

**Assessing Compliance to the World Health Organization Schedule for Antenatal  
Care in Swaziland: A retrospective Analysis**

**By**

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## Declaration

I declare that the dissertation titled **“Assessing Compliance to the World Health Organization schedule for Antenatal Care visits in Swaziland: A retrospective analysis”** which I hereby submit for the degree Master of Public Health to the University of Pretoria is my own original work and where other people’s work has been used, it has been properly acknowledged and referenced. Neither this work, nor any part of it, has been submitted to any other tertiary institution for any degree or diploma.

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May the Almighty God bless you all.

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## Dedication

To my mom and dad, your words of inspiration and encouragement to pursue this milestone still linger on. I know exactly what you would say right now; "It's not the end but only the beginning". You tirelessly played your part in raising me up and I will continue making you proud. Mom and dad I know without doubt that you are sitting in Gods' right hand, I always feel your presence. I promise I will strive for better things as you have always taught me. I thank you once again for loving me and giving me the best in life. I will always love the two of you and treasure what you instilled in me.

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## List of Acronyms

AIDS	Acquired Immuno Deficiency Syndrome
ANC	Antenatal Care
ARVs	Antiretroviral Therapy
SDHS	Swaziland Demographic Health Survey
EDD	Expected Date of Delivery
FANC	Focused Antenatal Care
HIS	Health Information Systems
HIV	Human Immuno Virus
IPT	Intermittent Prevention Therapy
ITN	Insecticide Treated Nets
MICS	Multiple Indicator Cluster Survey
MIP	Malaria In Pregnancy
MMR	Maternal Mortality Ratio
MNCH	Maternal Neonatal and Child Health
NGO	Non Governmental Organization
PIH	Pregnancy Induced Hypertension
PMTCT	Prevention of Mother-To-Child Transmission
RCTs	Randomized Control Trials
SRH	Sexual Reproductive Health
SSA	Sub Saharan Africa
STI	Sexually Transmitted Infections
TB	Tuberculosis
TT	Tetanus Toxoid
UNDP	United Nations Development Programme
WHO	World Health Organization



## Definition of terms

Table 1: Definition of Terms

Term	Definition
Compliance	Adherence to a standard expectation. In this study compliance is measured based on the recommended WHO focused ANC schedule
Focused ANC	A WHO recommendation for offering antenatal care services
Gestation period	The time between conception and birth (pregnancy)
Gravidity	A number of pregnancies a women has ever had regardless of whether children are alive or dead
Primigravida	A woman's first pregnancy
gandmultipara	A woman who has given birth to 5 or more children
Parity	Number of children a women has ever had
Perinatal	A period commencing between 22 weeks of gestation and seven days after delivery
Postnatal	The period starting immediately after delivery extending to 6 weeks after giving birth

## Executive Summary

In 2001, the World Health Organization (WHO) proposed to developing countries a different approach to antenatal care (ANC) service delivery called the “Goal-oriented” or “focused ANC” (FANC) approach. Since then, a number of countries have adopted this approach and Swaziland is one of the countries. Fundamentally, this model helps in reducing the number of ANC visits women need to make during pregnancy, placing more emphasis on birth planning, emergency preparedness and identification, prevention and management of life threatening complications during pregnancy, labour and delivery.

Swaziland like many African states has encountered several challenges in implementing this approach. About 97 percent of pregnant women visit health facilities during pregnancy, close to 80 percent make at least four ANC visits (Swaziland Demographic and Health Survey 2006/7) but the challenge is the country does not have empirical evidence on compliance to the WHO focused approach.

To assess compliance with the Focused ANC approach among women in Swaziland, a retrospective desk review of ANC records was undertaken in 17 ANC facilities identified as ANC sentinel sites. The review used records of pregnant women attending ANC from 2010 to 2012.

The primary objective was to assess compliance with the WHO FANC approach, using data from 2010-2012. The limitation of the study approach is that only existing information collected for patient monitoring was used, therefore additional information that would have been necessary for the analysis was unfortunately unavailable. There was no contact made with the women during data collection process.

Epi-info was used for electronic data capturing. Data was then imported to STATA version 12 for analysis. A p-value of 0.05 was considered for statistical significance. The total sample size used was 1264 records. Descriptive statistics were generated to compare demographic information. Compliance was estimated by combining the four visits made by each woman and comparing visits with the WHO schedule for visits. Fishers exact test was used to test for probable demographic and health

factors associated with compliance. The multivariate logistic regression model was used to estimate the coefficients for ANC compliance according to demographic and health factors and to control for potential confounders.

Ethical clearance to conduct the study was sought from the Ministry of Health Scientific and Ethics Committee in Swaziland as well as the University of Pretoria. Permission to access data was also sought from the Strategic Information Department in the Ministry of Health.

Results from this study will be used as a baseline since no other study on compliance has been done in Swaziland. The results will also be used to inform future FANC implementation as Swaziland has already reviewed the focused ANC guidelines. On the other hand, WHO is reviewing the focused ANC guidelines which will be shared with countries for adaptation. This study has come just at an opportune time as results can also be used to inform the finalization of the new FANC guidelines at the global level.

The findings will be presented at the University of Pretoria School of Health Systems and Public Health seminar and also at a national stakeholders' meeting, as well as local and international conferences. Findings will also be published in the WHO Bulletin.

The study found that women in Swaziland did not comply with the Focused ANC schedule. Overall compliance was 0.87% (CI: 0.4-1.4). There was however an observed improvement in compliance over the years, where women who presented for ANC in 2012 were four (4) times more compliant than those who presented in 2010 (OR: 3.8).

These findings are presented as a journal article in partial fulfilment of the requirements for the award of a Master's degree in Public Health at the University of Pretoria. Miss. Nomsa Mulima is the first author and Professor Andy Beke and SAS Shade Ajayi Steve Olorunju are the second and third authors respectively.

## **PART ONE: RESEARCH PROTOCOL**

### **1 Introduction and Literature Review**

#### **1.1 Introduction**

Maternal mortality is one of the many public health problems faced by countries where every minute a woman dies due to complications in pregnancy. Ninety nine percent of the deaths occur in developing countries, especially in Sub Saharan Africa (SSA). Maternal mortality contributes at least 18 percent to the burden of diseases among women of sexual reproductive age groups<sup>1</sup>. For every maternal death, there are 15-20 other women who suffer other pregnancy complications such as severe disabilities that affect their reproductive health and socio-economic status<sup>1</sup>.

Having a healthy pregnancy starts with a woman attending antenatal care (ANC) with skilled health personnel. ANC is care and education given to women during pregnancy<sup>2</sup>. It entails promotion and maintenance of physical and mental health of the pregnant women; early detection of conditions or irregularities that may arise during pregnancy; promotion of access to treatment and prevention services; ensuring delivery of full term babies as well as helping prepare for infant feeding<sup>2</sup>.

The provision of ANC within the public health system was stimulated by the realization that maternal deaths were declining but somehow deaths due to eclampsia were on the increase and for countries to avert eclampsia related deaths, early interventions were to be done during pregnancy<sup>3</sup>. The ANC period presents an opportunity to reach out pregnant women with a number of interventions that are critical for both their health and the health of the unborn child. The recommended standard package offered at ANC is as follows<sup>3 4</sup>;

- Screening and testing for TB, HIV, malaria and Sexually Transmitted Infections (STIs);

- Physical examination to determine early interventions for treatment of severe anaemia and testing of pre-eclampsia/eclampsia;
- Preventive measures include prevention of Tetanus toxoid, giving of iron/folate supplements, PMTCT interventions; prevention of TB by issuing Intermittent Prevention Therapy (IPT) and malaria by giving Insecticide Treated Nets (ITNs).
- For birth preparedness, women are sensitized on health facility based deliveries, educated on infant feeding, preparedness on emergency deliveries, budgeting and planning for delivery and on available modes of delivery.

