and Ashanti regions of Ghana. This study was conducted from April to November, 2022. Over 400 nomadic settlements were mapped in all the eleven study districts. One hundred and eighty two key informants' interviews were conducted to appraise the movement patterns and health seeking behaviors of nomadic populations. The study revealed that nomads were relatively stable from May to September/October within the year which is the raining season.

The nomads in the local communities were mostly involved in vaccination, but it was a challenge for those who stay in settlements far away from the communities. Awareness about disease and severity influenced vaccination among nomads. Social mobilization approaches that could be used to improve vaccinations among nomads include the use of community radio and information centres. Engagement of the nomads on specific days, and involvement of nomadic leadership, butchers and volunteers were potential avenues to reach nomadic populations for vaccination. Consequently, a framework was developed using the WHO health system building blocks to provide pathways that could improve on vaccination among nomads. Under leadership and governance, it emerged that the role of community leaders in vaccinations specially nomadic leaders should be strengthened. For service delivery, it was recommended that some nomads and cattle owners should be engaged to support vaccinations in order to overcome language barrier and build trust. Strategically setting up vaccination centers at markets, mosque or the chief's palace also emerged.

The Ghana Health Service and veterinary service were also encouraged to do joint vaccination among nomads and their animals. With regards to health workforce, health workers/vaccinators were encouraged to avoid the use of derogatory language as nomads feel discriminated against. Capacity building in customer care for health workers was highly recommended. With regards to medical products and vaccines, continuous education and sensitization among nomads and their leaders was the most important tool for addressing wrong perception about vaccine safety. Healthcare financing largely revolved around strengthening the political will to support vaccination among nomads.

Though vaccinations are free, logistics such as motorbikes and vehicles were required to reach the nomad populations. For health information, mass awareness creation and leveraging the existing structures nomads use to pass information such as electronic voice recordings and short videos was strongly recommend.

Figure 1: UNICEF team visit to KHRC during data collection

Kintampo Health and Demographic Surveillance System (KHDSS)

Background

The Kintampo Health and Demographic Surveillance System (KHDSS) aims to document accurate health and demographic information of the resident population within its catchment area through the conduct of routine data collection and updates. This serves as an important resource for health research at the Kintampo Health Research Centre. The KHDSS covers the resident population of six administrative districts within the Bono East Region of Ghana and these have been categorized into three (3) Health and Demographic Surveillance System (HDSS) sites for data and field management purposes.

These are the Kintampo site (Kintampo North Municipal and Kintampo South District), Techiman site (Techiman South Municipal and Techiman North District), and the Nkoranza site (Nkoranza South Municipal and Nkoranza North District). It has a surface area of 9,619 square kilometers which represents 24.3% of the total land area of the Bono East Region. It operates in 344 communities with 112,205 active households within 78,845 active compounds. The current coverage is based on accessibility to the communities all year round and this involves over 90% of the resident population in all three sites.

Field operations

Routine updates and other data collection are done electronically since the data management system was migrated from FoxPro (i.e. the Household Registration System2 (HRS2) to the Open Health and Demographic System (OpenHDS) platform in 2018. Two update rounds were conducted during the year under review. In each round, core demographic events (i.e., births, deaths and migration) and pregnancies were updated. In addition, the socio-economic status of newly registered households (profile), was also documented. Verbal Post-Mortems (VPMs) were conducted for about 90% of the recorded deaths by trained field workers using the WHO verbal autopsy tool.

Demographic Characteristics of the HDSS

The total resident population of the HDSS as of 31st December 2022 was 540,710 across the three sites, with 52.7% (285,068/540,710) of the population being females. The HDSS area is gradually becoming urbanized with 50.5% of the population living in urban areas, with an average household size of 4.8. In 2021, 14,546 births, 196 under-five deaths, and 2,452 total deaths were documented across the three sites. The demographic characteristics of the HDSS area are presented in table 1.

