SURVEY REPORT FOR

THE MLINDE MAMA PROJECT FOR IMPROVING CLINICAL DECISION MAKING AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE IN GEITA REGION OF TANZANIA

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CONTENTS

ACRONYMS

ANC	Antenatal Care
CHW	Community health workers
CI	Confidence Intervals
DC	District Council
GANC	Group ANC
HCW	Health care workers
SD	Standard Deviation
UCS	Unified Community System

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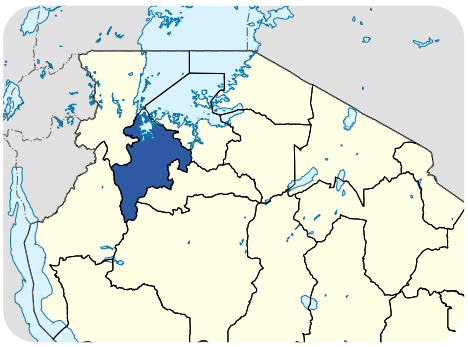
EXECUTIVE SUMMARY

The project involved a majority of participants from Geita District Council and provided care primarily at health centres. The average participant age was 27.8 years, with a diverse educational background. Group ANC showed higher attendance rates and better provision of ANC services compared to routine ANC, including Tetanus Toxoid administration and physical examinations. It also enhanced communication between pregnant women and healthcare providers, improved test completion rates, and increased knowledge of pregnancy risks. There was an overall positive statistically significant change from baseline and endline and compare those from routine and from group ANC especially in knowledge about pregnancy and danger signs during pregnancy as was well receiving of respective tests during pregnancy. The intervention was seen relevant, effective, efficient and sustainable. However, a continued investment in workforce expansion and resources is crucial for successfully sustaining the intervention.

Geita Region - Northern Tanzania



27.8

Avarage Partticipant Age

BACKGROUND AND RATIONALE

About Project

This project was designed to pilot the implementation of the digital health system and group antenatal care using mixed methods approach of data collection to assess the usability of the system and the feasibility and acceptability of group antenatal care in the low resource settings like Tanzania. The study was conducted in 6 health facilities in the Geita region. The project is aiming at leveraging existing digital health systems and adding new innovations for improvements with focus on strengthening community linkages with the health facility improving service delivery and outcomes by facilitating clinical decision making and referral services and improve level of knowledge and awareness of maternal health matters among pregnant women. Moreover, the proposed pilot implementation of the digital health system aimed to contribute to the reduction of maternal mortality and morbidity by improving women's experience of care by combining the benefits of Group ANC model and AI powered decision making for early detection of risks and helping with timely decision making for pregnant women with higher risk from the community level to the health facility level.

Project Objectives

01 To pilot implementation of the digital health system to facilitate timely clinical decision making for pregnant women attending ANC.

02 To assess usability of the digital health system from health care providers perspective.

03 To Pilot implementation of GANC model in Geita Region of Tanzania.

04 To assess the feasibility and acceptability of GANC among pregnant women and health care providers.

Key findings

The group ANC was implemented in Geita region and from the project tracking tool, a total of 5,936 pregnant women were beneficiaries across two districts. The largest share of pregnant women attended Katoro Health Center (26.84%), followed by Bwanga Health Center (21.31%) and Nkome Dispensary (18.23%). Chato District Hospital and Nzera Hospital had 14.25% and 11.64% of participants, respectively, while Butengorumasa Dispensary had the fewest at 7.73%, see **Table 1**.

Table 1: Group ANC project Implementation

Variable	Number	Percent (%)
Facility		
Butengorumasa Dispensary	459	7.73
Bwanga Health Center	1,265	21.31
Chato District Hospital	846	14.25
Katoro Health Center	1,593	26.84
Nkome Dispensary	1,082	18.23
Nzera Hospital	691	11.64
ANC contacts during GANC		
One visit	937	15.79
Two Visits	387	6.52
Three Visits	758	12.77
Four Visits	1,174	19.78
Five Visits	2,680	45.15
Delivery Status		
Delivered	4,660	78.5
Not yet	1276	21.5
Place of delivery		
Project Facility	1,382	29.7
Another Facility	3,248	69.7
Home delivery	30	0.6
Delivery Outcome*		
Alive	4,656	99.91
Infant Death	4	0.09
Complications during delivery*		

Variable	Number	Percent (%)
No	4,639	99.55
Yes	17	0.36
Unknown	4	0.09
Total	5,936	100
Note * Total of those delivered		

Regarding the number of antenatal care (ANC) contacts during GANC, 45.15% of women had the recommended five visits, which is the highest percentage, indicating that a significant proportion of women consistently attended ANC. About 19.78% attended four visits, while lower percentages were recorded for three visits (12.77%), two visits (6.52%), and one visit (15.79%). Examining delivery status, 78.5% of women had already delivered at the time of data collection, while 21.5% were yet to have delivered by the time of data collection. Of those who delivered, 29.7% gave birth at the project facilities, 69.7% at other healthcare facilities, and a very small proportion (0.6%) delivered at home, see Table 1. The delivery outcomes were positive, with 99.91% of births resulting in live infants and only 0.09% resulting in infant death. In terms of complications during delivery, 99.55% of women reported no complications, 0.36% experienced complications, and for 0.09%, the status was unknown. Generally, the implementation of GANC in these six facilities in Geita Region shows strong maternal health outcomes with high levels of engagement, especially in facilities like Katoro and Bwanga, multiple ANC visits, and delivery outcomes were highly positive with minimal complications, indicating that project effectiveness in improving maternal and child health services in the region.

The comparison between the 2022 Tanzania Demographic and Health Survey (TDHS) and project results shows significant improvements in some maternal health services. In terms of at least four antenatal visits, the 2022 TDHS reported 65% coverage, while the endline data showed a notable increase for group ANC, reaching 92%, compared to 63% for routine ANC, see Table 2. This highlights the effectiveness of group ANC in ensuring more consistent attendance. The provision of iron and folic acid (FeFo), the 2022 TDHS recorded 58% coverage, with the endline results showing a marked improvement. Group ANC achieved full coverage at 100%, while routine ANC reached 96.1%, indicating success in increasing (FeFo) supplementation, with group ANC being slightly more efficient.

