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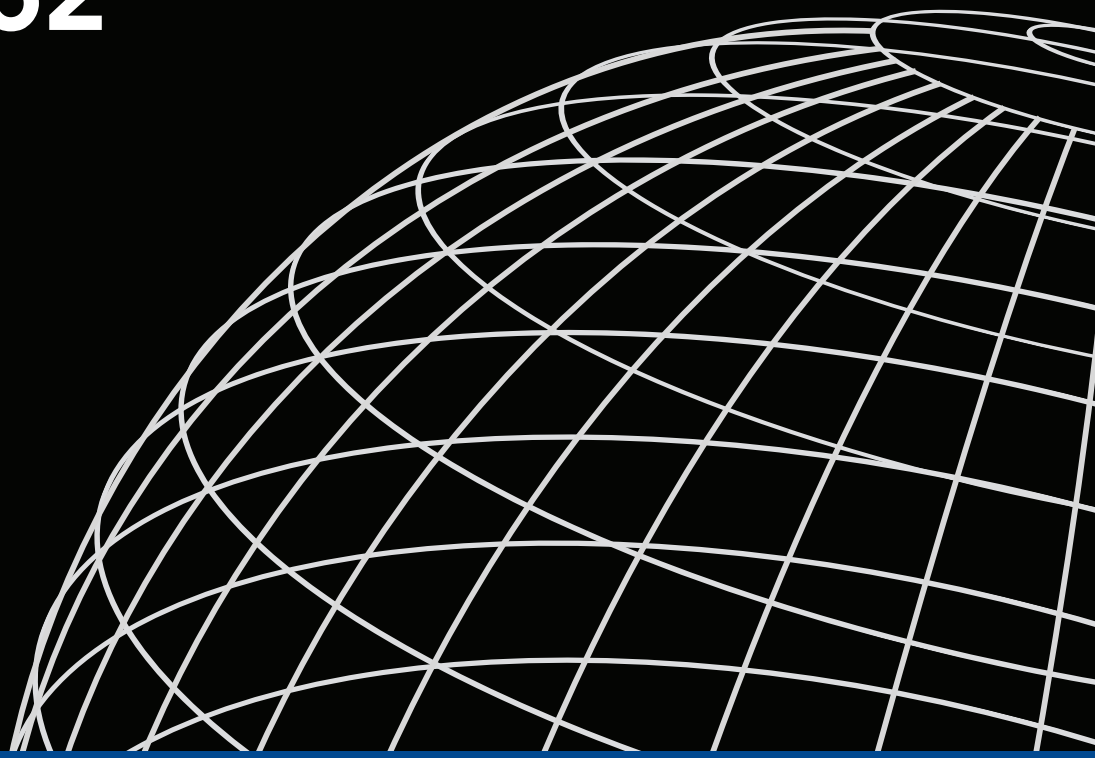
INTEGRATION OF INFECTIOUS DISEASE SERVICES WITH ANTENATAL CARE SERVICES AT HEALTH FACILITIES IN KENYA, MALAWI, AND TANZANIA

DHS ANALYTICAL STUDIES 62



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Integration of Infectious Disease Services with Antenatal Care Services at Health Facilities in Kenya, Malawi, and Tanzania

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Preface

The Demographic and Health Surveys (DHS) Program is one of the principal sources of international data on fertility, family planning, maternal and child health, nutrition, mortality, environmental health, HIV/AIDS, malaria, and provision of health services.

One of the objectives of The DHS Program is to analyze DHS data and provide findings that will be useful to policymakers and program managers in low- and middle-income countries. DHS Analytical Studies serve this objective by providing in-depth research on a wide range of topics, typically including several countries and applying multivariate statistical tools and models. These reports are also intended to illustrate research methods and applications of DHS data that may build the capacity of other researchers.

The topics in the DHS Analytical Studies series are selected by The DHS Program in consultation with the U.S. Agency for International Development.

It is hoped that the DHS Analytical Studies will be useful to researchers, policymakers, and survey specialists, particularly those engaged in work in low- and middle-income countries.

Sunita Kishor

Director, The DHS Program

Abstract

The disproportionate demand for services related to infectious diseases such as HIV/AIDS, tuberculosis, and malaria among pregnant women in sub-Saharan Africa, given limited health facility attendance, drives a need to integrate these services with antenatal care (ANC). This paper uses data from Service Provision Assessments in Kenya (2010), Malawi (2013-14), and Tanzania (2014-15) to examine aspects of integrating services for HIV, specifically prevention of mother-to-child transmission (PMTCT), tuberculosis, and malaria into ANC services. For the study, we defined five components of ANC integration with each infectious disease service and created an integration score for each infectious disease by averaging the components. We examined the extent to which the health facility's integration capacity was associated with selected facility characteristics and women's receipt of integrated services during ANC visits. Overall, facilities with ANC had higher integration scores for PMTCT and malaria than for tuberculosis, although availability of the integration components varied by background characteristics across and within countries. Logistic regression results show that the ANC-malaria integration score was associated with consuming sulfadoxine-pyrimethamine (SP) in Kenya and Tanzania, and the ANC-PMTCT integration score was associated with receiving HIV counseling and testing during observed ANC visits in Tanzania. The only integration component associated with SP consumption, aside from having SP available, was the presence of at least one ANC provider at the facility who also provides malaria services and has recent training in these services. The only ANC-PMTCT component with a significant association with observation of HIV counseling and testing, except for the availability of HIV rapid diagnostic testing, was having HIV counseling and ANC services at the same site. More research is needed to determine the synergies among the different aspects of integrated services.