With the growing awareness of maternal deaths, the WHO working with countries introduced different ANC approaches for countries to adopt, mostly used are the “Risk” and “Focused ANC” approaches.

The traditional “Risk” approach is commonly used in developed countries. With this approach, ANC visit schedules are predetermined by the level of risks identified by clinicians during initial ANC booking. In developed countries this approach works effectively because of the high quality health care systems and adequate human resource and infrastructure, where women can spend as much time with clinicians as possible and still be able to undergo the expected ANC service package without overburdening the service delivery system.

From a financial and logistical view point, the “Risk” approach has not been practical in developing countries. A majority of pregnant women in developing countries cannot afford to make regular clinic visits because of transport costs and work environments that do not allow for absenteeism. On the other hand, health care systems in developing countries are under-resourced, with inadequate human resources, limited screening skills and insufficient infrastructure. For developing countries, the “Risk” approach has contributed immensely on home deliveries that are assisted by unskilled traditional birth attendants. Due to the manner of the “Risk” approach and lack of capacity in screening during pregnancy, a majority of pregnancies end up being misclassified as low or high risk pregnancies. In an

attempt to respond to the above challenges, the WHO recommends the Focused ANC approach to developing countries.

Randomised Control Trials were commissioned by the WHO in 2001 to assess the effectiveness of the FANC model, compared to the traditional “Risk” approach. Findings from the assessment revealed that service providers and pregnant women were in favour of the FANC model as it reduced

The FANC approach gained much popularity because of its effectiveness in the reduction of maternal and perinatal mortality and morbidity, especially in developing countries. The FANC ensures that women are offered specific evidence based interventions which are carried out at certain gestation periods during the pregnancy as strongly outlined in the WHO FANC guidelines. The FANC approach is based on evidence derived from Randomized Control Trials (RCTs) spearheaded by WHO in Argentina, Cuba, Saudi Arabia and Thailand. Findings from the RCTs showed that antenatal care services can be provided within four visits and at specified gestation periods, at least for a normal pregnancy<sup>5</sup>. The findings also showed that the FANC approach reduced antenatal care visits.

The goal of the FANC is mainly to promote maternal and newborn health and survival through early detection and treatment of problems and complications; prevention of complications and disease; birth preparedness and complication readiness and health promotion. In a nutshell, the FANC approach focuses on quality versus quantity visits and on ensuring that personnel assisting in delivering a baby have received formal training and have experience, knowledge and skills to deliver safe effective maternal and newborn health care practices. The following table illustrates the interventions given within the FANC schedule<sup>5</sup>;

**Table 2: Schedule for the WHO Focused ANC visits**

Goals	First Visit (8-14 weeks)	Second visit (24-28 weeks)	Third Visit (30-32 weeks)	Forth Visit (36-38 weeks)
	<ul style="list-style-type: none"> <li>➤ Confirm pregnancy and EDD,</li> <li>➤ Classify women for basic ANC or more specialized care.</li> <li>➤ Screen, treat and give preventive measures.</li> <li>➤ Develop an emergency plan.</li> <li>➤ Advise and counsel.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Assess maternal and fetal well-being.</li> <li>➤ Exclude PIH and anaemia.</li> <li>➤ Give preventive measures.</li> <li>➤ Review and modify birth and emergency plan.</li> <li>➤ Advise and counsel</li> </ul>	<ul style="list-style-type: none"> <li>➤ Assess maternal and fetal well-being.</li> <li>➤ Exclude PIH, anaemia and multiple pregnancy</li> <li>➤ Give preventive measures.</li> <li>➤ Review and modify birth and emergency plan.</li> <li>➤ Advise and counsel</li> </ul>	<ul style="list-style-type: none"> <li>➤ Assess maternal and fetal well-being.</li> <li>➤ Exclude PIH, anaemia, multiple pregnancies and malpresentation</li> <li>➤ Give preventive measures.</li> <li>➤ Review and modify birth and emergency plan.</li> <li>➤ Advise and counsel</li> </ul>

Source: WHO 2006<sup>5</sup>

## 1.2 Benefits of the Focused Antenatal care approach

The aim of FANC is to help women remain healthy during pregnancy and to give birth to a healthy baby. ANC services are tailored at providing support and guidance to pregnant women through education, treatment, care and support. Early and regular ANC is critical as pregnancy risk factors can be identified and mitigated early in pregnancy. Evidence shows that women who present early for ANC and make regular ANC visits are more likely to deliver in health facilities, thus reducing the risks of either the mother or the baby dying during labour, delivery and postnatal<sup>3</sup>. Almost half of maternal deaths are due to eclampsia and antepartum haemorrhage and both these causes are often related to poor care during pregnancy<sup>5</sup>.

In Swaziland, with the high burden of TB, pregnant women are screened for TB at every ANC visit and those diagnosed with TB are immediately referred for treatment. For malaria, the same initiative as that for TB applies, where women are screened

for malaria and referred for treatment if found to be positive and for women who come from malaria endemic areas, ITNs are given.

FANC is the best approach for resource limited countries where health professionals are few and health infrastructure is limited. The approach also helps reduce the number of ANC visits made by women, thus reducing the costs incurred by women as especially on transport. Studies such as that by Lincetto et al revealed that women tended to miss ANC appointments due to lack of money for transport to the ANC facilities<sup>6</sup>.

Women who attend ANC normally make informed decisions. With the advent of HIV, ANC especially in Sub Saharan Africa has proven to have a positive effect in reducing HIV transmission from mother to the unborn child. Women who attend ANC are highly likely to get tested for HIV and syphilis as early as they present for ANC booking. ANC gives women an opportunity to receive early treatment and care of HIV as they are closely monitored throughout pregnancy. With the roll-out of “option B-plus”, women have been prioritized to getting HIV treatment in the early stages of HIV.

An estimated 900,000<sup>5</sup> babies are reported to have died within the last twelve weeks of pregnancy in Sub-Saharan Africa and the deaths are mainly attributed to maternal infections such as syphilis restricted fetal growth, congenital infections and alcohol syndrome. In areas where women are closely monitored throughout pregnancy, maternal and neonatal deaths are very low, which simply shows that early and regular ANC bookings are very essential during pregnancy.

### **1.3 Maternal and Neonatal Child Health (MNCH) services in Swaziland**

#### **1.3.1 Country background**

Swaziland is situated in the Southern part of Africa and covers a surface of 17,364<sup>2</sup> KM. According to the 2007 Swaziland population census, the population was estimated at 1,018,449 with an annual growth rate of 0.9 per annum<sup>7</sup>. Swaziland has



four regions, namely Hhohho, Manzini, Lubombo and Shiselweni. The age group 15-49 years constitutes half the population and 51.1 percent of these are females<sup>8</sup>. An estimated 78 percent of the population resides in the rural areas. Maternal mortality in Swaziland has been estimated at 320/ 100 000 live births. The country has an estimated 33,000<sup>9</sup> annual pregnancies with 97 percent of attending ANC during pregnancy<sup>7</sup>.

There are 265 health facilities in the country with 172 offering antenatal care services and 88 percent offering Prevention of Mother to Child Transmission services (PMTCT)<sup>10</sup>. To address the increase in maternal deaths, Swaziland has integrated HIV services in Maternal and Neonatal Child Health (MNCH) services (ANC, labour and delivery, Post Natal Care as well as child welfare). The integration of HIV services within MNCH has contributed to 90 percent pregnant women knowing their HIV status and about 87 percent of those in need of PMTCT prophylaxis receiving ARVs, where over half received ART for their own health<sup>9</sup>.

In 2001, Swaziland adopted the WHO focused ANC schedule but unfortunately this approach was poorly emphasized in the 2003 Sexual Reproductive Health (SRH) strategic plan. In 2010, the country reviewed the SRH strategy and ensured that the FANC was well advocated and revitalized.