Table 2: Comparisons between 2022 TDHS and endline results

Variables	TDHS	Endline	
		Group ANC	Routine ANC
At least 4 visits	65%	92%	63%
Given FeFo	58%	100.0%	96.1%
BP monitoring	76%	100%	100%
Given Tetanus Toxoid?	57%	94%	75%
Given deworming Pills	62%	95%	80%

Blood pressure (BP) monitoring also showed improvement. While 2022 TDHS showed 76% coverage, the endline results showed both group and routine ANC reached 100% coverage. The administration of tetanus toxoid injections also improved. The 2022 TDHS reported 57% coverage, with group ANC reaching 94% and routine ANC at 75% by the endline, see Table 2. Lastly, in terms of receiving deworming pills, the 2022 TDHS reported 62% coverage, while group ANC reached 95% and routine ANC achieved 80% by the endline. Overall, group ANC consistently outperformed routine ANC across all indicators, showing greater improvements in maternal health service delivery compared to the baseline and 2022 TDHS irrespective that both routine and group ANC were offered in the same project facilities.

Theory of change

The group antenatal care (GANC) explains how group sessions improve maternal health by bringing pregnant women of the same gestation age together for regular check-ups, education, and peer support. Healthcare workers lead the sessions, providing essential health information while encouraging women to share experiences and build social connections. This model is expected to increases the number of antenatal care visits, improves communication between women and healthcare providers, and fosters male partner involvement. The short-term effects are more women will attend the recommended contacts and choose to give birth in healthcare facilities. The long-time impacts are the quality of care improves, leading to healthier pregnancies, fewer complications, and better overall maternal and newborn health outcomes.

Rationale for Endline evaluation

The evaluation of the group Antenatal Care (GANC) intervention is crucial for understanding its alignment with the needs and preferences of pregnant women and healthcare providers, its effectiveness in promoting recommended antenatal visits, and its efficiency in encouraging facility deliveries. By assessing the GANC model's impact on the quality of care and its sustainability, this evaluation aims to provide comprehensive insights into the model's overall performance and potential for long-term integration into maternal health services. Evaluating these dimensions will help identify strengths and areas for improvement, ensuring that the GANC model can be effectively sustained and optimized to enhance maternal health outcomes.

EVALUATION OBJECTIVES

General Objective

To evaluate the relevance, effectiveness, efficiency, impact, and sustainability of the Group Antenatal Care (GANC) model in improving maternal health.

Specific objectives

- To evaluate the relevance of the GANC model in alignment with the needs and preferences of pregnant women and healthcare providers in the study sites.
- To evaluate the effectiveness of the GANC model (vs routine) in promoting recommended eight antenatal care (ANC) visits.
- To assess the efficiency of the GANC model (vs routine) in promoting facility delivery.
- To examine the impact of the GANC model (vs routine) in association with improved quality of care.
- To assess the sustainability of the GANC model by describing the experiences of care (women attending GANC & male partners) and experiences of service providers (HCW & CHWS).

Key Evaluation Questions

The key evaluations question was related to the objectives of the evaluation. Below are the evaluation Questions;

1. How well does the GANC model address the specific needs and preferences of pregnant women in the study sites?
2. How effective is the GANC model in promoting adherence to the recommended eight antenatal care (ANC) visits compared to routine care?
3. How does the GANC model compare to routine care in promoting facility-based deliveries among pregnant women?
4. What is the impact of the GANC model on the perceived quality of antenatal care received by pregnant women?
5. What are the experiences of healthcare providers (HCWs and CHWs) in sustaining the GANC model over time?

EVALUATION METHODOLOGY

Evaluation Design

The evaluation employed a mixed of quantitative and qualitative. For the quantitative survey data were collected using the exit interviews. Secondary data from UCS, Project cohort tracker and DHIS2 were used for quantitative analysis. Data from 2022 TDHS were used for comparisons.

Evaluation sites

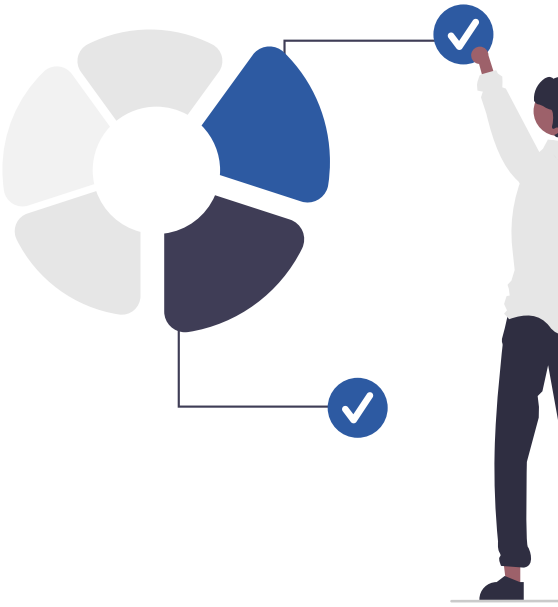
The evaluation was done in Geita and Chato Districts across all six project facilities. Since the project facilities had both arms of routine ANC and project ANC, then those under routine ANC were treated as control while those under group ANC were treated as intervention. This was done also for the secondary data, data from the UCS were used but the type of ANC (routine vs group) was used to distinguish group ANC from the routine ANC and comparison made.

Sampling & sample size

The sampling employed random sampling for exit interviews to pregnant women. A number of 388 pregnant women were interviews to compare their knowledge and experience about ANC services. Of these 154 were those attended the group ANC and 234 were from routine ANC. All these women were recruited from the same project health facilities and were treated and admitted with same health care workers and interviews done the same day, the aim of doing that being the only difference is either attended routine ANC or group ANC and hence easier to report the difference. For Qualitative interviews, the sampling technique was purposive.

Data collection

The qualitative data we collected using the focused group discussion and Key Informant interviews. These were administered to Pregnant women from the group ANC, health care providers, health facility in-charges and community health care workers. Quantitative data were collected through exit interviews administered to pregnant women who attended group ANC and those attended routine ANC. These interviews aimed to capture perceptions of the ANC services received during their visits, including physical examinations conducted, health education provided, and the knowledge they gained about danger signs during pregnancy. The assessment was done to compare perception knowledge and experience between those from routine ANC and those from group ANC.



Secondary Data review

As part of the quantitative data collection using exit interview, ANC data from project implementation cohort tracker and UCS ANC data were reviewed to assess the impact of the intervention on improving maternal and newborn health. DHIS2 data at facility levels, we analysed the trends in ANC indicators, including the number of pregnant women attending antenatal care before 12 weeks, the number of women with at least four ANC contacts, and the rate of facility deliveries. The UCS ANC data provided individual-level information, which was used for comparison and to triangulate services offered in group ANC versus routine ANC. This data included tests for haemoglobin, syphilis, temperature, fundal height, fetal heart rate, glucose in urine, and blood group. These were used to compare the quality of services and assess whether group ANC had improved service delivery. The project cohort tracker was used to assess the project implementation, like visits for the group ANC, facility delivery and occurrence of complications during delivery.

