INVESTIGATING POTENTIAL STRATEGIES TO IMPROVE ACCESS TO ANTENATAL CARE IN WESTERN KENYA

Nina Nganga

A thesis
submitted in partial fulfillment of
the requirements for the degree of

Master of Public Health

University of Washington

2020

Committee:
Melissa Mugambi
Kenneth Mugwanya

Program Authorized to Offer Degree:
Department of Global Health

©Copyright 2020
Nina Nganga

University of Washington

Abstract

INVESTIGATING POTENTIAL STRATEGIES TO IMPROVE ACCESS TO ANTENATAL CARE IN WESTERN KENYA

Nina Nganga

Chair of the Supervisory Committee:

Melissa Mugambi

Department of Global Health

The World Health Organization (WHO) recommends that pregnant women should initiate the first antenatal care (ANC) visit in the first trimester of pregnancy because early ANC access is central to identifying pregnancy complications and managing pre-existing conditions. However, in western Kenya, less than 20% of pregnant women are estimated to present for ANC in the first trimester. Barriers to early initiation of ANC such as uncertainty of pregnancy status during the first trimester and limited access to health facilities can potentially be addressed by improving access to pregnancy testing among pregnant women and task shifting services to community-level cadres of care such as community pharmacies. However, little is known about how often women use pregnancy self-tests or the characteristics of these women. Additionally, little is known about the extent to which community pharmacies provide services for pregnant women or the potential capacity of community pharmacies to provide such services. Therefore, in Aim 1 of the following study we conducted a cross-sectional survey among pregnant women enrolling in the PrEP Implementation for Mothers in Antenatal Care (PrIMA) study to determine the prevalence and

factors associated with pregnancy self-testing among women in western Kenya. In Aim 2, we conducted a scoping review to determine the scope, type, and nature of services that are delivered through community pharmacies for pregnant women and to identify research gaps and opportunities for developing the evidence base. Overall in our study population, the prevalence of pregnancy self-testing was 22% and higher among women who were employed, currently in school, had previous pregnancy complications, received services from urban health facilities, and had partners who had at least attended secondary school. The most reported reasons for non-use of pregnancy self-tests included not thinking it was necessary, lack of knowledge, and lack of money to pay for the test. In the scoping review, we found a limited body of research on the role of community pharmacists in providing care to pregnant women. Among selected articles (n = 7), pharmacists were primarily involved in prevention (e.g. anemia and malaria), treatment, health education activities, and referral activities. Future research should focus on understanding the knowledge and attitudes of women toward pregnancy self-testing and pharmacy-based delivery of ANC services as well as the motivations and attitudes of community pharmacists toward providing services for pregnant women.

Table of Contents

Chapter 1: Background and Significance 1

Chapter 2: Prevalence and correlates of pregnancy self-testing among pregnant women attending antenatal care in Western Kenya 5

Chapter 3: The potential role for community pharmacies in providing care for pregnant women 17

References 29

Appendix 37

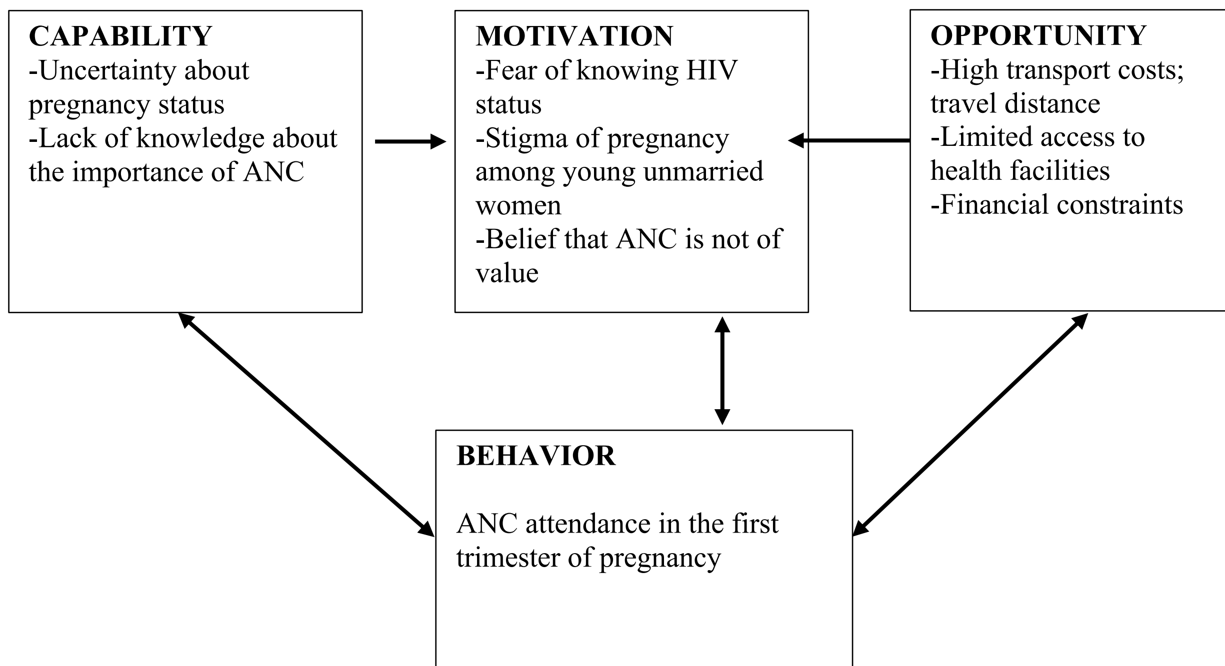
Chapter 1: Background and Significance

With a maternal mortality ratio (MMR) of 342 maternal deaths per 100,000 live births and a neonatal mortality ratio (NMR) of 19 deaths per 1,000 live births as of 2015,(1) Kenya is unlikely to meet the Sustainable Development Goal (SDG) target of reducing MMR to 70 maternal deaths per 100,000 live births and NMR to 12 deaths per 1000 live births by 2030.(2) The top three leading causes of maternal death are: hemorrhage (27.1%), hypertensive disorders (14%), and sepsis (11%).(3) In order to allow timely access to preventive interventions and improve maternal and child health outcomes, the World Health Organization (WHO) recommends that women should initiate their first antenatal care (ANC) visit in the first trimester and have a total of at least eight ANC visits during pregnancy.(4) Early ANC access is central to identifying pregnancy complications and managing pre-existing conditions.(4,5) ANC access has been shown to promote formal engagement with the health care system and increase utilization of skilled birth attendants and postnatal services, which are key maternal health indicators.(6–9) Some of the basic services provided during ANC include iron and folic acid supplementation, screening and management for sexually transmitted infections (STIs), malaria prevention, tetanus vaccination, and health education.(9–15)

However, in western Kenya, less than 20% of women are estimated to initially present for ANC during their first trimester and just over half of women attend at least four ANC visits.(16) Patient, provider and health system level barriers to early ANC have been well-documented including high transportation costs, poor perceived quality of care, lengthy clinic wait times, maternal and paternal education, marital status, long travel distances and financial constraints, place of residence, and parity.(9,17–20) The reasons why women delay ANC presentation can be

understood using the capability, opportunity, and motivation of behavior (COM-B) model (Figure 1).(21) The model posits that health seeking behavior is influenced by the interaction of: a) capability, which relates to skills or knowledge b) opportunity, which relates to social (emotional, informational and instrumental support) or physical environment and c) motivation, which can either be automatic (emotions) or reflective (beliefs, attitudes, intentions).(21–24) In this study we primarily focus on capability (uncertainty about pregnancy status) and opportunity (lack of access to health facilities).

Figure 1: Applying the COM-B Model to Early ANC Initiation



Late pregnancy recognition has been cited as a reason for delayed ANC initiation.(17,25) A qualitative study in Ghana, Kenya, and Malawi found that primigravidae women were uncertain of their pregnancy status during the first trimester.(17) Pell et al found that although pregnancy self-tests were available at large health centers, they were not affordable. Another study from South

Africa found that women with irregular monthly cycles tended to wait up to five months before they were certain of their pregnancy.(25) There is increasing evidence that pregnancy self-testing is associated with early ANC attendance. A cross-sectional study showed that access to urine pregnancy tests was associated with earlier access to ANC services.(26) Similarly, another South Africa study found that offering free onsite pregnancy testing shifted presentation of ANC to an earlier gestational age.(27)

Limited access to health facilities, long distance to health facilities, and high transportation costs have been well-documented as barriers to ANC access.(17,18,28,29) Women delay their first ANC visit until the second or third trimester in order to limit the number of visits to health facilities.(17,28) Task shifting services to other community-level cadres of care such as community pharmacies is a potential strategy to address poor access to health care facilities, particularly in rural areas where there is a sparse distribution of primary health care services.(30) The role of community pharmacies in public health is evolving and goes beyond dispensing medication.(31) Community pharmacies are highly accessible and are viewed as first points of healthcare access for both minor and major illnesses.(32,33) Community pharmacists could be leveraged to encourage women to confirm their pregnancy and utilize skilled birth attendance. Additionally, they could be used to potentially deliver ANC services such as pregnancy confirmation, tetanus vaccination, abdominal palpation, screening and management of HIV/AIDS and syphilis, TB treatment and management, malaria and anemia prevention, and counselling of pregnant women. Community pharmacies have been shown to be well-positioned to deliver sexual and reproductive health services.(33–35) For example in Kenya, pharmacies are one of the major sources of modern contraceptives in the private sector.(16) Therefore, there is a unique opportunity to engage community pharmacies in promoting access to ANC services.

