Clinical Study Report

AfyaPro/MOM Integrated Digital Health Solution Pilot in Kenya:
Midline Report
(*Draft Report)*

Note:
This report only FBO/NGO sites - Mang'u and Ting'ang'a Dispensaries

Protocol ID / Title:	ICBE - S – 000189 / AfyaPro – Mobile Obstetric Monitoring (MOM) Integrated Digital Health Solution Pilot Implementation Study in Kiambu County, Kenya.

This report concerns a Clinical Study or a Clinical Investigation that was performed in accordance with the International Standard: ISO 14155:2011 or ISO 14155:2020 (E).

1. ROLES / RESPONSIBILITIES

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Investigational Site	NGO/FBO health facilities, Kiambu County 1. Mangu Dispensary 2. Ting'ang'a Catholic Dispensary 3. Githunguri Health Centre 4. Ruiru SubCounty Hospital (Level Four) 5. Kihara SubCounty Hospital (Level Four) 6. Githunguri Holy Family Hospital (Level Four)
Sponsor	Philips Foundation
Laboratory sites	N/A
Other / Appendix	
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2. LIST of ABBREVIATIONS and relevant DEFINITIONS

Abbreviations

AMREF	African Medical and Research Foundation
ANC	Antenatal Care
CE	Conformitè Europëenne (Mark)
CFIR	Consolidate Framework for Implementation Research
CSP	Clinical Study Protocol
CV	Curriculum Vitae
DHIS2	District Health Information System version 2
EC	Ethics Committee
EE	Effort Expectancy
EHR	Electronic Health Record
EU	European Union
EU - MDD	European Union Medical Device Directive
EU - MDR	European Union Medical Device Regulation
FGD	Focus Group Discussion
FBO	Faith Based Organization
GCP	Good Clinical Practice
GDPR	General Data Protection Regulation
GoK	Government of Kenya
HIS	Health Information Systems
HMIS	Health Management Information System
HMT	Health Management Teams
HRIO	Health Records and Information Officer
ICT	Information and Communications Technology
IRB	Institutional Review Board
IS	Information System
IT	Information Technology
KEPH	Kenya Essential Packages for Health
KII	Key Informant Interview
M&E	Monitoring and Evaluation
Mcr	Core readiness mean

MeH	eHealth mean
Mlr	Learning readiness mean
MOH	Ministry of Health
Mpr	Policy readiness mean
Msr	Societal readiness mean
Mtr	Technological readiness mean
NCD	Non Communicable Diseases
NGO	Non-governmental Organization
OPD	Outpatient Department
PC	Personal Computer
PE	Performance Expectancy
PEOU	Perceived Ease of Use
PI	Principal Investigator
PLS	Partial Least Squares
PPE	Personal protective equipment
PU	Perceived Usefulness
SEM	Structural Equation Modeling
TAM	Technology Acceptance Model
ICBE	(Philips) Internal Committee for Biomedical Experiments

Definitions

Digital health	The use of information and communications technology in support of health and health-related fields. It is the convergence of digital technologies with health, healthcare, living, and society to enhance the efficiency of healthcare delivery.
eHealth	eHealth is the use of information and communication technologies (ICT) for health (source: WHO)
Endpoint	principal indicator(s) used for assessing the primary hypothesis of a clinical study
IC	Informed Consent The informed consent is documented by means of a written, signed and dated informed consent form. The informed consent process is the process by which an individual is provided information and is asked to voluntarily participate in a clinical study.
Investigation site	institution or site where the clinical study is carried out
Investigator	individual member of the investigation site team designated and supervised by the principal investigator at an investigation site to perform critical clinical-investigation-related procedures or to make important clinical study- related decisions NOTE An individual member of the investigation site team can also be called “sub-investigator” or “co-investigator”.
Objective	main purpose for conducting the clinical study
Sponsor	individual or organization taking responsibility and liability for the initiation or implementation of a clinical study

3. SUMMARY

Title	AfyaPro – Medical Obstetric Monitoring Integrated Digital Health Solution Pilot Implementation Study
Introduction	For health management teams at various levels including county and national levels to realize the expected benefits from facility wide EHR systems deployment at health facilities, it is important that the system implementation is successful, the EHR system gains wide acceptance from the targeted users and there is an assurance that the solution is cost effective. A review of the literature indicates that one major factor leading to failure of systems deployment is the lack of adequate investment in the implementation process, the inadequate understanding of the socio-technical aspects of information technology, particularly the understanding of how people and organizations adopt IT (Kaplan, B., & Harris-Salamone, K. D, 2009). Further, the cost benefits that accrue from the use of EHR are required to inform policy, practice and advocacy for investments in digital health systems.
Purpose	To better understand the implementation of an integrated digital health system using Implementation Science, to adapt a technology acceptance model in predicting user acceptance, to evaluate the factors that affect acceptance and use of an EHR system by healthcare workers and patients in four sampled public and faith based /non-governmental organizations health facilities in Kiambu County, Kenya and to evaluate the care costing aspects related to the eHealth solution
Devices used	The device in use for this study is software, the Afypro-MOM integrated solution.
Subjects	The respondent in this study are the patients, facility management and healthcare workers
Investigation design	Observational study because the investigators are not acting upon study participants, but instead observing natural relationships between factors and outcomes.
Investigation procedures	The participants were taken through privacy notice and explanation of the objectives of the study and eventually asked to voluntarily sign informed consent forms. The participant did not undergo any form of clinical procedure. They were however informed the importance of their participation in helping to understand the process of implementation of an EHR system in their facility. The patients who accepted to be part of the study were asked to voluntarily consent to allow abstraction of their medical records in their patient files over the past 12 months
Duration	This report depicts the findings and observations at midline. A baseline was conducted earlier, while an endline will be conducted too. The study in all the sites will end in April 2022.
Conclusion	The implementation of AfyaPro-MOMs integrated solution provides an opportunity to enhance healthcare outcomes by digitization of the facilities, improve data completeness and quality, enhance interaction between patients and ultimately enhance the care quality and reduce the patient cost of healthcare. We will also be better informed on how to better implement EHR systems in similar settings.

4. INTRODUCTION

According to the Kenya Health Policy (2014-2030), the Ministry of Health (MoH) envisions investments in digital health interventions as a means to the attainment of the highest standard of health for every Kenyan. This endeavour will ultimately impact on health outcomes *(MoH, 2014)*.

While Kenya has a robust routine reporting system using the DHIS2 system, one of the frontiers that still requires considerable support for growth is digital health investments for patient-level systems, specifically, electronic health records (EHR). An electronic health record system is typically a facility wide system that facilitates the availability of a patient record throughout the entire facility. This differs from electronic medical records (EMR) that are often intervention specific. For instance, in Kenya, the *KenyaEMR* is largely a system that supports HIV AIDS patient care and would normally be available at the HIV clinic in a health facility. Kenya currently has more than 1,200 facilities using a HIV care EMR.

For health management teams at various levels including county and national levels to realize the expected benefits from facility wide EHR systems deployment at health facilities, it is important that the system implementation is successful, the EHR system gains wide acceptance from the targeted users and there is an assurance that the solution is cost effective. A review of the literature indicates that one major factor leading to failure of systems deployment is the lack of adequate investment in the implementation process, the inadequate understanding of the socio-technical aspects of information technology, particularly the understanding of how people and organizations adopt IT *(Kaplan, B., & Harris-Salamone, K. D, 2009)*. Further, the cost benefits that accrue from the use of EHR are required to inform policy, practice and advocacy for investments in digital health systems.

This study will use an Implementation Science approach and apply the Technology Acceptance Model (TAM) by *Davis, F. D. (1989)* to evaluate the individual, technology and organizational factors affecting user acceptance during the piloting of an EHR system, the *AfyaPro integrated solution*. In addition, optimization of the solution for health facility workflows will be established through the use of Petri Nets, a mathematical modelling methodology. This approach has been employed successfully by other researchers in information systems *(Van Der Aalst, 1998*).

We expect that this research study's approach to the implementation of a facility wide EHR solution in several health facilities of public ownership and faith-based/non-governmental organization (NGO) ownership will provide new insights in digital health implementations in countries with a similar profile as that of Kenya. Another key aspect of this study will be to establish the cost of care of this EHR solution post implementation using a health economics approach.

Findings from this study will inform policy makers as well as system designers and implementers on future approaches that will contribute to the successful implementation of digital health systems especially in developing countries.

1 INVESTIGATIONAL DEVICE and Methods

1.1 Investigational device description

Device description	<The AfyaPro-MOM integrated solution comprises two solutions that complement one another to provide a unique solution. The AfyaPro integrated health solution is a facility wide implementation that covers all the departments and services in a typical health facility. It is modular in nature allowing for a facility to only use the modules that serve the services that facility provides. It runs on the Philips Vital Health Platform. Mobile Obstetrics Monitoring (or MOM), is a smartphone-based solution that supports mother baby care. MOM2.0 software is a Class 1 medical device as per global Medical Devices Directive (MDD) guidelines. >
Intended purpose	<To study the implementation of the AfyaPro-MOM integrated digital health solution in Kiambu County. This will proved learnings on how to implement EHRS in similar setting and also analyse the healthcare costs.>
Previous intended purpose	<N/A>
Manufacturer:	<AfyaPro is developed by Africa eHealth Solutions International, while MOM is developed by Philips >
Device model / type	<Cloud-based AfyaPro-MOM integrated solution software>
Software version	<Version 2>
Accessories	<Computing devices, tablets,..>

Changes		
Changes to the investigational device during the clinical study or any changes from the IB:		
1.	raw materials	N/A
2.	software	N/A
3.	components	N/A
4.	shelf-life	N/A
5.	storage conditions	N/A
6.	instructions for use	N/A

7.	other changes	N/A

1.2 Study Protocol (SP)

Background: One major factors leading to failure of digital health systems implementation, is the inadequate understanding of the socio-technical aspects of information technology. The proposed study will apply a technology adoption model to evaluate individual, technology and organizational factors affecting user acceptance of the implementation of the AfyaPro - MOM integrated eHealth solution together. Also part of the study will be to report and observe the associated costs patients incur.

Objectives: To better understand the implementation of an integrated digital health system using Implementation Science, to adapt a technology acceptance model in predicting user acceptance, to evaluate the factors that affect acceptance and use of an EHR system by healthcare workers and patients in four sampled public and faith based /non-governmental organizations health facilities in Kiambu County, Kenya and to evaluate the care costing aspects related to the eHealth solution

Methodology: Baseline, midline and endline surveys will be conducted primarily through use of quantitative methods. Qualitative data will be collected to provide background and contextual information. Descriptive analysis of the variables will be performed using SPSS statistical analysis. Technology acceptability study analysis will be done through Structural Equation Modeling (SEM), specifically Partial Least Square path modeling (PLS). Research sample size is 290 and includes healthcare staff, leadership and patients. Study duration will be from November 2020 to April 2022. Ksh. 1,778,700 is donated by Philips Foundation to support this study.

Expected results: A technology adoption model will be adapted to explain the current situation regarding eHealth adoption in Kenya, using a case of public and private health facilities located in Kiambu County. The study will provide a significant contribution to scientific understanding of acceptance and use of technology in healthcare settings.

This paragraph contains a summary of the Study, including any subsequent amendment(s) with a rational for each amendment:

Study objectives	< To better understand the implementation of an integrated digital health system using Implementation Science, to adapt a technology acceptance model in predicting user acceptance, to evaluate the factors that affect acceptance and use of an EHR system by healthcare workers and patients in four sampled public and faith based /non-governmental organizations health facilities in Kiambu County, Kenya and to evaluate the care costing aspects related to the eHealth solution.>
Study design	**Type of study**
	<Implementation Study>
	Study endpoints
	< A technology adoption model will be adapted to explain the current situation regarding eHealth adoption in Kenya, using a case of public and private health facilities located in Kiambu County. The study will provide significant contribution to scientific understanding of acceptance and use of technology in healthcare settings.>

2 ANALYSIS AND RESULTS

Clinical study initiation date	The first subject was enrolled in the study on <2021-Feb-16>
Clinical study completion/suspension date	<N/A. This report relates to the baseline. This report has combined both the FBO/NGO and Public sites. The Public sites baseline was conducted 2 months after the NGO/FBO sites>
Disposal of subjects and investigational devices	<N/A>
Subject demographics	<The subjects comprised of the facility management, the healthcare works and patients>
CSP compliance	<The is study is conducted according to the study protocol>

Organization of this section: We have presented the key analysis and summary results for the technology aspects in section 2.1, the economic and clinical aspects of the study based on the data collection tools in section 2.2. The detailed data analysis tables are available in the appendix. We have also presented our observations before the discussions and conclusion.

All the questionnaires were manually checked for completeness before data entry. The data was then cleaned to ensure consistency and accuracy prior to its importation to SPSS version 26.

2.1 TECHNOLOGY ASPECTS

An analysis of the health informatics (technology) study data is presented, followed by a short explanation in the section below.

2.1.1 CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION

2.1.1.1 Intervention Characteristics

Results from baseline study found the following constructs namely: ***Intervention source, relative advantage, adaptability and complexity*** being favorable for possible successful implementation of the AfyaPro-MOM Integrated system in all the four study sites. The same constructs remained as facilitators at the midline study period though their average scores slightly reduced.

Table 2:4: Intervention Characteristic comparison baseline and midline

Construct	**Baseline Average**	**Midline Average**

Intervention source	4.67	4.11
relative advantage	4.49	4.18
adaptability	4.52	4.13
complexity	2.91	2.51
evidence strength	3.70	4.20

During baseline ***evidence strength*** was perceived as a potential barrier for successful implementation in the FBOs. This could be attributed to the fact that the implementers may have failed to share examples of prior successful implementation of the system in other sites during the consultative meetings. On the contrary, during midline study, ***evidence strength*** was found as a facilitator for successful implementation of the system. This could have been attributed to the fact that the implementation had already occurred in their sites and thus acted as examples of the sites where the system has been implemented.

2.1.1.2 Outer Setting

According to the results, during baseline, only the ***patient needs and resources*** was found as an important outer setting construct that could motivate the successful implementation of AfyaPro-MOM Integrated system in the FBOs. This could have been attributed to the participants' consensus on the fit between the system and their patients' needs. However, ***external policy and incentives*** was not found to be an important construct to motivate the successful implementation of AfyaPro-MOM Integrated system in the FBOs.

However, in the midline, ***patient needs and resources, external policy and incentives*** were not found to be important constructs that were motivating the successful implementation of AfyaPro-MOM Integrated system in the FBOs. This could have been attributed to the fact that the implementation to some extent failed to address a number of healthcare worker concerns majorly around data migration, reporting, data duplication and incomplete integration of MOMs component

Table 2:5: Outer setting construct comparison baseline and midline

Construct	Baseline Average	Midline Average
patient needs and resources	4.20	3.97
external policy and incentives	1.73	2.49

2.1.1.3 Inner Setting

According to the results from the baseline, the following inner setting constructs: ***networks and communications, culture and readiness for implementation*** were identified as potentially key to the successful implementation of AfyaPro-MOM integrated system in the FBOs. During midline, the same inner setting constructs were seen to be promoting successful implementation of the system within the FBOs sites.

However, the ***structural characteristics*** was found not influential for the successful implementation during baseline. However, in the midline period the construct average dropped implying that ***structural characteristics*** are likely to be a barrier going forward if not addressed.

Table 2:6: Inner setting construct comparison baseline and midline

Construct	Baseline Average	Midline Average
networks and communications	4.27	4.13
culture	4.23	4.22
readiness for implementation	4.42	4.27
Structural characteristics	3.99	3.56

2.1.1.4 Characteristics of Individuals

According to the results from baseline, the following individual characteristics constructs: **knowledge and beliefs about intervention, self-efficacy** were identified as key constructs that can motivate the successful implementation of AfyaPro-MOM Integrated system in the FBOs. The respondents from FBOs expressed their confidence and competence to use the system upon implementation. During midline, the same constructs were found as the one motivating the positive implementation of the system.

Table 2:7: Individual characteristic construct comparison baseline and midline

Construct	Baseline Average	Midline Average
knowledge and beliefs about intervention	4.77	4.55
self-efficacy	4.56	4.42

2.1.1.5 Process of Implementation

As per the findings from baseline, the following implementation strategies constructs namely: ***engagement, execution, reflection and evaluation*** were identified as key constructs towards successful implementation of AfyaPro-MOM Integrated system in the FBO sites. However, there was a reduction in their averages at the midline, an indication that these constructs need to be watched keenly going forward as they may affect the successful implementation.

However, though the findings from baseline indicate that ***planning*** was a facilitator, the respondents felt proper planning should have been undertaken with emphasis on staff training and time schedules for the implementations. During the midline, the average for planning construct had improved due to the fact that the staff had already undertaken the training and there were clear time schedules for the implementation.

Table 2:8: Implementation Process construct comparison baseline and midline

Construct	Baseline Average	Midline Average
engagement	4.74	4.33
execution	4.21	4.02
reflection and evaluation	4.51	4.31
planning	3.88	4.15

2.2 ECONOMIC AND CLINICAL ASPECTS

2.2.1 Antenatal Clinic

The results regarding the ANC are shown in the table 2.9. In general, the number of patients seen in Mangu is 2-4 times greater than that seen in Ting'ang'a. Similarly, the number of ANC patients seen at Ruiru were almost twice those seen at Githunguri health facilities. This trend was evident for the clients registered for either 1st visit or revisit.