Data Analysis

For the Quantitative, descriptive statistics was used to describe data. The chi-square was used for comparisons between group ANC and routine ANC for categorical variables. The t-tests was used for comparisons between group ANC and routine ANC for the numerical data. For evaluation of impact of the intervention, the before and after, the comparison and intervention approach as well as the Difference in Differences was used. The * was used to indicate < 5% statistical significance, ** was use for <1% statistically significant while *** was used for <0.1 statistical significance. Different graphical presentation was used to visualize data. For Qualitative analysis, the thematic approach was used.

Ethical consideration

Data collection used the study approval as the evaluation was part of the implementation research. However, to each interviewed personal the content was asked and provided prior to interview.

Challenges & Limitations

The two indicators from the DHIS2 those used for impact were absolute numbers, then the total ANC attendance summation of those attended less than 12 weeks and those attended 12 weeks and more was used as a proxy denominator. This might cause some errors. For the number of ANC contacts, the intervention was designed at facility and had nothing to do with promotion of early ANC initiation which has to be done in the community, this also might limit results on ANC early initiation. The project no comparisons sites, then the remaining facilities in Geita were treated as comparison sites.

EVALUATION FINDINGS

Baseline findings

The baseline study revealed that 34% of women attended at least four antenatal care (ANC) visits, with no maternal deaths recorded. Malaria prevalence among the women was 9%, while HIV/AIDS and syphilis prevalence were 6% and 1%, respectively. Most women (58.9%) received three doses of Intermittent Preventive Therapy (IPT) for malaria, but 48.2% had anemia. Iron and folic acid supplementation was widely administered, with 76.9% receiving two doses, though only 34.3% received a fourth dose. About 97.8% gave birth in health facilities, with 97.5% delivering vaginally. Postpartum hemorrhage (41.9%) and stillbirths (31.6%) were the most common maternal complications, especially in Chato and Nzera health facilities. Maternal danger signs included lower abdominal pain, limb swelling, vaginal bleeding, and others. Six out of 11 community health workers (CHWs) were knowledgeable about reporting maternal complications, but none had digital reporting tools. Challenges reported by CHWs included lack of digital tools, limited understanding among mothers about early ANC, lack of incentives, long distances to health facilities, and poor collaboration from some healthcare providers.

Sociodemographic characteristics

The table outlines background characteristics for 388 individuals from two districts. Most participants are from Geita District Council, comprising 73.2% of the sample, while 26.8% are from Chato District Council. In terms of healthcare facilities, a majority (62.4%) received care at health centres, 25.3% at district hospitals, and 12.4% at dispensaries. The participants have a mean age of 27.8 years with a standard deviation of 5.5, indicating a varied age range, see Table 3.

Table 3: Background Characteristics of respondents

Background Characteristics	Number	Percent
District		
Chato DC	104	26.8
Geita DC	284	73.2
Health facility Type		
Dispensary	48	12.4
District hospital	98	25.3
Health Centre	242	62.4
Age in years, mean [SD]	27.8 [5.5]	
Education		
No formal Education	89	22.9
Primary Education	186	47.9

Background Characteristics	Number	Percent
Secondary and above	113	29.1
Marital Status		
Married / Cohabiting	342	88.1
Single	46	11.9
Type of ANC		
Group ANC	154	39.7
Routine ANC	234	60.3
Ever been Pregnant?		
First Pregnancy	98	25.3
Not First Pregnancy	290	74.7
Total	388	100.0

Source Exit Interviews

Regarding education, 47.9% have completed primary education, 29.1% have secondary education or higher, and 22.9% have no formal education. The marital status shows that 88.1% are married or cohabiting, while 11.9% are single. When looking at the type of antenatal care received, 60.3% attended routine ANC sessions, and 39.7% participated in group ANC. Regarding pregnancy history, 74.7% of the sample have been pregnant before, whereas 25.3% are experiencing their first pregnancy, see Table 3. Since UCS data was used, also let review the profile of UCS clients. Profile of clients from the UCS ANC data by the time of data collection included a total of 4,076 women, distributed across two districts, Chato district council (DC) and Geita district council (DC). Geita DC had a higher proportion of clients, with 2,212 women (54.27%), while Chato DC accounted for 1,864 (45.73%), see Table 4.

Table 4: Profile of ANC clients from UCS database

Variable	Number	Percent
District		
Chato DC	1,864	45.73
Geita DC	2,212	54.27
Health facility		
Butengorumasa	219	5.37
Bwanga	617	15.14
Chato DH	1,028	25.22
Katoro	762	18.69
Nkome	981	24.07
Nzera DH	469	11.51
Type of ANC attended		
Routine ANC	1,353	33.19
Group ANC	2,723	66.81
Total	4,076	100

The were only from six project health facilities. Chato District Hospital (DH) had the highest number of attendees, serving 1,028 women (25.22%), followed by Nkome with 981 (24.07%), and Katoro (18.69%). Bwanga had 617 (15.14%), while Nzera District Hospital served 469 clients (11.51%). Butengorumasa had the fewest attendees, with 219 clients (5.37%), see Table 4. In terms of the type of ANC attended, Majority of women 2,723 (66.81%), participated in group ANC, while 1,353 (33.19%) attended routine ANC.

ANC services

Number of ANC contacts

In the exit interviews, clients were asked to suggest to the best of their knowledge how many contacts should a pregnant women attend? The Table 5 compares the mean number of antenatal care (ANC) contacts required to attend as reported by pregnant women during exit interviews those from group ANC and routine ANC. The aim being to see their knowledge on number of contacts. Women who attended group ANC reported an average of 5.3 visits with visits ranged from 3 to 9 visits.

Table 5: Comparisons of number of by type of ANC visit

Type of ANC Visit	Respondents	Mean number of visit [95% CI]	Renge [Min / Max]	t-test
Group ANC	154	5.3 [5.0 - 5.6]	3 / 9	4.64***
Routine ANC	234	4.5 [4.2 - 4.7]	1/8	

In contrast, women in routine ANC attended an average of 4.5 visits ranging from 1 to 8 visits. The difference in their knowledge and understanding of number of contacts was statistically significant different in favor of group ANC (t-test 4.64, p<0.001). This might indicate that women from the group ANC are more likely to attend more visits, see Table 5.
Trend in number of ANC contacts