Within the antenatal care approach, women are expected to book within 14 weeks<sup>11</sup> of pregnancy for ANC so that health threatening conditions can be identified early for treatment and care. Swaziland has a high HIV prevalence among pregnant women (41.1 percent)<sup>12</sup>, which has perpetuated an increase in maternal deaths<sup>13</sup>. With the high burden of HIV among pregnant women, regular and early ANC is very critical as women are initiated on HIV treatment early and are closely followed by a skilled health care professional throughout pregnancy up to the time they deliver.

As highlighted, the FANC has also been highlighted on the 2010 PMTCT guidelines and with this change, data collection tools at facilities have also been reviewed to

cater for the FANC approach, emphasizing on early ANC bookings (14 weeks). According to the Swaziland Demographic Health Survey (SDHS), 79 percent of women make at least the 4 expected ANC visits<sup>4,14</sup>. Forty eight percent make their first ANC visit during the second trimester and over 23 percent make their first visit during the third trimester<sup>15</sup>.

Since 2010 Swaziland has made efforts to strengthen the FANC implementation in health facilities and country efforts are clearly outlined in the 2010 PMTCT guidelines<sup>7,16</sup>. There is limited literature on the FANC implementation in Swaziland as the only available information is from the SDHS 2006/7 and the Multiple Indicator Cluster Survey (MICS 2010), which only shows the proportion of women attending ANC and the proportion of women per visit number. Unfortunately measuring ANC coverage alone does not provide information on progress made towards the implementation of the FANC approach.

## 1.4 Review of Literature

The aim of the literature review was to identify and synthesize relevant evidence available from published literature that would give guidance on specific results from this study.

The focused ANC approach was informed by a Randomized Control Trial (RCT) which was commissioned through WHO in 53 ANC clinics from different countries (Cuba, Argentina, Saudi Arabia Thailand)<sup>4</sup>. Findings from the trials revealed that using the focused ANC approach produced similar maternal and perinatal outcomes to those clinics that conducted the standard (High risk) approach. Women and health care providers also recommended the FANC approach as it reduced overburdened health care systems as women were making fewer visits with more time given to each woman during the visits<sup>17</sup>.

Other studies have concentrated on the sustainability of the WHO recommended four-focused ANC model. In a study conducted in Kenya<sup>18</sup>, it was found that sustainability of this approach was dependent on partner support and government

efforts were inadequate. The study also revealed that timing of ANC visits even after interventions by partners and governments remained unchanged<sup>19 20 21</sup>.

Maternal Mortality Ratio (MMR) remains the key indicator to measure the effectiveness of health care systems in developing countries and is often used to show health differentials between developed and developing countries. MMR is highest in developing countries, therefore considered a public health problem<sup>22</sup>. There is unfortunately limited evidence to show that ANC can drastically reduce maternal mortality as only 25 percent of maternal deaths occur during pregnancy and the bigger proportion of deaths occurring during delivery and post partum<sup>23</sup>. Worth noting however is that safe delivery and postpartum care are linked to regular ANC visits, therefore all opportunities of contact with a pregnant woman must be used optimally. Women in Sub-Saharan countries make at least one ANC visit but fewer are delivered by skilled attendants. This also gives a good justification why it is essential to ensure women follow the focused ANC approach.

About 97 percent of pregnant women attend ANC as already mentioned and this gives an opportunity to most pregnant women to receive interventions that may reduce maternal complications and deaths. Another important element to reduce maternal deaths is early ANC booking and regular visits. In Swaziland as mentioned above, 79 percent of women make four or more visits and only 23 percent book within the first trimester<sup>15</sup>. With the limited resources and human capacity, the FANC approach is by far highly recommended as women are expected to make fewer but pertinent visits in Swaziland, mitigating overloads in human capacity and health systems, yet leading to quality ANC.

Compliance to the FANC seems to be a major problem in developing countries. In a study conducted in Beijing on compliance to the ANC model used, a retrospective record review was done and findings show that women did not comply. The mean duration of gestation age during the first ANC was found to be 25.4 +/- 8.8 weeks<sup>24</sup>.

According to a study conducted in Burkina Faso, Uganda and Tanzania women presenting for ANC during the first trimester (within 12 weeks of pregnancy) ranged between 19 to 35 percent and the study also shows that a larger proportion of

women presented for first ANC booking within the last trimester (36 weeks)<sup>25</sup>. This is very critical when measuring compliance as this information will inform the country on when exactly women present for their first ANC bookings. This information will also support data for the PMTCT interventions as the country rolls out the Option B-plus.

There is also evidence that late bookings have strong associations with high parity and gravida<sup>19</sup>. In a cross sectional study conducted in Vietnam, mostly in rural areas with a focus primarily on individual maternal factors. Mother's education, occupation and number of children were found to be important factors for explanation of ANC use variation<sup>26</sup>. There is currently no evidence on influence of regional variations. However, it is known that women in rural areas are more likely to visit ANC facilities than their urban counterparts. Toan K Tran et al also looked at factors associated with ANC adequacy in rural-urban settings of Vietnam, where they found that living in rural areas was significantly associated with inadequate use of ANC services<sup>22</sup>, which is indeed opposite to evidence from the Swaziland DHS 2006/7.

The same study conducted in Burkina Faso, Uganda and Tanzania show that women who book early for ANC and make frequent ANC visits are more likely to deliver in health care facilities compared to those who start ANC late<sup>2</sup>. Swaziland's Maternal Mortality Ratio (MMR) is estimated 320/100 000 live births, largely due to the HIV/AIDS pandemic. This ratio puts Swaziland amongst the countries with the highest MMR. One may need to ascertain why the MMR is high in Swaziland when 97 percent of women come for ANC and 79 percent make four or more ANC visits.

In an assessment conducted in Swaziland to inform the virtual elimination strategy of Mother-To-Child HIV Transmission, only 11 percent of women come within the 14 weeks of gestation<sup>15</sup>. Analysis of Demographic and Health Surveys (DHS) from 45 developing countries showed that women book late for ANC compared to women from the developed countries<sup>2</sup>. On another note, studies conducted in Africa on timing of ANC even show socio-demographic disparities, where younger expectant mothers came late than their older counterparts<sup>27 28</sup>.

Literature from Swaziland shows that the increase in maternal mortality is largely due to the increase in HIV prevalence, which increased from 3.9 percent in 1992 to 41.1 percent in 2010<sup>12</sup>. According to an audit on maternal deaths conducted in Swaziland, HIV and other opportunistic infections accounted for 25 percent of maternal deaths. According to the PMTCT guidelines 2010, the refill schedule for ARVs is aligned to the ANC appointment dates given to the women, therefore making it a necessity to ensure that women comply with the appointment dates.

## **2 Study Justification and study relevance**

### **2.1 Study justification**

Swaziland has been implementing the WHO focused ANC approach since 2001. Guidelines on PMTCT and the SRH strategic plan have been reviewed, ensuring that health care providers implement the FANC approach when rendering ANC services. There has not been any study conducted in the country to measure whether women comply with the FANC, as recommended by the WHO.

### **2.2 Problem statement**

Swaziland still faces high maternal mortality and 25 percent of the deaths are during pregnancy. In the midst of ensuring Swaziland reduces maternal deaths, Swaziland adopted the WHO Focused ANC approach in 2001 but since then there has been no empirical evidence to show progress towards implementation. It is currently not known whether women are compliant with the FANC as expected. What is available is information on ANC attendance and the proportion of women who made four or more visits. This information does not even attempt to answer the question of compliance to an approach that is currently being implemented.