Table 2:9:ANC Services Utilization

Parameters	Mangu	Ting'ang'a	Ruiru	Githunguri
Total number of clients registered for 1st visit in the 12 months prior to the study	170	51	2640	1116
Total number of clients registered as re-visit in the 12 months prior to the study	321	76	3548	1216
Total number of 1st visit clients with a recording of ANC profile in the 12 months prior to the study	155	48	2640	1116
Number of clients (1st visit and revisits) with an anaemia diagnosis in the 12 months prior to the study	16	9	1365	799
Number of clients (1st visit and revisits) with a high risk pregnancy diagnosis in the 12 months prior to the study	4	1	139	0
Number of clients (1st visit and revisits) referred out in the 12 months prior to the study	2	0	0	0

ANC Clients Recorded in 1st Visits vs ANC Profiles in 1st Visit

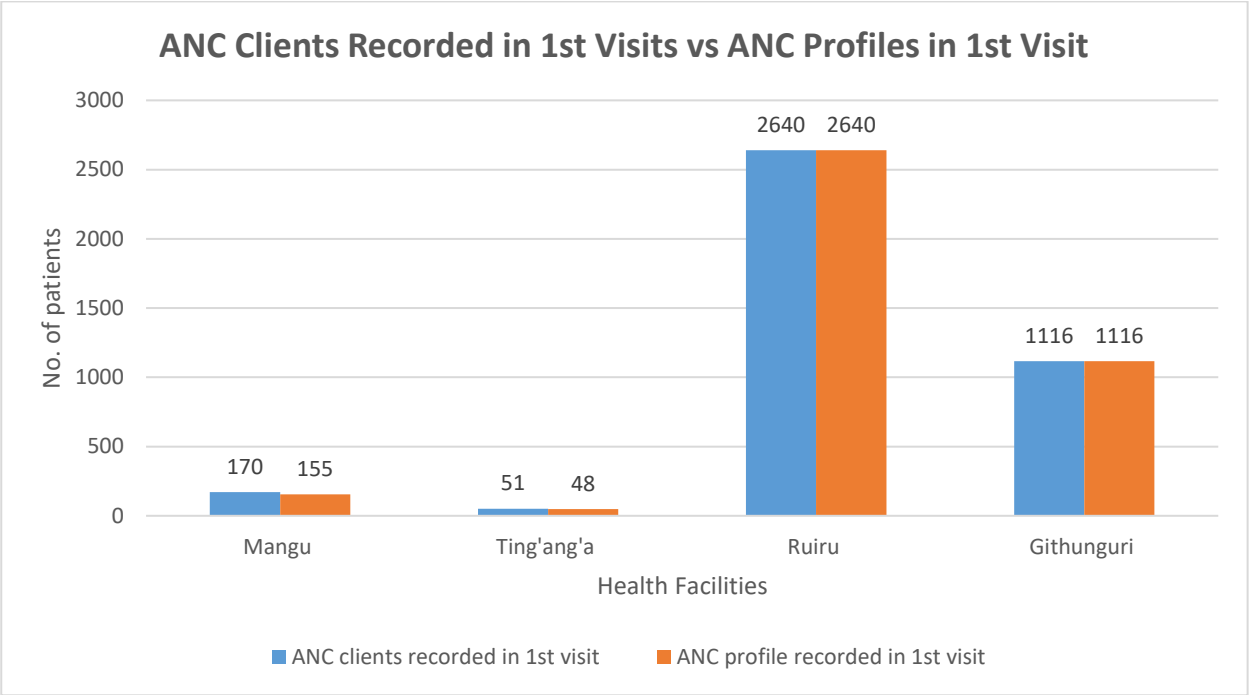


Table 2:10:ANC Clients Recorded in 1st Visits vs ANC Profiles in 1st Visit

Generally, the number of ANC clients recorded in the 1st visit for the public health facilities matched the total number of ANC profiles recorded during the 1st visits. However, the faith-based facilities exhibited some disparities between the total number of clients recorded in the 1st visit and the ANC profiles recorded.

ANC Profile vs High Risk Pregnancies

The results indicated that very minimal number of high risk pregnancies from the total ANC profiles recorded. Mangu was the only facility that recorded the highest number of high risk pregnancies (4) against the 155 ANC profiles.

Table 2:11:ANC Profile vs High Risk Pregnancies

Facility	Total ANC Profiles	High Risk Pregnancies
Ting'ang'a (ANC Profiles)	48	1
Mangu (ANC Profiles)	155	4
Githunguri (ANC Profiles)	1116	0
Ruiru (ANC Profiles)	2640	1

Comparison of 1st visits vs. Re-visits in FBO Facilities

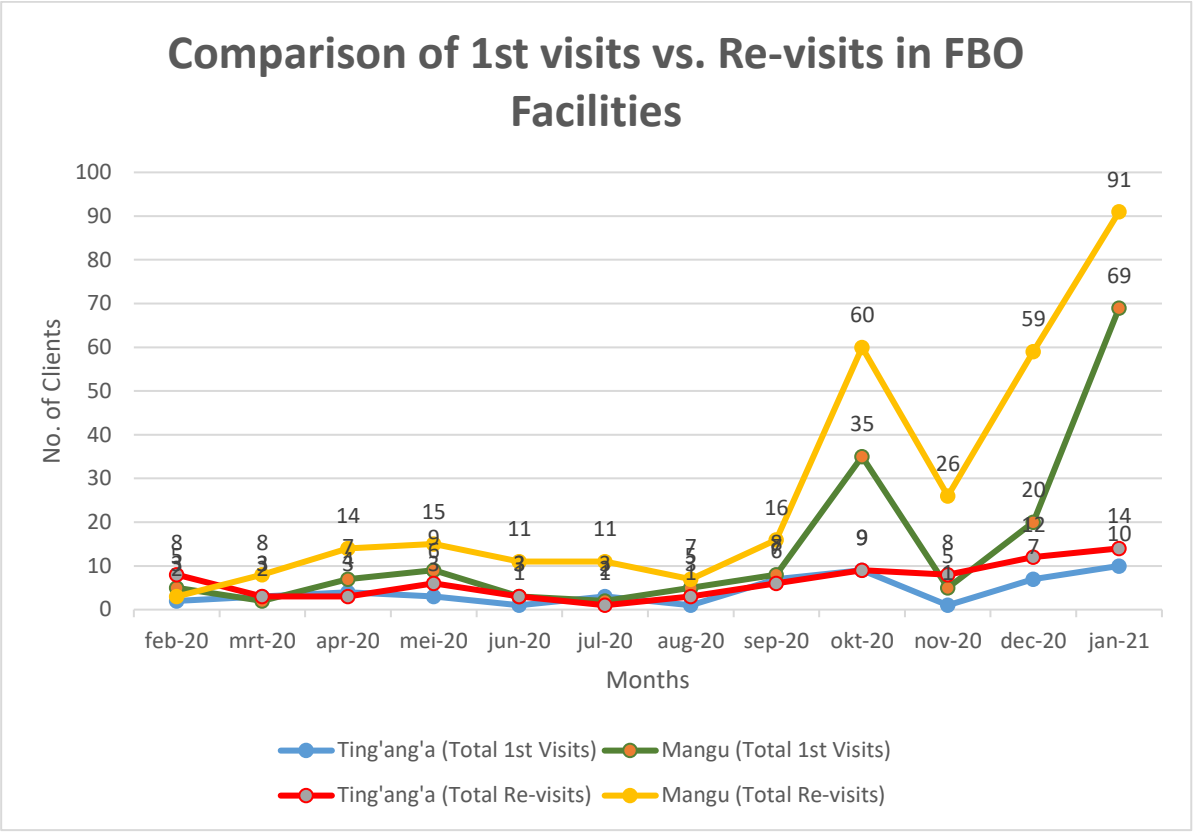


Figure 2:6:Comparison of 1st visits vs. Re-visits in FBO Facilities

The chart above denotes a comparison of total number of ANC clients in the 1st visits against the revisits at the FBO facilities. The trends appeared to be within the normal and steady ranges between February and August 2020. Interestingly, the number of clients seen in Mang'u in the months of November 2020 and February 2021 was substantially greater than the numbers seen in other months. It has been stated that this phenomenon was largely caused by the COVID-19 pandemic. That is, the first case in Kenya was reported at the beginning of March 2020, which could explain the low numbers in the period from March-October 2020. However, the increase in numbers in November 2020 followed by a decrease in December 2020 requires further review to arrive at an explanation. However, what is most important is whether the numbers of clients shown here reflect what is normally seen at these centres.

Comparison of 1st visits vs. Re-visits in Public Facilities

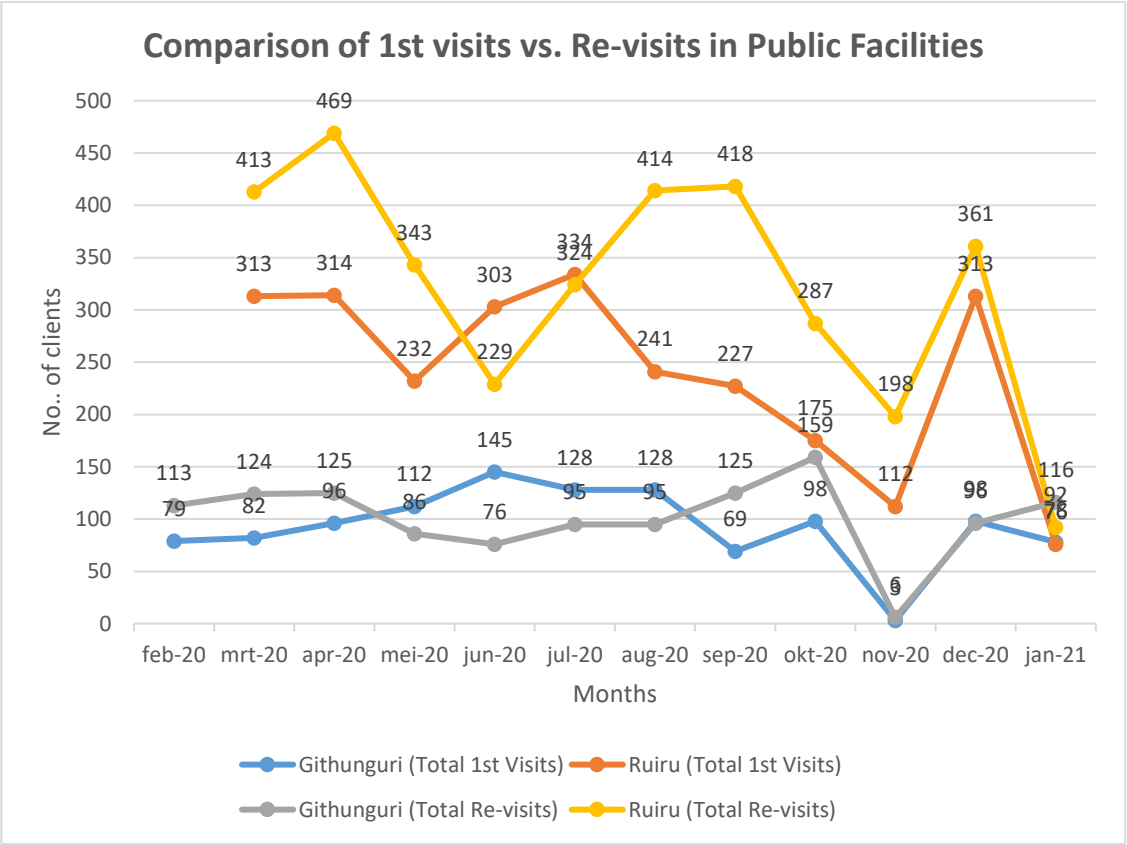


Figure 2:7:Comparison of 1st visits vs. Re-visits in Public Facilities

The chart in figure 2.7 denotes a comparison of total number of ANC clients in the 1st visits against the revisits at the PHF. The trends appeared to be within the normal and steady ranges in Githunguri for the better part of the year 2020 with COVID-19 exhibiting minimal disruptions. However, in Ruiru, utilization of ANC services may have been affected by the COVID-19 lockdown which resulted into a drastic reduction of ANC re-visits from April to June 2020 and a similar reduction in the ANC 1st visit from July all the way to November 2020. During this period, it had been proposed to act as a COVID-19 isolation center and these changes may have created confusion amongst expectant mothers on the alternative facilities where they could seek ANC services. Moreover, the reduction in numbers may have been caused by the reallocation of resources and personnel meant for the maternal health services to combat COVID-19 pandemic.

Comparison of Number of Clients Diagnosed with Anemia

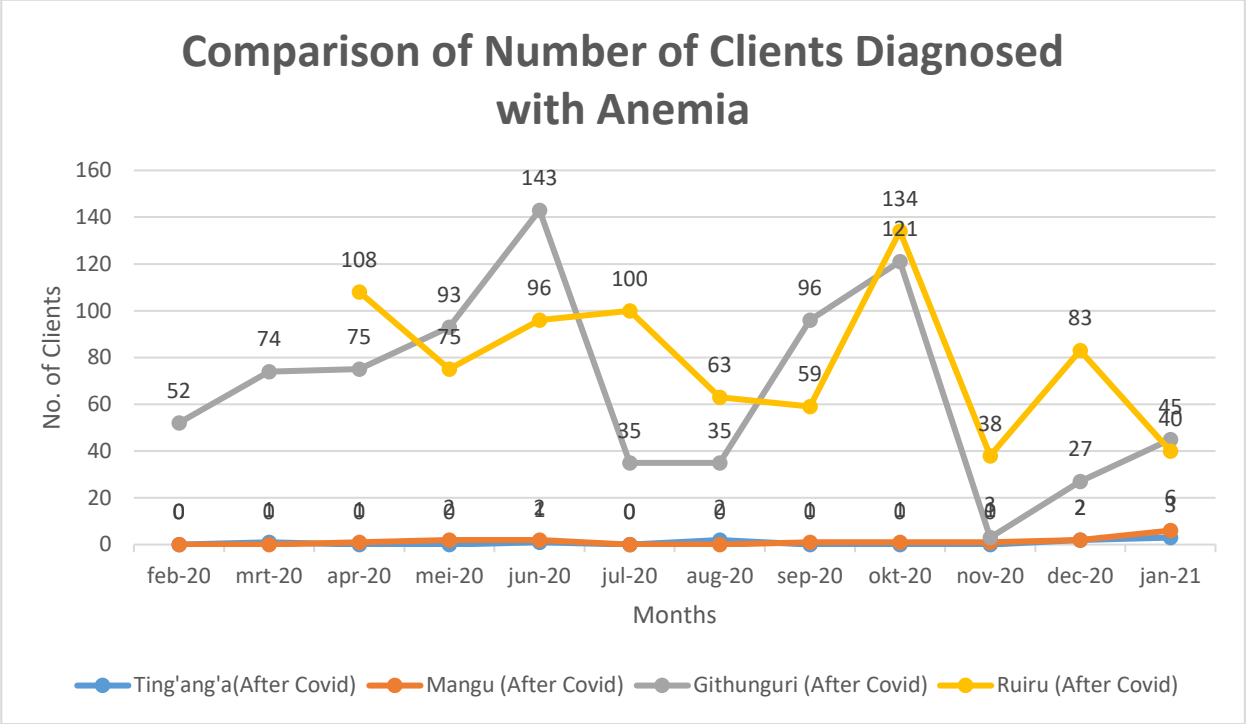


Figure 2:8:Comparison of Number of Clients Diagnosed with Anemia

The results show the anemia prevalence amongst the expectants mothers attending the ANC services in the four health facilities. The results indicate high prevalence of Anemia in the public health facilities. This could be attributed to the timing of the ANC 1st visit which literature terms as a predictor of anemia diagnosis. The late ANC 1st visits may have been attributed to COVID-19 interruptions. The low numbers of anemia diagnosis at the FBO facilities may be attributed to the low number of routine services and tests offered to mitigate anemia in pregnancies. The ANC registers did not provide evidence of such tests being carried out at the FBO facilities.

2.2.2 Service Utilization

The following figures show the variation in monthly service utilization in the 12-month period prior to the baseline study for four different parameters. Although it is uncertain how much these values reflect the numbers that were seen before the COVID-19 pandemic, certain observations can be made about the changes over the 12-month period.

Table 2:12: Service Utilization Results

	Ruiru (Before Covid)	Ruiru (After Covid)	Githunguri (Before Covid)	Githunguri (After Covid)
Total number of clients recorded at general outpatient department over the past one year under study	45,304	13,228	15,033	7,222

Total number of clients recorded at child welfare department over the past one year under study	21,084	7,183	11,585	3,855
Total number of deliveries recorded over the past one year under study	6,176	4,729	0	0
Total number of clients recorded at postnatal department over the past one year under study	3,195	2,520	1,321	2,160

We did a comparison of the total number of clients recorded at OPD at the public healthcare facilities one year before and one year after COVID-19 pandemic and noted that the numbers were higher before the pandemic with Ruiru and Githunguri recording 45,304 and 15,033 respectively. However, following the advent of the Covid-19 pandemic, the numbers went down at both facilities with Ruiru and Githunguri recording 13,228 and 7,222 respectively. This is about a one third reduction for Ruriu and one half for Githunguri.

Total number of clients recorded at the child welfare clinic in Ruiru and Githunguri over the one year under study were 21,087 and 11,585 respectively. Ruiru recorded 13,901 less clients in CWC in the one year after the pandemic while Githunguri healthcare recorded 7,730 less clients in CWC in the one year after the pandemic.

Total number of deliveries recorded in Ruiru and Githunguri over the past one year under study were 6,176 and none, respectively. Ruiru recorded 1,447 deliveries less than the period before COVID-19 pandemic. Githunguri healthcare facility do not run a maternity department.

Total number of clients recorded at the postnatal department in Ruiru and Githunguri over the one year under study were 3,195 and 1,321, respectively. Ruiru recorded 675 less postnatal clients one year after the pandemic while Githunguri recorded 839 less postnatal clients one year after the pandemic.