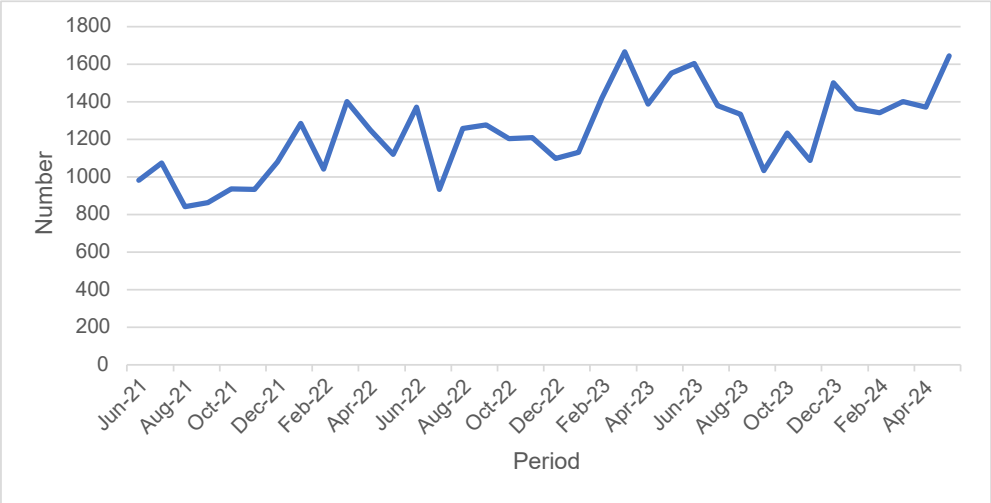


Figure 1: Trend in number of Pregnant women with at least 4 contacts (DHIS2)

From Figure 1, data shows a trend in increasing number of pregnant women with at least 4 contacts, however it hard to conclude the trend on absolute number.

Facility Delivery

The number of deliveries that occurred at healthcare facilities vary from 1745 in June 2021 to 2258 in August 2023. Facility deliveries show an overall upward trend, with some fluctuations, see Figure 3. However, the trend is in numbers and could not be concluded.

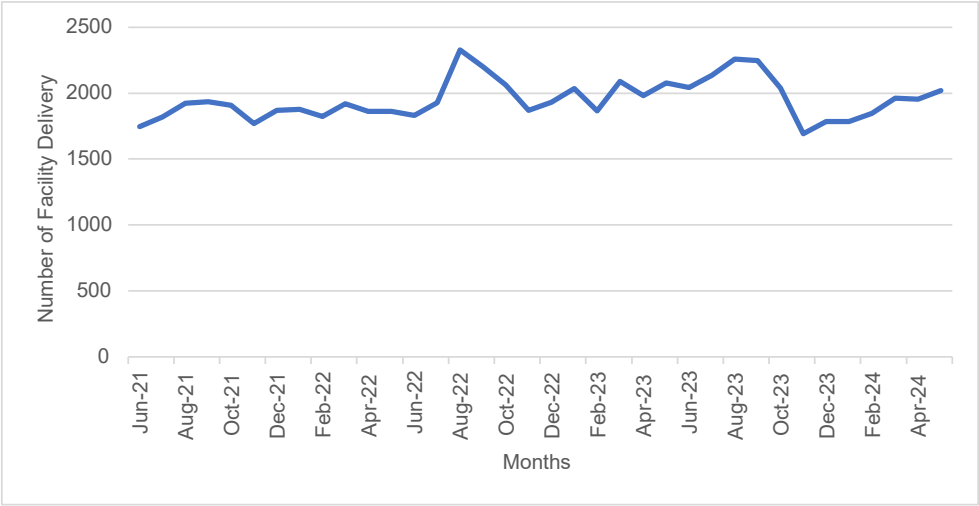


Figure 2: Trend in number of women delivering at facility

Women started ANC less than 12 weeks

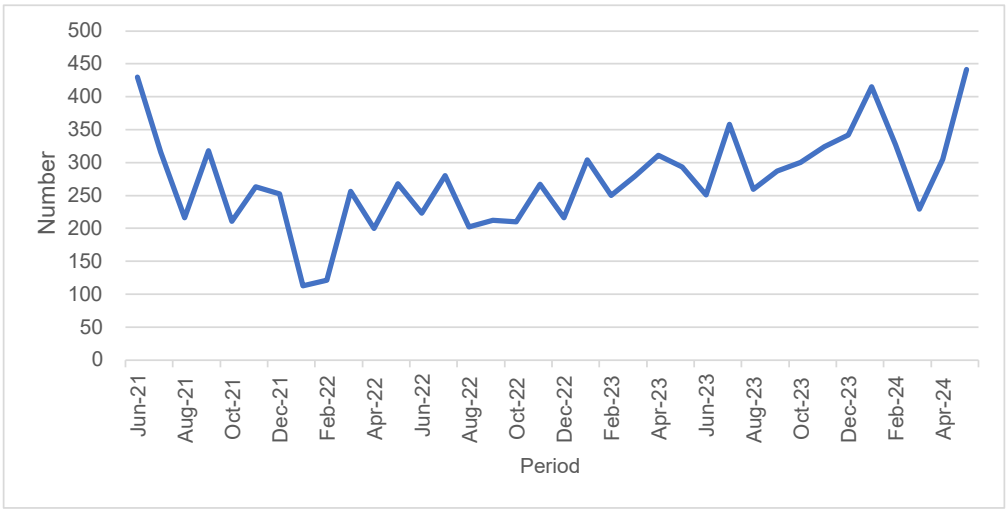


Figure 3: Trend in number of Pregnant women starting ANC less than 12 weeks

The data reveals fluctuating trends in antenatal care (ANC) visits before 12 weeks between June 2021 and May 2024. After an initial peak in June 2021, participation declined until early 2022, followed by a steady increase through 2023, reaching a high in January 2024, see Figure 1. Though there were minor declines in early 2024, the numbers peaked again in May 2024. Generally, the trend is indicating overall growth in early ANC attendance, but since in absolute number no conclusion was drawn.

Project Impact

The impact of the intervention was assessed in three levels; the qualitative, the Quantitative using the UCS data and exit interviews to compare key interventions questions between the intervention facilities and comparisons facilities in Chato and Geita District.

From the Qualitative; The group ANC intervention showed a significant and positive impact on healthcare delivery, and pregnant women engagement. In all intervention sites pregnant women excitedly preferred, and those enrolled participated in the group ANC. The practical approach used by the intervention (measuring blood pressure, peer support, and others) contributed to a notable increase in knowledge, as women were better equipped to identify early warning signs and manage their pregnancies. For healthcare providers, the group ANC model impacted them by having training and also improved efficiency in provision of quality care by reducing the time spent on individual consultations, as pregnant women arrived at health care provider pre-tested and more informed.

Number of ANC visits

Comparisons of number of ANC contacts between baseline and endline shows a significant improvement. At baseline 34% of women reported having at least 4 visits, while at endline the number raised to 75%.

ANC services received

During the exit interviews women were also asked about the ANC services they received. The responses were compared and the Chi-Square test was used for comparisons. Results shows differences between group ANC and routine ANC in several aspects of antenatal care. For the administration of iron pills, folic acid, or iron with folic acid (FeFo), group ANC participants had a slightly higher rate of 100% compared to 96.1% in routine ANC. However, this difference, was not statistically significant, Table 6.