With the FANC approach clearly incorporated in the SRH strategic framework and in the PMTCT guidelines, there is by no doubt a need for information on compliance to

the FANC in Swaziland, especially because ANC data is readily available from the ANC registers that are currently being used in all ANC sites countrywide. Availability of such significant data means compliance with the FANC will be with ease. Since Swaziland has no information on compliance to the FANC, the findings from this study will be used as a baseline and to inform policy and way forward to the implementation of the FANC. The findings as literature from other countries show, will also give global guidance in strengthening compliance to the recommendation by the WHO on the FANC.

### **2.3 Relevance of the study**

Maternal mortality is a public health problem, which has been made one of the Millennium Development Goals (MDGs) that countries committed to reduce drastically by 2/3s by 2015. According to the audit report on maternal deaths, most maternal deaths are due to complications that can be easily prevented through early and regular ANC visits. Compliance to the ANC focused approach is imperative as it contributes to the reduction of maternal mortality. It is therefore very important to measure compliance and to identify factors associated with non-compliance to inform future implementation of the FANC. As mentioned above, the findings will assist in reshaping implementation, advocacy and sensitization in future.

## **3 Study Aim and Objectives**

### **3.1 Study Aim**

The aim of the study was to conduct a retrospective analysis using data from ANC registers to assess compliance to the WHO focused ANC schedule and ascertain factors associated with non-compliance from 2010-2012 in Swaziland.

## 3.2 Study Objectives

### 3.2.1 Primary objective

The primary objective of the study is to assess compliance to the WHO FANC schedule by women attending ANC in health facilities in Swaziland in 2010 to 2012.

### 3.2.2 Secondary objectives

- To assess the mean gestation at first visit,
- To assess associations between compliance to the FANC visits and the different demographic variables (age and region),
- To assess differences in the FANC by region,
- To assess associations between the FANC compliance and parity,
- To assess associations between the FANC compliance and HIV status of women.

## 4 Methods

### 4.1 Study design

The study was conducted to assess compliance to the WHO FANC in Swaziland. The study design used was a retrospective cross-sectional approach, where records of women who attended ANC in 2010 to 2012 at the 17 ANC sentinel sites were reviewed. Appropriate data elements were extracted to assess compliance to the WHO focused ANC. Compliance to the FANC was defined as women who came for ANC within the appropriate ANC schedule as recommended by WHO for all visits. The data elements extracted were as follows;

Table 3: Data elements used for analysis from the ANC register, 2010-2012

<b>Variable</b>	<b>Category</b>
<b>Age</b>	—
<b>Region</b>	Hhohho Lubombo Manzini Shiselweni
<b>Year of enrolment to ANC</b>	2010 2011 2012
<b>Health facility name</b>	Dwaleni Hlatikhulu Lomahasha Luyengo Matsanjeni Dvokolwako Mankayane PHU Mkhuzweni King Sobhuza 2 Mbabane PHU Family life Association Manzini Nhlangano PHU Piggs Peak PHU Siteki PHU Sithobela Ndzevane Vuvulane
<b>Health Facility Type</b>	Clinic Public Health Unit Health Centre
<b>Parity</b>	—
<b>Gravida</b>	—
<b>HIV status</b>	Positive Negative Unknown
<b>CD4 count</b>	—
<b>RPR results</b>	Positive Negative Unknown
<b>ANC visit schedule</b>	1 2 3 4



## 4.2 Study setting

There are 17 ANC sentinel sites identified by Swaziland for conducting ANC epidemiological studies. Therefore, for this study, the same study sites were used. These were selected to be nationally representative and have been used for ANC sentinel Surveillance since 1992. The sentinel sites are distributed in all the four regions of the country. Women utilizing these facilities come from both urban and rural settlements. The sentinel sites are a combination of ownership (NGOs, Government and missions). ANC Services are easily accessible in these sites as the facilities offer free ANC services.

## 4.3 Study population

Records from 2010 to 2012 of pregnant women attending ANC visits from the 17 ANC sentinel sites and met the inclusion criteria were considered for the study.

### 4.3.1 Inclusion criteria

- All ANC records between 2010 and 2012 in the ANC register were eligible for selection.
- Only records of women who made the first ANC visit and all other subsequent visits at the study site were considered,
- Only records of women who made at least 4 ANC visits (including the first ANC visit) were considered.

The justification of taking only records with initial and subsequent ANC visits is because women tend to be very mobile during pregnancy and ANC facilities are unable to make a follow-up on women who decide to make other ANC visits elsewhere. The inability to make a follow-up results in incomplete information on the register.

### 4.3.2 Exclusion Criteria

To be excluded are:

- Records of pregnant women who were visitors in the study facilities.

- Records of pregnant women who did not have information on first ANC visits.
- Records of pregnant women who made their first ANC visit at study site but did not make all other subsequent visits at study sites.

## 4.4 Sampling method

The objective of the sample design is to draw a nationally representative sample of the ANC records. The study employed a stratified sampling method (regional: Hhohho, Lubombo, Manzini and Shiselweni) and the primary sampling unit was the ANC sentinel site (health facility).

### 4.4.1 Sampling size

According to the Multiple Indicator Cluster Survey conducted in 2010, 79 percent of women make at least four ANC visits. Assuming a margin error of 5 percent (0.05) and a 95 percent confidence interval, the final sample size was adjusted to account for a design effect of two (2) as shown by the ANC sentinel survey's literature. The sample size was as follows;

$$\begin{aligned}n &= (1.96)^2 * p (1-p) / (0.05)^2 \\n &= 3.8416 * ((0.79)*(0.21)) / (0.0025) \\n &= 3.8416 * (0.1659 / 0.0025) \\n &= 3.8416 * 66.36 \\n &= 254.9\end{aligned}$$

When the sample was inflated by a design effect of 2 because of clustering, the sample size was as follows:

$$\begin{aligned}n &= 254.9 * 2 \\n &= 509.9\end{aligned}$$

Assuming that not all records in the registers were complete as some women would have made the first ANC visit in the study site and subsequent visits at other sites, a rapid desk review was done prior to the study and it was found that 60 percent of the records were complete. Therefore the sample was again effected by an analogy to a response rate of 60 percent and the final sample size became;

n= 509.9/0.6

n= 849.8

~850

To ensure representativeness, the study employed probability proportionate to size sampling of ANC records at each study site as shown in the table below:

**Table 4: Study sites and estimated sample size**

Sentinel Site Name	Region	Total number of first ANC attendees per year	Probability proportionate to size	Actual sample size	Records per year
Dvokolwako Health Centre	Hhohho	538	5%	43	14
Dwaleni Clinic	Manzini	130	2%	17	6
Family Life Association Clinic (Manzini)	Manzini	604	5%	43	14
Hlatikhulu Public Health Unit	Shiselweni	730	6%	51	17
King Sobhuza II Public Health Unit	Manzini	1946	17%	145	48
Lomahasha Clinic	Lubombo	238	2%	17	6
Luyengo Clinic	Manzini	756	6%	51	17
Mankayane Public Health Unit	Manzini	434	4%	34	11
Matsanjeni Public Health Unit	Shiselweni	270	2%	17	6
Mbabane Public Health Unit	Hhohho	2058	18%	153	51
Mkhuzweni Health Centre	Hhohho	358	3%	26	9
Ndzevane Community Clinic	Lubombo	245	2%	17	6
Nhlangano Public Health Unit	Shiselweni	1210	10%	85	28
Piggs' Peak Public Health Unit	Hhohho	842	7%	60	20
Siteki Public Health Unit	Lubombo	741	5%	43	14
Sithobela Rural Health Centre	Lubombo	469	4%	34	11
Vuvulane Clinic	Lubombo	249	2%	17	6
Grand Total		11724	100%	850	283

After allocating health facility proportionate sample size, the sample size was then divided by the 3 years. The first records that met the inclusion criteria were then captured on Epi-info. The dividing by the 3 was due to the fact that most records were found not to have all four visits in most study sites as informed by the rapid assessment which was conducted prior to the study, leading to selecting records longitudinally from 2010 to 2012. However to be more cognizance of representativeness of data, more records were captured on Epi-info than the proposed sample size.