KEY WORDS: integrated services, infectious disease services, antenatal care, Service Provision Assessment, health facilities

Executive Summary

Introduction

Focused antenatal care (ANC) can provide key services that also prevent the spread of infectious diseases (ID), such as HIV/AIDS, tuberculosis (TB), and malaria. Integrating services can help to overcome the persistent difficulties in obtaining care, improving health outcomes, and saving clients' time and money. There is a dearth of research and little consensus on the key components of integrated services and the level of facility integration that can influence service delivery and outcomes. It is generally agreed that two services are "integrated" when they are co-located in the same health facility, and the provider of one service can provide or assist with helping the client obtain appropriate services for another. Research has identified a continuum of integration among facilities that ranges from a completely vertical structure with no capacity for integration to a fully integrated structure. Although combining services may improve service utilization, more research is needed to determine how different levels and aspects of integrated care affect service delivery and use, as well as health outcomes.

Methods

Based on information from Service Provision Assessment (SPA) surveys conducted in Kenya (2010), Malawi (2013-14), and Tanzania (2014-15), this study assessed various components of integration and overall facility capacity to integrate ID services, specifically prevention of mother-to-child transmission (PMTCT) of HIV/AIDS, TB/HIV, and malaria, with ANC services. Five indicators for each of the three ID areas were defined based on the World Health Organization (WHO) Service Availability and Readiness Assessment. We used these five components to assess service availability and service readiness (defined as whether the facility has the means to deliver services) for providing integrated ANC and ID services. We calculated an overall score for integration for each ID area with ANC by averaging the five components and multiplying by 100 to standardize the scores.

This study analyzed the three populations assessed by SPA surveys: facilities, providers, and clients. First, we describe the background characteristics of facilities that offer ANC services in the three countries, examine the availability of ID services at these facilities, and present the percentage of ANC providers who also offer and have recent training in each ID area. Second, we examine patterns in coverage of individual integration components and overall integration scores (for each ID service with ANC) across facility characteristics. Finally, we examine the association between facility integration and women's receipt of integrated services during ANC visits. To do this, we examine three indicators for women's receipt of integrated care: the provision of counseling or distribution of insecticide-treated mosquito nets (ITNs), direct observation of sulfadoxine-pyrimethamine (SP) consumption, and HIV counseling and testing (HCT).

Results

There are both similarities and differences among the three countries in the overall availability of ID services at facilities with ANC, health worker provision of and training in ID, capacity to provide integrated services, and observed integration of services during ANC visits. Malaria services are almost universally available and PMTCT services are widely available in all three countries. However, TB services are not common, particularly in areas with low population density, and are least common in Tanzania. Services for PMTCT and TB are more available in higher-level facilities in all three countries; in Kenya and Malawi, the services are more available in public than private facilities. ANC providers in each country more often provide and are recently trained in PMTCT, and are less trained in treating malaria; few are trained in treating TB. At the national level in each country, integrated services for ANC with TB/HIV are least common; the average PMTCT integration score is higher in Malawi and Tanzania than in Kenya, although

integration with malaria is highest in Kenya. The coverage of integrated malaria services varies substantially within the countries. Among women observed in ANC, receipt of integrated services varied by the specific service and country.

In Malawi, where PMTCT integration is higher than in the two other countries, observation of HCT during ANC visits is lowest and was observed in only 7% of visits. The study found that in Malawi HIV testing occurs in another room prior to the ANC visit. Thus, while facilities are ready to provide integrated services in the same facility, receipt of integrated care was not recorded in the survey.

After controlling for the characteristics of women, providers, and facilities, total facility integration and some integration components are significantly associated with receiving integrated care for consuming SP in Kenya and Tanzania, as well as for HCT in Tanzania. For HCT in Tanzania, the only significant predictor of receipt of HCT was the integration score. When a model included only the integration components, only one remained significantly associated with receipt of HCT: ANC and PMTCT services at the same site. Receipt of SP during ANC was significantly associated with overall integration of ANC with malaria in Kenya and Tanzania in the multivariable models. When analyzed by integration component, having at least one ANC provider who provides and was recently trained in malaria services at the facility was significantly associated with increased SP consumption.

Conclusion

The relatively high prevalence of the infectious diseases studied in this report (HIV, TB, and malaria), coupled with the recommendation for focused ANC in areas where women have limited access to care, such as Kenya, Malawi, and Tanzania, highlights the need to scrutinize how services for these conditions are integrated and how best to capitalize on the time spent at a facility. Our study finds variation in the availability of components of integration and in the average integration scores across the three countries and the three diseases studied. Regression analysis shows that having trained staff on-site and providing key services under one roof may be the key components in integrated services, although more research is necessary to confirm this finding. When considering availability and provision of integrated services, particularly for ANC and malaria, it is important to consider regional variations in prevalence and corresponding policies that may affect the provision of services. The study highlights the need for more precise definitions and survey tools that measure integration.

1. Introduction

Pervasive inequities in access to health care characterize many developing countries. Many people face barriers to obtaining care for reproductive, maternal, newborn, and child health (RMNCH) and also to receiving services for HIV/AIDS, tuberculosis (TB), and malaria. Joining or integrating service delivery may be a way to help overcome barriers to care and to maximize health outcomes (PMNCH 2013; UNAIDS 2011). Integrating interventions for HIV, TB, malaria, and RMNCH throughout the continuum of care can address critical gaps in service delivery, increase coverage, and save lives and money (Darmstadt et al. 2005; Lassi, Haider, and Bhutta 2010; Pattinson et al. 2011; PMNCH 2013; WHO 2010).