Understanding the characteristics of women who use pregnancy self-tests and identifying the potential role of integrating pharmacies to deliver maternal health interventions is crucial to the design of programs that can facilitate early access to ANC and to much-needed preventive interventions in pregnancy. In this study, our objectives were to:

1. Determine the prevalence of pregnancy self-testing and associated factors among pregnant women attending maternal and child health (MCH) clinics in Western Kenya.
2. Determine the scope, type, and nature of services that are delivered through community pharmacies for pregnant women in order to identify research gaps and opportunities for developing the evidence base.

Chapter 2: Prevalence and correlates of pregnancy self-testing among pregnant women attending antenatal care in Western Kenya

Introduction

In sub-Saharan Africa little is known about how often women use pregnancy self-tests or characteristics of these women despite increasing evidence that pregnancy self-testing is associated with early antenatal care (ANC) attendance.(26,27) Understanding the characteristics of women who use pregnancy self-tests is crucial to the design of programs that can facilitate early access to ANC and to much-needed preventive interventions in pregnancy. In this study, our primary objective was to determine the prevalence of pregnancy self-testing and associated factors among pregnant women attending maternal and child health (MCH) clinics in Western Kenya. In a secondary objective, we evaluated the factors associated with early ANC initiation among pregnant women.

Methods

Study design

From November 2018 to July 2019, we conducted a cross-sectional survey among pregnant women enrolling in the PrEP Implementation for Mothers in Antenatal Care (PrIMA) study. PrIMA is a cluster randomized trial (NCT03070600) that aims to compare the best approaches for delivering oral pre-exposure prophylaxis (PrEP) in pregnancy. The study protocol is described elsewhere.(36) Briefly, study participants were recruited from women presenting for ANC in 20 public health facilities in Homabay and Siaya counties in western Kenya. Participants answered questions on socio-demographics, medical and pregnancy history, and partner characteristics.

Study variables

We analyzed two dependent variables: pregnancy self-test use and early ANC. Pregnancy self-test users were defined as those who reported using a pregnancy self-test when asked "*Once you suspected that you were pregnant, how did you confirm that you were pregnant?*" Early ANC was defined as initiation of the first ANC visit during the first trimester of pregnancy. We analyzed independent variables that we hypothesized would be associated with pregnancy self-test use and early ANC including maternal age, education level, employment status, marital status, partners' education level, parity, prior pregnancy complications, travel time to health facility, and location of health facility. We analyzed pregnancy self-test use as an independent variable when evaluating factors associated with early ANC.

Statistical analysis

We examined the prevalence and correlates of pregnancy self-test use and early ANC among pregnant women. We estimated the odds of pregnancy self-test use and early ANC using univariate and multivariable logistic regression models. In the multivariable analyses, we adjusted for all above-mentioned independent variables. Statistical analyses were performed using R software (R-Studio Version 1.1.456) and STATA 15.1 (College Station, TX).

Ethics

The study was approved by the Kenyatta National Hospital and the University of Washington institutional review boards. All participants provided informed consent to participate in the study.

Results

Socio-demographic and pregnancy-related characteristics

Table 1 shows the characteristics of study participants. Overall, the study included 1085 pregnant women between the ages of 15-43 years, median age 24 (IQR 21-28). At the time of the survey, the majority of the respondents were married (87%), not employed (89%), 25 years or older (49%), not in school (91%) and had previously been pregnant 845 (78%). Approximately 65% of women confirmed their pregnancy in the first trimester. However, only 35% of the women presented for ANC early - in the first trimester. Fifty-eight percent of the women presented for ANC during the second trimester, and 8% during the third trimester. Twenty-two percent of women used a pregnancy self-test to confirm their pregnancy (Table 1). Of the 830 respondents who did not use a self-test: 85% confirmed their pregnancies at a public health facility, 9% at a private health facility, and 6% did not confirm their pregnancy. Users of pregnancy self-tests obtained their kits from a community pharmacy (77%), a public health facility (14%), a private health facility (7%), and stores (2%). The most reported reasons for non-use of pregnancy self-tests included: not thinking it was necessary (57%), lack of knowledge on self-tests (26%), and lack of money to pay for a self-test (11%).

Prevalence and correlates of pregnancy self-testing

Table 2 shows the univariate and multivariable logistic regression results for variables associated with pregnancy self-testing. In the univariate analysis, self-test use was associated with employment status (OR=3.25, 95% CI 2.24, 4.72), education status (OR= 2.42, 95% CI 1.55, 3.80), having had a previous pregnancy (OR= 0.54, 95% CI 0.39, 0.74), travel time to health facility (OR= 1.72, 95% C 1.26, 2.35), partner's education level (some high school (OR= 2.41, 95% CI

1.55, 3.75) and some college (OR= 8.00, 95% CI 5.07, 12.58)), and location of health facility (OR= 2.44, 95% CI 1.82, 3.26). After adjusting for the independent variables, self-test use was more likely among women who were employed (aOR=2.43, 95% CI 1.53, 3.85), currently in school (aOR= 2.14, 95% CI 1.19, 3.85), had previous pregnancy complications (aOR=1.34, 95% CI 1.24, 2.53), and received services from urban health facilities (aOR=1.77, 95% CI 1.24, 2.53). Compared to women whose partners had a primary school education or less, self-test use was 2 times more likely among women whose partners had some high school education (aOR= 2.10, 95% CI 1.32, 3.34) and 6 times more likely among women whose partners had attended college (aOR=5.93, 95% CI 3.60, 9.76). Pregnancy self-testing was not associated with age, marital status, having had a prior pregnancy, and travel time to health facility.

Prevalence and correlates of early antenatal care attendance

Table 3 shows univariate and multivariable logistic regression results for variables associated with early ANC attendance. In the univariate analysis, early ANC was associated with pregnancy self-testing (OR= 1.50, 95% CI 1.12, 2.00), having had a previous pregnancy (OR= 0.65, 95% CI 0.49, 0.87), being between 20-24 (OR=1.55, 95% CI 1.01, 2.39), receiving services from an urban health facility (OR= 1.66, 95% CI 1.28, 2.15), having had previous pregnancy complications (OR= 1.97, 95% CI 1.17, 3.32), and having a partner who had attended college (OR=2.04, 95% CI 1.43, 2.92). After adjusting for the independent variables, women who initiated ANC early were more likely to have had prior pregnancy complications (aOR=2.18, 95% CI 1.22, 3.90), be pregnant for the first time (aOR=0.58 95 % CI 0.38, 0.87), have a partner who attended college (aOR=1.58, 95% CI 1.03, 2.40), and received services from an urban health facility (aOR=1.51, 95% CI 1.11, 2.05).

Early ANC initiation was not associated with pregnancy self-test use, age, marital status, employment, education status, and travel time to health facility.