## **4.5 Measurements**

Data collected from women attending ANC in the study sites between 2010 and 2012 was used for this study. A database was developed on Epi-info to capture all selected records electronically. The development of the electronic database was informed by the study variables. For record identification (ID Numbers) the database made use of pre-recorded ANC numbers that were allocated to women during ANC visits.

## **5 Data Management and Analysis**

### **5.1 Data management**

For security, the database for this study is password protected and no persons' names were used. Only ANC numbers were used as record identifiers. For data entry, all selected records were captured into Epi-info. For data quality control, all entered records from the register were counter checked by the researcher once a week. Data was then imported from access base to STATA version 12 for analysis. In total 1,264 records were finally ready and used for analysis.

### **5.2 Data analysis**

The data will then be imported to STATA for analysis. For accuracy, a p-value of 0.05 will be used for statistical significance. For descriptive analysis, the study used

frequencies and proportions (%) and the results were presented in graphs and tables. For univariate analysis, logistic regression was used to measure associations between demographic variables and compliance with the FANC. Multivariate Logistic Regression (MLR) was used to control for confounding, where all variables were included to model their effect on compliance with the WHO FANC. The backwards stepwise logistic regression model was used to estimate the co-efficient values. A post mortem test (Post regression) was conducted to evaluate the validity of the model in estimating compliance to the FANC. In all analysis, a 95% confidence interval was used.

### **5.3 How compliance with the WHO focused ANC schedule was measured**

The ANC registers are already longitudinal (where women visits are followed until delivery). This made it easy to follow an individual's visits throughout the pregnancy. In the ANC registers, women can be followed for up to five visits; therefore the needed information was readily available. During each visit; a date of visit, parity, gravid, HIV status and other information is documented.

To measure compliance, the gestational weeks at each visit of each woman was assessed against the WHO focused ANC schedule. If a woman's gestational week fall within the FANC schedule, then the woman would have complied, but if it falls outside the WHO schedule, then the woman would have not complied. This was assessed for all ANC visits made during pregnancy for each woman. Finally, all ANC visits were combined and assessed together to measure "full compliance". Full compliance was true if a woman had all her visits within the WHO FANC schedule.

The available demographic factors as well as parity were also assessed to find statistically significant factors that influenced compliance.

## **6 Ethical and Legal Considerations**

The protocol was submitted to the University Of Pretoria School Of Health Systems and Public Health Ethics committee as well as the Swaziland Ministry of Health for

ethical approval before conducting the study as the individual records from the registers contained ANC client names. Selected Facility registers were kept at the study sites where they belonged.

The study sites were notified through the Principal Secretary in the Ministry of Health about the study prior to conducting the study.

During data entry, only the facility allocated ANC numbers were used as client identifiers and no names and other personal information such as telephone numbers entered in the database. No persons' names or other personal information has been used for any purpose during the study and in this report.

## 7 Logistics and Time Schedule

Below is the Gantt chart showing how the study was managed throughout until submission of the final report.

**Table 5: Gantt chart for the study timeframe**

Activity	July 2013	Aug 2013	Sept 2013	Oct 2013	Nov 2013	Nov 2013	Dec 2013	Jan 2014	Feb 2014	Mar 2014	Apr 2014	May 2014	Dec 2014
Submission of protocol													
Protocol inputs and adjustments													
Submission to Swazi SEC													
Finalization of protocol and data entry screen													
Data collection													
Data cleaning and verification													
Data analysis													
Report writing and incorporation of comments from external examiners													
Final report submitted													

## 8 Budget

The study did not a budget, which was one of the challenges as the researcher had other commitments and would only have time for data entry during weekends when most health facilities were closed.

## 9 Reporting of results

The findings of this study are presented as a journal article in partial fulfilment of the requirements for the award of the degree of Master of Public Health (MPH) at the University of Pretoria. The results will also be shared with the following in the Swaziland Ministry of Health: The Strategic Information Department (SID), Sexual Reproductive Health Unit (SRHU) and the World Health Organization and UNICEF country offices.

The article will be submitted to the WHO bulletin publication. Miss. Nomsa Portia Mulima is the first author and Professor Andy Beke and Professor Steven Olorunju are the second and third authors respectively.

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## Appendix

Variable	Variable Type	
<b>Exposure/Independent variables</b>		
Year of enrolment for current ANC	Nominal	
Age (completed years)	Numerical (discrete)	
Parity	Numerical (Discrete)	
Gravida	Numerical (Discrete)	
HIV status 1. Positive 2. Negative 3. Unknown	Nominal	
ART 1. Yes 2. No	Nominal (Binary)	
Region i. Hhohho ii. Lubombo iii. Manzini iv. Shiselweni v. Other, specify.....	Nominal	
Area of residence i. Rural ii. Urban	Nominal (binary)	
Number of ANC visits	Nominal	
<b>Outcome Variables</b>		
Visit number	1. Gestational Weeks	Continuous
	2. Height of Fundus	Continuous

## PART TWO: JOURNAL ARTICLE

### 2.1 Cover Letter

Faculty of Health Sciences  
School of Health systems and Public Health  
HW Snyman Building (North)  
31 Bophelo Road  
Gezina  
Pretoria

30<sup>th</sup> December 2014

The Editor  
The World Health Organization Bulletin

#### **REF: SUBMISSION OF MANUSCRIPT**

Dear Sir/Madam,

Please find attached our manuscript entitled **“Assessing the World Health Organization schedule for Antenatal Care visits in Swaziland: A retrospective analysis”** by Mulima N, Beke A and Olorunju S, a research article for consideration for publication in your bulletin.

We believe the results presented in the manuscript will provide information on progress towards the implementation of the WHO focused Antenatal care approach which was recommended for developing countries. We are hopeful that the results will help influence a way forward in strengthening the implementation of the focused ANC approach.

All authors listed have approved the manuscript and declared no competing interests. We declare that this manuscript has not been published in any scientific journal or meeting and is not being considered for publication by another journal.

Thank you for your consideration. Please address all correspondence to me by e-mail:

[nomsapo@yahoo.com](mailto:nomsapo@yahoo.com) or [beke@intekom.co.za](mailto:beke@intekom.co.za) or [steve.olorunju@mrc.ac.za](mailto:steve.olorunju@mrc.ac.za)

Yours sincerely,

Nomsa Mulima

## 2.2 Manuscript

### Assessing Compliance to the WHO Schedule for Antenatal Care Visits in Swaziland: A retrospective Analysis

Nomsa Mulima<sup>1</sup>, Andy Beke<sup>1</sup>, Steve Olorunju<sup>2</sup>

**Objective:** To assess compliance to the WHO schedule for ANC visits using retrospective patient data from 17 ANC sentinel sites in Swaziland in 2013.

**Methods:** A total of 1,264 client files were randomly selected from ANC files of women enrolled between 2010 and 2012 at 17 Swaziland ANC sentinel sites. Only files with at least 4 ANC visits were included in the study. Data on year of enrolment, age, gravida, parity, HIV, syphilis and gestational weeks was collected. Compliance was defined within the WHO FANC schedule for 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> visits. Both univariate and Multivariate analysis were used to analyze data for compliance in relation to the above mentioned variables.

**Results:** Overall compliance to the WHO FANC schedule was 0.87% (CI: 0.4 -1.4). There was an observed improvement in compliance between 2010 and 2012 where women enrolled into ANC in 2012 were more compliant than women who were enrolled in 2010 (OR: 3.8). Socio-demographic variables were tested to determine associations with compliance to the FANC. Only the variable “year of enrolment” was statistically significant (p-value: 0.028). The results show an improvement in compliance between 2010 and 2012, where women enrolled in 2012 were 4 times more compliant than women enrolled in 2010 for ANC.