Figure 1: Interview session with a resident

Figure 2: Compound Enumeration

Table 1: Demographic Characteristics of the HDSS by site

Characteristics of the resident population as of 31st December 2022	Kintampo	Nkoranza	Techiman	Total
Total Population	188,958	121,559	230,193	540,710
Male Population (n, %)	91,406 (48.4)	57,428 (47.2)	106,808 (46.4)	255,642 (47.3)
Female Population (n, %)	97,552 (51.6)	64,131 (52.8)	123,385 (53.6)	285,068 (52.7)
Rural Population (n, %) *	109,385 (57.9)	76,205 (62.7)	81,794 (35.5)	267,384 (49.5)
Urban Population (n, %) *	79,573 (42.1)	45,354 (37.3)	148,399 (64.5)	273,326 (50.5)
Number of Communities Covered	161	98	85	344
Number of Active Compounds	27,221	20,022	31,602	78,845
Number of Active Households	36,391	25,168	50,646	112,205
Average Household size	5.2	4.8	4.5	4.8
Birth and Deaths Recorded in 2021 by site				
Number of Births Recorded	5,740	3,062	5,744	14,546
Total Number of Deaths	940	630	882	2,452
Number of Under-Five Deaths	93	37	66	196

NB: *Rural and Urban populations are classified based on the population size of an area, Areas with a population of less than 5,000 are classified as rural while areas with a population of 5,000 or more are classified as urban.

Verbal Autopsy

A total of 2,931 verbal autopsies were conducted in 2022. This was done using the 2016 WHO Verbal Autopsy tool during the first round of the year under review, and the 2022 WHO VA tool in the second round, after the WHO had released a revised version of the VA tool.

Training Attended

Four senior staff from the department undertook short courses in professional development programs in Implementation Research (TDR), Fundamentals of Global Health Research, Epidemiology in Global Health, and Project Management.

Visitors

In February 2022, a Lecturer and Researcher at the Department of Geography, Obafemi Awolowo University, Nigeria, who was also on secondment for a Postdoc at the Department of Geography and Regional Research of the University of Vienna, Austria visited the HDSS department. The aim of the visit was to discuss the possible use of the HDSS data to study migration in the context of environmental changes. Again, two (2) Ph.D. students and eight (8) MPH/MSc students from various universities passed through the department as part of their internship program at the Centre.

Use of KHDSS Data

Individuals and projects from within and outside the Centre continued to use the KHDSS data during the year under review. For instance, the chief and elders of Anyima requested the KHDSS data to help in their development plan.

Data Science Department (DSD)

Introduction

The computer centre is now transitioning into a data science department. This transition has started with the renaming of the department to the Data Science Department. Although current activities for 2022 were more focused on real-time data collection and processing, new capacity is being built in the areas of Artificial intelligence and other data driven techniques relevant to modern data science.

Data Management

The implementation of near-real-time data collection and processing systems has been very successful and the procurement of a cloud infrastructure has significantly facilitated this. All Clinical Trials studies still use paper questionnaires to collect data from the field. However, there is an upcoming implementation study called PRISMA that is designed from the concept of clinical trials, which is being run on a paperless system. Indeed a few studies such as VAC4PM have proposed the exploration of the potential of using mobile applications for clinical trials.

ICT Infrastructure

The Cloud Service we acquired to enhance near-real-time remote data transmission is functioning very well. For the ethics submission and approval process is still being developed. Both, for KHRC and the Ghana Health Service Institutional Review Board. The next big thing for the ICT unit is establishing a knowledge management system. This we believe will help retain organisational memory. We are exploring information systems and compliance requirements that meet international standards for repository management.

Biostatistics

There will be more focus on how the biostatistics unit would be able to apply advance analytics tools and techniques to improve the contribution of the department to core research activities. A number of presentations in the areas of graph-based analytics, machine learning, neural network analysis and survival modelling is being planned this year.

Staff Development

Staff development is still high on the agenda in the data science department to help us achieve the transition to data science. Another of our staff from the data science department is enrolled in a PhD making two. The plan to get four (4) data managers to start MSCs is still in process. We are happy to also mention that some of our data entry staff have been able to enrol in diploma programmes in health information curtesy a sponsorship package provided by KHRC for junior staff.

Conclusion

The Data Science Department continues to be an interesting department in the use of cost-effective applications to maintain and improve our data processing systems and security. We are looking at the possibility of upgrading our Electronic Health and Demographics Surveillance Systems by using the novel Tangerine application.

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CLINICAL LABORATORY

Seth Owusu-Agyei Medical Laboratory

The Seth Owusu-Agyei Medical Laboratory (SOAML) consists of the Bacteriology, Clinical Chemistry, Entomology, Haematology, Immunology, Bio-Analytic (formerly Micronutrients), Molecular Biology, Virology and Parasitology Units. The Virology unit was developed in the course of the year 2022 as a COVID-19 testing center to support the fight against the pandemic in the three former Brong Ahafo Regions of Ghana. The SOAML is resourced with staff and equipment to run the activities in the Institution including the support for Lassa Fever and COVID-19 Vaccine trials. The laboratory is known for its quality assurance systems and capacity to offer training support to various professionals.