Discussion

In this study, we investigated the prevalence and correlates of pregnancy self-testing among pregnant women attending maternal and child health clinics in western Kenya. To our knowledge, this is the first study that has examined the factors associated with pregnancy self-testing among pregnant women. Overall, the prevalence of pregnancy self-testing in the study population was low with 22% of women reporting having used a pregnancy self-test to confirm their pregnancy. These findings are similar to a South African study in 2006 that reported use of pregnancy self-tests among 27% of ANC clients.(26) It is interesting to note that the majority of women who did not use a pregnancy self-test either did not think it was necessary or did not know that they could use one suggesting the need for further studies to understand women's knowledge and attitudes toward pregnancy self-testing. In the study population, maternal employment and education status, prior pregnancy complications, location of health facility, and partner's education level were the strongest correlates of pregnancy self-testing. These findings might reflect one's awareness or perception of the need for pregnancy self-testing, or one's availability of financial resources toward pregnancy self-tests. Employed women may have greater autonomy in their finances compared to women who are not employed.(37) Education may be directly related to awareness of pregnancy self-tests which can be attributed to formal education.(38) Partner's education is an important determinant of women's health seeking behavior. One study found that a partner's schooling has strong effects on their spouses' health care utilization especially when partners have at least a secondary school education.(37) Women residing in rural areas are less likely to use pregnancy self-tests due to the sparse distribution of health services.(30) Poor education levels in

rural areas may impact awareness of pregnancy tests. For women with previous pregnancy complications, confirming a pregnancy early becomes increasingly important due to the stigma surrounding infertility.(39)

In this study population, we found that 35% of women reported attending their first ANC visit in the first trimester of pregnancy. While still low compared to previous findings from Western Kenya (66%),(40) this percentage is much higher than findings reported for sub-Saharan Africa (24.9%) in a recent systematic review (2) and 20% national average in the Kenya Demographic and Health Survey (KDHS).(16) We found that women who initiated ANC in the first trimester were more likely to have been previously pregnant, have had previous pregnancy complications, have a partner who attended college, and received services from an urban health facility. Our findings are consistent with other studies which have shown that multigravida women are less likely to present early for ANC than primigravida women.(39) One study from Zimbabwe found that women who had at least one previous pregnancy were more likely to delay ANC.(41) As the number of children increases, the utility of ANC decreases.(40) Women with prior pregnancy complications are more likely to present early for ANC. This finding is consistent with findings from other studies and can be attributed to the fact that women who have not experienced adverse pregnancy complications do not perceive the necessity of ANC services.(25,39,42–44) There are several mechanisms through which partner's education may affect ANC utilization. Having more education may encourage adoption of positive health seeking behaviors, including the appropriate and timely use of ANC services.(45) Education also influences one's occupational trajectories and earning potential.(46) Women residing in rural locations are more likely to delay initiation of ANC compared with urban dwellers. This finding is consistent with other studies in sub-Saharan Africa.(38,41,47–49) This may be due to better access and availability of health care services in

urban areas. However, we did not find any association between maternal education and early ANC attendance. This could be explained by the fact that maternal education was categorized as a binary variable and women were assigned to either being currently in school or not currently in school. We did not have access to the women's education levels.

To our knowledge this is one of the few studies to evaluate whether pregnancy testing is associated with early ANC attendance. Several studies have found that women who recognized their pregnancy using a urine test were less likely to delay ANC compared to women who used other means such as missed periods.(50,51) A prior study in South Africa reported an association between pregnancy self-testing and timing of ANC initiation. The study treated timing of ANC initiation as a continuous variable and found that obtaining a urine pregnancy test from a private pharmacy was associated with a 3.6 week decrease in the gestational age at presentation for ANC.(26) In this study, we treated early ANC initiation – ANC attendance during the first 12 weeks of pregnancy – as a categorical variable. In the univariate analysis, we found that women who reported having used a pregnancy self-test were more likely to attend antenatal care in the first 12 weeks of pregnancy. However, after adjusting for partner's education level, location of the health facility, parity, and previous pregnancy complications, this association was no longer significant. These findings suggest that the aforementioned variables may be important modifiers of the association between pregnancy self-testing and ANC initiation and need to be investigated further. Additionally, the study sample size may not have been sufficient to observe a statistically significant association. We also acknowledge that the use of a categorical variable may have precluded us from assessing the extent to which pregnancy testing reduced gestational age at presentation. Additionally, the characteristics of the pregnant women in our study could have been

different from the women in the South Africa study. And such the women in our study could have different antenatal care seeking behaviors.

Our study has some limitations. Although we were able to recruit over 1000 study participants from 20 clinics in western Kenya, the majority of the participants came from rural areas therefore some aspects of our findings may not generalize to other settings. Secondly, participants self-reported when they confirmed their pregnancy and when they presented for antenatal care, this could lead to differential misclassification due to recall bias. Finally, given that we conducted secondary analysis from an existing RCT, we were unable to assess additional variables such as knowledge and attitudes towards pregnancy self-testing and ANC that may be associated with pregnancy testing and early ANC.

In conclusion, our study found a low overall use of pregnancy self-tests. While pregnancy self-test use was associated with earlier antenatal care attendance in univariate analysis, we found no significant evidence of an association between pregnancy self-test use and timing of presentation for early ANC. The majority of women either did not see the utility of pregnancy self-testing or did not know about pregnancy self-tests. Promoting awareness of pregnancy self-tests may be a useful driver of earlier ANC attendance and warrants further research.

Table 1: Characteristics of pregnant women who confirmed their pregnancy with or without conducting a pregnancy self-test (n=1074)

Characteristics	Conducted a pregnancy self-test (n=244) [a]		Did not conduct a pregnancy self-test(n=830) [a]		
	N	(%)	N	(%)	p-value
Age					0.982
15-19	29	(12)	98	(12)	
20-24	93	(40)	309	(39)	
≥25	113	(48)	387	(49)	
Currently in school					<0.001
Yes	36	(15)	55	(7)	
No	206	(85)	763	(93)	
Previously pregnant					<0.001
Yes	168	(69)	667	(80)	
No	76	(31)	162	(20)	
Marital status					0.572
Currently married[b]	208	(86)	719	(88)	
Not married[c]	33	(14)	101	(12)	
Currently employed					<0.001
Yes	61	(25)	77	(9)	
No	181	(75)	742	(91)	
Travel time to the health facility (minutes)					0.001
≤30	172	(71)	482	(59)	
>30	70	(29)	338	(41)	
Partner's education attainment					<0.001
Primary school and below[d]	31	(14)	291	(40)	
Some high school[e]	83	(38)	323	(44)	
Some college[f]	103	(47)	121	(16)	
Health facility location					<0.001
Urban	120	(49)	236	(28)	
Rural	124	(51)	594	(72)	
Previous pregnancy complications[f]					0.610
Yes	15	(6)	44	(5)	
No	229	(94)	786	(95)	
Timing of pregnancy					<0.001

confirmation				
1st trimester	201	(82)	496	(60)
2nd trimester	40	(16)	302	(36)
3rd trimester	3	(1)	32	(4)

[a]The number of respondents for each variable may vary due to missing responses

[b]Includes respondents who are married and come we stay

[c]Includes respondents who are single, divorced, widowed, have a steady boyfriend

[d]Includes respondents with no formal education and those who either completed or did not complete primary school

[e]Includes respondents who at least attended high school

[f]Includes respondents who at least attended college

[g]Includes late pregnancy bleeding, miscarriage, fetal miscarriage, and high blood pressure

Table 2: Logistic regression model for variables associated with pregnancy self-testing (N=909)

Predictor Variables	OR (95% CI) Crude	Adjusted
Marital status (reference group: unmarried)		
Married	0.89 (0.58, 1.35)	1.54(0.77, 3.08)
Previous pregnancy (reference group: no)		
Yes	0.54 (0.39, 0.74)	0.79 (0.49, 1.27)
Age (reference group: 15-19)		
20-24	1.02 (0.63, 1.64)	0.77 (0.41, 1.43)
≥25	0.99 (0.62, 1.57)	0.80 (0.41, 1.53)
Employment status (reference group: no)		
Yes	3.25 (2.24, 4.72)	2.43 (1.53, 3.85)
Education status (reference group: no)		
Yes	2.42 (1.55, 3.80)	2.14 (1.19, 3.85)
Travel time to health facility(minutes) (reference group: >30)		
≤30	1.72 (1.26, 2.35)	1.15 (0.79, 1.67)
Partners education attainment (reference group: some primary school)		
Some high school	2.41 (1.55, 3.75)	2.10 (1.32, 3.34)
Some college	8.00 (5.07, 12.58)	5.93 (3.60, 9.76)
Previous pregnancy complications (reference group: no)		
Yes	1.17 (0.64, 2.14)	1.34 (1.24, 2.53)
Location of health facility (reference group: rural health facilities)		
Urban health facilities	2.44 (1.82, 3.26)	1.77 (1.24, 2.53)

Table 3: Logistic regression model for variables associated with early antenatal care attendance (N=909)

Predictor Variables	OR (95% CI) Crude	Adjusted
Pregnancy self-testing		
Non-pregnancy self-test use	1.50 (1.12, 2.00)	1.09 (0.76, 1.55)
Marital status (reference group: unmarried)		
Married	1.29 (0.87, 1.90)	1.23 (0.68, 2.24)
Previous pregnancy (reference group: no)		
Yes	0.65 (0.49, 0.88)	0.58 (0.38, 0.87)
Age (reference group: 15-19)		
20-24	1.55 (1.01, 2.39)	1.30 (0.76, 2.21)
≥25	1.17 (0.76, 1.79)	1.20 (0.69, 2.09)
Employment status (reference group: no)		
Yes	1.33 (0.93, 1.92)	1.19 (0.77, 1.83)
Education status (reference group: no)		
Yes	0.98 (0.62, 1.54)	0.96 (0.55, 1.67)
Travel time to health facility(minutes) (reference group: >30)		
≤30	1.24 (0.95, 1.61)	1.00 (0.74, 1.35)
Partners education attainment (reference group: some primary school)		
Some high school	1.32 (0.97, 1.81)	1.19 (0.84, 1.67)
Some college	2.04 (1.43, 2.92)	1.58 (1.03, 2.40)
Previous pregnancy complications (reference group: no)		
Yes	1.97 (1.17, 3.32)	2.18 (1.22, 3.90)
Location of health facility (reference group: Rural health facilities)		
Urban health facilities	1.66 (1.28, 2.15)	1.51 (1.11, 2.05)