**Conclusions:** Compliance with the WHO recommended FANC schedule is very poor, especially within the first and second FANC ANC schedule. Swaziland needs to strengthen education and sensitization of women of childbearing ages on the importance of early bookings as well as revitalize the FANC strategy as recommended by the WHO. Swaziland needs to develop a FANC sensitization strategy, targeting young girls. The long term recommendation is to integrate the FANC strategy within life skills curriculum to increase awareness of the FANC schedule among young girls and the youth in general.

**Key words:** Compliance, Focused ANC visits, Antenatal care, Swaziland, retrospective analysis.

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## Introduction

Hundreds of thousands women die each year due to complications in pregnancy and childbirth. A majority of these deaths occur in developing countries, primarily Sub-Saharan Africa and Asia. Reduction of maternal mortality is one of the Millennium Development Goals (MDG # 5: Reducing maternal mortality by three quarters between 1990 and 2015<sup>1</sup>) that countries are expected to attain by 2015. Swaziland is one of the countries in Sub-Saharan Africa with a high maternal mortality ratio (MMR), estimated at 589/100 000 live births in 2007<sup>2</sup>.

According to the Maternal Deaths audit conducted in 2010, major contributors to maternal deaths in Swaziland are post-partum haemorrhage puerperal sepsis and eclampsia contributing 54% and advanced HIV/AIDS with opportunistic infections contributing 25% of maternal deaths. Unsafe abortions accounted for 15% of maternal deaths<sup>3</sup>. All these factors can be managed and controlled through early and regular Antenatal care (ANC) visits. ANC prepares women for child birth, allows for early detection, management and treatment of sexually transmitted infections such as syphilis and HIV, it also allows for access to preventive medicines such as anti-malarial drugs, iron and folic acid tablets<sup>4</sup>.

There are two approaches to providing ANC services used; the “Risk approach” and the “Focused ANC approach”, known as the FANC. According to the “Risk approach”, women are given appointment dates based on whether they are classified as “high risk” or “low risk” pregnancy. Under the “high risk” category women are given regular and often rather too many visits whilst women classified under “low risk” are given fewer visits. This “Risk approach” comes with a lot of limitations, especially in developing countries where women make unnecessary regular ANC visits that lead to overburdened health facilities. The other limitation is the poor/ misclassification of women as health care providers have limited capacity to classify the women correctly. Furthermore, this approach has led to women spending more money (which they may not have) on transport, which in turn contributes to missed appointments as women fail to come for visits due to lack of transport fares.

The World Health Organization (WHO) randomized control trials on ANC give evidence that on average, a woman needs at least four (4) Focused ANC (FANC) visits, and these visits are

to be made at specified gestation periods<sup>5</sup>. The FANC approach offers pregnant women a well defined ANC package proven to be beneficial to both the mother and the unborn baby at recommended gestation periods; 1<sup>st</sup> to 4<sup>th</sup> ANC visits at 8-12 weeks, 24-26 weeks, 32 weeks and 36-38 weeks respectively according to the schedule. This FANC approach has proven to be cost effective to both the women and the health care systems, as women save on transport money.

This approach also reduces the chances of misclassification. Within the health care systems, the FANC approach reduces ANC visits, where fewer women are seen at a point in time, giving much needed focus on the comprehensive ANC package<sup>4</sup>. Interventions, such as subsequent HIV testing, refills of ARV regimen given to pregnant women, anti-malarial and anti-hypertensive drugs according to the FANC approach are given during the appointment date to cut down costs that may be incurred with the additional visits.

According to the primary health care package, Swaziland has been implementing the FANC approach 2010. Within the national Sexual Reproductive Health (SRH) Strategic Framework 2010-2014 and in the Prevention of Mother to Child HIV transmission (PMTCT) guidelines<sup>6, 7</sup>, the FANC approach has been highlighted and health care providers trained on this approach. There is limited evidence globally to prove that women attending ANC comply with the FANC<sup>8, 9, 10</sup>. In Swaziland 97% of pregnant women attend ANC and 79% attend at least 4 times<sup>11</sup>. It should be noted however that the high ANC attendance does not necessarily mean compliance with the FANC even in the case of Swaziland. The bottleneck assessment conducted in Swaziland in 2012 show that only 14% of pregnant women make their first ANC during the first trimester, 64% during the 2<sup>nd</sup> trimester and 22% during the 3<sup>rd</sup> trimester<sup>12</sup>.

Compliance in this study referred to women who came for at least four ANC visits and came within the WHO recommended gestation periods. With the FANC approach said to be implemented in Swaziland, the study aimed to assess compliance with the FANC schedule among women attending ANC in Swaziland from 2010 to 2012.

## 2. Methods

The study used retrospective data of ANC visits from 17 ANC sentinel sites in Swaziland. These sites were selected in 1992 for the purposes of ANC HIV sentinel surveillance. Swaziland uses longitudinal registers where information on each pregnancy is documented. Each woman is followed up until delivery. Information on demographics, vital signs, tests performed, gestation periods as well as the height of the fundas are documented.

A total of 1,264 ANC client records were audited. Data on demographics, region of facility, HIV variables (HIV status and ARV regimen) as well as gestation periods was captured into Epi-info. Furthermore, only records for the years 2010, 2011 and 2012 were selected. Incomplete records, such as records of women who attended ANC visits at different ANC sites for the same pregnancy and records with less than four ANC visits were excluded. Data was imported to STATA version 12 for analysis<sup>13</sup>. Age and parity were grouped into 4 categories each for proficient analysis as they had too many categories.

### 2.1 Study Setting

The study was done in the Kingdom of Swaziland. The country has a total population of 1 018 449 (2007 census) and an annual growth rate of 0.9 per annum<sup>14</sup>. Swaziland has four administrative regions, (Hhohho, Manzini, Lubombo and Shiselweni). Half the population is within the 15-49 years age group, of which 51.1% are females. About 30, 000 women get pregnant each year<sup>15</sup>. According to the Service Availability Mapping conducted in 2013, Swaziland has 186 health facilities that offer ANC services<sup>16</sup>, of which 17 were identified as ANC sentinel sites and these sites were purposively selected for the study.

## 3. Results

### 3.1 General characteristics

This report is based on 1,264 records that were found to be complete with at least four ANC visits (2010 =N (548), 2011=N (410), 2012=N (306)) for the years under review. Thirty



percent of the records were from Manzini health facilities, 28% from Hhohho, 22% from Lubombo and 21% from Shiselweni region. Eighty percent of the records came from Public Health Units (PHUs), 3% from health centres and 17% from clinics. These were based on the proportionate population representativeness.

### 3.2 Demographic factors

The age range for pregnant women was 13 to 44 years with a mean age of 25 years (SD: 5.7 years) (median age: 24 years). The median was consistent throughout the three years. The mean gravida was 2.3 children (SD: 1.4 children) (median gravidity: 2 children) per woman. Thirty seven percent had their first pregnancy (gravidity1) while 3.4 % had five or more children.

The mean gestation age was 18.1 weeks (SD: 4.8 weeks) for the 1<sup>st</sup> ANC visit; 24.5 weeks (SD: 4.4 weeks) at 2<sup>nd</sup> visit; 30.5 weeks (SD: 3.8 weeks) at 3<sup>rd</sup> visit and 35.6 weeks (SD: 3.4 weeks) at the 4<sup>th</sup> visit. Figure 1 below shows the gestation periods per the FANC schedule.