Pregnant women are among the most vulnerable to these diseases. Pregnant women are at higher risk of contracting malaria due to lowered immune function, can pass HIV/AIDS to their fetus or infant through vertical transmission, are susceptible to acquiring HIV from blood transfusions resulting from complications during birth, and can be more susceptible to TB infection in the postpartum period (Bates et al. 2004). Antenatal care (ANC) is a strategic platform for delivering critical tests, counseling, and treatment, and for establishing a relationship between mothers and the health system, a relationship that influences future care seeking (Abrams et al. 2007; An et al. 2015; Myer et al. 2005; Stinson, Jennings, and Myer 2013). Thus, ANC is a key point in the continuum of care throughout a mother and child's lifetime—from services during pregnancy, delivery, and the postpartum period to newborn and child health services, adolescent health, and family planning. The ability to care for all needs, including the prevention and treatment of infectious diseases, should be incorporated in these contacts because it can affect the quality and satisfaction with service delivery and encourage the continuation of services (Kerber et al. 2007). Yet, integrating ANC with services for infectious disease, specifically HIV, TB, and malaria, is understudied. This report uses SPA data from Kenya (2010), Malawi (2013-14), and Tanzania (2014-15) to report facility capacity to provide integrated services for HIV, TB, and malaria with ANC. We assessed the extent of integration by various aspects of integration as well as the overall level of facility integration to identify potential associations with observed integration of service delivery during ANC visits.

1.1. Background: ANC Utilization and HIV, TB, and Malaria Prevalence during Pregnancy

1.1.1. ANC: Recommendations and utilization

About 25% of maternal deaths occur during pregnancy, with variance by region according to the prevalence of unsafe abortion, violence, and disease (WHO 2005). Between a third and half of maternal deaths from antepartum hemorrhage and hypertension result from inadequate care during pregnancy (Khan et al. 2006). Over 2 million women and children die from AIDS, TB, and malaria each year (PMNCH 2013); malaria and HIV/AIDS are associated with increased pregnancy complications and death (PMNCH 2006). Maternal infections during pregnancy can cause antepartum stillbirths (PMNCH 2006).

High-quality ANC provides the care that mothers need during pregnancy. Such care improves the health and survival of infants directly by reducing stillbirths and neonatal deaths and indirectly by providing an entry point for health contacts (PMNCH 2006). In addition, ANC improves the health and survival of mothers by diagnosing and treating infections and other complications that cause morbidity and mortality. Focused ANC services provide specific evidence-based interventions for women through a number of essential elements: the diagnosis and management of pregnancy-related complications (pre-eclampsia), screening for infectious diseases (syphilis and HIV) and other conditions (anemia); preventive measures such as intermittent preventive treatment with sulfadoxine-pyrimethamine (IPTp-SP) and insecticide-treated mosquito nets (ITNs); and advice and support for women and families (healthy behaviors) that are offered at certain critical times during a pregnancy (PMNCH 2006). Screening for and treating infections,

including TB and malaria, is part of the focused ANC protocol (PMNCH 2006), although effective coverage is hindered by uneven ANC attendance.

WHO recommends that mothers make at least four antenatal visits (PMNCH 2006). Although a high percentage of mothers attend at least one antenatal visit, ANC attendance gradually decreases as pregnancy progresses (Kinney et al. 2010). Table 1 shows the prevalence of ANC attendance in each country studied. According to the most recent Kenya DHS, 96% of women in Kenya attended at least one ANC visit, but only 58% attended the recommended four visits (KDHS 2014). Similar percentages of women attended at least four ANC visits in Malawi (46%) and Tanzania (43%). Although ANC could be an ideal platform for integrated care, participation with at least four visits is low, both in these countries and in sub-Saharan Africa overall. This limits the ability to provide continuous, integrated care of infectious diseases within ANC visits (Kinney et al. 2010). The need becomes apparent as we explore the burden of ID within this context and by geographic area.

Table 1. Selected indicators of maternal health, malaria, HIV, and TB in Kenya, Malawi, and Tanzania

	Kenya DHS 2014	Malawi DHS 2010	Tanzania AIS/MIS 2011-12
At least one ANC visit in the last pregnancy	95.7	97.6	97.7
Four or more ANC visits in last pregnancy	57.6	45.5	42.8
First ANC visit before four months pregnant	19.7	12.4	19.7
Facility delivery (all live births in the five years preceding survey)	61.2	73.2	50.2
Skilled birth attendant (all live births in the five years preceding survey)	61.8	71.3	47.6
Malaria prevalence in children under age five	5.0	33.2	4.1
Pregnant women who slept under an ITN the night before the survey	57.8	35.2	56.9
SP consumption during ANC	50.8	85.8	60.5
SP 2+ doses, at least 1 dose during ANC	34.7	53.8	26.3
Pregnant women counseled for HIV during ANC visit	67.5	85.7	64.0
Pregnant women counseled and tested for HIV during ANC visit and who received results	66.9	79.0	55.2
HIV prevalence in women	8.0 (CI: 6.7 – 9.3)	12.9 (CI: 11.6 – 14.2)	6.2 (CI: 5.5 – 6.8)
TB prevalence	0.3	0.3	0.5
% TB patients who are HIV-positive	36.0	54.0	35.0

Note: Data on malaria parasitemia are from the most recent MIS or AIS/MIS: Kenya in 2015, Malawi in 2014, and Tanzania 2011-12 (same as other data in table); most recent HIV prevalence data for Kenya are from the 2008-09 KDHS; data on indicator for four or more ANC visits during last pregnancy resulting in a live birth in the five years preceding the survey for Tanzania are from the 2010 TDHS; DHS data are collected from The DHS Program STATcompiler: http://beta.statcompiler.com/; Tuberculosis data from the WHO Global Tuberculosis Report 2015 (WHO 2015b).