Table 6: Comparisons of ANC services between routine and group ANC

ANC services	Group ANC (N = 154)	Routine ANC (N = 234)	Chi-Square test
During this visit or previous visit did health care provider give you iron pills, folic acid or iron with folic acid (FeFo)	154 (100)	225 (96.1)	6.06
During this visit or previous visit did health care provider give you Tetanus Toxoid?	145 (94.2)	177 (75.6)	22.55 ***
During this visit or previous visit did health care provider give you any pills to prevent you from getting malaria?	150 (97.4)	223 (95.1)	1.105
During this visit or previous visit did health care provider given you any pills for deworming?	147 (95.5)	187 (79.9)	18.72***

In terms of receiving Tetanus Toxoid, group ANC participants had a significantly higher rate (94.2%) compared to those from routine ANC (75.6%). Result indicating that attending group ANC is associated with a higher likelihood of receiving Tetanus Toxoid, see Table 3. Similarly, there is a significant difference in the provision of deworming pills, with 95.5% of group ANC participants compared to 79.9% in routine ANC. Conversely, for malaria prevention pills, the difference between the two groups is not statistically significant, as 97.4% of group ANC participants and 95.1% of routine ANC participants received these pills.

Physical examinations

The provision of physical examination was also assessed amongst pregnant women during exit interview. The Chi-Square test results for physical examinations during antenatal care reveal numerical differences but not statistical difference in physical examination provision between group ANC and routine, see Table 7. Blood pressure measurement is universally provided in both ANC models, with no difference observed. However, group ANC participants are slightly more likely to have their weight measured compared to those in routine ANC.

Table 7: Physical Examination during ANC

	Physical Examination during ANC	Group ANC (N = 154)	Routine ANC (N = 234)	Chi-Square test
	During this visit or previous visit was blood pressure taken?	154 (100)	234 (100)	-
	During this visit or previous visit was weigh was measured?	152 (98.7)	218 (93.2)	6.4
	During this visit or previous visit provider examined you for conjunctiva/palms for anemia?	28 (18.2)	23 (9.8)	5.7
	During this visit or previous visit was examination for legs/feet/hands for edema?	15 (9.7)	8 (3.4)	6.6

Additionally, group ANC shows a higher rate of examination for anaemia, as indicated by checks of the conjunctiva and palms, see Table 4. There is also a significant difference in the examination for edema, with group ANC participants more frequently assessed for swelling in the legs, feet, and hands. Overall, pregnant women attended group ANC appeared to have been offered more comprehensive physical examinations compared to those attended routine ANC.

Health education during ANC

The data reveals significant differences in the educational content provided during antenatal care (ANC) visits between group ANC and routine ANC settings. Women attended the group ANC were more likely to receive advice on using insecticide-treated mosquito nets, with 100% receiving this guidance compared to 91.8% in routine ANC, as indicated by a highly significant chi-square test result ($p < 0.001$), see Table 5.

Table 8: Health education during ANC

	Education during ANC	Group ANC (N = 154)	Routine ANC (N = 234)	Chi-Square test
	During any visit did a provider advice you to use mosquito net that has been treated with an insecticide?	154 (100)	215 (91.8)	13.15***
	During any visit has a provider talked to you about nutrition or what is good for you to be eating during your pregnancy?	146 (94.8)	94 (40.2)	117.45***
	During any visit has a provider discussed things you should have in preparation for this delivery?	138 (89.6)	204 (87.2)	0.5
	During any visit has a provider advice you on the importance of attending postnatal care for you and the baby?	154 (100)	163 (69.6)	57.19***

Similarly, group ANC provides more extensive nutrition advice during pregnancy, with 94.8% of women receiving this information, in contrast to just 40.2% in routine ANC, reflecting a substantial difference ($p < 0.001$) see Table 5. Additionally, group ANC also emphasizes the importance of postnatal care more effectively, with 100% of participants receiving advice compared to 69.6% in routine ANC, again showing a highly significant result ($p < 0.001$) see Table 8. However, there is no significant difference between the two ANC models regarding the advice on preparation for delivery, with 89.6% in group ANC and 87.2% in routine ANC receiving this information. Overall, pregnant women attended group ANC model appears to have been offered more comprehensive educational support in certain areas, potentially contributing to better care during pregnancy.

Health tests during ANC

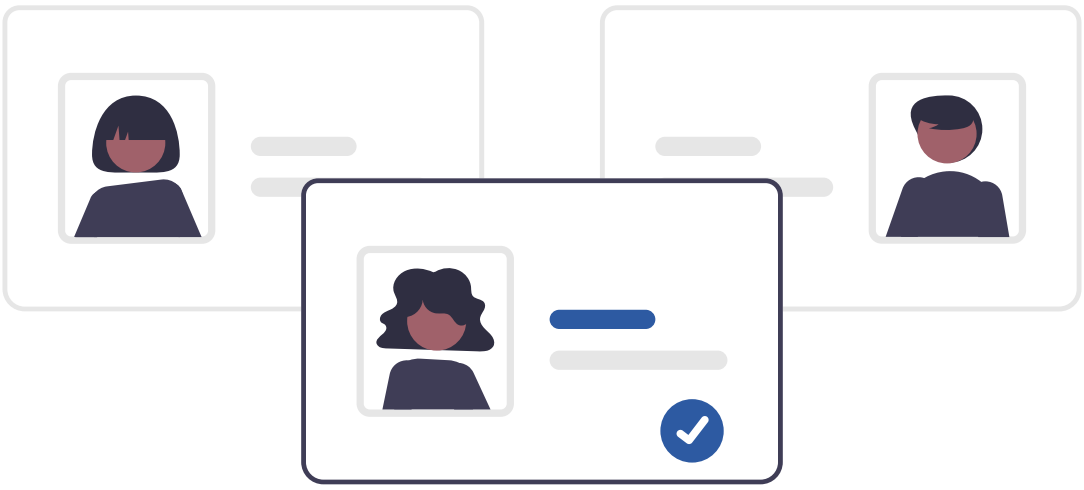
ANC data from UCS were used to sees the impact of group ANC over routine ANC in tests done during ANC contacts. Results from Table 9 compares the performance of group Antenatal Care (GANC) and routine Antenatal Care (ANC) models across several health tests during ANC contacts. GANC seems to have performed particularly well in ensuring that specific tests were completed, as evidenced by higher percentages in some tests. From Table 9 , 91.7% of women in GANC had their temperature test done, compared to 96.1% in routine ANC, but the difference was small. Similarly, 86.1% of women in GANC had their fundal height and fetal heart rate tests done, compared to only 67.9% in routine ANC, indicating that GANC outperformed routine ANC in these areas. Hemoglobin testing also showed better completion rates in GANC, with 71.1% of women tested versus 47.7% in routine ANC.