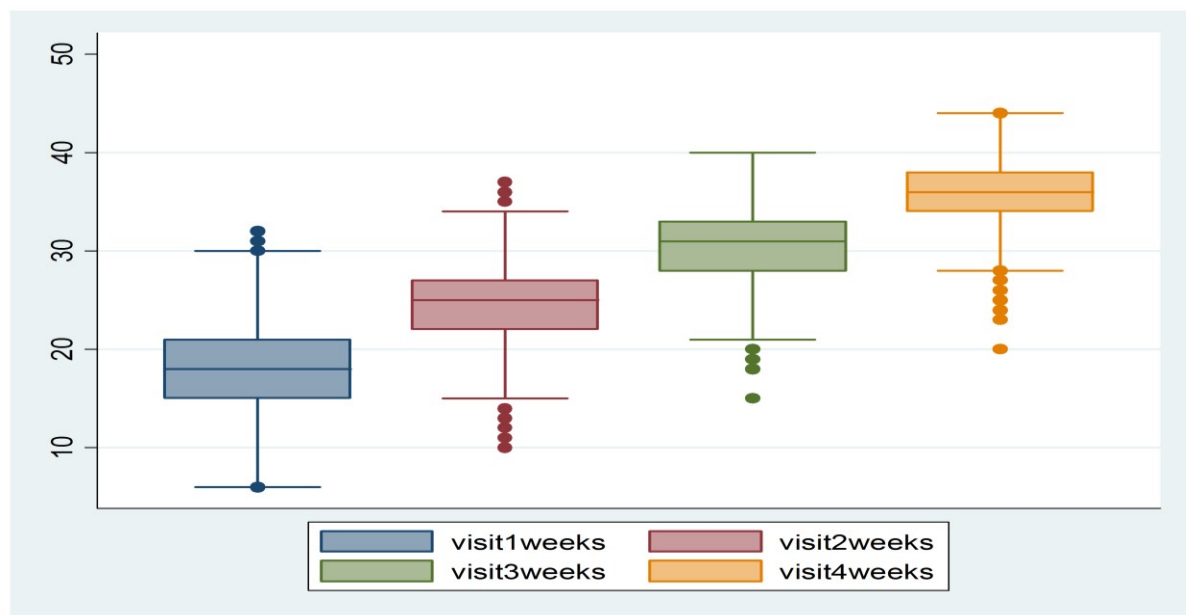


Figure 1: Antenatal care visits by gestation weeks in Swaziland, 2010-2012

### 3.3 HIV and syphilis status among pregnant women attending Antenatal care

Forty two percent (CI: 0.39 – 0.45) of women attending ANC were HIV positive and 4.3% (CI: 0.03 – 0.05) were RPR positive (positive screening for syphilis). HIV prevalence was higher

among women age 25 years and above (52%) (CI: 0.48-056). HIV prevalence was 35.2 % for women less than 25 years (CI: 0.32 - 039).

### **3.4 Compliance with the WHO FANC schedule**

The main purpose of the study was to assess compliance with the WHO recommended FANC schedule and to determine factors influencing compliance. To measure compliance, gestation weeks at each visit were grouped into binary variables (non-compliant (0) and compliant (1)). The same was done for overall compliance.

#### **3.4.1 Compliance with the first ANC visit**

Table 1 below shows that 23.8 % (CI: 0.21 – 0.26) pregnant women were compliant with the first ANC schedule. Demographic variables were tested for associations with compliance in the 1<sup>st</sup> ANC schedule using Fishers exact. Only variables region (p-value: 0.001), HIV status (p-value: 0.015) and year (p-value: 0.006) were statistically significant, showing an association between the variables and compliance within the first ANC visit schedule.

#### **3.4.2 Compliance with subsequent visits (visit 2, 3 and 4)**

Compliance was 27.8 % (CI: 0.25 – 0.30) in the 2<sup>nd</sup> ANC schedule, 33.6 % (CI: 0.31 – 0.36) in the 3<sup>rd</sup> ANC schedule and 42.8 % (CI: 0.40 – 0.46) in the 4<sup>th</sup> ANC schedule. Again, demographic variables were tested for associations with compliance at each of the subsequent visits and the variables year, facility type and region were found to be statistically significant.

#### **3.4.3 Overall compliance**

Overall compliance for this study meant the women who made all ANC visits (from time of booking through to the last visit) according to the FANC schedule. Overall compliance was 0.87% (CI: 0.35 - 1.4). Since the data was collected from 2010 through to 2012, trends were also measured for possible improvement and women were seen to be 2 times (OR: 2.01; p-value: 0.45) more compliant in 2011 than in 2010 and 5 times (OR: 5.46; p-value: 0.038) more compliant in 2012. With regional comparisons, Manzini region showed a high

compliance (1.34%) when compared with other regions, followed by Hhohho with 1.13 % compliance.

### 3.4.4 Demographic factors influencing overall compliance

The following table shows demographic factors that were available in the ANC register for analysis.

**Table 1: Distribution of Factors based on Compliance to the focused ANC schedule in Swaziland, 2010-2012**

Factor	Category	n (%)	Compliance n (%)	Non-compliance n (%)
		<b>1,264</b>		
<b>Age</b>	< =19 years	191 (15)	0 (0.00)	191(100)
	20-24 years	468 (37)	4 (0.85)	464 (99.15)
	25-29 years	343 (27)	4(1.17)	339 (98.83)
	> 30 years	262 (21)	3 (1.15)	259 (98.85)
		<b>1,264</b>		
<b>Region</b>	Hhohho	355 (28.1)	4 (1.13)	351 (98.87)
	Lubombo	272 (21.5)	1 (0.37)	271 (99.63)
	Manzini	374 (30.0)	5 (1.34)	369 (98.66)
	Shiselweni	263 (20.8)	1 (0.38)	262 (99.62)
		<b>1,264</b>		
<b>Year of enrolment</b>	2010	548 (43.4)	2 (.036)	546 (99.64)
	2011	410 (32.4)	3 (0.73)	407 (99.27)
	2012	306 (24.2)	6 (1.96)	300 (98.04)
		<b>1,264</b>		
<b>Parity</b>	First Pregnancy	469(37.1)	1 (0.21)	468 (99.79)
	second Pregnancy	378 (29.9)	5 (1.32)	373 (98.68)
	Third Pregnancy	218 (17.3)	2 (0.92)	216 (99.08)
	Over 3 Pregnancies	199 (15.7)	3 (1.51)	196 (98.49)
		<b>1,264</b>		
<b>HIV Status</b>	Positive	531 (42.01)	8 (0.56)	523(99.44)
	Negative	726 (57.44)	3 (1.10)	723 (98.9)
	Unknown	7 (0.55)	0 (0.00)	7 (100)

No woman within the age-group less than 19 years was compliant to all visits. Women age 30 years and older were 1.15 % compliant overall, as shown in table 1. Women between ages 25-29 years were more compliant (1.17%).

### 3.4.5 socio-demographic factors associated with compliance

Bivariate analysis was performed to test for associations between compliance with FANC schedule and demographic variables using Fishers exact test. The year of enrolment 2012 was the only variable with a statistical significance (p-value: 0.029).

Multiple regression modeling was also carried out and the enrolment year 2012 was statistically significant (p-value: 0.041). The following table shows the outputs of the initial model;

**Table 2: Factors influencing Compliance to the WHO focused ANC schedule in Swaziland, 2010-2012**

Factor	Category	OR	p-value	95% CI
Year of enrolment	2011	2.06	0.433	0.34- 12.43
	2012	5.41	0.040*	1.08 - 27.02
Parity	Second pregnancy	6.25	0.095	0.73 - 53.85
	Third pregnancy	4.37	0.230	0.393 - 48.59
	>3 pregnancies	6.94	0.095	0.714 - 67.53

After performing a stepwise backwards regression, the results showed that compliance to the WHO focused ANC schedule improved over the years, where women who enrolled in 2012 were 4 times more likely to be compliant than women enrolled in 2010 for ANC.