1.1.2. Infectious diseases affect maternal and child health

1.1.2.1. HIV/AIDS and PMTCT

Prevalence of HIV is high among women in the countries studied, at 6% in Tanzania, 8% in Kenya, and 13% in Malawi (Table 1). In countries with high rates of HIV, HIV-associated infections exceed direct

causes of maternal death from hemorrhage, hypertension, and sepsis. This suggests that clinical HIV care should be integrated into maternity services (Madzimbamuto, Ray, and Mogobe 2013). Initiating antiretroviral therapy (ART) during pregnancy is important for preventing PMTCT and reducing maternal and infant morbidity and mortality related to HIV (Coutsoudis et al. 2010; Kuhn et al. 2010; Stinson, Jennings, and Myer 2013). In most of sub-Saharan Africa, the design of health systems is a barrier to ART during pregnancy because services are not co-located (Stinson, Jennings, and Myer 2013). The recognition that providing ART services to pregnant women requires additional counseling and interventions appropriate for pregnancy has prompted calls for integrating service provision (Abrams et al. 2007; Myer et al. 2005; Rosenfield and Figdor 2001; Stinson, Jennings, and Myer 2013). Since 2011, more than 20 countries, including Malawi, Kenya, and Tanzania, have adopted Option B+ policies, under which women receive HIV testing at the first ANC visit; if found HIV-positive, the women then begin ART for life (Chimbwandira et al. 2013; IATT 2016). Option B+ is a strategy for enrolling pregnant women in PMTCT programs, which include interventions to prevent mother-to-child-transmission during pregnancy, labor and delivery, and breastfeeding. Although Tanzania adopted the Option B+ policy, a study by An et al. (2015) found supply-side deficiencies in inputs and processes to deliver HIV counseling and testing (HCT) during ANC, which affected the quality of care.

1.1.2.2. Tuberculosis

Tuberculosis is a disease of poverty exacerbated by malnutrition and food insecurity. The disease affects the most vulnerable (WHO 2015a) and is one of the top five killers of women age 20-59. An estimated 3.2 million women were sick with TB in 2014 (WHO 2015b). There is often co-morbidity between TB and HIV. There were 140,000 TB deaths among HIV-positive women in 2014, which is nearly 30% of all TB-related deaths among women and about a third of all AIDS-related deaths among women, almost all in Africa (WHO 2015b). In Malawi, more than half of TB patients are HIV-positive, and about a third in Kenya and Tanzania (Table 1). Like HIV/AIDS, TB is associated with stigma and discrimination (WHO 2015b). Among mothers, TB affects both maternal and fetal health. There is a six-fold increase in perinatal death and two-fold risk of preterm birth and low birth weight, with a 300% risk of maternal and infant mortality for pregnant women with TB who are HIV-positive (WHO 2015b). In Africa, TB is 10 times more prevalent among pregnant women with HIV than pregnant women without HIV (WHO 2015b). Documented barriers to TB-PMTCT service integration include a lack of skilled providers, supervision of providers, the physical layout of service provision sites, and service delivery mechanisms (Uwimana and Jackson 2013).

1.1.2.3. Malaria

More than 30 million pregnant women live in malaria-endemic areas in sub-Saharan Africa (PATH 2014). Adult prevalence is less studied compared with child prevalence, although in Kenya one county reported an adult prevalence of 28%, with women 50% more likely to be infected than men (Jenkins et al. 2015). Malaria in pregnancy increases the risk of maternal anemia, miscarriage, stillbirth, prematurity, low birth-weight, and death for mothers and newborns (Dellicour et al. 2015). Interventions include prevention with IPTp-SP and ITNs, as well as prompt diagnosis and treatment (WHO 2014). The timing and number of ANC visits is critical for prevention, early diagnosis, and treatment of malaria (WHO 2014). Given the small percentage of women who make more than one visit, however, ANC was found to be more effective for ITN distribution than for IPTp-SP because ITNs are delivered at one time while IPTp-SP requires follow-up (Hill et al. 2013). Among the countries studied, the percentage of women sleeping under an ITN each night varied from 35% in Malawi to 58% in Kenya (Table 1). Only one-quarter (26%) of women in Tanzania and about a third (35%) of women in Kenya received two doses of IPTp-SP (at least one dose during ANC) during their last pregnancy within the last five years, while just over half (54%) did so in Malawi (Table 1). These percentages are much lower than the percentage of women receiving at least one dose during ANC, which ranges from 51% in Kenya to 86% in Malawi (Table 1). Efforts to increase IPTp-

SP distribution have shifted to the community level in some places; one study found that community health workers stocked with IPTp-SP had a positive impact on attendance of the recommended four ANC visits (PATH 2014). In addition, co-infection with malaria and HIV accelerates the spread of both diseases (Abu-Raddad, Patnaik, and Kublin 2006).