The first figure shows the number of visits recorded at the general outpatient departments at the four facilities over month 1 -February to month 12 -January . The number of visits in the NGO sites seems to be rather stable while the number of visits decreased in the two public sites. The drop seen in Ruiru is particularly drastic.

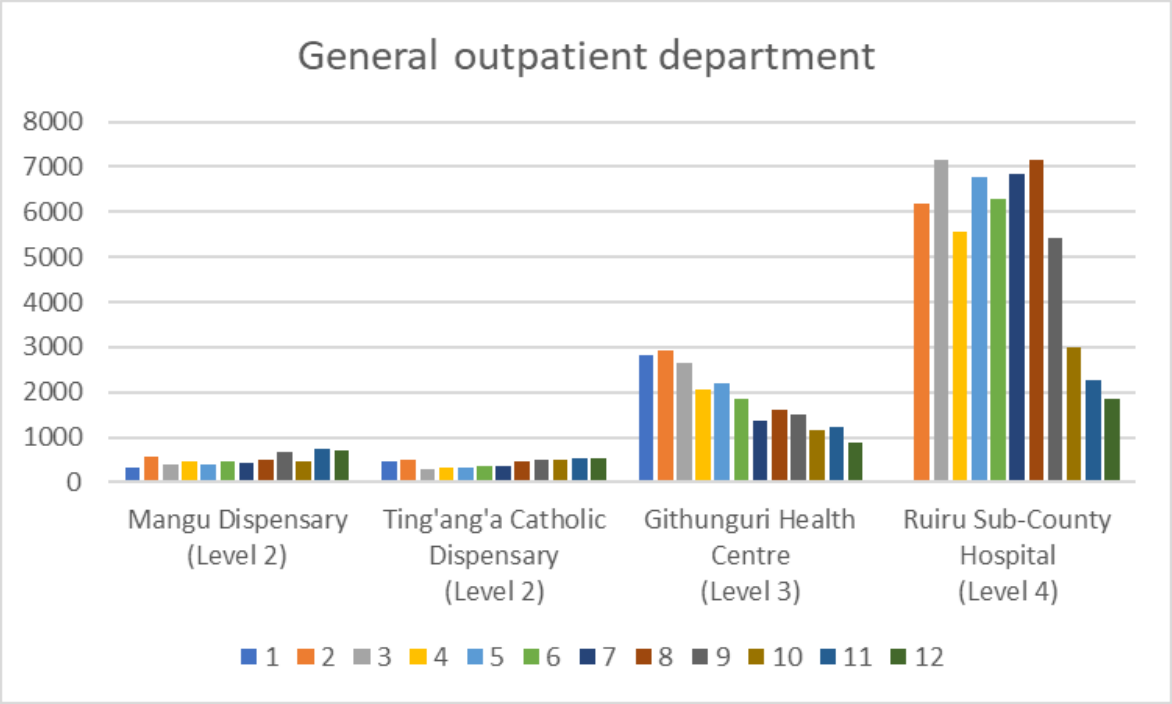


Figure 2:9:General Outpatient Results

The following figure shows the number of visits recorded at the child welfare department. The number of visits in the NGO sites seems to be somewhat stable, although the numbers per month go up and down in Mangu. Regarding the two public sites, the number of visits seen in the first two months seems higher than the later months, particularly with Ruiru.

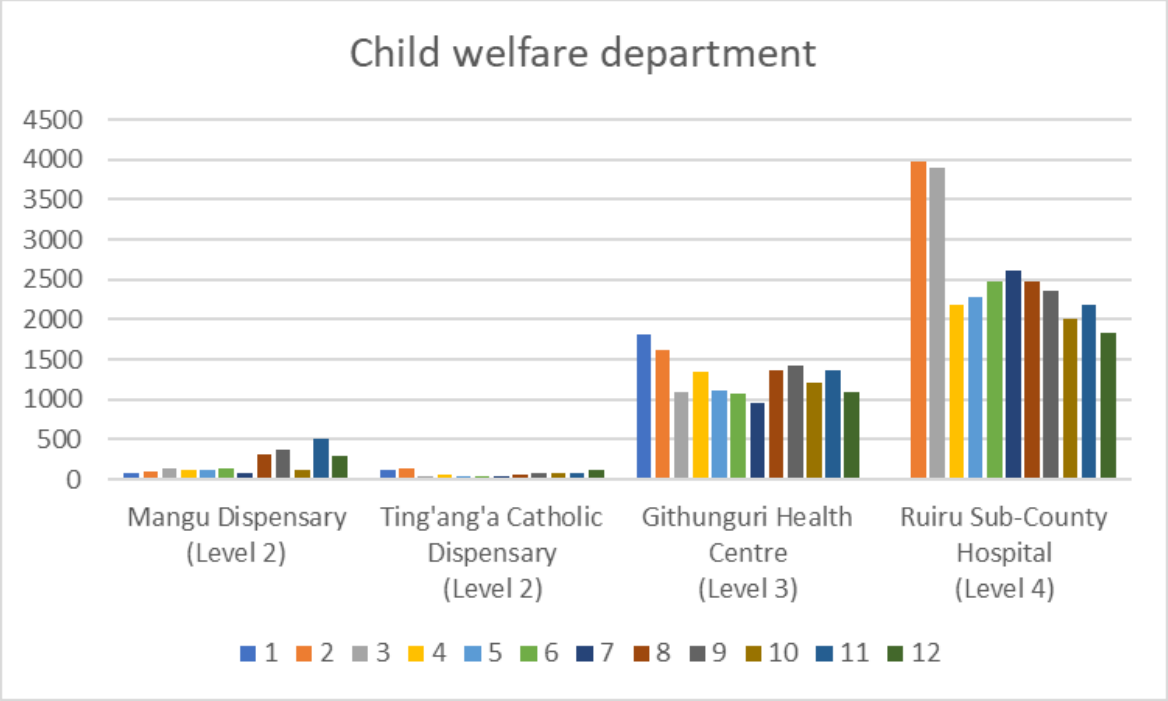


Figure 2:10:Child Welfare Visits Results

The following figure shows the number of deliveries recorded. The monthly number of deliveries in the Mangu was very low initially, although the numbers per month appear to have increased slightly towards

the end of the period. Regarding Ruiru hospital, the number of deliveries seen in the first seven months is somewhat higher than the number in the later months.

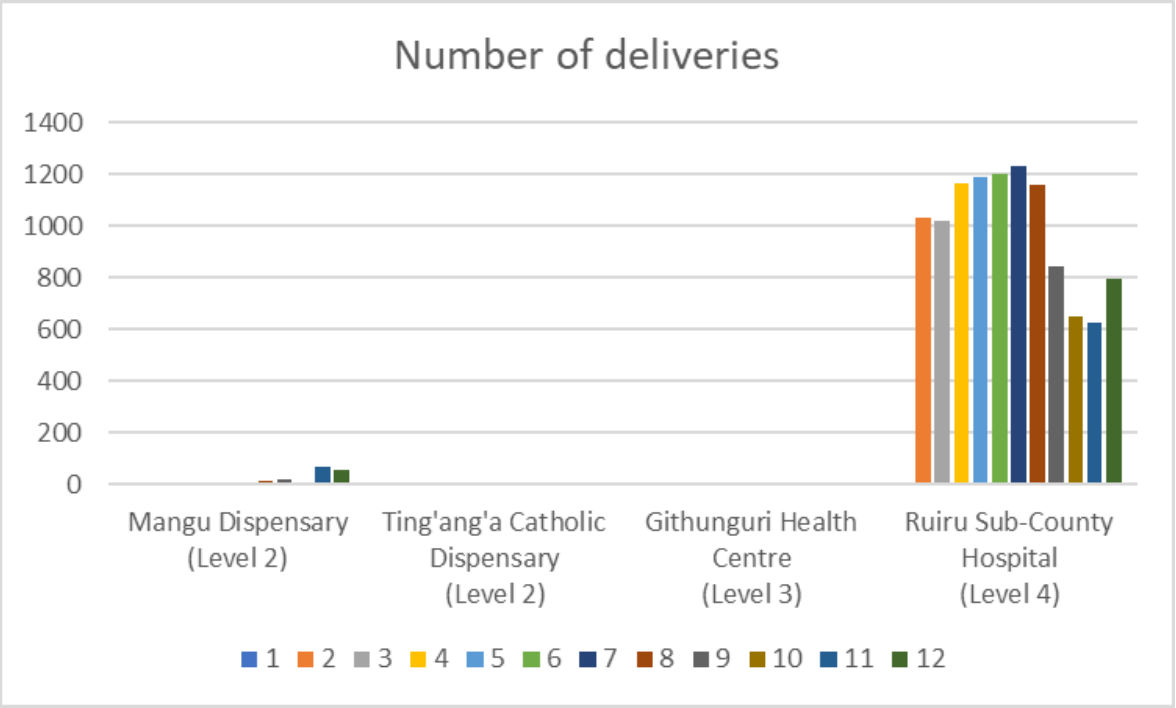


Figure 2:11:Number of deliveries results

The following figure shows the number of clients seen at the postnatal department. There are two striking results (one in Ting'ang'a and one in Githunguri), which are very likely to be typographical errors. If that is the case, then the monthly number in Githunguri shows a stable pattern, followed by a reduction to 50-70% in the last four months. Ruiru hospital shows a reverse pattern, since the frequencies in the first five months are actually lower than those in the last seven months.

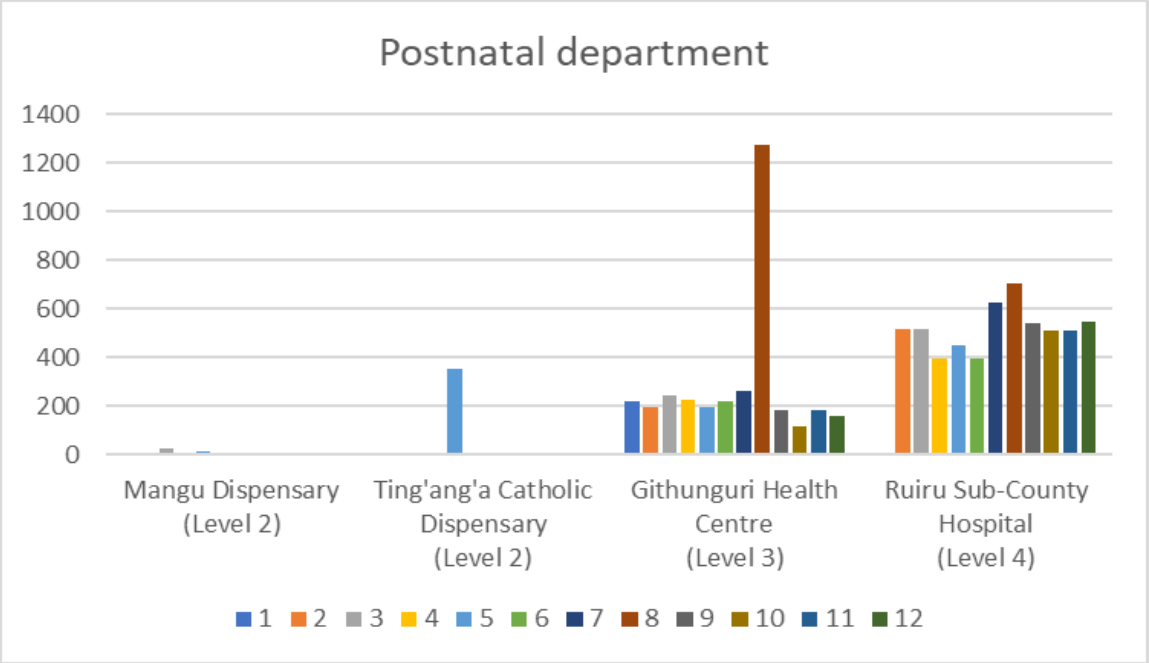


Figure 2:12:Client Numbers at Postnatal clinic

2.2.3 Patients with diabetes or hypertension

The demographics for patients with diabetes or hypertension are shown in the following table. Most patients in the NGO sites were 60+ years and most patients were female. In contrast, the patients seen in the public care facilities were younger and mainly male.

Table 2:13: Patients with Diabetes/Hypertension:

	Mangu Dispensary (Level 2)		Ting'ang'a Catholic Dispensary (Level 3)		Githunguri Health Centre (Level 3)		Ruiru Sub-County Hospital (Level 4)	
PATIENTS WITH DIABETES OR HYPERTENSION	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
N	15		18		10		42	
Age								
20-29 years	0	0%	0	0%	0	0%	2	5%
30-39 years	0	0%	0	0%	0	0%	3	7%
40-49 years	1	7%	1	6%	2	20%	11	26%
50-59 years	4	27%	2	11%	5	50%	13	31%
60 years and above	10	67%	15	83%	3	30%	13	31%
Male, %	7	47%	6	33%	10	100%	30	71%

2.2.3.1 Patients with diabetes

The table below provides some details about the patients with diabetes seen at the two FBO/NGO facilities. In total, 17 patients with diabetes were seen. Most of them (14/17, 82%) were 60 years and above and most were male (10/17, 59%). Of these 17, 35% (6/17) had comorbidities and diabetes complications, which consisted of hypertension (n=5) and neuropathy (n=1).

The table also shows the frequency of measurements in the past year. Both blood pressure and random blood glucose tests were performed fairly often. However, fasting blood glucose and HbA1c tests were seldom performed. This raises the question of whether the low frequency of an HbAlc measurement can be seen as a sign of inappropriate or suboptimal care in both sites.

Table 2:14:Profiles for Diabetic Patients

	Mangu		Ting'ang'a Catholic		Combined		Comments
PATIENTS WITH DIABETES	**N**	**%**	**N**	**%**	**N**	**%**	**From report (version April 1, 2021)**
N	7		10		17		
Age							
40-49 years					2	12%	
50-59 years					1	6%	
60 years and above					14	82%	
Male					10	59%	
Comorbidity/diabetes complications					6	35%	Five patients with hypertension, one patient with neuropathy.
Blood pressure measurement							
- 1st visit of past year, %					15	88%	
- 2nd visit of past year, %					8	47%	
- 3rd visit of past year, %					5	29%	
- 4th visit of past year, %					7	41%	
Random blood glucose measurement							
- 1st visit of past year, %					7	41%	
- 2nd visit of past year, %					5	29%	
- 3rd visit of past year, %					5	29%	
- 4th visit of past year, %					5	29%	
Fasting blood glucose measurement							
- 1st visit of past year, %					1	6%	
- 2nd visit of past year, %					0	0%	
- 3rd visit of past year, %					1	6%	
- 4th visit of past year, %					0	0%	
HbA1c measurement							
- 1st visit of past year, %					0	0%	
- 2nd visit of past year, %					0	0%	
- 3rd visit of past year, %					1	6%	
- 4th visit of past year, %					1	6%	
Foot and eye exams not shown here.							

2.2.3.2 Patients with hypertension

Twenty-nine patients with hypertension were seen at the two NGO facilities. Most of them (28/29, 97%) were 60 years and above and most were female (19/29, 66%). The prevalence of comorbidities was small in this group (2/29, 7%); both of the patients with comorbidity had retinopathy.

The table also shows the frequency of measurements in the past year. Both blood pressure and a random blood glucose test were performed fairly often. However, fasting blood glucose was seldom assessed. The fact that blood pressure was not assessed at every visit can raise questions about whether the quality of care can be improved.

Table 2:15: Profiles for Hypertension Patients

	Mangu		Ting'ang'a Catholic		Combined		Comments
PATIENTS WITH HYPERTENSION	**N**	**%**	**N**	**%**	**N**	**%**	**From report (version April 1, 2021)**
N	12		17		29		
Age - 60 years and above, %					28	97%	
Male					10	34%	
Comorbidity/hypertension complications					2	7%	Two patients with retinopathy.
Blood pressure measurement							
- 1st visit of past year, %					23	79%	
- 2nd visit of past year, %					24	83%	
- 3rd visit of past year, %					20	69%	
- 4th visit of past year, %					21	72%	
Random blood glucose measurement							
- 1st visit of past year, %					9	31%	
- 2nd visit of past year, %					10	34%	
- 3rd visit of past year, %					7	24%	
- 4th visit of past year, %					9	31%	
Fasting blood glucose measurement							
- 1st visit of past year, %					0	0%	
- 2nd visit of past year, %					1	3%	
- 3rd visit of past year, %					0	0%	
- 4th visit of past year, %					0	0%	

2.2.4 Economic and Financial Evaluation

An overview of different types of resource use for all four sites is provided in the table below. Here we can see that there was a very low frequency of hospitalization. Only two hospitalizations were seen, both in Ruiru; one of these was maternity-related, presumably for delivery of a baby.

Regarding outpatient care, almost all patients were seen at least once by a healthcare professional. In the NGO facilities and Githunguri, this was usually a Kenya registered nurse or clinical officer. In contrast, most patients at Ruiru Sub-county hospital stated that they had received ‘other type of care’ by a different healthcare professional, which turned out to be a ‘physician’ or ‘clinician’. In fact, this seemed to be the case for all patients in all sites who stated that they had received ‘other type of care”.

Regarding prescription medicines, most of the patients had taken prescription medicines in the previous months, only some of which were related to either diabetes (e.g. metformin) or hypertension. Patients occasionally received treatment for conditions other than hypertension or diabetes.

As noted in the clinical impact report, the team obtained more information regarding non-medical costs (e.g., transport costs) from the patients during a focus group discussion session.