Table 9: Comparisons of tests done during ANC contacts between Group ANC and routine ANC

Test done at least in one visit	Routine ANC (N=1,353)	Group ANC (N=2,723)	Chi-square
Weight measured	1,180 (87.2)	2,350 (90.0)	7.07**
Hemoglobin test done	1,026 (75.8)	2,056 (75.5)	0.05
Glucose in urine test done	292 (21.6)	446 (16.4)	27.8***
Protein in urine test done	690 (51.0)	506 (18.6)	517***
Temperature test done	1,180 (87.2)	2,450 (90.0)	7.1**
Blood group test done	446 (32.9)	366 (13.4)	254.3***
Syphilis test done	1,251 (92.0)	2,534 (93.0)	7.0*
High blood pressure done	1,180 (87.2)	2,450 (90.0)	7.1**

Source: UCS ANC data (at time of analysis)

The comparison between routine Antenatal Care (ANC) and group ANC in terms of tests performed during ANC visits highlights some significant differences in service provision. In terms of weight measurement, 90% of women attended group ANC had their weight measured, slightly higher than the 87.2% from routine ANC, see Table 9. Similarly, temperature checks and high blood pressure monitoring were done more frequently in group ANC (90%) compared to routine ANC (87.2%). These differences were statistically significant. For the hemoglobin test, there was no difference between the two groups, with 75.8% of routine ANC clients and 75.5% of group ANC clients receiving the test, showing no significant difference in this aspect, see Table 9. About, 32.9% of women in routine ANC had a blood group test, compared to only 13.4% in group ANC, which was a significant difference. Routine ANC also had a much higher rate of glucose in urine tests (21.6%) and protein in urine tests (51%) compared to Group ANC, where these tests were done for 16.4% and 18.6% of women, respectively. Syphilis testing was more frequent in group ANC, with 93% of clients tested, compared to 92% in routine ANC, see Table 9. Generally, while group ANC provided more consistent weight, temperature, and blood pressure monitoring, routine ANC was better at offering specific diagnostic tests, such as glucose and protein urine tests, and blood group determination.



Awareness of danger signs

The comparison between group Antenatal Care (GANC) and routine Antenatal Care (ANC) shows that GANC participants had significantly higher awareness of pregnancy danger signs. From Table 10, across all key signs, such as vaginal bleeding, fever, headaches, and reduced fetal movement; GANC women consistently demonstrated more knowledge than those in routine ANC.

Table 10: Awareness of danger signs

Awareness of danger signs	Group ANC (N = 154)	Routine ANC (N = 234)	Chi-Square test
Vaginal bleeding	137 (88.9)	149 (63.7)	30.6***
Fever	121 (78.6)	48 (20.5)	127.3***
Swollen face or hand	71 (46.1)	37 (15.8)	42.4***
Breathlessness	84 (54.6)	33 (14.1)	72.1***
Headache or blurred vision	104 (67.5)	55 (23.5)	74.4***
Seizures/ convulsions	95 (61.7)	63 (26.9)	46.5***
Reduced or absence of fetal movement	101 (65.6)	47 (20.1)	81.4***
Premature rupture of membranes	134 (87.1)	54 (23.1)	152.0***
Cough or difficulty breathing for 3 weeks or longer	69 (44.8)	22 (9.4)	64.8***
Don't know any danger sign	4 (2.6)	65 (27.8)	40.3***

Source: exit interview

For instance, 88.9% of GANC participants recognized vaginal bleeding as a danger sign compared to 63.7% in routine ANC. Additionally, only 2.6% of GANC participants reported not knowing any danger signs, while 27.8% of routine ANC women lacked awareness, see Table 10. These findings suggest that GANC is more effective in improving awareness of maternal health risks.

Use of digital platform

Community health care workers were asked on the use of digital platforms, they reported that the digital platform assisted them a lot in tracking of clients making referrals and reduce of stationary costs.

> *"The use digital platforms have benefited us a lot, it easy to track patients and to make referrals. Also, it easy to access clients basic information"*
>
> **– Community Health care worker – Katoto.**

Project relevance

The group ANC intervention was seen highly relevant to health care providers in the provision of quality care as well as relevant to the needs of pregnant women in Geita and Chato Districts. The relevance was seen in the following areas; **positive feedback from pregnant women**; pregnant women participated in the group ANC had positive feedback on the intervention. They liked the intervention and preferred the intervention could continue even after the delivery. Main reason was the intervention helped them to learn more and understand pregnancy and they wished to keep learning about breastfeeding and how to take care of their new babies.

> *"We thought it would be better if this service (group ANC) continued even after delivery, we wish to learn about breastfeeding and how to take care of our children. It could go at least our children are 3 years old or even 5 years"*
> **– Pregnant women, Katoro Health center.**

The relevance was also seen from the **Positive feedback from health care providers**; the project was seen relevant as also health care providers gave positive feedback about the intervention especially on how it helped them perform work as well as the high request, they received from pregnant women who wanted to join the group ANC.

> *"Most women prefer the group ANC, the main challenge was the high demand for group services, with too few providers."*
> **- Health care provider, Bwanga Health Center.**

Relevance was also seen on the **Positive feedback on the approach**; the intervention group women together, they learned and share experience on their pregnancies and the approach made them feel free, friendly and happy. Some women liked the part that in group session when women were singing and that attracted many women to join the groups.

> *"When the women sang different songs, it motivated others to come, learn, and join the groups."*
> **- Pregnant women, Chato Hospital.**

The approach also led them to be connected and have strong bonds. Some women repotted that the approach led them stay together and had a social connection even out of health facility and they communicate with each other and discussed other issues, hence groups discussed more than just pregnancy.

> *"Group ANC helped me get new friends who I am free to talk to them even on my other personal matter concerning economy and income generating activities"*
> **– Pregnant women Katoro Health Center.**

The relance was also seen of the **Feedback on the inclusion criteria**; the intervention had inclusion criteria of pregnancy age for pregnant women to qualify to join the group ANC. As an evidence of relevance, women preferred that the inclusion criteria be removed and all pregnant women allowed to join group ANC as it was relevant and beneficial to all pregnant women irrespective of age of the pregnancy.

> *"It would be better if services were offered even for women who are just one month pregnant." - Pregnant women, Bwanga Health center. "I suggest that this education start even for women who are only one month pregnant, not just those 20–25 weeks along."*
> **- Pregnant women, Chato Hospital.**

Hence the project was seen relevant by both health care providers especially due to the design and approach as reduced the gap between pregnant women and health care providers.