1.2. Integrated Care and How Services are Integrated

Integrating services can increase health care coverage by delivering the services in a more cost-effective way (Bollinger and Adesina 2013). Two services are "integrated" when they are offered at the same health facility during the same hours, and the provider of one service encourages clients to consider using the other service during the visit (Foreit, Hardee, and Agarwal 2002). While practitioners generally agree with this premise, it has been difficult to precisely define "integration" in practice (Ahgren and Axelsson 2005; Uyei et al. 2014). A systematic review found few examples of either complete integration or complete non-integration (Atun et al. 2010). The research acknowledged a continuum of integration and found that the dichotomy between vertical and horizontal programming is not rigid and that the *extent* of integration varies considerably among programs (Atun et al. 2009). That continuum describes the two extremes as full segregation (or vertical programming) or full integration of programs, joined together by the middle ground of linkage and coordination among networks (Atun et al. 2009):

Full segregation > linkage and coordination among networks > full integration

Integration is one of the seven core principles of the U.S. Global Health Initiative (US Government 2012). The WHO Consolidated Guidelines for ART recommended strategies for integration that included integrating PMTCT programs in maternal, newborn, and child health (MNCH) facilities (WHO 2013a). Analyses of integration efforts have examined how intervention elements can be integrated within the six health system building blocks that cut across all services: stewardship and governance; financing; planning; service delivery (structural, human resources, shared infrastructure, operational integration, referral/counter-referral systems, guidelines, procurement, and supply chain management); monitoring and evaluation (M&E); and demand generation (Atun et al. 2010). There are also supply-side needs such as infrastructure, space, commodities, and staff (Shigayeva et al. 2010). Integrated lab services also need adequate infrastructure, assays, reagents, maintenance, personnel, and policies (Birx, de Souza, and Nkengasong 2009). Some have observed that the influx of HIV/AIDS funding to establish labs threatens the existing fragile labs and makes service integration even more critical (Mbah et al. 2014).

1.2.1. Benefits of integrated care

There is some evidence that integrated care improves quality of services, outcomes, and saves money in some settings. Specifically, one study conducted by Kruk et al. (2015) found that integration of PMTCT/ART services with ANC/PNC services increases the quality of the RMNCH services, while another study found better outcomes (adherence to ARTs) and cost savings where HIV and MNCH services were integrated (Bollinger and Adesina 2013). Decreased patient time at a facility, increased efficiency, and closer patient-provider relationships all led to greater patient satisfaction (Winestone et al. 2012). In addition, providers believed that the improved confidentiality and decreased stigma made women more likely to initiate and adhere to ART (Winestone et al. 2012). A study in Malawi found that integration of PMTCT services into ANC increased participation in ANC, facility delivery, and postnatal care. There was also an increase in family planning consultations, treatment for sexually transmitted infection (STI), and testing for HIV-exposed infants, as well as a decrease in the proportion of infants who tested HIV-positive (Van den Akker et al. 2012). In South Africa, integration of ART into ANC increased initiation of treatment during pregnancy, when compared with vertical service provision, whether near or far from the ANC (Stinson, Jennings, and Myer 2013). A review of four studies found that ART integration in ANC clinics led to higher rates of ART initiation and coverage, and similar retention rates were found in referral-based

models of service provision (Suthar et al. 2013). There is also some evidence in Kenya of greater satisfaction among HIV-positive women who attended integrated services compared with those who attended non-integrated services (Vo et al. 2012). Research in Western Kenya found that women said that testing for disease, including HIV, was an important element of ANC (Mason et al. 2015). Testing for HIV also improved when it was integrated into routine TB services, while joint services improved adherence to TB and ART treatment among co-infected patients (Uyei et al. 2011). Although the benefits of integration of ANC and PMTCT have been well studied, a recent systematic review found no randomized controlled trial that attempted to measure the impact of integration of ANC on malaria or TB (de Jongh et al. 2016).

More than half of development aid for reproductive health in 2009 and 2010 was allocated for HIV prevention, treatment, and care for women of reproductive age (NIDI 2010; Patel et al. 2009; PMNCH 2013). Integrating services could leverage that investment to increase quality across the health system. With integration, laboratories use the same equipment for multiple health services such as HIV/AIDS, TB, and malaria, and laboratory upgrades realize multiplicative benefits (Birx, de Souza, and Nkengasong 2009).

Further, vertical programs can have negative effects. These include the diversion of funding from the general health system and other services to support HIV services, the concern that opt-out HIV testing in ANC could reduce the use of pregnancy care because women would not want to bear the burden of HIV stigma, and increased demands on an understaffed workforce (Van den Akker et al. 2012). Such negative effects support the argument for service integration.

1.2.2. Limitations of and challenges to integrated care

Integrated care faces a number of limitations and challenges. Research by Winestone (2012) and by An and colleagues (2015) found that the integration of HIV and ANC services increased the workload of health care providers. Winestone (2012) also reported that integration can result in longer appointment times, which might lead to inadvertent disclosure of woman's HIV status. An and colleagues (2015) found lower motivation among staff; providers gave only brief messages, despite the fact that they were knowledgeable. In these environments providers' workloads can be overstretched, which leads to longer waiting times for women (An et al. 2015; Brugha et al. 2010; Simba et al. 2010; Walsh et al. 2010), while there may be overcrowding, which discourages women from remaining or returning for care (An et al. 2015). Concerns remain about the effect of integration on the quality of health services (Chi, Bolton-Moore, and Holmes 2013), and health providers disagree about the potential benefit realized from increasing their skills and variety of work (Mutemwa et al. 2013).