Overview of resource use

Table 2:16:Economic and Financial Evaluation

	Mangu Dispensary (Level 2)			Ting'ang'a Catholic Dispensary (Level 3)			Githunguri Health Centre (Level 3)			Ruiru Sub-County Hospital (Level 4)		
	N	%	(missing values)	N	%	(missing values)	N	%	(missing values)	N	%	(missing values)
In-hospital care and daycare												
Hospitalised?	0	0%	0	0	0%	0	0	0%	0	2	5%	0
Number of hospitalisations (if hospitalised)	n/a			n/a			n/a			2	5%	0
Number of hospital days	n/a			n/a			n/a			4.5		
Number of days intensive care	n/a			n/a			n/a			n/a		
Number of tests												
Number of procedures (surgery)												
Emergency department visit?	1	7%	0	0	0%	0	0	0%	0	1	2%	1
Taken by ambulance to the hospital?	0	0%	0	0	0%	0	0	0%	0	1	2%	0
Daycare visit (yes vs no)?	0	0%	1	0	0%	0	0	0%	0	0	0%	3
Other care (e.g. rehabilitation)	0	0%	0	0	0%	0	0	0%	0	0	0%	0
Outpatient care												
Any outpatient clinic visit (yes vs no)?	13	87%	0	13	81%	6	9	100%	1	42	100%	0
Visit with a cardiologist (yes vs no)?	0	0%	0	0	0%	2	0	0%	1	2	5%	0
Visit with an endocrinologist (yes vs no)?	0	0%	0	0	0%	2	0	0%	1	1	2%	0
Visit with Kenya Registered nurse (yes vs no)?	2	14%	1	3	25%	6	0	0%	1	0	0%	0
- if yes, number of visits	2.0		1	2.0		6	-			-		0
Visit with Kenya Registered clinical officer (yes vs no)?	12	86%	1	9	75%	6	8	89%	1	7	17%	0
- if yes, number of visits	2.8		1	2.1		6	3.0			2.1		0
Any other type of care (e.g., GP, physiotherapist)?	14	93%	0	11	69%	2	1	11%	1	37	88%	0
- if yes, number of visits	2.6		1	2.4		7	3.0		0	2.1		0
Drugs												
Number of patients that took medication in the last 3 months	15	100%	0	15	83%	0	10	100%	0	42	100%	0
Metoprolol use (yes vs no)?	1	7%	0	0	0%	0	0	0%	0	0	0%	0
Furosemide use (yes vs no)?	0	0%	0	0	0%	0	0	0%	0	0	0%	0
Hydrocortisone cream use (yes vs no)?	1	7%	0	0	0%	0	0	0%	0	1	2%	0
Use of other medication (yes vs no)?	13	87%	0	15	83%	0	8	80%	0	39	93%	0

n/a = not available at this time.

3 OBSERVATIONS

Below we summarize the observations on various aspects.

Training

The research study team sought to identify the satisfaction level of training and the following was the feedback:

- All staff were trained at their convenient time and place. Instances where there is a problem, Peter Kaniu the ICT support personnel at Mangu was available to solve either in person or on call.
- The staff were generally comfortable with the use of the system and only need assistance in handling minor issues.
- There was need to train a facility-based healthcare worker to gradually undertake technical roles at the respective facility as the implementation team withdraws it team members
- Area of improvement: They AfyaPro-MoM implementation team could undertake training department by department as they understand the user needs and issues in new facilities
- Training was in the afternoon when there was less work load at the facilities

Health facility staff profile

At the FBO/NGO Facilities, we observed that the healthcare workers including the facility administrators were predominantly women and aged between 24 years and 40 years. Their educational training was diploma in their respective professions - nurses, clinical officers, lab technicians, health information and records officers, etc.

Patient profile

We observed that the majority of the patients attending the clinics at both the Diabetes and Hypertension clinics were predominantly female, elderly - 60 years of age and above. On gender this is consistent with health seeking behaviour. In addition, an interesting observation is that a number of those in diabetes clinics cited eye-sight challenges. This we expected could have an impact on the mobile app uptake.

Infrastructural Layout

Generally the workflows at both FBO/NGO and PHF were designed around the current physical setup of the facility. For instance, Mangu the building had its rooms well labeled from 1 to 8 from which the different services were offered. Of key interest, the triage and patient registration were carried out at the waiting lobby with patient files remaining at the waiting lobby, thus compromising patients' privacy. Ting'ang'a on the other hand did not have sufficient space which forced the different services to be offered at the same service point, for instance the cash office and registry were in the same room. Githunguri health centre converted the security guard's office into a patient registration point as well as the records office.

Filing Storage Space:

For all the facilities at this baseline, prompt availability and access to patient data is a major challenge. Challenges included space for storage of patient files and patients carrying home their patient records. Once the AfyaPro-MOMs integrated solution is put in place, we anticipate that patient clinical data will be readily available and accessible, including supporting referrals and this will lead to enhanced quality of care.

Workflows

Midline

The diagram below illustrates the current patient workflow at the Mang'u Dispensary during the midline. This is also similar to that of Ting'ang'a Catholic Dispensary. At both facilities, we noted that several activities were handled by the same healthcare worker, e.g. a nurse was involved in patient clerking (registration) as well as triaging.

The team were informed that the workflow had largely remained the same after the AfyaPro-MOM integrated solution was put in place, however the system brought a change in the following areas

1) **Digital patient Records:** The Registry clerk no longer needs to walk to and fro to pick patient files which initially were stored in a different registry room as the patient records are now in the system

2) **Patient confidentiality:** The patients no longer move with their patient files in the different service points which affected the confidentiality of their information as anyone could likely read their file while they are waiting on queues. Additionally, the patients only move around with a cash receipt denoting the service paid for.

3) **Queue management:** The system has streamlined the queue management as the staff used the queue on the system to call the next patient and thus patients no longer jump the queue

4) **Time saving**: It was noted that much time was being spent by the medics to seek the patient file and receipt from the patient and confirm correct payment and read the prescription. The medics were now able to quickly access the patient record since payment had to be done for the next service to be offered.

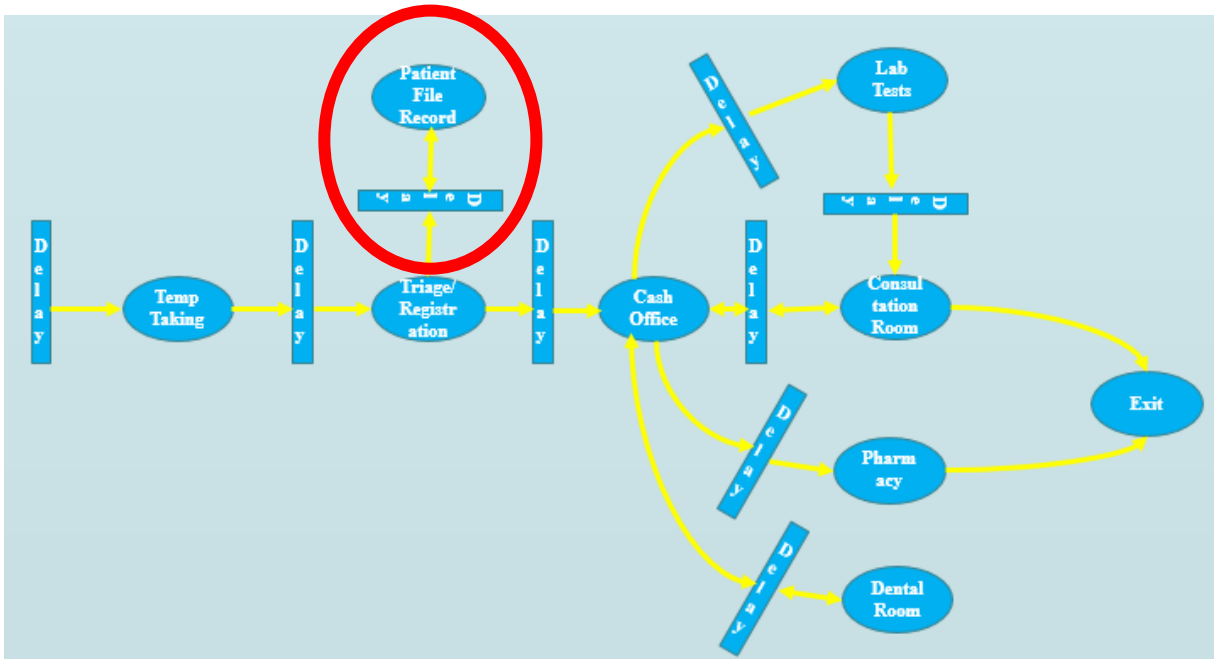
5) **Receipt:** The patients expressed satisfaction with the use of computer generated cash receipts instead of the previous handwritten ones.

6) **Stationary Costs:** The facility no longer purchases patient files as the records are now within the system.

7) There is proper control for cash, lab and pharmacy unlike before.

8) The management termed the system as 80% percent successful but noted Connectivity as still a major issue.

The red circled area is where we anticipated the workflow to change, however we observed that the NCD clinics hadn't fully gone paperless because data migration wasn't fully done and thus physical patient files were still being used. It is anticipated that as we move towards the endline, this is an area that the workflow may change.



The diagram below illustrates the current patient workflow for one process at the Githunguri public health facility. This is different from the Ruiru level 4 district public health facility. At this facility, they don't have a cash office as all the services are provided free of charge to the patient (consultation, drugs, lab tests). However, after an interaction with some patients, they informed us that they indeed pay for the lab tests

NCD Clinic

The team observed that no data migration was done for diabetes and HTN clinics. The adopted criteria was to register them as they visit the facility. Whereas this seemed an option, it misses out on the historical data that could be used by the clinician. This means that currently, the clinician will need to access the manual patient file as the patient's history is built. The team further noted that the patient history record section that was to be populated during the patient registration, a sample of the patient record viewed, very few information was put.

NCD Data

The following was noted:

- The visits only capture BP and **Pulse**, weight. No record of height, RBS was found. We were informed that the height is only taken on clinician's request.
- Secondly, HBA1c and foot examination and eye examination is still not done
- Data on drugs is recorded as per the invoice and payment (quantity, prices and total cost).This wasn't the case before system implementation.
- Data is now readily available in on place on the system and not on files.
- System provides a charting visual which were found good for visualizing trends
- Risk scoring form the provided data is available though not currently in use.

MOMs

The MCH nurse expressed satisfaction with the use of the MOMs so far. They termed is as an easy to use system.

However, the following concerns were raised:

- Internet issues on the MOM tablet that makes the nurse at times to leave the building to look for network.
- Nurse can't perform medication prescription from the MOMs side
- Nurse can initiate a lab request from the MOMs side but cant access the results from the MOMs side.
- Key reports missing on the MOMs i.e ANC report.

Report Generation:

It was noted that though the AfyaPro-MOM system had the report feature, it was missing a number of reports that the dispensary find key in their routine reporting to the Sub-County level and to diocese. These are expected to be incorporated into the system before end-line as it was observed that it increased the HRIOs workload.

1) MOH 717-Workload report

2) MOH 705 A & MOH 705 B(over and under 5 years)

3) Diabetes and Hypertension report

4) ANC 1st Visit and Re-Visit report

Availing the above routine reports and other necessary ones would simplify her work and motivate greater use of the system.

There is need to review the reports access roles; it was noted that though the HRIO is the one who does most of the facility reporting, she doesn't have the necessary access rights to access and generate reports. We recommend generation and access roles could be shared with HRIO

Internet Connectivity

Previously this connection was unstable, but with the redundant line now in place, Internet connection was reported as having improved but, downtimes were still present and this was affecting service delivery. The facility management asserted Internet had been a problem, reporting that it was slow and sometime no internet at all. This has affected the services at this point where we want to be paperless.

The hospital management at both health facilities asserted that a stable Internet would ensure their quick service delivery and this would lead ensure proper controls and management. Additionally, with stable Internet, their plans to go paperless would be made a reality.

4 DISCUSSION

Consolidate Framework for Implementation Research (CFIR) FACILITATORS

AT BASELINE

From CFIR under baseline a total of THIRTEEN constructs namely FOUR intervention characteristics constructs(Intervention source, relative advantage, adaptability ,complexity), ONE outer setting construct (patient needs and resources),THREE inner setting constructs (networks and communications, culture and readiness for implementation), TWO individual characteristics constructs(knowledge and beliefs about intervention, self-efficacy) and THREE implementation process constructs(engagement, execution, reflection and evaluation) constructs were found as facilitators for the successful implementation of the system. However a total of… barriers namely were found to likely inhibit the successful implementation.

AT MIDLINE

From CFIR under midline, a total of FOURTEEN constructs namely FIVE intervention characteristics constructs(Intervention source, relative advantage, adaptability ,complexity, evidence strength), NO outer setting construct ,THREE inner setting constructs(networks and communications, culture and readiness for implementation) , TWO individual characteristics constructs (knowledge and beliefs about intervention, self-efficacy) and FOUR implementation process constructs(engagement,planning, execution, reflection and evaluation) constructs were found as facilitators for the successful implementation of the system. However, a total of… barriers namely were found to likely inhibit the successful implementation.

Consolidate Framework for Implementation Research (CFIR) BARRIERS

AT BASELINE

However, a total of FOUR constructs namely ONE intervention characteristics constructs (evidence strength), ONE outer setting construct (external policy and incentives), ONE inner setting constructs (structural characteristics) and ONE implementation process constructs (planning) were found to likely inhibit the successful implementation of the system if not addressed.

MIDLINE

However, a total of THREE constructs namely ZERO intervention characteristics constructs, TWO outer setting construct (patient needs and resources , external policy and incentives), ONE inner setting constructs (structural characteristics) and ZERO implementation process constructs were found to likely inhibit the successful implementation of the system if not addressed.

The economic aspect of this report describes the baseline situation for all of the four sites (two NGO sites and two public facilities). A baseline situation, including the period prior to the baseline situation, will help to assess the economic and financial value of the AfyaPro-MOM solution. However, economic evaluations of any intervention require a comparison of two alternative ways to provide care. Therefore, this baseline report only describes the current way. The second way, using the AfyaPro-MOM solution, will be assessed later this year. The results of that second way will be described in the midline and endline assessments. Once the second way has been described, it will be possible to make comparisons of the two ways, including the differences in economic outcomes.

Data migration was never fully undertaken and thus physical patient record was being used for historical purposes as patients sought treatment in the different service points. This led to the

CFIR construct: patient needs and resources being identified as a barrier during the midline as it was felt that the system failed to capture and address patients' needs.

The HRIO needs to be mentored to take over the role of a project champion to drive the support of the system to other users. Additionally, the HRIO should take over the role of the ICT support personnel.

There is need to undertake the Data quality audits as there were cases on inconsistent records on the system and register (in one instance they found 38 patients in the register; on system they were 34 patients).

Routine reports feature is a critical area for the HRIO and this should be prioritized as it was observed that a number of key reports were missing.

The facility management asserted Internet had been a problem - slow and sometime not internet at all. This has affected the services at this point where we want to be paperless. The management recommended that reliable Internet with acceptable speeds to be priotised so as to enable them offer quick service delivery and this would lead ensure proper controls and management

5 CONCLUSION

From this midline it is clear that for a successful EHR implementation, there is a need to establish and develop a checklist and ensure that the following is addressed before the end-line is undertaken. These include the following:

- Reliable Internet with bandwidth and acceptable speeds to be immediately prioritized
- Data migration needs to be relooked again as was noted that it was not done as planned. The patient history available to the healthcare worker such as the clinician was very limited.
- Undertake a mentorship program for one facility member such as the HRIO to take one the role of a project champion and take over as the ICT support gradually from the implementation team.
- Undertake the Data quality audits as there were cases on inconsistent records on the system and register.
- Routine reports feature should be prioritized as this is critical for the HRIO
- Double entry on the patient registration needs to be rechecked.

The patient workflows are likely to change once the facilities go paperless after observed changes in the implementation of the AfyaPro-MOMs integrated digital health solution are addressed. It is important to evaluate this so as to ascertain that this solution does not introduce bottlenecks and reduce efficiency and poor patient satisfaction heading to end line.

6 ETHICS

We confirm that the study has adhered to the study protocol.

7 ANNEXES

No Annexes include in this report

8 REFERENCES

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AfyaPro-MOM integrated solution implementation study Baseline report (Sept, 2021)

9 APPENDIX

- CONSOLIDATED FRAMEWORK FOR IMPLEMENTATION RESEARCH FINDINGS

9.1.1 Intervention Source Findings

- Baseline

This section asked the respondents their view on the following; if there was consultation during the EHRs sourcing and if the EHRs was sourced from a legitimate source. The results are as stipulated below.

Intervention Source

	N	Minimum	Maximum	Mean	Std. Deviation
We as the stakeholders were consulted when this EHR system was being sourced for implementation.	11	1	6	4.73	1.272
This EHR system was sourced from a legitimate vendor/organization	11	3	5	4.36	.809
Intervention source	11	3.50	5.00	4.6364	.50452
Valid N (listwise)	11				

The results show that the majority of the respondents agree to have been consulted when the EHRs was being discussed for implementation [M=4.73] and they also perceive that the EHRs system was sourced from a legitimate source [M=4.36].

Overall the mean score for intervention source is above the expected level that may affect implementation success of EHRs [Mis=4.6364>MeH =3.4] implying that the EHRs implementation is likely to be successful.

- Midline

This section asked the respondents their view on the following; if there was consultation during the EHRs sourcing and if the EHRs was sourced from a legitimate source. The results are as stipulated below.

Intervention Source

	N	Minimum	Maximum	Mean	Std. Deviation
We as the stakeholders were consulted when this EHR system was being sourced for implementation.	15	0	5	4.07	1.710

This EHR system was sourced from a legitimate vendor/organization	15	0	5	3.73	1.981
I believe the vendor is capable of developing a good EHR system	15	4	5	4.53	.516
ISOURCE	15	1.33	5.00	4.1111	1.24510
Valid N (listwise)	15				

The results show that the majority of the respondents agree to have been consulted when the EHRs was being discussed for implementation [M=4.07] and they also perceive that the EHRs system was sourced from a legitimate source [M=3.73].