Chapter 3: The potential role for community pharmacies in providing care for pregnant women

Introduction

As part of ongoing research efforts, Mugambi and colleagues are exploring the feasibility of leveraging community pharmacies in promoting earlier access to antenatal care among pregnant women either by facilitating improved referral to health facilities or providing select ANC services in community pharmacy settings.(52) Community pharmacies have the potential to increase healthcare accessibility and improve maternal health outcomes. Community pharmacies have been shown to be well-positioned to deliver sexual and reproductive health services.(34,53,54) For example, in Kenya pharmacies are one of the major sources of modern contraceptives in the private sector.(1) Community pharmacies might be well-positioned to provide antenatal care services because they are often thought to be the first point of contact for healthcare needs, particularly in rural areas where there is a sparse distribution of primary health care services.(30) Additionally, several studies indicate a high prevalence of self-medication among pregnant women and the majority of pregnant women purchase medication from pharmacies.(55–57) In some cases women do not disclose their pregnancy status or the pharmacists do not routinely assess whether women are pregnant before dispensing medication.(55,58) This represents a missed opportunity to provide counselling on medication safety and other services that might benefit pregnant women

In Kenya anecdotal evidence suggests that pharmacists are required to refer pregnant women for ANC services. However, not much is known about the extent to which community pharmacies in Kenya and in other similar settings provide services for pregnant women either formally or informally. Additionally, not much is known about the potential capacity of community pharmacies to provide such services.

We propose to conduct a scoping review to determine the scope, type, and nature of services that are delivered through community pharmacies for pregnant women and to identify research gaps and opportunities for developing the evidence base. Specifically, we plan to identify studies that have evaluated pharmacy-based services for pregnant women and describe the evidence base on the feasibility of involving pharmacies in ANC service delivery. A scoping review is a useful approach in this context because not much is known about the extent of research in this area – that is – the role that formal and informal community pharmacies play in delivering ANC services. A scoping review would therefore provide an opportunity to quickly review methodologically diverse studies, outline the type of evidence available, and based on the evidence gaps identified, develop a roadmap for future research.(59–61)

To our knowledge, this is the first scoping review to evaluate the potential role of community pharmacies in delivery of ANC services. Prior scoping and systematic reviews have focused on pharmacy-based delivery of sexual and reproductive health services including screening and prevention of sexually transmitted infections (STIs) and provision of family planning(33,35), smoking cessation(62–64), weight management(65–67), adult immunizations(68,69), and chronic disease screening and management(70–73). However, no reviews have focused on delivery of services tailored to pregnant women.

Methods

We searched electronic databases (PubMed, EMBASE, Web of Science, ProQuest Dissertations and Theses Global) and the gray literature from select non-profit organizations (FHI 360, PATH, and Marie Stopes) for journal articles, conference papers, white papers, press releases, and policy briefs in English published between January 2000 and March 2020. We also reviewed the references cited within the articles resulting from the preliminary search. Search terms were

identified and revised iteratively in order to retrieve additional articles. We used several search terms to guide the scoping review process including ‘pregnancy and pharmacy’, ‘antenatal care and pharmacy’, and ‘prenatal care and pharmacy’ and then systematically scanned article titles, abstracts and full texts in order to identify the final set of articles. Selected articles were reviewed and a narrative synthesis conducted. Due to the limited body of research on the subject, the review included all existing relevant research regardless of study design and geographic location. Additional inclusion and exclusion criteria are listed in Table 4.

Table 4: Summary of inclusion and exclusion criteria

Criterion	Description
Types of pharmacies	Primarily included articles focusing on community pharmacies including formal (i.e. accredited) and informal community pharmacies
	Excluded pharmacies housed within health facilities
Types of studies	Included all existing relevant research regardless of study design
Type of evidence	Included studies that focused on the evaluation of pharmacy-based approaches to deliver ANC services and of the types of the services
	Excluded studies evaluating the efficacy of treatments on various pregnancy-related ailments
Characteristics of women	Primarily included articles focusing on pregnant women
Geographic location	Low, middle- and high-income countries

Results

We retrieved 341 articles during the initial search. After eliminating duplicates, scanning titles and abstracts, and reviewing full-texts, seven articles met the inclusion and exclusion criteria and were included in the narrative synthesis. Altogether, we reviewed two articles from Tanzania and five separate articles from each of the following countries: Uganda, Kuwait, Thailand, Norway and Canada. The articles focused on a variety of topics related to the role of community pharmacies or pharmacists in providing care for pregnant women: integrating care for pregnant women at the

community level, malaria and anemia prevention, blood pressure monitoring, and self-care and self-medication.

Integrating care for pregnant women at the community level

One paper was identified that evaluated the opportunities and challenges of integrating primary health care strategies across different cadres of providers in order to improve timely access to maternal health services.(74) This was a qualitative study conducted in Kibaha district in Tanzania. The study participants included 40 community pharmacists, 85 community health workers (CHWs), and 17 health facility staff. In this study, pharmacists were involved in promoting utilization of skilled birth attendants, identifying danger signs during pregnancy, educating pregnant women in the community during village health days in remote and pastoral communities, counselling pregnant women on medication safety, treating and managing minor illnesses, serving as initial points of health care access when health facilities were not accessible, and referring clients to either health facilities or CHWs. Pharmacists reported that as result of their improved knowledge on case management, they were able to refer pregnant women promptly for appropriate healthcare services. Pharmacists and CHWs reported a perceived decrease in maternal mortality however the authors did not audit facility records to support this qualitative finding. While pharmacists reported better communication with CHWs, there was no established mechanism for discussing progress and challenges in identifying and referring pregnant women highlighting the importance of an adequate supervision plan. Due to the occasional stock-outs of referral forms and common acceptance of oral referrals in the community, tracking documentation of referrals was identified as a challenge of the intervention. As with any in-service training, turnover of trained

pharmacists was a likely possibility and health facility staff expressed concern over working with trained pharmacists only for them to move to other locations.

Malaria and anemia prevention in pregnancy

Mbonye et al evaluated the potential for community pharmacists to be accessed for malaria prevention efforts.(75) This was a mixed methods study conducted in Mukono District in Central Uganda. Study staff administered surveys to participants and conducted 60 key interviews that included community pharmacists. Community pharmacists were involved in intermittent preventive treatment (IPT) for malaria, which involves two doses of sulfadoxine-pyremethamine (SP) administered during the second and third trimester. In addition, they provided iron folate (IFA) supplementation, deworming, and nutrition counselling. The use of community pharmacists to deliver IPT improved access and compliance because pharmacies were physically accessible. In order to determine the feasibility of using community pharmacies to deliver ANC services, more research is needed to understand user preferences/motivations for seeking health care services from community pharmacies

One study evaluated the potential for community pharmacists to be accessed for anemia prevention and management through iron folate (IFA) supplementation in Pemba, Tanzania.(76) The study compared current delivery system of IFA supplements through private (community pharmacies) and public-sector (pharmacies in health facilities) pharmacies. The study showed that since public clinics experienced frequent stock-outs of IFA supplements, community pharmacists could fill gaps in preventive care to compensate for deficiencies in the health system. In addition to selling IFA supplements, community pharmacists occasionally provided follow-up care and nutrition

advice to pregnant women. Qualitative interviews with community pharmacists and observations of pharmacy-client interactions showed that community pharmacists were well-positioned to provide the above-mentioned services because of their familiarity with the local communities. Compared to public sector pharmacies, community pharmacies had longer hours of operation and were typically open during the weekends and holidays. Women also reported shorter wait times and longer visits with community pharmacists, and subsequently ample time to discuss their needs. While community pharmacists were generally knowledgeable on maternal anemia, they often prescribed inadequate IFA dosage (2 weeks rather than 6 months).