1.2.3. Measuring health service integration

A systematic analysis of integration considers the types of services integrated and the outcomes of interest. The ultimate goal is improvement in measures of patient care and its cost (Devers et al. 1994; Strandberg-Larsen and Krasnik 2009). There are multiple methods of analysis and several definitions of integration (Ahgren and Axelsson 2005; Atun et al. 2010; Strandberg-Larsen and Krasnik 2009). More than 20 measurement methods are available and some are highly developed. Application is based on an explicit conceptual framework with the process objective of refining and validating existing methods rather than developing a new method (Strandberg-Larsen and Krasnik 2009).

One study of the integration of HIV and TB care in South Africa used a comprehensive survey that rated 35 items related to different aspects of integration of HIV and TB care on a Likert scale (Uyei et al. 2014). Principal components analysis established eight factors of integration, including service availability at the facility, routine screening, the same clinician providing care for both diseases, and patient receipt of care for both diseases in a single visit. The researchers tested the differences of mean scores between facilities where both TB and HIV services were available and facilities with only one or the other; co-location of

services alone did not ensure integrated care, since some clinics with single services scored better on some factors than clinics with both services.

1.3. Rationale for this Study

A number of issues highlight the need for this research: The increased vulnerabilities associated with HIV/AIDS, TB, and malaria among pregnant women; the high burden of these diseases in Kenya, Malawi, and Tanzania; the potential benefits of integrating services; and the lack of consensus about the definition of and best methods for assessing the most important components that integrate services for infectious diseases with provision of ANC. Although there is broad agreement about the potential for integrated services that could positively affect health outcomes while containing costs, there is scant research about the most critical aspects of integrated services and the standardization of critical aspects across the integration of different services. As mentioned, Uyei and colleagues (2014) found that co-location of services was insufficient to provide integrated care, and that a joint service delivery model was optimal; however, this study focused only on the integration of TB and HIV/AIDS care. A systematic review (Dudley and Garner 2011) found some evidence that adding services or linking to them may improve service utilization, although there was no evidence that fuller integration improves service coverage or health status. The review concluded that more studies of different strategies are needed. Further, a study in Swaziland found that HIV-integrated services were not as integrated in practice as they claimed to be (Church et al. 2015).

Additional research can serve as a reference point for the potential of integrated services, the degree to which integration translates to actual service delivery, and how the various components may influence service delivery independently or as a combined package. Based on the available indicators measured by the Service Provision Assessment (SPA) surveys, this study identifies potential components of integration for HIV, TB, and malaria with ANC services, and provides a baseline assessment of the level of integration in health facilities in Kenya, Malawi, and Tanzania. In addition, the study examines whether women are receiving integrated services and if the availability of various aspects of integration or overall level of integration are related to women's receipt of services. These findings will inform future research and investments in strengthening health system that support integrated service delivery.

2. Data and Methods

2.1. Data

This study used data from Kenya, Malawi, and Tanzania, where there is a high burden of HIV/AIDS, TB, and malaria and a recent health facility survey. The DHS Program conducted health facility surveys—Service Provision Assessments—in Kenya (2010), Malawi (2013-14), and Tanzania (2014-15) in collaboration with the host countries. The SPA surveys include several questionnaires that collect information about facilities with an *inventory questionnaire*, which includes questions about availability of health services, infrastructure, commodities, procedures, and resources; the *health worker interview*, which captures characteristics, qualifications, and satisfaction of providers; and the *observation checklist*, which identifies the content and quality of selected consultations. The observation of consultations is typically specific to visits for ANC, child health, and family planning, although some SPA surveys include observations of other types of visits such as birth and delivery services. Clients who were observed during a visit are eligible for an *exit interview* to assess the client's perceptions of the visit.

The SPA surveys are usually conducted with a sample of formal-sector health facilities in a given country; this was the case for the SPA surveys conducted in Kenya and Tanzania that were used in this study. A random subset of facilities are selected from a list of all facilities in the country, with the potential of over-selection or over-sampling of facilities in regions with small populations or among facility types that are less common throughout the country, such as hospitals. In Malawi, the SPA is a complete census of facilities in that the survey included every formal-sector health facility in the country.

After selecting the facilities, a total of 8-15 providers were randomly selected from a list of providers within each facility. Priority is given to those who conduct consultations, with a goal that three will be providers of services in the areas of ANC, family planning, and child health. Each health worker who completes the interview is observed during his or her consultations with up to five clients, if possible. Thus, the interviewer observes a maximum of 15 consultations for each service. Clients for these observations are selected from a sample of clients attending visits that day, with priority given to new clients or clients attending the first ANC visit for their current pregnancy. All clients observed are offered the opportunity to participate in the exit interview.

This study uses data from the inventory questionnaire, health worker interview, the observation checklist, and the exit interview from facilities and health workers who provide ANC services and observation of women in ANC visits. In Kenya, this included 509 health facilities, 1,520 health workers, and 1,409 women observed in ANC visits; in Malawi, 632 facilities, 1,137 providers, and 2,068 women; and in Tanzania, a total of 1,005 facilities, 4,195 providers, and 4,007 women.