Overall the mean score for intervention source is above the expected level that may affect implementation success of EHRs [Mis=4.1111>MeH =3.4] implying that the EHRs implementation is likely to be successful.

9.1.2 Evidence Strength Findings

- Baseline

The study further sought to establish how the respondents perceived the evidence supporting the EHRs implementation and its expected outcomes. The results are shown below.

Evidence Strength

	N	Minimum	Maximum	Mean	Std. Deviation
Implementation of this EHR system is supported by concrete evidence from an organization similar to ours	10	0	5	2.30	2.452
Implementation of this EHR system conforms to the opinions of respected experts	9	4	5	4.44	.527
Implementation of this EHR should be effective, based on current scientific knowledge	10	4	5	4.60	.516
Evidence strength	10	2.00	5.00	3.7000	.94868
Valid N (listwise)	9				

From the findings, the respondents are unaware of a similar organization that had implemented such a system [M=2.30]. However, the respondents greatly agree on the existence of evidence both scientific knowledge [M=4.60] and opinions from experts [M=4.44] to support the EHRs implementation.

Overall the mean score for evidence strength is above the expected level that may affect implementation success of EHRs[Mes=3.7000>MeH =3.4] an indication this strength of evidence will likely make the EHRs implementation to be successful.

- Midline

The study further sought to establish how the respondents perceived the evidence supporting the EHRs implementation and its expected outcomes. The results are shown below.

Evidence Strength

	N	Minimum	Maximum	Mean	Std. Deviation
Implementation of this EHR system is supported by concrete evidence from an organization similar to ours	15	1	5	3.93	1.163
Implementation of this EHR system conforms to the opinions of respected experts	15	3	5	4.27	.799
Implementation of this EHR should be effective, based on current scientific knowledge	15	3	5	4.40	.737
EVIDENCE STRENGTH	15	2.67	5.00	4.2000	.81455
Valid N (listwise)	15				

From the findings, the respondents are unaware of a similar organization that had implemented such a system [M=3.93]. However, the respondents greatly agree on the existence of evidence both scientific knowledge [M=4.40] and opinions from experts [M=4.27] to support the EHRs implementation.

Overall the mean score for evidence strength is above the expected level that may affect implementation success of EHRs[Mes=4.200>MeH =3.4] an indication this strength of evidence will likely make the EHRs implementation to be successful.

9.1.3 Relative Advantage Findings

- Baseline

The study further sought to establish how the respondents perceived the ability of the proposed EHRs to perform better compared to other alternatives. The results are shown below.

Relative advantage

	N	Minimum	Maximum	Mean	Std. Deviation

Implementation of EHR system appears to have many more advantages than disadvantages	**11**	**4**	**5**	**4.55**	**.522**
Implementation of EHR system is likely to be supported by staff because they believe that the advantages outweigh disadvantages	**11**	**4**	**5**	**4.55**	**.522**
Staff, in general, are not depressed by the prospect of change	**11**	**3**	**5**	**4.36**	**.674**
RELATIVE ADVANTAGE	**11**	**3.67**	**5.00**	**4.4848**	**.50252**
Valid N (listwise)	**11**				

From the findings, the respondents perceive the EHRs implementation as having more advantages than disadvantages [M=4.55]. Secondly, the respondents agree to support the proposed EHRs as its advantages outweigh its disadvantages [M=4.55]. Moreover, the respondents are willing to adapt to the change being brought about by the proposed EHRs [M=4.36].

Overall the mean score for relative advantage is above the expected level that may affect implementation success of EHRs[Mra=4.4848>MeH =3.4] an indication that the users believe the EHRs system will work better compared to alternatives and will likely make the EHRs implementation to be successful.

- Midline

The study further sought to establish how the respondents perceived the ability of the proposed EHRs to perform better compared to other alternatives. The results are shown below.

Relative advantage

	N	Minimum	Maximum	Mean	Std. Deviation
Implementation of EHR system appears to have many more advantages than disadvantages	15	4	5	4.27	.458
Implementation of EHR system is likely to be supported by staff because they believe that the advantages outweigh disadvantages	15	3	5	4.20	.676
Staff, in general, are not depressed by the prospect of change	15	3	5	4.07	.799
RELATIVE ADVANTAGE	15	3.33	5.00	4.1778	.54724
Valid N (listwise)	15				

From the findings, the respondents perceive the EHRs implementation as having more advantages than disadvantages [M=4.27]. Secondly, the respondents agree to support the proposed EHRs as its

advantages outweigh its disadvantages [M=4.20]. Moreover, the respondents are willing to adapt to the change being brought about by the proposed EHRs [M=4.07].

Overall the mean score for relative advantage is above the expected level that may affect implementation success of EHRs[Mra=4.1778>MeH =3.4] an indication that the users believe the EHRs system will work better compared to alternatives and will likely make the EHRs implementation to be successful.

9.1.4 Adaptability Findings

- Baseline

The study further sought to establish how the respondents perceived the ability of the proposed EHRs to be adapted to their local contexts. The results are shown below.

Adaptability

	N	Minimum	Maximum	Mean	Std. Deviation
The EHR system has the likelihood of being tailored to fit the needs within our healthcare facility	11	4	5	4.64	.505
The EHR system can be tailored and retain its effectiveness within our healthcare facility	10	4	5	4.60	.516
The adaptation of the EHR system will be politically and ethically easy to achieve	11	3	5	4.36	.674
Adaptability	11	3.67	5.00	4.5152	.43111
Valid N (listwise)	10				

From the findings above, the respondents are positive that the proposed EHRs can be tailored to align to their facility needs [M=4.64], that even after being tailored, it will remain effective [M=4.60] and that it will be easy to achieve the adaptation [M=4.36].

Overall the mean score for EHRs adaptability is above the expected level that may affect implementation success of EHRs[Mad=4.5152>MeH =3.4] an indication that the users believe that the proposed EHRs can be tailored to their local contexts and this will likely make the EHRs implementation to be successful.

- Baseline

The study further sought to establish how the respondents perceived the ability of the proposed EHRs to be adapted to their local contexts. The results are shown below.

Adaptability

	N	Minimum	Maximum	Mean	Std. Deviation

The EHR system has the likelihood of being tailored to fit the needs within our healthcare facility	15	3	5	4.27	.594
The EHR system can be tailored and retain its effectiveness within our healthcare facility	15	3	5	4.27	.594
The adaptation of the EHR system will be politically and ethically easy to achieve	15	0	5	3.87	1.246
ADAPTABILITY	15	2.33	5.00	4.1333	.66428
Valid N (listwise)	15				

From the findings above, the respondents are positive that the proposed EHRs can be tailored to align to their facility needs [M=4.27], that even after being tailored, it will remain effective [M=4.27] and that it will be easy to achieve the adaptation [M=3.87].

Overall the mean score for EHRs adaptability is above the expected level that may affect implementation success of EHRs[Mad=4.133>MeH =3.4] an indication that the users believe that the proposed EHRs can be tailored to their local contexts and this will likely make the EHRs implementation to be successful.

9.1.5 Complexity Findings

- Baseline

The study further sought to establish how difficult the respondents perceived the proposed EHRs to be. The results are shown below.

Complexity

	N	Minimum	Maximum	Mean	Std. Deviation
The implementation of EHR system is too complex and I don't believe it will be successful	**11**	**1**	**6**	**2.45**	**1.753**
Implementing this intervention will make it difficult for me to perform my duties	**11**	**1**	**5**	**1.91**	**1.375**
The leadership and the implementation team has explained the implementation process and benefits of EHR and it doesn't seem complex	**11**	**2**	**5**	**4.36**	**1.027**
Complexity	**11**	**2.00**	**4.33**	**2.9091**	**.81773**
Valid N (listwise)	**11**				

From the findings, the respondents do not perceive the EHRs system as complex or that it will fail [M=2.45]. In addition, the respondents do not perceive that the proposed EHRs will make it hard to perform their duties [M=1.91]. Further, the respondents are positive with the role played by the leadership and implementation team to explain the benefits as well as the implementation process of the EHRs [M=4.36].

Overall the mean score for EHRs complexity is below the expected level that may affect implementation success of EHRs[Mcomp=2.9091<MeH =3.4] an indication that the users do not perceive the EHRs as complex and this will likely make the EHRs implementation to be successful.

- Midline

The study further sought to establish how difficult the respondents perceived the proposed EHRs to be. The results are shown below.

Complexity

	N	Minimum	Maximum	Mean	Std. Deviation
The implementation of EHR system is too complex and I don't believe it will be successful	15	1	5	2.07	1.100
Implementing this intervention will make it difficult for me to perform my duties	15	1	4	1.73	.884
The leadership and the implementation team has explained the implementation process and benefits of EHR and it doesn't seem complex	15	1	5	3.73	1.486
COMP	15	1.00	3.67	2.5111	.75453
Valid N (listwise)	15				

From the findings, the respondents do not perceive the EHRs system as complex or that it will fail [M=2.07]. In addition, the respondents do not perceive that the proposed EHRs will make it hard to perform their duties [M=1.73]. Further, the respondents are positive with the role played by the leadership and implementation team to explain the benefits as well as the implementation process of the EHRs [M=3.73].

Overall the mean score for EHRs complexity is below the expected level that may affect implementation success of EHRs[Mcomp=2.5111<MeH =3.4] an indication that the users do not perceive the EHRs as complex and this will likely make the EHRs implementation to be successful.

9.1.6 Patient Needs and resources Findings

- Baseline

The study further sought to establish to what extent the proposed EHR captures patient needs and priorities. The results are shown below.

Patient Needs and resources					
	N	Minimum	Maximum	Mean	Std. Deviation
The proposed EHR implementation take into consideration the needs and preferences of our patients	10	4	5	4.50	.527
The proposed EHR implementation anticipates and is ready to receive and address patients' feedback and concerns.	9	3	5	4.22	.667
The proposed EHR implementation has considered the possible barriers faced by patients.	10	3	5	4.00	.816
The proposed EHR implementation seeks to improve patients' experience through patient portals	10	0	5	4.10	1.524
Patient Needs and resources	10	2.75	5.00	4.2000	.69522
Valid N (listwise)	9				

From the findings, the respondents agree that the proposed EHRs has put emphasis on the patient by considering the patient needs and concerns [M=4.50], that it can address arising patient concerns [M=4.22], that it has the ability to improve patients experiences.[M=4.10].

Overall the mean score for patient needs and resources is above the expected level that may affect implementation success of EHRs[Mpneed=4.2000>MeH =3.4] an indication that the users perceive the EHRs will address the patient needs and concerns and this will likely make the EHRs implementation to be successful.

- Midline

The study further sought to establish to what extent the proposed EHR captures patient needs and priorities. The results are shown below.

Patient Needs and resources

	N	Minimum	Maximum	Mean	Std. Deviation
The proposed EHR implementation take into consideration the needs and preferences of our patients	15	1	5	4.00	1.000
The proposed EHR implementation anticipates and ready to receive and address patients' feedback and concerns.	15	3	5	4.27	.704

The proposed EHR implementation has considered the possible barriers faced by patients.	15	0	5	3.40	1.502
The proposed EHR implementation seeks to improve patients' experience through patient portals	15	3	5	4.20	.561
Patient Needs and resources	15	3.00	5.00	3.9667	.48978
Valid N (listwise)	15				

From the findings, the respondents agree that the proposed EHRs has put emphasis on the patient by considering the patient needs and concerns [M=4.00], that it can address arising patient concerns [M=4.27], that it has the ability to improve patients experiences.[M=4.20].

Overall the mean score for patient needs and resources is above the expected level that may affect implementation success of EHRs[Mpneed=3.9667>MeH =3.4] an indication that the users perceive the EHRs will address the patient needs and concerns and this will likely make the EHRs implementation to be successful.

9.1.7 External Policies and Incentives

- Baseline

The study further sought to establish how external policies and incentives influence the implementation of the EHRs. The results are shown below.

External Policies and Incentives

	N	Minimum	Maximum	Mean	Std. Deviation
This EHR implementation project has been influenced strongly by pressures from outside the organization.	11	0	5	1.73	1.272
This EHR implementation project has been motivated strongly by government (National/County) financial stimuli/incentives	11	0	5	1.18	1.401
This EHR implementation project has been motivated strongly by government (National/County) policies and regulations	11	0	5	2.27	1.679
External Policies and Incentives	11	.67	4.67	1.7273	1.10371
Valid N (listwise)	11				

From the results by the respondents, the EHRs implementation wasn't influenced by pressures from outside the health facility[M=1.73], neither was it motivated by financial incentives from the national/county government[M=1.18] nor motivated by the policies and regulations from the government.

Overall the mean score for external policies and incentives is below the expected level that may affect implementation success of EHRs[Mextpol=1.7273<MeH =3.4] an indication that the users do not perceive the external policies and incentives as a requirement to make the EHRs implementation to be successful.

- Midline

The study further sought to establish how external policies and incentives influence the implementation of the EHRs. The results are shown below.

External Policies and Incentives

	N	Minimum	Maximum	Mean	Std. Deviation
This EHR implementation project has been influenced strongly by pressures from outside the organization.	15	1	5	2.87	1.187
This EHR implementation project has been motivated strongly by government (National/County) financial stimuli/incentives	15	0	5	2.27	1.792
This EHR implementation project has been motivated strongly by government (National/County) policies and regulations	15	0	5	2.33	1.839
EXTERNAL POLICY	15	.33	5.00	2.4889	1.45224
Valid N (listwise)	15				

From the results by the respondents, the EHRs implementation wasn't influenced by pressures from outside the health facility[M=2.87], neither was it motivated by financial incentives from the national/county government[M=2.27] nor motivated by the policies and regulations from the government.

Overall the mean score for external policies and incentives is below the expected level that may affect implementation success of EHRs[Mextpol=2.4889<MeH =3.4] an indication that the users do not perceive the external policies and incentives as a requirement to make the EHRs implementation to be successful.

9.1.8 Structural Characteristics

- Baseline

The study further sought to establish how structural characteristics influence the implementation of the EHRs. The results are shown below.

Structural Characteristics

	N	Minimum	Maximum	Mean	Std. Deviation
We have the required human resource in our facility for EHR implementation.	10	1	5	4.00	1.247
We need to invest on infrastructural changes to meet the EHR implementation requirements.	11	1	5	4.00	1.549
Our healthcare facility has low staff turnover	11	1	5	3.82	1.328
Structural Characteristics	11	2.00	5.00	3.99	1.05217
Valid N (listwise)	10				

From the findings by the respondents responses, there is agreement on existence of the required workforce for the EHRs implementation [M=4.00], there was agreement on low staff turnover [M=3.82] implying staff do not change jobs frequently and this is a good indicator for the implementation success. However there was agreement on the need to invest on the required infrastructural changes to meet the EHRs requirements [M=4.00].

Overall the mean score for structural characteristics is slightly above the expected level that may affect implementation success of EHRs [Mstrchr=3.9394>MeH =3.4] an indication that though there is adequate staff for the EHRs implementation, there is need to address infrastructural changes as a requirement to make the EHRs implementation to be successful.

- Midline

The study further sought to establish how structural characteristics influence the implementation of the EHRs. The results are shown below.

Structural Characteristics

	N	Minimum	Maximum	Mean	Std. Deviation
We have the required human resource in our facility for EHR implementation.	15	1	5	4.00	1.000
We need to invest on infrastructural changes to meet the EHR implementation requirements.	15	1	5	3.07	1.163
Our healthcare facility has low staff turnover	15	1	5	3.60	1.404
Structural Characteristics	15	1.67	4.67	3.5556	.76290
Valid N (listwise)	15				

From the findings by the respondents responses, there is agreement on existence of the required workforce for the EHRs implementation [M=4.00], there was agreement on low staff turnover [M=3.60] implying staff do not change jobs frequently and this is a good indicator for the implementation success.

However there was agreement on the need to invest on the required infrastructural changes to meet the EHRs requirements [M=3.07].

Overall the mean score for structural characteristics is slightly above the expected level that may affect implementation success of EHRs [Mstrchr=3.5556>MeH =3.4] an indication that though there is adequate staff for the EHRs implementation, there is need to address infrastructural changes as a requirement to make the EHRs implementation to be successful.

9.1.9 Networks & Communications

- Baseline

The study further sought to establish how the social communication is facilitated within the health facilities as it influences the implementation of the EHRs. The results are shown below.

Networks & Communications

	N	Minimum	Maximum	Mean	Std. Deviation
Mechanisms have been developed to keep leaders informed and involved	8	2	5	4.13	1.126
We as staff have a cordial working relationship with influential stakeholders	10	2	5	4.40	.966
We normally hold regular staff meetings to address matters arising	10	4	5	4.50	.527
Typically, we get informed about new initiatives or accomplishments	10	2	5	4.20	.919
Networks & Communications	10	3.33	5.00	4.2667	.60578
Valid N (listwise)	8				

From the results, there was agreement on existence of mechanisms that ensure the leaders are kept informed and involved [M=4.13], that the staff enjoy a warm relationship with their stakeholders [M=4.40], that the staff hold regular meetings to address issues arising [M=4.50] and that they are always informed when new initiatives are introduced such as this EHRs [M=4.20].

Overall the mean score for networks and communications is way above the expected level that may affect implementation success of EHRs [Mncom=4.2667>MeH =3.4] which was a higher indicator of the good communications that exists and this is a good contributor for the EHRs implementation to be successful.

- Midline

The study further sought to establish how the social communication is facilitated within the health facilities as it influences the implementation of the EHRs. The results are shown below.