Blood pressure monitoring during pregnancy

Tsao et al investigated a pharmacy surveillance program of hypertension and medication use in pregnancy and breastfeeding.(77) This was a mixed methods study that recruited 63 community pharmacists in British Columbia, Canada. Community pharmacists provided education on self-monitoring and interpreting blood pressure as well medication safety to pregnant and breastfeeding women enrolled in the study. At baseline, community pharmacists identified women with untreated hypertension and pre-hypertension and referred these cases to the client's physicians. However, the study did not report any changes on baseline blood pressure status. This study had several challenges. Of the 63 community pharmacists who were trained to deliver the intervention, 21 enrolled at least one client and only one met the objective of enrolling at least 10 clients. Majority of the community pharmacists reported difficulty in recruiting multigravida and women with normal blood pressure levels as they did not see the value of participating in the feasibility study. Pharmacist participation in the intervention was voluntary and thus there was no remuneration or additional infrastructure support. As such the surveillance intervention relied

heavily on additional time and other resources for patient enrollment and follow-up activities, which impeded the success of the intervention as exhibited by the low participation rates. As such this study failed to demonstrate the feasibility of pharmacists taking on the role of drug safety surveillance for pregnant and breastfeeding women. The authors suggested that future studies should offer incentives for pharmacist in order to increase their buy-in and improve participation in study activities.

Standardized consultations during early pregnancy

Only one study was an RCT that investigated the feasibility of a pharmacy-based intervention to provide standardized consultations to pregnant women in early pregnancy.(78) This RCT involved six community pharmacies in South-Eastern Norway. Community pharmacists provided 15-minute phone and in-person consultations to 35 women enrolled in the study. During the consultations, community pharmacists answered questions on management and treatment of common physiological symptoms of pregnancy, with the most common being nausea and vomiting. Community pharmacists also responded to concerns on general medication use during pregnancy. The study demonstrated that provision of pharmacy services for medication counseling of pregnant women may be feasible. However, consultations were only offered to 11 out of the 35 participants in the study. Therefore, caution is required before generalizing these findings to other pharmacies.

Self-care and self-medication in pregnancy

One study from Kuwait surveyed community pharmacists in order to identify the services provided to pregnant and breastfeeding women.(79) This was a cross-sectional survey involving 192 fully licensed community pharmacists. The most common services provided by community pharmacists

were recommendations on vitamins and supplements, physician referrals, and general advice on lifestyle modifications e.g. diet and exercise. In this study, community pharmacists primarily addressed pregnancy-related ailments by either referring clients to other health providers or dispensing medication and rarely advised patients directly. Compared to male pharmacists, female pharmacists were more likely to dispense medications for vaginal itching/simple discharge compared to male pharmacists either due to having more direct (personal) or indirect (work) experience. More experienced pharmacists (defined as having practiced for at least 10 years) were more likely to dispense medication for conditions such as diarrhea, constipation, and nausea/vomiting compared with less experienced colleagues due to their wider knowledge base. While none of the dispensed medications were found to be harmful, the medications were occasionally unnecessary. Overall, the study showed that pharmacists lacked confidence in providing appropriate advice and could benefit from access to up-to-date and accurate guidelines on medication safety counselling in pregnant women.

Standard consultations in early pregnancy

One dissertation identified the knowledge and views of community pharmacists regarding self-treatment activities in pregnancy and breastfeeding by surveying the services provided by community pharmacists in Thailand.(80) This was a mixed methods study involving 110 community pharmacists. The author found that community pharmacists preferred to either dispense medication or provide client advice only. Pregnant and breastfeeding women often consulted community pharmacists in the treatment and management of the nausea/vomiting, indigestion, back pain, insomnia, scurvy, leg cramps, vaginal itching and simple discharge, varicose vein, swelling feet and legs, and the common cold. Similar to findings from Albassam

and Awad, most of the medications dispensed were shown to be safe for pregnant and breastfeeding women. Additionally, community pharmacists expressed a lack of confidence in providing counselling on medication safety due to a lack of accurate and up-to-date information regarding medication use for pregnant and breastfeeding women. This could be explained by the fact that most community pharmacists used textbooks as information sources of medications for pregnant and breastfeeding women. While textbooks were trusted information sources, it is challenging to keep that information up-to-date.

Discussion

In the scoping review, we identified 7 articles, covering a range of services provided by community pharmacies for pregnant women including preventive measures (intermittent preventive treatment for malaria and iron folate supplementation), treatment and management of common physiological symptoms, evaluation of medication risk, and health systems interventions to improve the utilization of ANC, which are in accordance with the WHO maternal, newborn, and child health interventions.(4,81)

The scoping review identified several potential advantages of engaging community pharmacies in ANC service provision. Community pharmacies were found to be well-positioned to deliver services to the community because they were in close proximity to the community, had longer operating hours, provided trusted and accessible sources of information, and had strong pre-existing relationships with the community.(32,35,82) In particular, one of the studies from Uganda noted that community pharmacies were a useful alternative to care due to frequent stockouts and long wait times at public health facilities.(76) One of the studies in Canada showed that by enabling

community pharmacies to provide standard consultations during early pregnancy, women were able to receive services before their first ANC visit at the health facility.(78)

The scoping review identified several challenges to engaging community pharmacies in ANC service provision. Most of the studies found that community pharmacists lacked the appropriate knowledge to counsel women during pregnancy. For example, one study from Uganda found that community pharmacists dispensed inadequate IFA dosage to treat anemia.(76) Secondly, several studies reported that pharmacists lacked up-to-date and accurate guidelines on medication safety counselling for pregnant women.(79,80) For example, pharmacists from Thailand reported using information from out-of-date textbooks to provide counseling to pregnant women. In one case, pharmacists and the community health workers with whom they collaborated lacked an adequate supervision plan therefore hampering their communication and successful integration of care between community pharmacies and health facilities. Subsequently, there was no established mechanism for discussing progress and challenges in the identification and referral process for pregnant women.(74)

This review had several limitations. Only one reviewer completely screened and reviewed titles, abstracts, and full-texts, and abstracted information. Additionally, due to time constraints we were unable to consult technical experts on the subject and incorporate multiple databases in our search strategy. Therefore, it is possible that other relevant papers could have been excluded. Due to the limited body of research on the subject, we did not find a substantial variety of quality articles on the role of community pharmacists in providing care to pregnant women. If an RCT is the gold standard for research, only one study met that criterion. More studies are needed to create a robust evidence base. Our aim was simply to describe pharmacy services targeted to pregnant women and identify research gaps and opportunities for developing the evidence base. Notwithstanding these

limitations, this review suggests that community pharmacies have unique qualities that make them convenient access points for ANC services. Community pharmacies have an active role in improving access to ANC services.

Further research is needed to understand the characteristics and in particular the motivations of women who access community pharmacies. Additionally, more qualitative research is needed to understand the knowledge, attitudes, and perceptions of community pharmacists on providing services to pregnant women in order to facilitate the design of interventions that integrate community pharmacies in the delivery of maternal, newborn, and child health. A key question remains as to what extent the services identified in our scoping review are being implemented or considered for implementation. It is also critical to understand the requirements for the investment and success of pharmacy-based interventions in more diverse settings beyond those examined in this scoping review.

Pharmacists can promote maternal and child health through prevention, referral, treatment, and health education activities. Going forward, it will be important to understand how pregnant women engage with community pharmacies. Most of the studies included in this review were descriptive studies and surveys. There is need for more randomized control trials to evaluate the feasibility of pharmacy interventions in ANC service provision. Additionally, there is need for more studies that look into developing strategies to implement ANC interventions in pharmacy settings.

In conclusion, this scoping review demonstrates that there is limited evidence on the role of pharmacies in delivering interventions for pregnant women in ANC. However, there is potential to improve access to ANC services by bridging the gap between community pharmacies and health facilities. Moving services closer to the community is a critical strategy to increasing access, particularly in rural areas where ANC services remain underutilized. Task shifting services to other

cadres at the community-level such as pharmacies has the potential to address some of the reasons for delay in ANC attendance such as limited access to health facilities, high transport costs, and time and financial constraints. Together the studies in this review demonstrate that community pharmacies could play a larger role in service delivery for pregnant women.