2.2. Methods

2.2.1. Construction of variables

2.2.1.1. Integration

A comprehensive review of each SPA survey identified questions that pertain to integrated services at the facility level and with observation of ANC visits. Five indicators for integration with each of the three infectious diseases (IDs) in this report are described in Table 2. It is important to note that the Kenya SPA was conducted prior to a major revision of SPA instruments. Although most questions between the surveys are the same or comparable, there are some discrepancies between surveys. Those are noted in Table 2. In addition to selecting indicators based on the availability of information in SPA surveys, we based indicator construction on current WHO recommendations for each ID, as defined in several WHO documents: A

Guide for Monitoring and Reporting on the Health Sector Response to HIV/AIDS (WHO 2011); A Strategic Framework for Malaria Prevention and Control during Pregnancy in the African Region (WHO 2004); WHO Policy Brief for the Implementation of Intermittent Preventive Treatment in Malaria in Pregnancy using Sulfadoxine-pyrimethamine (IPTP-SP) (WHO 2014); and the Service Availability and Readiness Assessment (SARA) Reference Manual (WHO 2013b).

The variables for integration of ANC with PMTCT and TB/HIV are adapted from the indicators in the WHO SARA Reference Manual (2013b) and the WHO Guide for Monitoring and Reporting (WHO 2011). These documents designate recommended measures for PMTCT that include providing HIV testing and counseling during pregnancy and offering ARTs on site. Specifying that PMTCT should be available at the same site as ANC is specifically mentioned in the SARA Manual, and is also noted as a core element of integrated care (Foreit, Hardee, and Agarwal 2002; WHO 2013b). The PMTCT recommendations for appropriate maternal ART medications have changed in the last decade; thus, the national guidelines for each country nearest to the time of the survey guided the creation of ART variables for PMTCT (Kenya 2005; Malawi 2011a; Tanzania 2012). The high co-infection with TB among people living with HIV prompted WHO to recommend that HIV patients should be screened for TB and newly enrolled HIV patients provided with TB prophylaxis (WHO 2013a). The WHO SARA Reference Manual also includes an indicator for screening for HIV among TB patients (WHO 2013b).

The indicators related to malaria are taken from WHO guidelines (WHO 2014). The current recommendation for IPTp-SP is that women consume IPTp-SP during each ANC visit in the second and third trimester no more than once per month under direct observation. WHO also recommends that all pregnant women use ITNs throughout their entire pregnancy. In addition to the WHO recommendation of "prompt and effective treatment of malaria in pregnant women" (WHO 2014:1), the variable for provision and availability of rapid diagnostic testing (RDT) for malaria was included in response to the growing concern about SP resistance and the waning effectiveness of IPTp-SP. One proposed solution currently under study is the effectiveness of providing RDT and providing treatment only as needed (Williams et al. 2016).

Variables were then constructed to mimic the WHO domains that are used to calculate health service readiness for independent services (WHO 2013b). The domains include whether or not the facility provides the service (availability) and if the facility has the appropriate equipment or supplies necessary to carry out these activities (readiness). For each service area in the manual, indicators fall into four domains for readiness: staff and training, equipment, diagnostic, and medicines and commodities. The integration indicators used in this report follow a similar format to measure integration service readiness. An additional domain accounted for availability of both services. Although the WHO SARA Reference Manual differentiates between availability and readiness, this report examines elements of both availability and readiness-like indicators as components of integration and then combines these components to create an integration score that describes a facility's capacity to provide integrated services.

For each ID area, we calculated an overall integration score with integration of ANC. This was done by summing all five components within each area. To standardize the scores on a scale of 0 to 100 for ease of comparability, we divided the calculated score by five to create an average and then multiplied by 100. This provided an average integration score for each facility, which represents both availability and readiness to provide integrated services at the facility level.

Table 2. Integration indicators and definitions, calculated as a percent among facilities providing ANC with integration items available on the day of the survey