Networks & Communications

	N	Minimum	Maximum	Mean	Std. Deviation
Mechanisms have been developed to keep leaders informed and involved	15	2	5	4.00	.845
We as staff have a cordial working relationship with influential stakeholders	15	2	5	4.07	.884
We normally hold regular staff meetings to address matters arising	15	3	5	4.27	.594
Typically, we get informed about new initiatives or accomplishments	15	3	5	4.20	.676
Networks & Communications	15	2.50	5.00	4.1333	.66054
Valid N (listwise)	15				

From the results, there was agreement on existence of mechanisms that ensure the leaders are kept informed and involved [M=4.00], that the staff enjoy a warm relationship with their stakeholders [M=4.07], that the staff hold regular meetings to address issues arising [M=4.27] and that they are always informed when new initiatives are introduced such as this EHRs [M=4.20].

Overall the mean score for networks and communications is way above the expected level that may affect implementation success of EHRs [Mncom=4.1333>MeH =3.4] which was a higher indicator of the good communications that exists and this is a good contributor for the EHRs implementation to be successful.

9.1.10 Culture

- Baseline

The study further sought to establish how the cultural norms are facilitated within the health facilities as it influences the implementation of the EHRs. The results are shown below.

Culture

	N	Minimum	Maximum	Mean	Std. Deviation
This EHR implementation project has been influenced by our mandate to provide quality healthcare services	10	3	5	4.40	.699
EHR implementation is most likely in our organization due to less bureaucracy and considerable flexibility enabling rapid changes	10	1	5	3.80	1.135
Staff members in our healthcare organization are willing to innovate and/or experiment to improve service provision	10	2	5	4.50	.972
Culture	10	3.33	5.00	4.23	.49814

Valid N (listwise)	10				

From the findings, there was agreement that the need to offer quality healthcare services is what influenced the proposal to implement the EHRs [M=4.40], agreement on ease of flexibility and less bureaucracy to facilitate the oncoming changes [M=3.80], agreement on their willingness to seek innovations that improve health care service delivery [M=4.50].

Overall the mean score for culture is above the expected level that may affect implementation success of EHRs [Mcult=4.2333>MeH =3.4] which shows the good cultural norms that exist and this is a good contributor for the EHRs implementation to be successful.

- Midline

The study further sought to establish how the cultural norms are facilitated within the health facilities as it influences the implementation of the EHRs. The results are shown below.

Culture

	N	Minimum	Maximum	Mean	Std. Deviation
This EHR implementation project has been influenced by our mandate to provide quality healthcare services	15	4	5	4.47	.516
EHR implementation is most likely in our organization due to less bureaucracy and considerable flexibility enabling rapid changes	15	3	5	3.93	.884
Staff members in our healthcare organization are willing to innovate and/or experiment to improve service provision	15	2	5	4.27	.884
Culture	15	3.00	5.00	4.2222	.68622
Valid N (listwise)	15				

From the findings, there was agreement that the need to offer quality healthcare services is what influenced the proposal to implement the EHRs [M=4.47], agreement on ease of flexibility and less bureaucracy to facilitate the oncoming changes [M=3.93], agreement on their willingness to seek innovations that improve health care service delivery [M=4.27].

Overall the mean score for culture is above the expected level that may affect implementation success of EHRs [Mcult=4.2222>MeH =3.4] which shows the good cultural norms that exist and this is a good contributor for the EHRs implementation to be successful.

9.1.11 Readiness for Implementation

- Baseline

The study further sought to establish to what extent the leaders and managers are committed, their involvement in the implementation and the availability of resources as they influence the implementation of the EHRs. The results are shown below.

Readiness for Implementation

	N	Minimum	Maximum	Mean	Std. Deviation
Senior Leadership in this healthcare facility have endorsed the implementation project	11	4	5	4.64	.505
The leadership has committed time & resources to support the implementation project	11	0	5	4.27	1.489
Information about the implementation has been made available to all staff	11	0	5	4.36	1.502
READINESS	11	1.33	5.00	4.4242	1.07591
Valid N (listwise)	11				

- Midline

The study further sought to establish to what extent the leaders and managers are committed, their involvement in the implementation and the availability of resources as they influence the implementation of the EHRs. The results are shown below.

Readiness for Implementation

	N	Minimum	Maximum	Mean	Std. Deviation
Senior Leadership in this healthcare facility have endorsed the implementation project	15	0	5	4.20	1.265
The leadership has committed time & resources to support the implementation project	15	3	5	4.27	.594
Information about the implementation has been made available to all staff	15	2	5	4.33	.816
READINESS FOR IMPLEMENTATION	15	3.00	5.00	4.2667	.60684
Valid N (listwise)	15				

From the results, there was agreement that healthcare leadership has endorsed the implementation of the EHRs [M=4.20], they have committed the necessary resources(time and personnel) that are needed to support the implementation[M=4.27], and agreement that the information about how to implement the system is readily available to all staff [M=4.33].

Overall the mean score for readiness for implementation is above the expected level that may affect implementation success of EHRs [Mri=4.2667>MeH =3.4] which shows the health facility readiness for implementation and this is a good contributor for the EHRs implementation to be successful.

9.1.12 Knowledge and belief on intervention

- Baseline

The study further sought to establish whether the users perceive the EHRs implementation to be valuable to their work as this influences the implementation success of the EHRs. The results are shown below.

Knowledge and belief on intervention

	N	Minimum	Maximum	Mean	Std. Deviation
I am knowledgeable about the benefits of implementing EHR system in this healthcare organization	10	4	5	4.80	.422
In my understanding, I believe that the EHR system will be effective in our setting	11	4	5	4.73	.467
I believe EHR implementation will be valuable to my work.	10	4	5	4.90	.316
Knowledge and belief on intervention	11	4.00	5.00	4.7727	.41010
Valid N (listwise)	9				

From the results, there was agreement about the familiarity of the benefits that the proposed EHRs would offer the health facility [M=4.80, they believe that the EHRs implementation is the most effective for their setting [M=4.73], they perceive that the EHRs implementation will be valuable for their work [M=4.90].

Overall the mean score for knowledge and beliefs about the EHRs implementation is way above the expected level that may affect implementation success of EHRs [Mkn=4.7727>MeH =3.4] which shows the health facility users perceive the EHRs implementation as valuable and this is a good contributor for the EHRs implementation to be successful.

- Midline

The study further sought to establish whether the users perceive the EHRs implementation to be valuable to their work as this influences the implementation success of the EHRs. The results are shown below.

Knowledge and belief on intervention

	N	Minimum	Maximum	Mean	Std. Deviation
I am knowledgeable about the benefits of implementing EHR system in this healthcare organization	15	4	5	4.53	.516
In my understanding, I believe that the EHR system will be effective in our setting	15	4	5	4.53	.516
I believe EHR implementation will be valuable to my work.	15	4	5	4.60	.507
Knowledge and belief on intervention	15	4.00	5.00	4.5556	.44840
Valid N (listwise)	15				

From the results, there was agreement about the familiarity of the benefits that the proposed EHRs would offer the health facility [M=4.53, they believe that the EHRs implementation is the most effective for their setting [M=4.53], they perceive that the EHRs implementation will be valuable for their work [M=4.60].

Overall the mean score for knowledge and beliefs about the EHRs implementation is way above the expected level that may affect implementation success of EHRs [Mkn=4.5556>MeH =3.4] which shows the health facility users perceive the EHRs implementation as valuable and this is a good contributor for the EHRs implementation to be successful.

9.1.13 Self-Efficacy

- Baseline

The study further sought to establish user's confidence to execute the EHRs implementation as this influences the implementation success of the EHRs. The results are shown below.

Self-Efficacy

	N	Minimum	Maximum	Mean	Std. Deviation
I am confident that I will be able to successfully implement the EHR intervention	10	4	5	4.80	.422
I am confident that I am competent enough and will be able to use the EHR intervention	10	4	5	4.60	.516
I have the requisite skills to implement the EHR intervention	10	3	5	4.40	.843
I am confident that my colleagues are/will be comfortable using the EHR intervention	10	3	5	4.50	.707
Self Efficacy	10	4.00	5.00	4.5750	.45720
Valid N (listwise)	10				

From the findings, the respondents exhibited confidence in their ability to execute the EHRs intervention [M=4.80], agreement that they are competent enough and will be able to use the EHRs [M=4.60], agreement that they possess the required skills to implement the EHRs [M=4.40], confidence of their colleagues ability to use the EHRs[M=4.50],

Overall the mean score for self-efficacy about the EHRs implementation is above the expected level that may affect implementation success of EHRs [Mse=4.5750>MeH =3.4] which shows a higher self-efficacy indicating that the users will likely embrace and commit to the EHRs implementation and this is a good contributor for the EHRs implementation to be successful.

- Midline

The study further sought to establish user's confidence to execute the EHRs implementation as this influences the implementation success of the EHRs. The results are shown below.

Self-Efficacy

	N	Minimum	Maximum	Mean	Std. Deviation
I am confident that I will be able to successfully implement the EHR intervention	15	4	5	4.47	.516
I am confident that I am competent enough and will be able to use the EHR intervention	15	4	5	4.47	.516
I have the requisite skills to implement the EHR intervention	15	4	5	4.40	.507
I am confident that my colleagues are/will be comfortable using the EHR intervention	15	3	5	4.33	.617
Self-Efficacy	15	3.75	5.00	4.4167	.50592
Valid N (listwise)	15				

From the findings, the respondents exhibited confidence in their ability to execute the EHRs intervention [M=4.47], agreement that they are competent enough and will be able to use the EHRs [M=4.47], agreement that they possess the required skills to implement the EHRs [M=4.40], confidence of their colleagues ability to use the EHRs[M=4.33],

Overall the mean score for self-efficacy about the EHRs implementation is above the expected level that may affect implementation success of EHRs [Mse=4.4167>MeH =3.4] which shows a higher self-efficacy indicating that the users will likely embrace and commit to the EHRs implementation and this is a good contributor for the EHRs implementation to be successful.

9.1.14 Planning

- Baseline

The study further sought to establish whether proper steps have been undertaken to promote an effective implementation as this influences the implementation success of the EHRs. The results are shown below.

Planning

	N	Minimum	Maximum	Mean	Std. Deviation
Leadership and staff have carefully selected the EHR system for implementation	11	0	5	4.00	1.414
The plan for implementing the EHR system is precise and has realistic time schedule	11	4	5	4.45	.522
The leadership has facilitated staff training on the use of the EHR system upon implementation	11	0	5	3.18	1.779
PLANNING	11	1.33	5.00	3.8788	.99189
Valid N (listwise)	11				

From the findings, there was agreement that EHRs was carefully selected by both the leadership and the staff [M=4.00], agreement that the laid out plan was precise and has realistic time schedule [M=4.45], however the respondents indicated that the leadership hasn't facilitated any staff training for the use of EHRs.

Overall the mean score for planning about the EHRs implementation is slightly above the expected level that may affect implementation success of EHRs [Mpl=3.8788>MeH =3.4] which shows a planning needs to be emphasized more indicating that the users will likely embrace and commit to the EHRs implementation and this is a good contributor for the EHRs implementation to be successful.

- Midline

The study further sought to establish whether proper steps have been undertaken to promote an effective implementation as this influences the implementation success of the EHRs. The results are shown below.

Planning

	N	Minimum	Maximum	Mean	Std. Deviation
Leadership and staff have carefully selected the EHR system for implementation	15	3	5	4.20	.561
The plan for implementing the EHR system is precise and has realistic time schedule	15	3	5	3.80	.561
The leadership has facilitated staff training on the use of the EHR system upon implementation	15	4	5	4.47	.516
PLANNING	15	3.33	5.00	4.1556	.43400
Valid N (listwise)	15				

From the findings, there was agreement that EHRs was carefully selected by both the leadership and the staff [M=4.20], agreement that the laid out plan was precise and has realistic time schedule [M=3.80], and that the respondents indicated that the leadership has facilitated staff training for the use of EHRs[M=4.47].

Overall the mean score for planning about the EHRs implementation is slightly above the expected level that may affect implementation success of EHRs [Mpl=4.1556>MeH =3.4] which shows a planning needs to be emphasized more indicating that the users will likely embrace and commit to the EHRs implementation and this is a good contributor for the EHRs implementation to be successful.

9.1.15 Engaging

- Baseline

The study further sought to establish the presence of a project champion and their role in the EHRs implementation as this influences the implementation success of the EHRs. The results are shown below

Engaging

	N	Minimum	Maximum	Mean	Std. Deviation
The Project champion is very committed to making this project successful	11	4	5	4.91	.302
The Project champion has substantial influence on the implementation process	10	4	5	4.70	.483
The Project champion shows respect for the involved staff	11	4	5	4.64	.505
ENGAGE	11	4.00	5.00	4.7424	.31059
Valid N (listwise)	10				

From the findings, there was agreement that the project champion is committed to ensuring that the EHRs implementation is successful [M=4.91], agreement that the project champion has substantial influence on the implementation process [M=4.70], agreement that there exists respect for all the involved staff in the implementation [M=4.64].

Overall the mean score for engaging about the EHRs implementation is way above the expected level that may affect implementation success of EHRs [Men=4.7424>MeH =3.4] which shows strong championship of the EHRs project and this is a good contributor for the EHRs implementation to be successful.

- Midline

The study further sought to establish the presence of a project champion and their role in the EHRs implementation as this influences the implementation success of the EHRs. The results are shown below

Engaging

	N	Minimum	Maximum	Mean	Std. Deviation
The Project champion is very committed to making this project successful	15	4	5	4.53	.516
The Project champion has substantial influence on the implementation process	15	0	5	4.00	1.309
The Project champion shows respect for the involved staff	15	3	5	4.47	.640
ENGAGE	15	3.33	5.00	4.3333	.64242
Valid N (listwise)	15				

From the findings, there was agreement that the project champion is committed to ensuring that the EHRs implementation is successful [M=4.53], agreement that the project champion has substantial influence on the implementation process [M=4.00], agreement that there exists respect for all the involved staff in the implementation [M=4.47].

Overall the mean score for engaging about the EHRs implementation is way above the expected level that may affect implementation success of EHRs [Men=4.3333>MeH =3.4] which shows strong championship of the EHRs project and this is a good contributor for the EHRs implementation to be successful.

9.1.16 Executing

- Baseline

The study further sought to evaluate the execution of the EHRs implementation process as this influences the implementation success of the EHRs. The results are shown below.

Executing

	N	Minimum	Maximum	Mean	Std. Deviation
The implementation of this EHR system will be done according to the laid down plans and budget	11	0	5	3.82	1.401
The implementation progress will be continually monitored to ensure fidelity to the outline strategies	11	3	5	4.36	.674
Key stakeholders will be engaged in the implementation process	11	4	5	4.45	.522
EXECUTION	11	2.67	5.00	4.2121	.73443
Valid N (listwise)	11				

From the results, there was agreement that the implementation will be carried out within the identified plan and budget [M=3.82], strong emphasis that the implementation process will be continually

monitored [M=4.45], and finally strong emphasis on involvement of key stakeholders during the implementation process [M=4.45]

Overall the mean score for execution about the EHRs implementation is above the expected level that may affect implementation success of EHRs [Mex=4.2121>MeH =3.4] which shows the high stakeholder expectation and involvement expected during the implementation process and this will be a good contributor for the EHRs implementation to be successful.

- Midline

The study further sought to evaluate the execution of the EHRs implementation process as this influences the implementation success of the EHRs. The results are shown below.

Executing

	N	Minimum	Maximum	Mean	Std. Deviation
The implementation of this EHR system will be done according to the laid down plans and budget	15	3	5	4.07	.704
The implementation progress will be continually monitored to ensure fidelity to the outline strategies	15	0	5	4.07	1.280
Key stakeholders will be engaged in the implementation process	15	0	5	3.93	1.280
EXECUTION	15	1.00	5.00	4.0222	1.00370
Valid N (listwise)	15				

From the results, there was agreement that the implementation will be carried out within the identified plan and budget [M=4.07], strong emphasis that the implementation process will be continually monitored [M=4.07], and finally strong emphasis on involvement of key stakeholders during the implementation process [M=4.93]

Overall the mean score for execution about the EHRs implementation is above the expected level that may affect implementation success of EHRs [Mex=4.0222>MeH =3.4] which shows the high stakeholder expectation and involvement expected during the implementation process and this will be a good contributor for the EHRs implementation to be successful.

9.1.17 Reflecting and Evaluation

- Baseline

The study further sought to find mechanisms that can reflect and evaluate the EHRs implementation process as this influences the implementation success of the EHRs. The results are shown below.

Reflecting and Evaluation

	N	Minimum	Maximum	Mean	Std. Deviation
I believe the use of feedback to measure the implementation progress will be essential	11	4	5	4.55	.522
I believe the use of a forum for presentation/discussion of results and implications for continued improvements will be essential	11	4	5	4.55	.522
Progress of the project will be measured by developing and distributing regular performance measures to staff involved.	11	4	5	4.45	.522
REFLECT	11	4.00	5.00	4.5152	.50252
Valid N (listwise)	11				

From the findings, there was agreement that use of feedback would be a good option to measure the implementation progress [M=4.55], emphasis that use of forums for presentation and discussion of results would be essential [M=4.55], emphasis on the use of performance measures to measure project progress [M=4.45].

Overall the mean score for reflection and evaluation about the EHRs implementation is above the expected level that may affect implementation success of EHRs [Mre=4.5152>MeH =3.4] which shows the high expectation of the use of mechanisms to reflect and evaluate the implementation process and this will be a good contributor for the EHRs implementation to be successful.

- Midline

The study further sought to find mechanisms that can reflect and evaluate the EHRs implementation process as this influences the implementation success of the EHRs. The results are shown below.