Project effectiveness

The effective of the intervention was seen in the following; high participation from Pregnant women; since the introduction of the group ANC, the intervention gained a number of pregnant women interested in joining and attending the group sessions. The high participation shows the effectiveness of the intervention in attracting women in services.

> *"When the group system was first introduced, women eagerly participated, and attending clinics in groups greatly benefited pregnant women."*
> **– Health care provider, Bwanga Health center.**

Another aspect of the effectives of the intervention is the learning and empowerment to pregnant women to take care of their health by empowering them to be able to measure some basic tests and this knowledge has been beneficial to pregnant women.

> *"Many pregnant women gained the ability to measure their own weight and blood pressure, and encouraged others to join the groups."- Pregnant women, Chato Hospital. "They learned various things, such as measuring their own blood pressure and teaching each other."*
> **- Health care provider, Katoro Health Center.**

The effectiveness was also observed on the fact that intervention was able to promote open communication about pregnancy between pregnant women as well as free and open communication with health care providers. The interventions created a friendly atmosphere between pregnant women and between pregnant women and health care providers.

"Women came to the groups happily, and attending clinics in groups greatly benefited pregnant women."
- Health care provider, Nzela.

"There has been a strong relationship between the service provider and the client, where they feel free to express their challenges."
- Pregnant women, Chato Hospital.

"The mothers have enjoyed the service and learned many things, gaining a lot of experience."
- Health care provider, Chato Hospital.

The intervention was effective in communication and creating a platform for pregnant women to lean and share experiences openly and happily.

Project efficiency

The efficiency of the intervention was measured using the qualitative interviews. The intervention was seen efficient in the following aspects; increased efficiency of care delivery: Health care providers reported the intervention apart from adding more tasks but help them in increasing the efficiency in care delivery as pregnant women talk to each other, share experiences and complete some basic checkups and left the health care providers to concentrate in high priority tasks. The efficiency was also seen by reducing the time spend by health care provider attending pregnant women.

"When a pregnant woman comes, she has already been tested, which reduces the time she spends with health care provider at the hospital." - Health care provider, Nzela. "It was easier to serve [GANC members] because they handled many things themselves, allowing us to spend less time with them."
- Health care provide, Chato Hospital.

The intervention was also reported efficient by health care providers as the intervention assisted health facilities with medical equipment and tools, these helped them in performing some tests, reducing the work-loads and increase efficiency in care provision.

"The tools provided, like the battery machine and weight scale, reduced our workload."
- Health care provider, Chato Hospital.

However, in some cases the efficiency faced challenges due to women arriving late for their group sessions, late arrival of medical equipment and tools and having shortage of staffs and in days when facility have many groups to attend.

"In one day, we would have more than six groups, and we spent a lot of time serving them due to the shortage of staff."
– Health care Provider, Nzela.

The intervention has increased the efficiency of care delivery by enabling pregnant women to complete certain tests before arriving at the hospital, thus reducing the time they spend at the facility as well since pregnant women take some responsibilities, reducing the burden on health care providers.

Project Sustainability

The group ANC intervention is seen sustainable by observing the reactions and reception from pregnant women and health care providers participated in the project. The sustainability was seen in the following areas; **Pregnant women reception and ownership and Provider reception**: The group ANC interventions have been well-received by both pregnant women and healthcare providers, indicating promising sustainability even after the project has ended. The project succeeded in the transfer the ownership to health care providers and pregnant women. The project design and implementation motivated pregnant women to attend clinics regularly and project also empowered them to be able to manage their health proactively. The approach showing increased engagement and demand for project among pregnant women in Geita.

> *"We request that the project continues, as the mothers have been highly motivated to learn and take care of themselves."*
> **- Pregnant woman, Chato Hospital.**

The intervention also stimulated **Teamwork and cooperation:** The group ANC intervention help to ensure team work among health care providers, and the cooperation between health care providers and pregnant women. The team work and cooperation helped providers to maintain high levels of service by working closely with the women and supporting one another through teamwork. This is another proxy that the intervention could be sustainable even after the project has phased out.

> *"The key to success of the project was teamwork, which made the work easier."*
> **- Health care provider, Bwanga Health Center.**

However, health care providers acknowledge that group ANC spend relative more time as compared with routine ANC but with comprehensive services. For a successful sustainability of the project, health team feel that there is a need for a continued support in the form of essential resources, such as work equipment's, protective gear, and tools for healthcare workers.

> *"Additionally, I request the project to assist us with work phones, bags to store the phones, and rain gear to protect the equipment when it rains."*
> **- Health care provider, Chato Hospital.**

Also additional of trained workforce through increased provider training in group ANC is also critical to meet the growing demand for group services and ensure the quality of care.

> *"My suggestion is to expand the number of service providers so that more people can receive the education."*
> **– Health care provider, Nkome.**

> *"My suggestion is to increase the number of service providers so that more people can benefit from the education."*
> **– Health care provider, Bwanga Health center.**

Generally, continued investment in both workforce expansion and resource provision will be crucial to maintaining the long-term sustainability of the interventions and the high standard of care within the community.

DISCUSSION OF FINDINGS

The project had the recruitment procedures and inclusion criteria like gestation age, these were similar to other interventions as those done in Nigeria, Kenya and Rwanda (Grenier et al., 2019; Lori et al., 2024; Sayinzoga et al., 2021)an alternative service delivery model, in Kenya and Nigeria, to assess its impact on quality and attendance at ANC and uptake of facility-based delivery. Methods From October 2016–January 2018, we conducted a facility-based, pragmatic, cluster-randomized controlled trial with 20 clusters per country. We recruited women <24 weeks gestation during their first ANC visit and enrolled women at intervention facilities who agreed to attend G-ANC in lieu of routine individual ANC. The G-ANC model consisted of five monthly 2-hour meetings with clinical assessments alongside structured gestationally specific group discussions and activities. Quality of care was defined as receipt of eight specific ANC interventions. Data were obtained through facility records and self-report during a home-based postpartum survey. Analysis was by intention to treat. Findings All women who completed follow up are included in the analysis (Nigeria: 1018/1075 enrolled women [94.7%], Kenya: 826/1013 [81.5%]. However a study in Ghana (Lori et al., 2017) used a different inclusion criteria by recruiting those with first antenatal visit between 11 and 14 weeks gestation. Most of the group ANC evaluations were done in randomized control trial settings as (Grenier et al., 2019; Lori et al., 2024; Sayinzoga et al., 2021)an alternative service delivery model, in Kenya and Nigeria, to assess its impact on quality and attendance at ANC and uptake of facility-based delivery. Methods From October 2016–January 2018, we conducted a facility-based, pragmatic, cluster-randomized controlled trial with 20 clusters per country. We recruited women <24 weeks gestation during their first ANC visit and enrolled women at intervention facilities who agreed to attend G-ANC in lieu of routine individual ANC. The G-ANC model consisted of five monthly 2-hour meetings with clinical assessments alongside structured gestationally specific group discussions and activities. Quality of care was defined as receipt of eight specific ANC interventions. Data were obtained through facility records and self-report during a home-based postpartum survey. Analysis was by intention to treat. Findings All women who completed follow up are included in the analysis (Nigeria: 1018/1075 enrolled women [94.7%], Kenya: 826/1013 [81.5%]. With RCT it was easier to control and account for spillover effects unlike in our case we had to use the same project facilities so as to have similar settings but could not control for spillover effects.