Bacteriology

The unit is equipped with a class II biosafety cabinet which is the main workstation, a carbon dioxide (CO2) incubator, two BACTEC machines for blood cultures and an autoclave. Samples processed include blood, Cerebrospinal Fluid (CSF), urine, nasopharyngeal swab, ear swab and stool. Culturing, identification and antimicrobial susceptibility testing are performed according to Clinical Laboratory Standard Institute (CLSI) guidelines.

To ensure that results generated from this unit are of high quality and reliable, the unit was previously enrolled in External Quality Assessments provided by World Health Organisation/National Institute for Communicable Diseases (WHO/NICD) and currently with United Kingdom National External Quality Assessment Scheme (UK NEQAS). Excellent results have been obtained from these schemes in both the identification of microorganisms and antimicrobial susceptibility testing. In addition to the participation in EQAs, daily, weekly and monthly internal quality controls on both equipment and reagents are performed to ensure they are all working effectively.

The unit provides support to the children's ward of the Kintampo Municipal Hospital by processing patient samples. The unit was instrumental in providing Quality Management System training in bacteriology to medical laboratory personnel from the sentinel sites of the Malaria Vaccine Pilot Implementation and Evaluation study.

To support with continuous QMS at the various sites, the unit is serving to provide external quality assurance services on the malaria vaccine project in Ghana.

Figure 1: C02 Incubator

Clinical Chemistry

A Horiba Medical Pentra C200 automated clinical chemistry analyzer is available in the unit for carrying out analyses such as liver function tests, kidney function tests, lipid profile, glucose and uric acid. The equipment has the capacity to be programmed and used for quantitative estimation of other substances including G6PD activity, Urine protein and creatinine, etc.

The analyzer replaces the VitaLab Flexor E clinical chemistry analyzers previously used. In addition to internal quality control systems, the unit is enrolled onto the External Quality Assessment (EQA) schemes organized by the Royal College of Pathologists, Australasia (RCPA) and the International External Quality Assessment Scheme (IEQAS) from the United Kingdom.

Figure 2: Clinical Chemistry Analyzer in SOAML

Entomology

The unit has one Entomologist and 2 Research Officers and with major equipment to support needed studies. The unit has been pivotal in studies that collect insects (mosquitoes at various stages and ticks) for speciation and classification as well as further molecular analysis.
Major equipment among other things include: An ELISA plate reader, Automated plate washer, and Stereo Dissecting Microscope.

Figure 3: A presentation of ELISA plater reader and pate washer

The unit has planned to build an insectary to be able to indulge in projects to test the efficacy of insecticides and other interventions.

Haematology

This is a very active unit since most studies require a full blood count to assess health status in recruiting participants for clinical trials and other studies and also for the management of study participants as well as determination of absolute parasite counts for the various malaria studies.

The unit is equipped with a Sysmex (5-part differential) Haematology analyzer, ABX Micros 60 (3-part differential) analyzer, electrophoresis equipment for haemoglobin genotyping, and two photometers for quantitative determination of Glucose-6-phosphate dehydrogenase (G6PD). The unit participates in external quality assessment scheme organised by the United Kingdom National External Quality Assessment Scheme (UK NEQAS) with great performance over the years. Currently, to augment an anaemia project, the Unit has been registered to participate in Eqa by the College of American Pathologists (CAP).

Figure 4: Haematology analyzer

Immunology

The unit has separate sections for cellular and humoral assays, with equipment such as a class II biosafety cabinet, refrigerated centrifuge, Quansys Bioscience System and pipetting accessories. The unit is also equipped with a laminar flow cabinet, a carbon dioxide incubator, -80oC and -150oC freezers and liquid nitrogen tanks. Currently, isolation and cryopreservation of peripheral blood mononuclear cells (PBMCs) is being done at the unit for a Lassa fever vaccine. The multiplex ELISA platform is used for estimates on an anaemia project which is running in five other research sites.

Figure 5: Multiplex ELISA platform.

Molecular Biology

The unit has a newly installed Applied biosystems 7500 Fast Real Time PCR in addition to C1000 Thermal Cycler with 96-Well Fast Reaction and the GeneXpert by Cepheid.