Reflecting and Evaluation

	N	Minimum	Maximum	Mean	Std. Deviation
I believe the use of feedback to measure the implementation progress will be essential	15	3	5	4.20	.561
I believe the use of a forum for presentation/discussion of results and implications for continued improvements will be essential	15	4	5	4.33	.488
Progress of the project will be measured by developing and distributing regular performance measures to staff involved.	15	4	5	4.40	.507
REFLECT	15	3.67	5.00	4.3111	.47920
Valid N (listwise)	15				

From the findings, there was agreement that use of feedback would be a good option to measure the implementation progress [M=4.20], emphasis that use of forums for presentation and discussion of results would be essential [M=4.33], emphasis on the use of performance measures to measure project progress [M=4.40].

Overall the mean score for reflection and evaluation about the EHRs implementation is above the expected level that may affect implementation success of EHRs [Mre=4.31111>MeH =3.4] which shows the high expectation of the use of mechanisms to reflect and evaluate the implementation process and this will be a good contributor for the EHRs implementation to be successful.

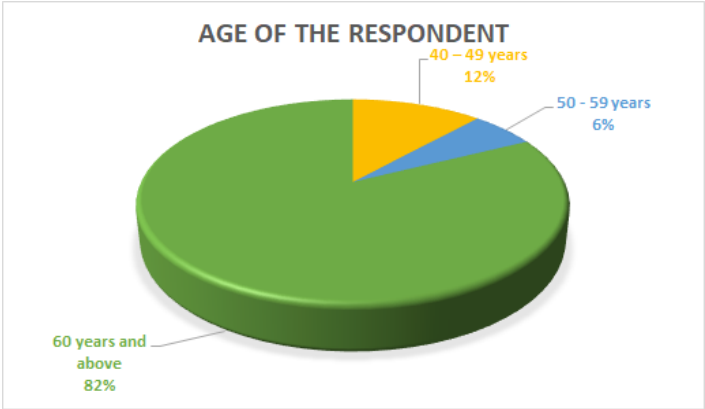
9.2 Facility Data Abstraction Tool – Diabetes (Report)

Number of participants

The total number of patients who volunteered to enroll and signed the consent form allowing for the abstraction of their data which is domicile at the diabetes clinics at the two FBO/NGO healthcare facilities was 17. Mang'u Dispensary had 7 while Ting'ang'a dispensary had 10 participants - this is graphically represented below in a chart.

Age of the respondent

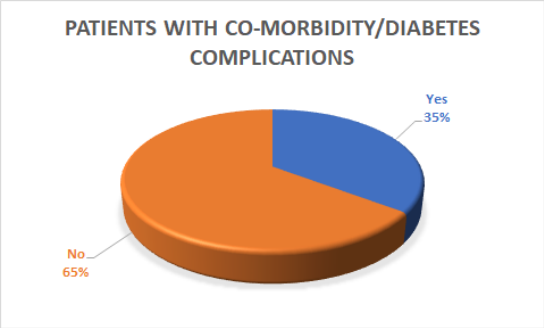
One of the inclusion criteria dictated that the participant should be 18 years old and above. We categorized the ages as follows; 18 – 19 years, 20 – 29 years, 30 – 39 years, 40 – 49 years, 50 - 59 years and 60 years and above. Below is the graphical representation of the participants.



Majority of the participants were 60 years and above - representing 82%. This is consistent with the general setting of both facilities' respective catchment areas being relatively rural where the population have a fairly active lifestyle rather than a sedentary lifestyle.

Comorbidity/Diabetes Complications

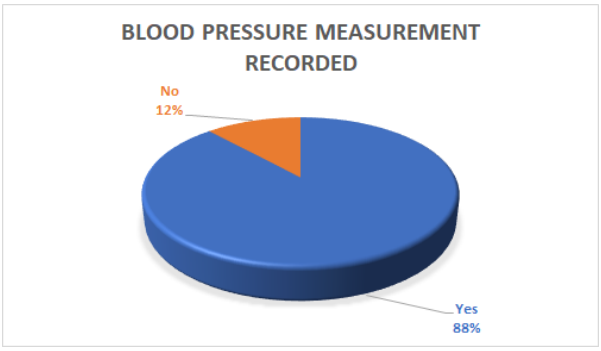
Patients with Co-morbidities/diabetes complication	
Yes	6
No	11

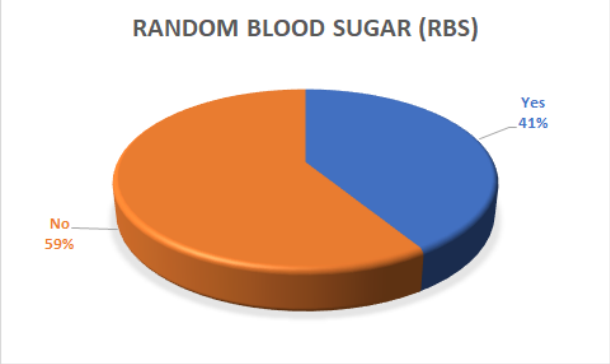
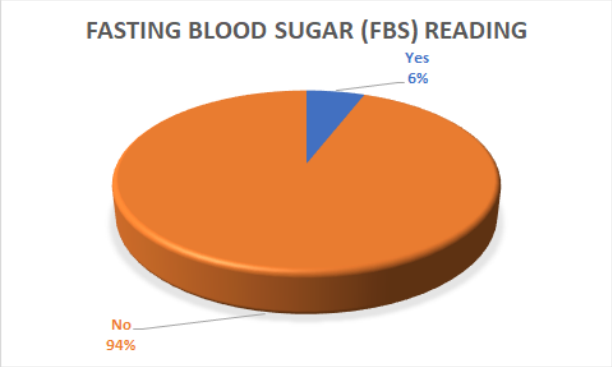
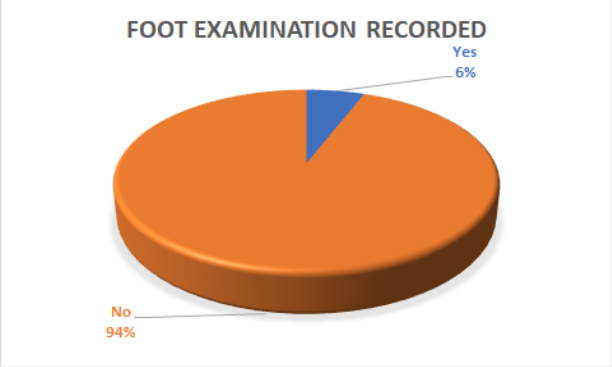


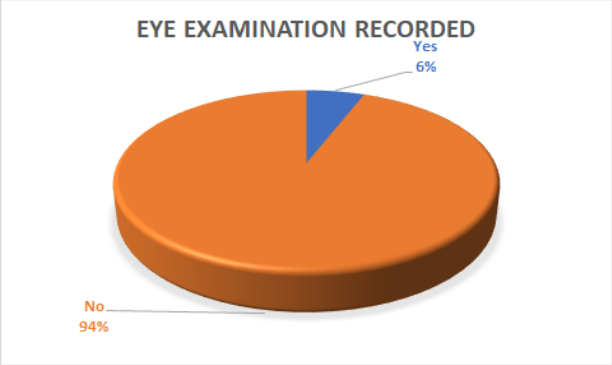
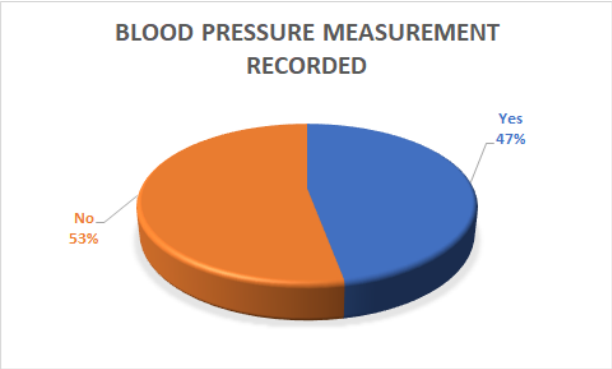
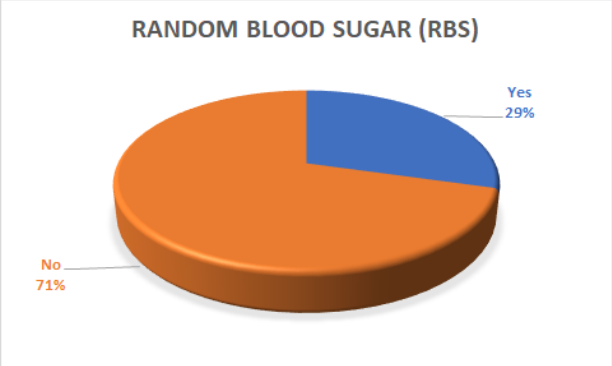
The baseline study revealed that 35% of the participants had co-morbidities and diabetes complications. Of those with the co-morbidities, 1 was identified to be having neuropathy while 5 had hypertension – representing 17% and 83% for neuropathy and hypertension, respectively.

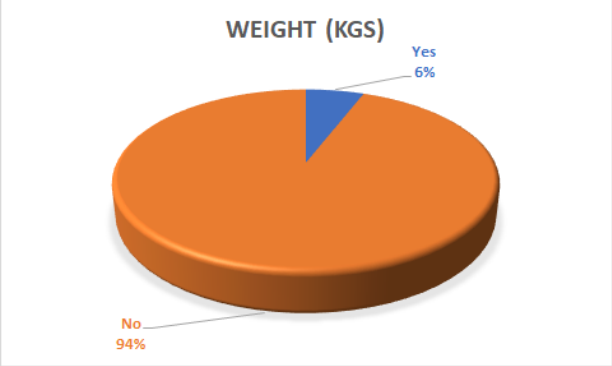
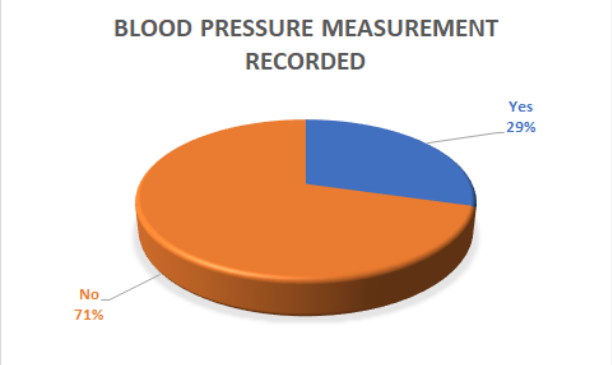
9.3 Facility Abstraction - Diabetes

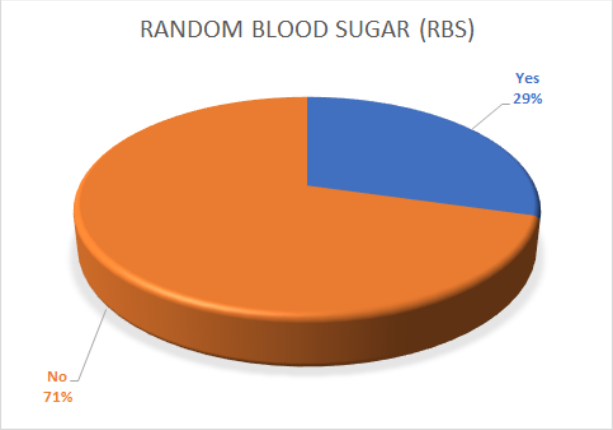
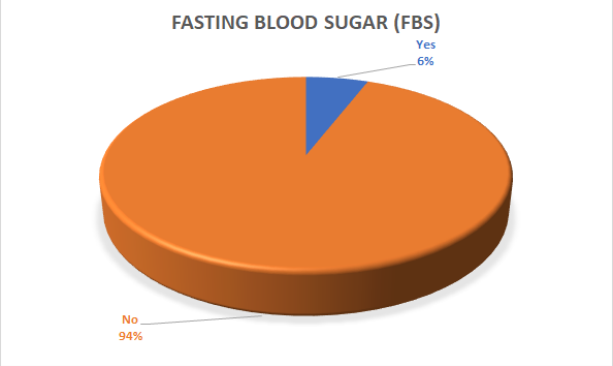
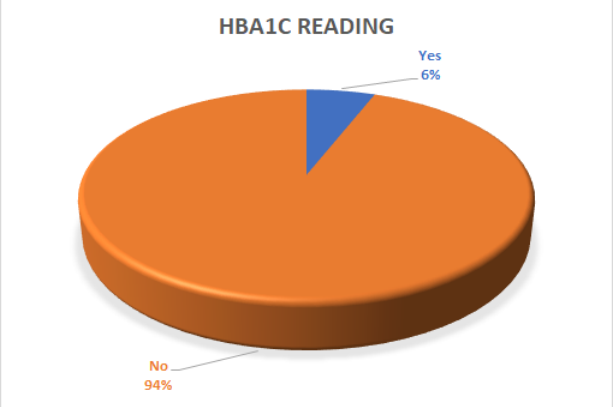
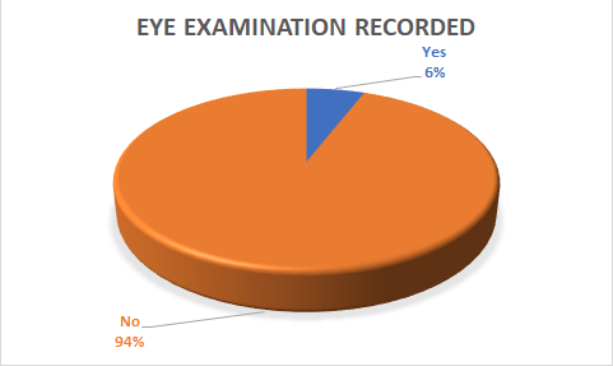
Care processes and outcomes: 4 Visits in the past one year. Below we provide details of each of the visits.

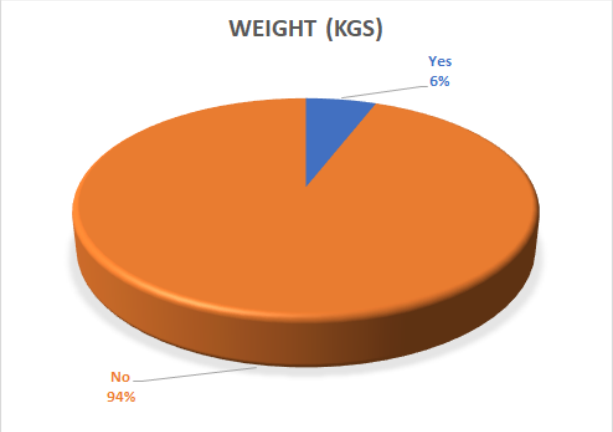
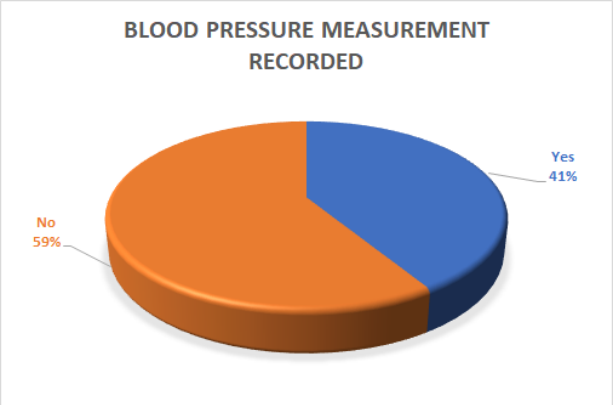
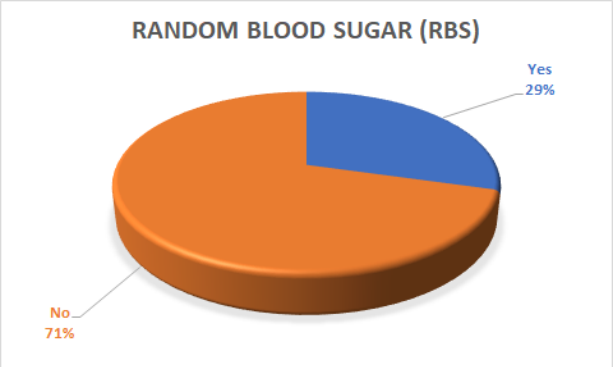
1st Visit		
Vitals	**Number of those whose measurements were taken and recorded**	**Graphical Presentation**
Weight (Kgs)	None	None
Height (cm)	None	None
BP	15 patients, representing 88% of the total participants enrolled for the study from both FBO/NGO facilities. All the 7 patients from Mang'u had their BPs taken and recorded in the files while at Ting'ang'a 8 patients had their BPs taken and recorded. The 2 patients whose BPs had not been recorded in the files had indicated that their own self-monitoring BP machines at	

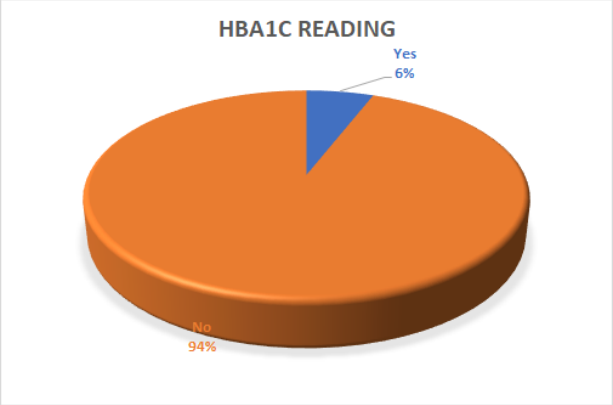
	home and that they usually do self-measurements – suggesting that they only go to the health facilities to collect medication.	
Random blood sugar (RBS)	7 out of 17 patients had their Random blood sugar (RBS) reading taken and recorded – this representing 41%.	
Fasting blood sugar (FBS) reading (mmol/l)	Majority of the participants did not have their FBS readings taken. These were 16 out of 17 patients, representing 94%.	
HbA1c reading	There was no HbA1c reading recorded	None
Foot examination recorded	Only 1out of 17 patients had foot examinations recorded, representing 6%.	