**Table 3: Odds Ratios of the final model of compliance regressed on year of enrolment in Swaziland 2010-2012**

Factor	Category	OR	p-value	95% CI
Year of enrolment	2012	3.81	0.028	1.155- 12.58

### 3.6 Discussions

Although according to the Multiple Indicator Cluster Survey (MICS 2010) ANC attendance is high in Swaziland, (97% for 1<sup>st</sup> ANC attendance and 79% for 4 or more visits), compliance to the WHO ANC schedule is very poor. Early ANC booking (before 14 weeks gestation) is highly recommended as it has shown to improve outcomes of pregnancy for both the mother and the foetus. From figure 1 above it can be noted that women were presenting rather too late for the first ANC booking as evidenced by the mean gestation weeks at 1<sup>st</sup> ANC visit of 18 weeks instead of the recommended 14 weeks or early. This value is however lower than the 28 weeks reported amongst women in Nigeria<sup>17</sup>, showing that Swazi women come a bit earlier for first ANC bookings than women from other African States.

Compliance with the 1<sup>st</sup> ANC visit is notably very poor at only 23% (<14 weeks). This low compliance shows that Swaziland has failed to achieve the 75% compliance that was set for the country's PMTCT elimination strategy<sup>18</sup>. The PMTCT elimination strategy clearly states that for Swaziland to reduce Mother-To-Child HIV transmission to less than 95% there is need to ensure that at least 75% of pregnant women come within 14 weeks of pregnancy.

As depicted again by figure 1, there are those women who come very early for subsequent visits and this may be likely due to the fact that women are not even aware of the ANC visit schedule. Overarching message is that women book very late in pregnancy and there may be missed opportunities to prevent and manage diseases and complications during pregnancy, such as eclampsia, placenta previa, cervical incompetence and HIV. All these complications need to be ascertained early in pregnancy for immediate interventions and these are normally ascertained in the first ANC booking.

Albeit the poor compliance to FANC schedule, there has been some improvement between 2010 and 2012 on compliance with the FANC schedule, from 0.36% in 2010 to 1.96% in 2012, showing that women enrolled in 2012 were 5 (OR: 5.41) times more likely to be compliant than women enrolled in 2010. The slow increase on the other hand creates a need for continuous follow-up on the implementation of the FANC. This is also very important information especially now that Swaziland and WHO are reviewing the FANC implementation guidelines. This information shows that implementation of the FANC

strategy is only on paper and the country must seriously strengthen this approach as it is already incorporated on the Sexual Reproductive Health and PMTCT guidelines.

Despite the fact that adherence is generally poor in Swaziland in all the regions, Lubombo and Shiselweni women were found to be completely non-compliant to the FANC schedule, meaning that these two regions need more education tailored for both health care workers and women in childbearing ages. Women younger than 20 years were completely non-compliant. Again, this may be due to the fact that at this age mostly women are primigravidas (first pregnancy). What is also important to note is that if all regions are non-compliant, this may be due to the fact that generally health care workers do not sensitize women on the FANC schedule and when making appointments the health care workers do not conform to the FANC schedule. Unfortunately the study did not investigate compliance by health care professionals.

More interestingly, literature shows that parity is an important determinant of ANC bookings, where primigravidas are more likely to book early than grandmultiparas (Women with 5 or more children). For Swaziland, this was not the case as primigravidas enrol later than the grandmultiparas. This may be due to awareness of the importance of early booking among women who have been pregnant before. The study reveals that women in their 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> pregnancy are more likely to comply than primigravidas. However, as women have over 5 children, they become even more compliant. This may be due to the fact Swaziland has been using the “risk approach” instead of the FANC, where women with over 5 children or pregnancies are rated as high risk and are scheduled by health care workers to come as frequent as possible. Unfortunately the “risk” variable was not collected for this study.

#### **4. Conclusions and recommendations**

According to the results, women in Swaziland come late for ANC bookings, only 23.8% are compliant and this raises the need to educate women of childbearing ages on the importance of early ANC bookings and on the disadvantages of making ANC visits late in the pregnancy. Within Swaziland’s PMTCT virtual elimination strategy, the country set a target

of 75% compliance with 1<sup>st</sup> ANC booking. According to the maternal audit report, one of the contributing factors to maternal deaths is eclampsia, which can be identified during early stages of pregnancy and easily managed and monitored if women presented early. With the high HIV prevalence in Swaziland among pregnant women, early ANC bookings has also become a priority as women can be initiated on ART as early as possible to reduce HIV transmission from mother-to-child. If Swaziland is to achieve the virtual elimination of HIV, early ANC bookings should be strongly emphasised and this will also be beneficial for women who do not want to start ART immediately as early bookings would give enough time to women to reconsider ART initiation.

The results also showed that in as much as overall compliance has improved; the improvement is very minimal, from 0.36% in 2010 to only 1.96 in 2012. This brings in the need to hasten the development of the FANC guidelines and results from this study should be used as baseline information in the crafting of these guidelines. Within the proposed FANC guidelines, issues of adherence should be clearly addressed and means to capacitate health care workers on the FANC approach should be clearly laid out. Unfortunately the study did not look at the knowledge of health care workers on the FANC approach, it is clear however that health care workers also need to be knowledgeable about the FANC approach to ensure women are well educated on the ANC appointment keeping. This also brings the recommendation that Swaziland should consider conducting a follow-up survey on why women do not comply with the FANC to inform future direction.

Only 37% of the women in the study sample were primigravidas and according to the results, there was no statistical significance between compliance and parity. This means that compliance was similar in women regardless of whether they had a previous pregnancy or not. Therefore is recommended that in all pregnancies, either first pregnancy or not, women need to be constantly sensitized on the FANC approach throughout their sexual reproductive age.

Currently there are no strategies in Swaziland focusing on young girls on maternal and child health issues. The findings show that for the FANC strategy to be a success, the Swaziland

needs to develop strategies tailored for young girls on maternal and child health, incorporating the focused ANC approach. One way is to recommend integration of the FANC schedule within the life skills curriculum. This will be strengthened by ensuring that within the curriculum, advantages and disadvantages of antenatal care issues are well addressed.

Another important recommendation is the constant reminder on follow-up visits that should be in congruence with the FANC schedule at each visit. This can be done through Short Message Service (SMS) reminders telephonically. This can also be done by writing the next appointment visit date on the ANC card in “Bold” for easy visualization. Other issues to be addressed pertaining the follow-up visit is that women should be prescribed all necessary drugs and appointments for refills should be scheduled according to the FANC schedule. This would help reduce the number of visits women are expected to make during pregnancy.

There are currently outreach services through the public health units. Unfortunately these outreach services are unfriendly for ANC as there are no private rooms for palpations during pregnancy. A sound recommendation is to ensure that these outreach services cater for pregnant women as well. There should be make-shift private rooms to conduct examinations necessary for pregnant women. This will ensure that women have access to services within their communities, thus reducing the financial burden of having to travel long distances for ANC services.

This study is very important as the findings can be used to inform the new FANC guidelines which WHO is currently developing.

## **5. Study limitations**

The study had limitations and for transparency, the limitations included the following; First and foremost, the study was only conducted in the 17 ANC sentinel sites of Swaziland. Secondly, only data that was pre-collected routinely was used, therefore the researcher was obliged to use only records that were complete and with at least 4 ANC visits, which may



have introduced bias if women presenting much earlier or much late were not making subsequent visits in the same facility.

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## **APPENDICES**

**Appendix 1: University of Pretoria Ethical Approval**

**Appendix 2: Ministry of Health Swaziland Ethical Approval**

**Appendix 3: Ministry of Health Swaziland Permission Letter to Access Database**

**Appendix 4: WHO Bulletin Manuscript Guidelines**