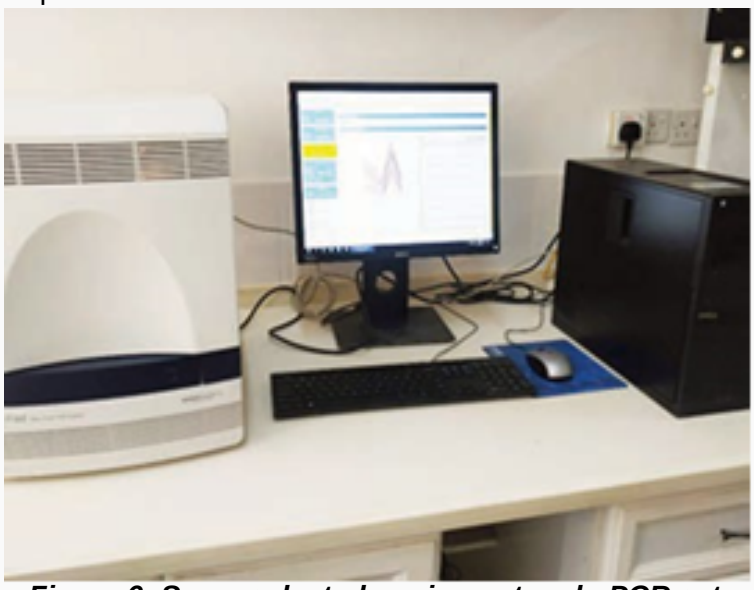

Figure 6: Some selected equipment and qPCR set up in the Clinical Laboratory of KHRC.

Figure 7: The GeneXpert for tuberculosis and SARS CoV-2 identification and diagnosis.

The GeneXpert was given by the Ministry of Health/Ghana Health Service to set up KHRC as a testing center for tb and COVID-19.

The molecular biology unit with the presence of the qPCR is establishing protocols for bacterial and parasitological molecular analysis to minimize the shipment of samples to external laboratories after sample collection on most projects within KHRC.

Bio-Analytic (Micronutrient)

A High Performance Liquid Chromatography (HPLC) machine with auto-sampling, UV Scanning Spectrophotometer and a Zinc Protoporphyrin (ZPP) analyzer are the major equipment at the Unit.

The newly installed UHPLC equipment is for the Hb variant and Vitamin A analysis for participants of an anaemia study.

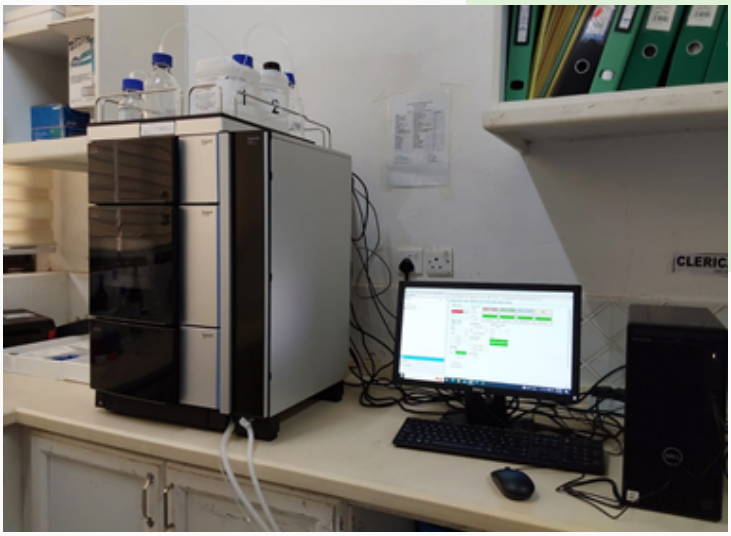

Figure 8: UHPLC installed in the unit for Hb variants analysis.

Parasitology

This unit is supportive in studies that require malaria microscopy results and other blood borne infections. For quality purposes, each malaria blood smear is examined by two independent certified microscopists. Discordant slides are examined by a third microscopist. For external quality assessment, the unit participates in the following malaria External Quality Assessment Schemes: Clinical Laboratory Services/National Institute for Communicable Diseases (CLS/NICD), South Africa, and UK NEQAS. There are currently at least 10 malaria microscopists certified at “Expert” level by CLS/NICD.