Eye examination recorded	Only 1out of 17 patients had eye examinations recorded, representing 6%.	
2nd Visit		
Vitals	**Number of those whose measurements were taken and recorded**	**Graphical Presentation**
Weight (Kgs)	None	None
Height (cm)	None	None
BP	8 patients had their BP measurements recorded - 6 of whom were those from Mang'u dispensary while Ting'ang'a dispensary only 2 patients had their BPs taken and recorded. The remaining 9 patients didn't have their BP measurements recorded in their files.	
Random blood sugar (RBS)	5 out of 17 patients had their Random blood sugar (RBS) reading taken and recorded – this representing 29%.	
Fasting blood sugar (FBS) reading (mmol/l)	None of the patients had their FBS readings taken.	None

HbA1c reading	There was no HbA1c reading recorded	None
Foot examination recorded	None of the patients had foot examinations recorded.	None
Eye examination recorded	None of the patients had eye examinations recorded.	None
3rd Visit		
Vitals	**Number of those whose measurements were taken and recorded**	**Graphical Presentation**
Weight (Kgs)	1 patient from Mang'u dispensary had weight recorded	
Height (cm)	None	None
BP	5 patients had their BP measurements recorded - all of whom were patients from Mang'u dispensary while at Ting'ang'a dispensary none of patients had their BPs taken and recorded. Only 2 patients from Mang'u didn't have their BP recorded in their files.	

Random blood sugar (RBS)	5 out of 17 patients had their Random blood sugar (RBS) reading taken and recorded – this representing 29%.	
Fasting blood sugar (FBS) reading (mmol/l)	1 patient had their FBS readings taken and recorded in their file.	
HbA1c reading	1 patient had the HbA1c reading recorded in the patient file	
Foot examination recorded	None of the patients had foot examinations recorded.	None
Eye examination recorded	1 patient had eye examinations recorded.	

4th Visit		
Vitals	**Number of those whose measurements were taken and recorded**	**Graphical Presentation**
Weight (Kgs)	1 patient had weight measurement recorded in the file	
Height (cm)	None	None
BP	7 patients, representing 41% of the total participants enrolled for the study from both FBO/NGO facilities had their BP measurements recorded. Only 1 out of the 7 patients whose BPs were recorded was from Ting'ang'a dispensary.	
Random blood sugar (RBS)	5 out of 17 patients had their Random blood sugar (RBS) reading taken and recorded – this representing 29%.	
Fasting blood sugar (FBS) reading (mmol/l)	None	None

HbA1c reading	There was only 1 patient whose HbA1c reading recorded. This was a patient at Mang'u dispensary	
Foot examination recorded	None	None
Eye examination recorded	None	None

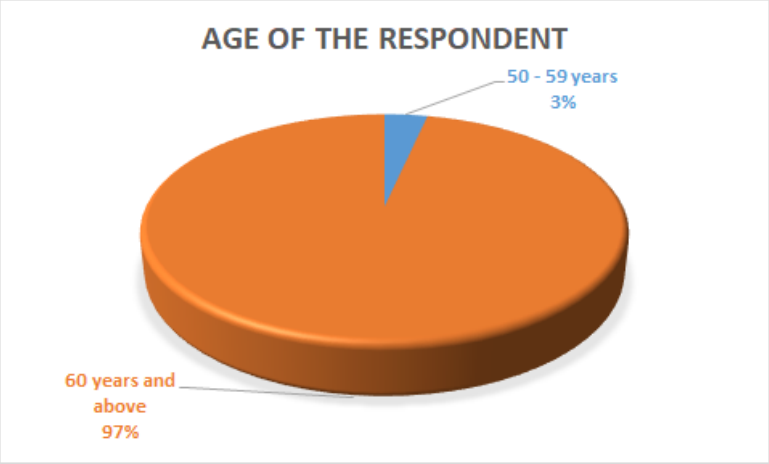
9.4 Facility Data Abstraction Tool – Hypertension

Number of participants

The total number of patients who volunteered to enroll and signed the consent form allowing for the abstraction of their data that was available at the hypertension clinics at the two FBO/NGO healthcare facilities was 29. Mang'u Dispensary had 12 while Ting'ang'a dispensary had 17 patients - this is graphically represented below in a Pie-chart.

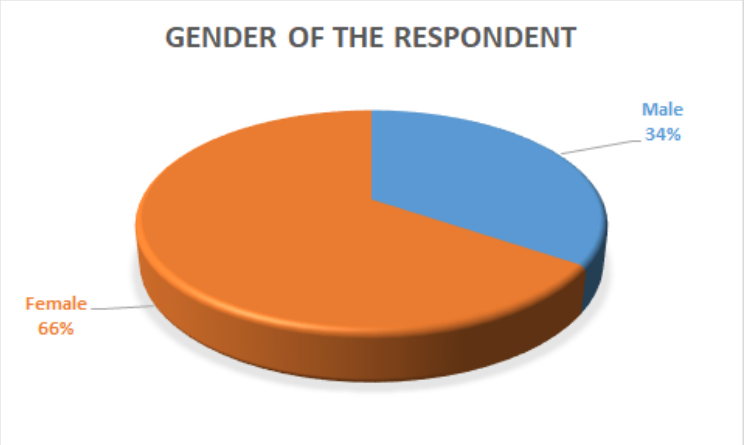
Age of the respondent

Majority of the patients whose data were abstracted were 60 years and above, this was followed closely by only one patient who was within the age group of 50 - 59 years.



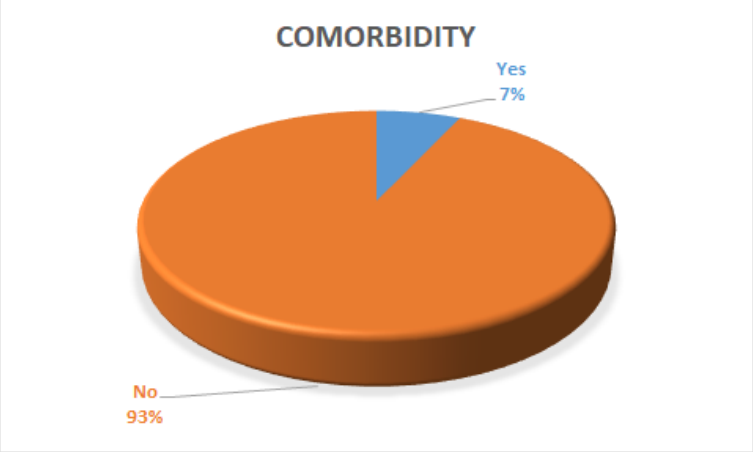
Gender of the respondent

As indicated in the pie chart below, female patients were more than male patients in the hypertension clinics at both FBO/NGO health facilities - 66% and 34% respectively.

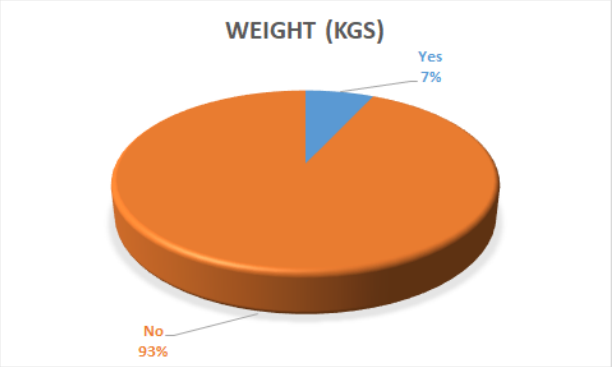
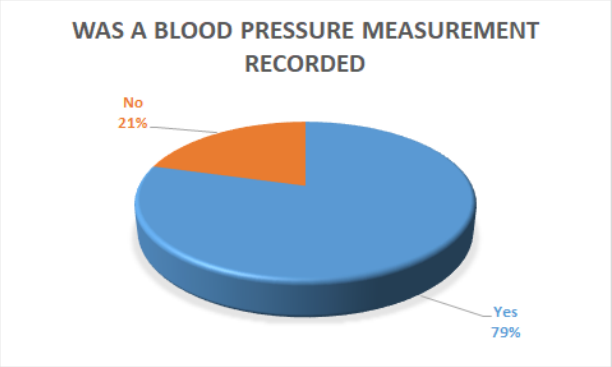
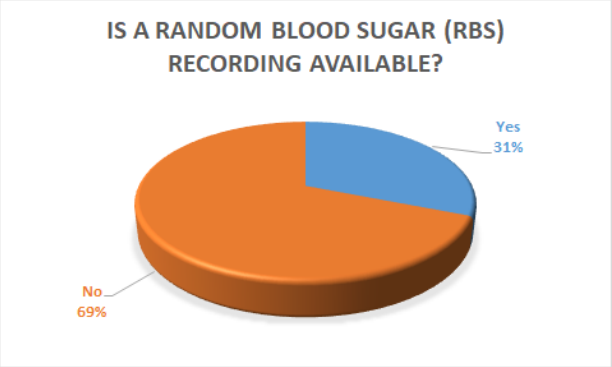


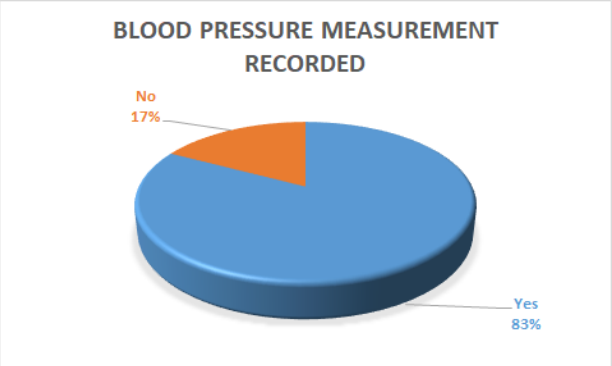
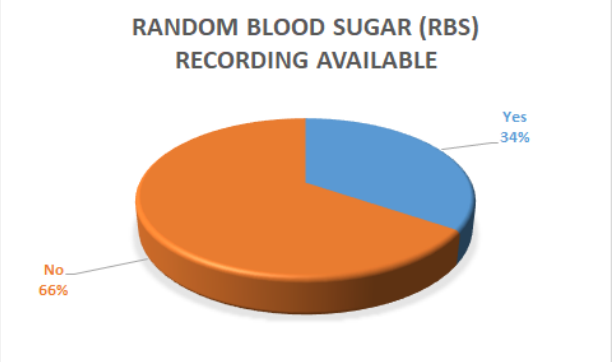
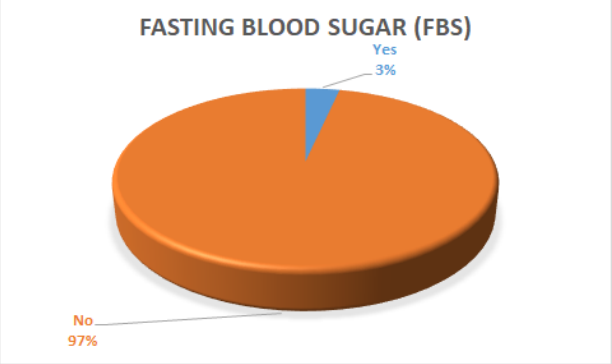
Comorbidity/Hypertension Complications

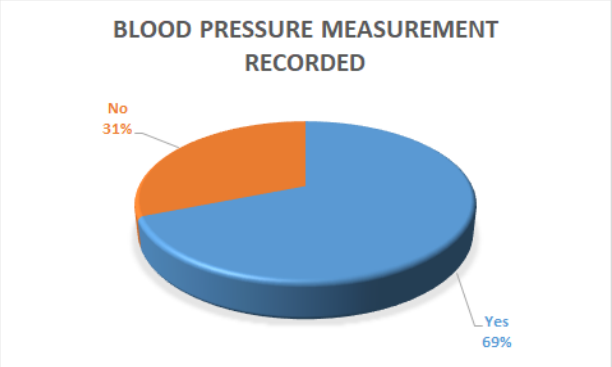
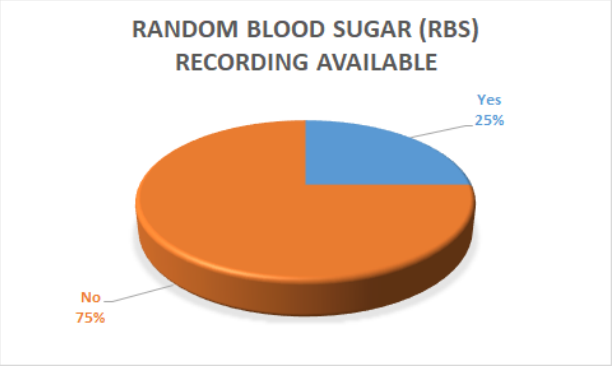
We noted from the abstracted data that 93% (n=27) of the participants did not have any co-morbidity. The remaining 7% (n=2) were captured to be having Retinopathy disease.

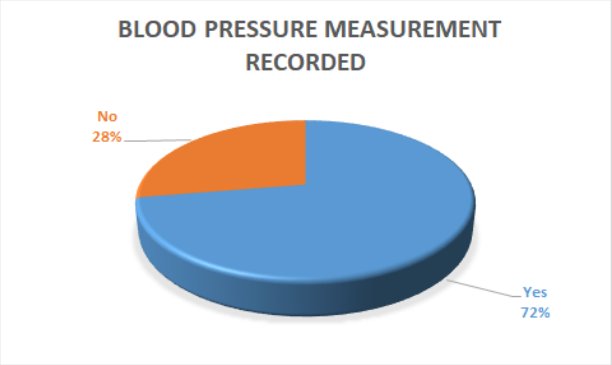
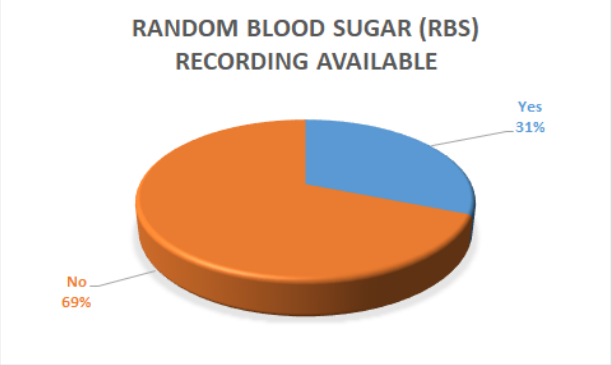


Care processes and outcomes: 4 Visits in the past one year

1st Visit		
Vitals	**Number of those whose measurements were taken and recorded**	**Graphical Presentation**
Weight (Kgs)	93% (n=27) patients did not have their weight readings recorded in the files.	
Height (cm)	None	None
BP	23 out of 29 patients, representing 79% of the total participants who were enrolled for the study from both FBO/NGO facilities had their BP measurements recorded.	
Random blood sugar (RBS)	Only 9 out of 29 patients had their Random blood sugar (RBS) reading taken and recorded – this representing 31%.	
Fasting blood sugar (FBS) reading (mmol/l)	None	None
HbA1c reading	None	None

Foot examination recorded	None	None
Eye examination recorded	None	None
2nd Visit		
Vitals	**Number of those whose measurements were taken and recorded**	**Graphical Presentation**
Weight (Kgs)	1 patient had weight measurement recorded in the file - representing 4%	
Height (cm)	None	None
BP	24 out of 29 patients, representing 83% of the total participants who were enrolled for the study from both FBO/NGO facilities had their BP measurements recorded.	
Random blood sugar (RBS)	10 out of 29 patients had their Random blood sugar (RBS) reading taken and recorded – this representing 34%.	
Fasting blood sugar (FBS) reading (mmol/l)	97% (n=28) of the hypertension patients did not have their FBS readings recorded in their files.	

HbA1c reading	None	None
Foot examination recorded	None	None
Eye examination recorded	None	None
3rd Visit		
Vitals	**Number of those whose measurements were taken and recorded**	**Graphical Presentation**
Weight (Kgs)	None	None
Height (cm)	None	None
BP	20 out of 29 patients, representing 69% of the total participants who were enrolled for the study from both FBO/NGO facilities had their BP measurements recorded.	
Random blood sugar (RBS)	7 out of 28 patients had their Random blood sugar (RBS) reading taken and recorded – this representing 25%.	
Fasting blood sugar (FBS) reading (mmol/l)	None	None
HbA1c reading	None	None

Foot examination recorded	None	None
Eye examination recorded	None	None
4th Visit		
Vitals	**Number of those whose measurements were taken and recorded**	**Graphical Presentation**
Weight (Kgs)	None	None
Height (cm)	None	None
BP	21 out of 29 patients, representing 72% of the total participants who were enrolled for the study from both FBO/NGO facilities had their BP measurements recorded.	
Random blood sugar (RBS)	9 out of 29 patients had their Random blood sugar (RBS) reading taken and recorded – this representing 31%.	
Fasting blood sugar (FBS) reading (mmol/l)	None	None
HbA1c reading	None	None
Foot examination recorded	None	None

Eye examination recorded	None	None

Summary Care processes and outcomes: 4 Visits in the past one year

Vitals Recorded	**Visit 1**	**Visit 2**	**Visit 3**	**Visit 4**
Weight (Kgs)	Yes = 7%	Yes = 4%	Nil	Nil
Height (cm)	Nil	Nil	Nil	Nil
BP	Yes = 79%	Yes = 83%	Yes = 69%	Yes = 72%
Random blood sugar (RBS)	Yes = 31%	Yes = 34%	Yes = 25%	Yes = 31%
Fasting blood sugar (FBS)	Nil	Yes = 3%	Nil	Nil
HbA1c reading	Nil	Nil	Nil	Nil
Foot examination recorded	Nil	Nil	Nil	Nil
Eye examination recorded	Nil	Nil	Nil	Nil