The results about number of ANC visits shows a general improvement of number of ANC contacts as compared to the Tanzania demographic and health survey that outlined 65% having at least 4 visits (Ministry of Health (MoH) [Tanzania Mainland], Ministry of Health (MoH) [Zanzibar], National Bureau of Statistics (NBS), Office of the Chief Government Statistician (OCGS), 2022). Comparing between group ANC and routine ANC showed that women accessing services from the same facilities but those from routine 63.7% reported that women should have at least 4 visits while those from group ANC 92.9% reported women should have at least 4 visits. The difference is statistically significant. Results from evaluation is similar to results from randomized control trail done in Kenya and Nigeria that reported more ANC contacts from those attended group ANC as compared to those from the routine ANC (Grenier et al., 2019)an alternative service delivery model, in Kenya and Nigeria, to assess its impact on quality and attendance at ANC and

uptake of facility-based delivery. Methods From October 2016–January 2018, we conducted a facility-based, pragmatic, cluster-randomized controlled trial with 20 clusters per country. We recruited women <24 weeks gestation during their first ANC visit and enrolled women at intervention facilities who agreed to attend G-ANC in lieu of routine individual ANC. The G-ANC model consisted of five monthly 2-hour meetings with clinical assessments alongside structured gestationally specific group discussions and activities. Quality of care was defined as receipt of eight specific ANC interventions. Data were obtained through facility records and self-report during a home-based postpartum survey. Analysis was by intention to treat. Findings All women who completed follow up are included in the analysis (Nigeria: 1018/1075 enrolled women [94.7%], Kenya: 826/1013 [81.5%].

The advantage with our setting was to empower the current system as project was not implemented in study settings. However, in that case it was difficult to use the DHIS2 (routine platforms) data to measure the impact as those received group ANC were not easily identified from the DHIS2. Compared to other studies were participants from both intervention and control provided contacts and were willing to be followed. For example a randomized control study done in Kenya and Nigeria collected data via surveys administered to women in both study arms at enrollment; 3–6 weeks postpartum; and 1 year postpartum, (Grenier et al., 2022). This also explain the possibility to be able to measure long term impact.

Birth preparedness from the project was at 89% and was seen not different as compared to group and routine ANC. However the percentage of birth preparedness were higher as compared to those reported in other arears like in Chamwino was at 58% (Bintabara et al., 2015) its status in Tanzania is not well documented. We assessed the practice and determinants of Birth preparedness and complication readiness among recently delivered women in Chamwino district, Central Tanzania. Methods: A community based cross-sectional study was conducted to women who delivered two years prior to survey in January 2014 at Chamwino district, Tanzania. Woman was considered as prepared for birth and its complication if she reported at least three of these; know expected date of delivery, saved money, identified a skilled birth attendant/health facility, mode of transport and Identified two compatible blood donors. Descriptive, bivariate and multivariable logistic regression analyses were performed at P value < 0.05 level of significance. Results: We interviewed 428 women whose median age (IQR. The project was expected to show significant impact in birth preparedness as reported in RCT done in Ghana (Kukula et al., 2024). Also the protocol prepared in Ghana aimed to evaluate health literacy, increase birth preparedness and complication readiness, and optimize maternal and newborn outcomes among women attending ANC at seven rural health facilities (Lori et al., 2022). However, as stated above data was followed in both arms and follow up was done 6 weeks postpartum, 6 months postpartum, and 1 year postpartum.

A study in Ghana showed that pregnant women participating in group care demonstrated improved health literacy by exhibiting a greater understanding of how to operationalize health education messages (Lori et al., 2017). This is similar to the results from the evaluation that those from group ANC had higher knowledge of danger signs. Also, comparing results with Tanzania service provision Assessment (TSPA, 2015), during the exit interview 54% of pregnant women

reported discussed vaginal bleeding as one of the danger signs while in the evaluation 88% from group ANC and 63% from routine ANC mentioned vaginal bleeding as among the danger sign which is an indicator that they have discussed it with health care providers.

Generally, women attended group ANC were had better experience with ANC services. Results from evaluation showed all pregnant women (100%) that attended intervention sites irrespective that they were in routine ANC or group ANC blood test was tested. Regarding weight measurement, 98% from group ANC and 93% from routine ANC their weights were measured. Upon comparing with (TSPA, 2015) reported 88% of pregnant women had weight measured while 80% of pregnant women reported blood pressure taken. The group ANC shows improvement in pregnant women experience during ANC services and that is similar to the systematic review done by (Sharma et al., 2018)group antenatal care (ANC that reported group ANC intervention among other things improved pregnant women experience during ANC.

Among challenges faced as reported in the sustainability of the project included the additional resources required by the group ANC approach. That goes in line with the study by (Gaur et al., 2021) that outlined that among problems experienced include additional resources in terms of logistical support, as well as organizational issues, privacy concerns, and adaptation of materials for beneficiaries.

CONCLUSION

The group Antenatal Care (GANC) model has demonstrated clear benefits in maternal healthcare delivery compared to routine Antenatal Care (ANC). Women participating in GANC had higher attendance rates for ANC visits, were more likely to receive essential vaccinations and deworming medication, and benefited from more comprehensive physical examinations. GANC also promoted greater awareness of pregnancy-related risks and offered more educational support on key health practices, such as nutrition and malaria prevention. The overall feedback from healthcare providers highlighted the model's relevance, efficiency, and effectiveness in improving communication and reducing the burden on healthcare systems.

RECOMMENDATIONS

The evaluation recommends; expand GANC model to other facilities: Given the effectiveness and efficiency of GANC in improving awareness of pregnancy risks, and providing a supportive environment for pregnant women, efforts should be made to scale up the model in other facilities and regions to improve maternal health outcomes. The GANC also has assisted in the easy tracking of clients using the tablets. Invest in workforce and resources; to ensure the sustainability of GANC, it is critical to continue investing in healthcare workers and community health workers, providing them with training, resources, and support to maintain high standards of care.

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+255 (786) 966 733

info@phit.or.tz

Mbezi Beach,
Dar es Salaam, Tanzania