References

1. Kenya National Bureau of Statistics. Kenya Demographic and Health Survey 2013-2014 [Internet]. 2015. Available from: www.DHSprogram.com.
2. Moller AB, Petzold M, Chou D, Say L. Early antenatal care visit: a systematic analysis of regional and global levels and trends of coverage from 1990 to 2013. Lancet Glob Heal. 2017 Oct 1;5(10):e977–83.
3. Say L, Chou D, Gemmill A, Tunçalp Ö, Moller AB, Daniels J, et al. Global causes of maternal death: A WHO systematic analysis. Lancet Glob Heal. 2014 Jun 1;2(6):e323–33.
4. WHO. WHO recommendations on antenatal care for a positive pregnancy experience. Geneva; 2016.
5. Afulani PA, Buback L, Essandoh F, Kinyua J, Kirumbi L, Cohen CR. Quality of antenatal care and associated factors in a rural county in Kenya: an assessment of service provision and experience dimensions. BMC Health Serv Res [Internet]. 2019 Dec 7 [cited 2020 Feb 12];19(1):684. Available from: https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-019-4476-4
6. Pulok MH, Sabah MN-U, Uddin J, Enemark U. Progress in the utilization of antenatal and delivery care services in Bangladesh: where does the equity gap lie? BMC Pregnancy Childbirth [Internet]. 2016 Dec 29 [cited 2020 Feb 10];16(1):200. Available from: http://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/s12884-016-0970-4
7. Trujillo JC, Carrillo B, Iglesias WJ. Relationship between professional antenatal care and facility delivery: an assessment of Colombia. Health Policy Plan [Internet]. 2014 Jul 1 [cited 2020 Feb 11];29(4):443–9. Available from: https://academic.oup.com/heapol/article-lookup/doi/10.1093/heapol/czt033
8. Obago IT. The Role of Antenatal Care in Predicting Health Facility Delivery among Women in Kenya: Further Analysis of Data from the 2008-09 KDHS [Internet]. 2013 Feb [cited 2020 Jun 25]. Available from: https://dhsprogram.com/publications/publication-wp86-working-papers.cfm
9. Gupta S, Yamada G, Mpembeni R, Frumence G, Callaghan-Koru JA, Stevenson R, et al. Factors Associated with Four or More Antenatal Care Visits and Its Decline among Pregnant Women in Tanzania between 1999 and 2010. Noor AM, editor. PLoS One [Internet]. 2014 Jul 18 [cited 2020 Feb 12];9(7):e101893. Available from: https://dx.plos.org/10.1371/journal.pone.0101893
10. Pervin J, Moran A, Rahman M, Razzaque A, Sibley L, Streatfield PK, et al. Association of antenatal care with facility delivery and perinatal survival – a population-based study in Bangladesh. BMC Pregnancy Childbirth [Internet]. 2012 Dec 16 [cited 2020 Feb 11];12(1):111. Available from: http://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/1471-2393-12-111
11. Brown CA, Sohani SB, Khan K, Lilford R, Mukhwana W. Antenatal care and perinatal outcomes in Kwale district, Kenya. BMC Pregnancy Childbirth [Internet]. 2008 Dec 10 [cited 2020 Feb 12];8(1):2. Available from: http://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/1471-2393-8-2

12. Gitonga E. Determinants of Focused Antenatal Care Uptake among Women in Tharaka Nithi County, Kenya. Adv Public Heal. 2017;2017:1–4.

13. Menéndez C, D'Alessandro U, ter Kuile FO. Reducing the burden of malaria in pregnancy by preventive strategies [Internet]. Vol. 7, Lancet Infectious Diseases. Lancet Infect Dis; 2007 [cited 2020 Jun 25]. p. 126–35. Available from: https://pubmed.ncbi.nlm.nih.gov/17251083/

14. Carroli G, Rooney C, Villar J. How effective is antenatal care in preventing maternal mortality and serious morbidity? An overview of the evidence. Paediatr Perinat Epidemiol [Internet]. 2001 Jan [cited 2020 Jun 25];15(s1):1–42. Available from: https://pubmed.ncbi.nlm.nih.gov/11243499/

15. Gamble C, Ekwaru PJ, Garner P, Ter Kuil FO. Insecticide-treated nets for the prevention of malaria in pregnancy: A systematic review of randomised controlled trials [Internet]. Vol. 4, PLoS Medicine. Public Library of Science; 2007 [cited 2020 Jun 25]. p. 506–15. Available from: /pmc/articles/PMC1831739/?report=abstract

16. Kenya National Bureau of Statistics and ICF Macro. Kenya Demographic and Health Survey 2013-2014. Kenya; 2015 Dec.

17. Pell C, Meñaca A, Were F, Afrah NA, Chatio S, Manda-Taylor L, et al. Factors Affecting Antenatal Care Attendance: Results from Qualitative Studies in Ghana, Kenya and Malawi. PLoS One. 2013 Jan 15;8(1).

18. Ochieng CA, Odhiambo AS. Barriers to formal health care seeking during pregnancy, childbirth and postnatal period: A qualitative study in Siaya County in rural Kenya. BMC Pregnancy Childbirth [Internet]. 2019 Sep 18 [cited 2020 Mar 16];19(1):339. Available from: https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/s12884-019-2485-2

19. Ettarh RR, Kimani J. Influence of Distance to Health Facilities on the Use of Skilled Attendants at Birth in Kenya. Health Care Women Int [Internet]. 2016 Feb 11 [cited 2020 Mar 16];37(2):237–49. Available from: http://www.tandfonline.com/doi/full/10.1080/07399332.2014.908194

20. Van Eijk AM, Bles HM, Odhiambo F, Ayisi JG, Blokland IE, Rosen DH, et al. Use of antenatal services and delivery care among women in rural western Kenya: A community based survey. Vol. 3, Reproductive Health. BioMed Central; 2006. p. 2.

21. Michie S, van Stralen MM, West R. The behaviour change wheel: A new method for characterising and designing behaviour change interventions. Implement Sci [Internet]. 2011 Apr 23 [cited 2020 Mar 14];6(1):42. Available from: http://implementationscience.biomedcentral.com/articles/10.1186/1748-5908-6-42

22. McDougall GJ, Dalmida SG, Foster PP, Burrage J, Burrage J. Barriers and Facilitators to HIV Testing Among Women. HIV/AIDS Res Treat open J [Internet]. 2016 [cited 2019 Oct 14];2016(SE1):S9–13. Available from: http://www.ncbi.nlm.nih.gov/pubmed/29607406

23. Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for use in behaviour change and implementation research. Implement Sci [Internet]. 2012 Apr 24 [cited 2020 Mar 11];7(1):37. Available from:

http://implementationscience.biomedcentral.com/articles/10.1186/1748-5908-7-37

24. Howlett N, Schulz J, Trivedi D, Troop N, Chater A. A prospective study exploring the construct and predictive validity of the COM-B model for physical activity. J Health Psychol [Internet]. 2019 Sep 27 [cited 2020 Mar 11];24(10):1378–91. Available from: http://www.ncbi.nlm.nih.gov/pubmed/29172808

25. Myer L, Harrison A. Why do womn seek antenatal care late? Perspectives from rural South Africa. J Midwifery Women's Heal [Internet]. 2003 Jul [cited 2020 Jun 22];48(4):268–72. Available from: https://pubmed.ncbi.nlm.nih.gov/12867911/

26. Morroni C, Moodley J. The role of urine pregnancy testing in facilitating access to antenatal care and abortion services in South Africa: a cross-sectional study. BMC Pregnancy Childbirth [Internet]. 2006 Dec 7 [cited 2020 Jan 31];6(1):26. Available from: https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/1471-2393-6-26

27. Jeffery BS, Tsuari M, Pistorius LR, Makin J, Pattinson RC. The impact of a pregnancy confirmation clinic on the commencement of antenatal care. S Afr Med J [Internet]. 2000 Feb [cited 2020 Jan 31];90(2):153–6. Available from: http://www.ncbi.nlm.nih.gov/pubmed/10745970

28. Konje ET, Magoma MTN, Hatfield J, Kuhn S, Sauve RS, Dewey DM. Missed opportunities in antenatal care for improving the health of pregnant women and newborns in Geita district, Northwest Tanzania 11 Medical and Health Sciences 1117 Public Health and Health Services. BMC Pregnancy Childbirth [Internet]. 2018 Oct 5 [cited 2020 Jun 25];18(1):394. Available from: https://bmcpregnancychildbirth.biomedcentral.com/articles/10.1186/s12884-018-2014-8

29. Stekelenburg J, Kyanamina S, Mukelabai M, Wolffers I, Van Roosmalen J. Waiting too long: Low use of maternal health services in Kalabo, Zambia. Trop Med Int Heal [Internet]. 2004 Mar [cited 2020 Jun 25];9(3):390–8. Available from: https://pubmed.ncbi.nlm.nih.gov/14996369/

30. Okedo-Alex IN, Akamike IC, Ezeanosike OB, Uneke CJ. Determinants of antenatal care utilisation in sub-Saharan Africa: A systematic review. BMJ Open. 2019 Oct 1;9(10).