Quality Assurance Systems

The Clinical Laboratory complies to Good Clinical Laboratory (GCLP) and ISO 15189:2012 standards. The laboratory is providing technical support to the laboratories of the Kintampo Municipal Hospital, Kintampo South District Hospital (Jema), St. Theresah Hospital, Nkoranza and the Holy Family Hospital (Techiman) in the development and maintenance of laboratory QA systems. We acknowledge the support of Clinical Lab Services (CLS), South Africa for the quality management system.

Collaborators

The Kintampo Health Research Centre maintained its working relationship with a number of organisations including a few new ones. The centre collaborated with the institutions listed below:

External	Internal
GlaxoSmithKline Biologicals S.A. (GSK)	Ghana Health Service
Columbia University, NY	Kwame Nkrumah University of Science and Technology (KNUST), University of Ghana (UG), University of Cape Coast (UCC), University of Health and Allied Sciences (UHAS) , University of Energy and Natural Resources (UENR) and Other Local Universities
National Institute of Health	Agogo Malaria Centre, Navrongo Health Research Centre (NHRC), Dodowa Health Research Centre (DHRC)
Program for Appropriate Technology in Health (PATH)	Newmont Ghana Gold Limited
United Nations Foundation	National Malaria Control Programme (NMCP) in Ghana
World Health Organisation (WHO)	Kwame Nkrumah University of Science and Technology
The David and Lucile Packard Foundation	University of Ghana, School of Public Health
Barcelona Institute for Global Health (ISGLOBAL)	Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR)
University of Massachusetts	Noguchi Memorial Institute for Medical Research (NMIMR)
European and Developing Clinical Trial Partnership (EDCTP)	
The Liverpool School of Tropical Medicine	
Novartis Pharma AG/Quintiles Clindepharm (Pty)	
Bill and Melinda Gate Foundation (BMGF)	
European Commission	
Brown University	
London School of Hygiene and Tropical Medicine (LSHTM)	
Massachusetts General Hospital	
European Vaccine Initiative (EVI)	
African Research Collaboration for Health Limited	
Kenya Medical Research Institute (KEMRI)	

External	Internal
University of Malawi, College of Medicine	
Fogarty International Center	
George Washington University (GWU)	
Harvard's Beth Israel Deaconess Medical Center, Boston	
George Town University	
The International Vaccine Institute (IVI)	
Columbia World Projects	
National Institute for Health and Care Research (NIHR)-UK	

Staff

KHRC recorded a total staff strength of 478 during the year under review. These staff worked on different projects. In line with the Centre's strategic plan to make it attractive to partners, the existence of a Health and Demographic Surveillance System (KHDSS) offers support to all projects at the Centre. Again, there is a database that informs prospective collaborators in making informed decisions about research activities. The KHDSS currently has 74 staff.

Study areas

The centre continued to operate in seven (7) contiguous districts of the Bono East and Bono regions namely the Kintampo North and Techiman Municipalities, the Kintampo South, Nkoranza North and South, Wenchi and Tain districts with the Kintampo North municipality being the Headquarters. The centre maintained links with Afrancho, Akumadan and Nkenkesu communities in the Ashanti Region. The centre also operated in the Volta and Central regions.

Transport

The centre has seven 4X4 pickups, one Tata truck and 23 station wagons. The total number of motorbikes during the year under review stood at seventy three (73).

Guest House

The facility offers decent accommodation for visitors to KHRC. The guest house is about a 15 minute walk from the centre. It has a 24-hour security service. The rooms are fitted with air conditioners and fans. Also, it has a 24/7 Internet service. There are mosquito nets fitted in all the rooms. All of that is to ensure visitors have a comfortable stay. The rate per night at the guest house is US$50, while meals are $5 for breakfast and $7 for lunch and dinner. There is a bar which is stocked with a large variety of drinks. There is also a standby generator to provide power when the national grid goes off. The guest house received 120 visitors within the period under review.

"The Pentagon"

This is the staff eating place. Breakfast, lunch and dinner can be arranged at the Pentagon. Special meals can also be requested for. This can be served at either the Pentagon or the at the guest house depending on the visitor's preference.

Website

The centre's website continues to be the outlet which provides information to the outside world about activities at the centre.

Auditing

To ensure that funds given to the centre by funders and donors are judiciously used and accounted for, the centre hosted Deloitte and Touche and the Ghana Internal Audit Service during the year under review.

Visitors

The centre was privileged to host important personalities during the 2022 fiscal year.

KINTAMPO HEALTH
RESEARCH CENTRE

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