31. Nguyen H, Snider J, Ravishankar N, Magvanjav O. Assessing public and private sector contributions in reproductive health financing and utilization for six sub-Saharan African countries. Reprod Health Matters [Internet]. 2011 Jan 17 [cited 2020 Jun 15];19(37):62–74. Available from: https://www.tandfonline.com/doi/full/10.1016/S0968-8080%2811%2937561-1

32. Melton B, Lai Z. Review of community pharmacy services: what is being performed, and where are the opportunities for improvement? Integr Pharm Res Pract [Internet]. 2017 Mar [cited 2020 Jun 25];Volume 6:79–89. Available from: /pmc/articles/PMC5774328/?report=abstract

33. Gonsalves L, Hindin MJ. Pharmacy provision of sexual and reproductive health commodities to young people: a systematic literature review and synthesis of the evidence [Internet]. Vol. 95, Contraception. Elsevier USA; 2017 [cited 2020 Jun 25]. p. 339–63. Available from: https://pubmed.ncbi.nlm.nih.gov/28025018/

34. Sudhinaraset M, Ingram M, Lofthouse HK, Montagu D. What Is the Role of Informal

Healthcare Providers in Developing Countries? A Systematic Review. Derrick GE, editor. PLoS One [Internet]. 2013 Feb 6 [cited 2020 May 13];8(2):e54978. Available from: https://dx.plos.org/10.1371/journal.pone.0054978

35. Smith F. Private local pharmacies in low- and middle-income countries: A review of interventions to enhance their role in public health. Vol. 14, Tropical Medicine and International Health. 2009. p. 362–72.

36. Dettinger JC, Kinuthia J, Pintye J, Mwongeli N, Gómez L, Richardson BA, et al. PrEP Implementation for Mothers in Antenatal Care (PrIMA): Study protocol of a cluster randomised trial. BMJ Open. 2019 Mar 1;9(3).

37. Adjiwanou V, Bougma M, LeGrand T. The effect of partners' education on women's reproductive and maternal health in developing countries. Soc Sci Med. 2018 Jan 1;197:104–15.

38. Yaya S, Bishwajit G, Ekholuenetale M, Shah V, Kadio B, Udenigwe O. Timing and adequate attendance of antenatal care visits among women in Ethiopia. Larson BA, editor. PLoS One [Internet]. 2017 Sep 18 [cited 2020 Jun 21];12(9):e0184934. Available from: https://dx.plos.org/10.1371/journal.pone.0184934

39. Pell C, Meñaca A, Were F, Afrah NA, Chatio S, Manda-Taylor L, et al. Factors Affecting Antenatal Care Attendance: Results from Qualitative Studies in Ghana, Kenya and Malawi. Moormann AM, editor. PLoS One [Internet]. 2013 Jan 15 [cited 2020 Feb 16];8(1):e53747. Available from: https://dx.plos.org/10.1371/journal.pone.0053747

40. Asweto CO, Aluoch JR, Obonyo CO, Ouma JO. Maternal Autonomy, Distance to Health Care Facility and ANC Attendance: Findings from Madiany Division of Siaya County, Kenya. Am J Public Heal Res. 2014 Aug 6;2(4):153–8.

41. Makate M, Makate C. Prenatal care utilization in Zimbabwe: Examining the role of community-level factors. J Epidemiol Glob Health. 2017 Dec 1;7(4):255–62.

42. Wilunda C, Scanagatta C, Putoto G, Montalbetti F, Segafredo G, Takahashi R, et al. Barriers to utilisation of antenatal care services in South Sudan: a qualitative study in Rumbek North County. Reprod Health [Internet]. 2017 Dec 22 [cited 2020 Jun 19];14(1):65. Available from: http://reproductive-health-journal.biomedcentral.com/articles/10.1186/s12978-017-0327-0

43. Kotoh AM, Boah M. "No visible signs of pregnancy, no sickness, no antenatal care": Initiation of antenatal care in a rural district in Northern Ghana. BMC Public Health [Internet]. 2019 Aug 13 [cited 2020 Jun 8];19(1):1094. Available from: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-7400-2

44. Simkhada B, Teijlingen ER van, Porter M, Simkhada P. Factors affecting the utilization of antenatal care in developing countries: systematic review of the literature. J Adv Nurs [Internet]. 2008 Jan 9 [cited 2020 Jun 22];61(3):244–60. Available from: http://doi.wiley.com/10.1111/j.1365-2648.2007.04532.x

45. Elo IT. Social class differentials in health and mortality patterns and explanation in comparative perspective. Annu Rev Sociol. 2009;35:553–72.

46. Hahn RA, Truman BI. Education Improves Public Health and Promotes Health Equity. Int

J Heal Serv [Internet]. 2015 Oct 19 [cited 2019 Apr 22];45(4):657–78. Available from: http://journals.sagepub.com/doi/10.1177/0020731415585986

47. Aliyu AA, Dahiru T. Predictors of delayed Antenatal Care (ANC) visits in Nigeria: secondary analysis of 2013 Nigeria Demographic and Health Survey (NDHS). Pan Afr Med J [Internet]. 2017 [cited 2020 Jun 21];26:124. Available from: /pmc/articles/PMC5429423/?report=abstract

48. Tekelab T, Chojenta C, Smith R, Loxton D. Factors affecting utilization of antenatal care in Ethiopia: A systematic review and metaanalysis. PLoS One [Internet]. 2019 Apr 1 [cited 2020 Jun 22];14(4). Available from: /pmc/articles/PMC6459485/?report=abstract

49. Gebremeskel F, Dibaba Y, Admassu B. Timing of First Antenatal Care Attendance and Associated Factors among Pregnant Women in Arba Minch Town and Arba Minch District, Gamo Gofa Zone, South Ethiopia [Internet]. Journal of Environment and Public Health. 2015 [cited 2020 Jun 22]. Available from: https://www.hindawi.com/journals/jeph/2015/971506/

50. Gudayu TW. Proportion and Factors Associated with late Antenatal Care Booking among Pregnant Mothers in Gondar Town, North West Ethiopia. Afr J Reprod Health. 2015;19(2):93.

51. Tesfaye G, Loxton D, Chojenta C, Semahegn A, Smith R. Delayed initiation of antenatal care and associated factors in Ethiopia: a systematic review and meta-analysis. Reprod Health [Internet]. 2017 Dec 15 [cited 2020 Feb 7];14(1):150. Available from: https://reproductive-health-journal.biomedcentral.com/articles/10.1186/s12978-017-0412-4

52. Global WACh. Can community pharmacies in Kenya improve early access to antenatal and HIV prevention care? Dr. Melissa Mugambi awarded NIH Diversity Award to explore feasibility | Global WACh [Internet]. Global WACh blog. 2019 [cited 2020 Jun 26]. Available from: https://depts.washington.edu/gwach/div-supp-award-mugambi/

53. Sneeringer RK, Billings DL, Ganatra B, Baird TL. Roles of pharmacists in expanding access to safe and effective medical abortion in developing countries: A review of the literature [Internet]. Vol. 33, Journal of Public Health Policy. Palgrave; 2012 [cited 2020 Jun 26]. p. 218–29. Available from: https://link.springer.com/article/10.1057/jphp.2012.11

54. Garcia P, Hughes J, Carcamo C, Holmes KK. Training pharmacy workers in recognition, management, and prevention of STDs: District-randomized controlled trial. Bull World Health Organ [Internet]. 2003 [cited 2020 Jun 26];81(11):806–14. Available from: /pmc/articles/PMC2572366/?report=abstract

55. Abeje G, Admasie C, Wasie B. Factors associated with self medication practice among pregnant mothers attending antenatal care at governmental health centers in Bahir Dar city administration, Northwest Ethiopia, a cross sectional study. Pan Afr Med J [Internet]. 2015 [cited 2020 Jun 24];20:276. Available from: /pmc/articles/PMC4483357/?report=abstract

56. Kebede B, Gedif T, Getachew A. Assessment of drug use among pregnant women in Addis Ababa, Ethiopia. Pharmacoepidemiol Drug Saf [Internet]. 2009 [cited 2020 Jun 24];18(6):462–8. Available from: https://pubmed.ncbi.nlm.nih.gov/19334033/

57. Eze UI, Eferakeya AE, Oparah AC, Enato EF. Assessment of prescription profile of pregnant women visiting antenatal clinics. Pharm Pract (Granada) [Internet]. 2007 [cited 2020 Jun 24];5(3):135–9. Available from: https://pubmed.ncbi.nlm.nih.gov/25214930/

58. Riley C, Dellicour S, Ouma P, Kioko U, Ter Kuile FO, Omar A, et al. Knowledge and adherence to the national guidelines for malaria case management in pregnancy among healthcare providers and drug outlet dispensers in rural, western Kenya. PLoS One [Internet]. 2016 Jan 1 [cited 2020 Jun 26];11(1). Available from: https://pubmed.ncbi.nlm.nih.gov/26789638/

59. Peters MDJ, Godfrey CM, Khalil H, McInerney P, Parker D, Soares CB. Guidance for conducting systematic scoping reviews. Int J Evid Based Healthc [Internet]. 2015 Sep 1 [cited 2020 Jun 24];13(3):141–6. Available from: http://content.wkhealth.com/linkback/openurl?sid=WKPTLP:landingpage&an=01787381-201509000-00005

60. Sucharew H, Macaluso M. Methods for research evidence synthesis: The scoping review approach [Internet]. Vol. 14, Journal of Hospital Medicine. Frontline Medical Communications; 2019 [cited 2020 Jun 26]. p. 416–8. Available from: https://www.journalofhospitalmedicine.com/jhospmed/article/202729/hospital-medicine/methods-research-evidence-synthesis-scoping-review

61. Arksey H, O'Malley L. Scoping studies: Towards a methodological framework. Int J Soc Res Methodol Theory Pract [Internet]. 2005 Feb [cited 2020 Jun 26];8(1):19–32. Available from: https://www.tandfonline.com/doi/abs/10.1080/1364557032000119616

62. O'Reilly E, Frederick E, Palmer E. Models for pharmacist-delivered tobacco cessation services: a systematic review [Internet]. Vol. 59, Journal of the American Pharmacists Association. Elsevier B.V.; 2019 [cited 2020 Jun 24]. p. 742–52. Available from: https://pubmed.ncbi.nlm.nih.gov/31307963/

63. Dent LA, Harris KJ, Noonan CW. Tobacco interventions delivered by pharmacists: a summary and systematic review. Pharmacotherapy [Internet]. 2007 Jul [cited 2020 Jun 24];27(7):1040–51. Available from: http://www.ncbi.nlm.nih.gov/pubmed/17594210

64. Agomo CO. The role of community pharmacists in public health: A scoping review of the literature. J Pharm Heal Serv Res. 2012;3(1):25–33.

65. Brown TJ, Todd A, O'malley C, Moore HJ, Husband AK, Bambra C, et al. Community pharmacy-delivered interventions for public health priorities: A systematic review of interventions for alcohol reduction, smoking cessation and weight management, including meta-analysis for smoking cessation. BMJ Open. 2016;6(2).

66. Rosenthal M, Ward LM, Teng J, Haines S. Weight management counselling among community pharmacists: a scoping review [Internet]. Vol. 26, International Journal of Pharmacy Practice. Wiley-Blackwell Publishing Ltd; 2018 [cited 2020 Jun 24]. p. 475–84. Available from: https://pubmed.ncbi.nlm.nih.gov/29732639/

67. Gordon J, Watson M, Avenell A. Lightening the load? A systematic review of community pharmacy-based weight management interventions. Obes Rev [Internet]. 2011 Nov [cited 2020 Jun 24];12(11):897–911. Available from: https://pubmed.ncbi.nlm.nih.gov/21883869/

68. Burson RC, Buttenheim AM, Armstrong A, Feemster KA. Community pharmacies as sites of adult vaccination: A systematic review [Internet]. Vol. 12, Human Vaccines and Immunotherapeutics. Taylor and Francis Inc.; 2016 [cited 2020 Jun 24]. p. 3146–59. Available from: /pmc/articles/PMC5215426/?report=abstract

69. Baroy J, Chung D, Frisch R, Apgar D, Slack MK. The impact of pharmacist immunization programs on adult immunization rates: A systematic review and meta-analysis. J Am Pharm Assoc [Internet]. 2016 Jul 1 [cited 2020 Jun 24];56(4):418–26. Available from: http://www.japha.org/article/S1544319116300218/fulltext

70. Morgado MP, Morgado SR, Mendes LC, Pereira LJ, Castelo-Branco M. Pharmacist interventions to enhance blood pressure control and adherence to antihypertensive therapy: Review and meta-analysis. Am J Heal Pharm [Internet]. 2011 Feb 1 [cited 2020 Jun 24];68(3):241–53. Available from: https://pubmed.ncbi.nlm.nih.gov/21258029/

71. Stanton-Robinson C, Al-Jumaili AA, Jackson A, Catney C, Veach S, Witry MJ. Evaluation of community pharmacist–provided telephone interventions to improve adherence to hypertension and diabetes medications. J Am Pharm Assoc. 2018 Jul 1;58(4):S120–4.

72. Martínez-Mardones F, Fernandez-Llimos F, Benrimoj SI, Ahumada-Canale A, Plaza-Plaza JC, S. Tonin F, et al. Systematic Review and Meta-Analysis of Medication Reviews Conducted by Pharmacists on Cardiovascular Diseases Risk Factors in Ambulatory Care. Vol. 8, Journal of the American Heart Association. American Heart Association Inc.; 2019.

73. Espinosa Y, Córdova P, Fernández P, Morales F, Villa L. Evaluating the role of clinical pharmacists in providing pharmaceutical care to improve adherence in hypertensive patients at a rural hospital in southern chile: A pilot study. J Res Pharm Pract. 2019;8(4):214.

74. Dillip A, Kimatta S, Embrey M, Chalker JC, Valimba R, Malliwah M, et al. Can formalizing links among community health workers, accredited drug dispensing outlet dispensers, and health facility staff increase their collaboration to improve prompt access to maternal and child care? A qualitative study in Tanzania. BMC Health Serv Res [Internet]. 2017 Jun 19 [cited 2020 May 13];17(1):416. Available from: http://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-017-2382-1

75. Mbonye AK, Magnussen P, Bygbjerg IB. Intermittent preventive treatment of malaria in pregnancy: the effect of new delivery approaches on access and compliance rates in Uganda. Trop Med Int Heal [Internet]. 2007 Apr 16 [cited 2020 Jun 25];12(4):519–31. Available from: http://doi.wiley.com/10.1111/j.1365-3156.2007.01819.x

76. Young S, Ali SM, Beckham S. The potential role of private pharmacies in maternal iron supplementation in rural Tanzania. Food Nutr Bull [Internet]. 2009 [cited 2020 Jun 25];30(1):16–23. Available from: https://pubmed.ncbi.nlm.nih.gov/19445256/

77. Tsao NW, Marra CA, Lynd LD, Thomas JM, Ferreira E. Community pharmacist surveillance of hypertension in pregnancy: Are we ready for prime time? Can Pharm J [Internet]. 2014 Sep 11 [cited 2020 Jun 25];147(5):307–15. Available from: /pmc/articles/PMC4213270/?report=abstract

78. Truong MB-T, Ngo E, Ariansen H, Tsuyuki RT, Nordeng H. Community pharmacist counseling in early pregnancy—Results from the SafeStart feasibility study. Shiyanbola OO, editor. PLoS One [Internet]. 2019 Jul 19 [cited 2020 Jun 25];14(7):e0219424. Available from: https://dx.plos.org/10.1371/journal.pone.0219424

79. Albassam A, Awad A. Community pharmacists' services for women during pregnancy and breast feeding in Kuwait: A cross-sectional study. BMJ Open [Internet]. 2018 Jan 1 [cited 2020 Jun 25];8(1). Available from: https://pubmed.ncbi.nlm.nih.gov/29306891/

80. Boonyaprapa S. Self-care in pregnancy and breastfeeding: views of women and community pharmacists in Thailand. 2010 Dec 9;

81. FIP statement of policy the effective utilization of pharmacists in improving maternal, newborn and child health (MNCH). Dublin; 2013.

82. Hermansyah A, Sainsbury E, Krass I. Community pharmacy and emerging public health initiatives in developing Southeast Asian countries: a systematic review. Vol. 24, Health and Social Care in the Community. Blackwell Publishing Ltd; 2016. p. e11–22.

Appendix

Operational definitions used in Aim 1

Characteristics	Operational definition
Early antenatal care (ANC) access	Early ANC access was defined as initiation of the first ANC visit during the first 12 weeks of pregnancy
Maternal age	Maternal age was categorized into either of three age categories: "15-19 years", "20-24 years", "≥ 25 years)"
Maternal education	Maternal education was dichotomized into "currently in school" or "not currently in school"
Maternal employment	Maternal employment was dichotomized into "employed" or "not employed"
Marital status	Marital status was dichotomized into "currently married" (including married, come we stay) or "not currently married" (including single, divorced, widowed, and steady boyfriend).
Partners' education attainment	Partners education status was categorized into three categories: "primary school and below" (respondents with no formal schooling, and respondents who at least attended primary school), "some high school" (respondents who at least attended high school), and "some college "(respondents who at least attended college).
Parity	Parity was dichotomized into "previously pregnant" or "not previously pregnant"
Prior pregnancy complications	Prior pregnancy complications was dichotomized into "had prior pregnancy complications" or "did not have prior pregnancy complications"
Travel time to health facility	Travel time was dichotomized into ">30minutes" or "≤ 30 minutes" to health facility
Location of health facility	Location was dichotomized into "urban" or "rural" health facilities