	Indicator	Definition	Notes
PMTCT Integration			
Availability	ANC and HCT services	HCT and ANC available at least 3 days per week	
Staff and Training	Trained staff[1]	At least one ANC provider who also provides and has recent training in PMTCT services	In Kenya, recent training refers to training 36 months prior to the survey; in Malawi and Tanzania, it is 24 months.
Equipment	Same site	PMTCT same site as ANC Service	If the facility offers HCT to pregnant women at the same site as ANC site
Diagnostics	HIV testing	Offer HCT during ANC and have RDT or functioning microscopy with reagents available; must be able to conduct the test at the PMTCT site or laboratory within the facility	Diagnostic capacity includes RDT kit or ELISA test with ELISA washer, ELISA reader, incubator, specific assay kit.
Medicine and Commodities	PMTCT ART	Provide ART as part of PMTCT and have recommended ART available	The recommended ART for PMTCT varies by country and year. This variable was created following national guidelines for each country at the time of the survey.
TB/HIV Integration			
Availability	ANC and TB services	Offer TB services and ANC at least 3 days per week	The question for number of days TB services are provided is not included in the Kenya SPA; the substitute indicator for Kenya is if the facility offers both services.
Staff and Training	Trained staff[1]	At least one ANC provider who also provides and has recent training in TB/HIV services	In Kenya, recent training is in the 36 months prior to the survey, in Malawi and Tanzania, it is 24 months. Recent training can include any aspect of TB for Kenya. For Malawi and Tanzania, training specifically refers to management of TB/HIV co-infection.
Equipment	NA	No additional equipment recommended	
Diagnostics	TB screening system and TB diagnostics for HIV+ patients	Have an observed system for screening for TB for HIV+ patients and have TB diagnostic capacity	Diagnostic capacity includes: Light or fluorescent microscope, slides, and ZN stain OR fluorescent microscope, slides, and auramine-rhodamine stain.
	HIV screening system and HIV diagnostics for TB+ patients	Have an observed system for diagnosing HIV among TB+ patients and have HIV diagnostic capacity	In Kenya, the questionnaire asks if testing is done routinely versus selectively, while in Malawi and Tanzania, the question asks if there is a system for testing.
Medicine and Commodities	TB prophylaxis for HIV+ patients	Provide TB treatment for HIV+ patients and have preventive TB medicines with at least one in stock and valid	TB prophylactic medication given to HIV+ patients is isoniazid and vitamin B6.
Malaria Integration			
Availability	ANC and Malaria services	Offer malaria services and ANC at least 3 days per week	The question for number of days malaria services are provided is not included in the Kenya SPA; the substitute indicator for Kenya is if the facility offers both services.
Staff and Training	Trained staff[1]	At least one ANC provider who also provides and has recent training in malaria services	In Kenya, recent training is in the 36 months prior to the survey; in Malawi and Tanzania, it is 24 months. Recent training can include any aspect of malaria.
Equipment	NA	No additional equipment recommended	
Diagnostics	Malaria RDT	Routinely conduct RDT and have RDT available	Routinely provision of RDT can be observed or reported.
Medicine and Commodities	ITNs	Routinely distribute or counsel on ITNs and have ITN available	In Malawi or Tanzania the question pertains to counseling on ITN use; in Kenya, the most comparable question pertains to distribution only.
	IPTp	Have SP available	Observed in service area or where routinely stored; in stock with at least one valid

[1] To calculate staff training indicators, we collapsed and merged the provider training data into the facility file, and created a variable for having at least one ANC provider at the facility trained in each ID area.

2.2.1.2. Facility characteristics

The analysis incorporated several variables that describe the characteristics of facilities. Facility type was compared across all three surveys and comparable categories were created to include higher-level facilities such as a hospital, health center or maternity clinic, and lower-level facilities such as a dispensary, clinic, or other categories, which included health posts in Malawi. In Kenya stand-alone HIV counseling and testing facilities were excluded from the analysis because they are not equipped to provide ANC or other services. Managing authority was grouped across all three surveys as either public or private and other. Private and other included faith based organizations (FBOs) and both for-profit and not-for-profit non-governmental organizations (NGOs), as well as parastatal facilities in Tanzania. The analysis also compared facilities by regions, although in Tanzania the 30 regions were re-grouped into six geographical zones with the two zones in Zanzibar combined (Tanzania DHS 2010). In Kenya, an additional variable referenced malaria endemicity when examining integration of ANC with malaria. Since prevalence varies throughout the country, calculations of malaria endemicity regions were based on the findings of prevalence testing from the 2010 Kenya MIS (Division of Malaria Control [Ministry of Public Health and Sanitation] and Macro 2011).

The Kenya SPA survey did not report locality (urban or rural) status of the facilities; thus, a measure of population density was used as a proxy of locality. The population within the immediate service area (5km) of SPA facilities was estimated using population density rasters from WorldPop[1]. The country-specific population density rasters represent the predicted population per grid square with national totals adjusted to match UN population estimates. A custom python script and ArcGIS 10.4 Buffered Zonal Statistics tool calculated the total population estimate within a 5km radius surrounding the SPA facilities' GPS location.

Among all facilities, the range of the weighted sum of the population density within 5km of a facility ranged between 0 and 1,545,653 in Kenya (Mean (M) = 87,174, Standard Deviation (SD) = 209,446.6), between 117 and 295,658 (M = 47,196.6, SD = 7,0047.2) in Malawi, and between 44 and 841,291 (M = 63543.2, SD = 145,339.7) in Tanzania. The distribution of the population measure revealed highly positive skewness towards lower density areas in all three surveys, with skewness of 4.7 and kurtosis of 26.8 in Kenya, skewness of 2.1 and kurtosis of 6.3 in Malawi, and skewness of 3.1 and kurtosis of 12.9 in Tanzania. Two standardized cut points were used to categorize the variable into three groups across all three countries: a population density of less than <10,000 is defined as the lowest density, a population density of 10,000 to 34,999 as low density, and above 35,000 as medium/high density. This lowest, low, and medium-high population density variable was compared with the urban and rural variable in Malawi and Tanzania and the association was found to be highly significant ($p < .001$).

2.2.1.3. Provider characteristics

This study also describes characteristics of service providers (or health workers) who offer ANC services. These characteristics include occupational category, years of education, salary type, and gender. Occupational category was standardized to create a dichotomous variable for more technical qualifications or highly qualified positions such as doctors, clinical technicians, or other advanced specialists, and less technical qualifications or less qualified positions such as nurses, midwives, or other health workers. Although years of education are recorded as a continuous number, this study categorized the number to create a variable that may represent less, moderate, or advanced education; up to 14 years of education would include primary and secondary education, 14-17 years would include advanced education, and over 17 years would be the most advanced education, which is consistent with previous studies (Assaf 2015). Years of education, either the continuous variable or the categorized variable used in this report, is not

[1] Data were retrieved on March 15, 2016, from: http://www.worldpop.org.uk/data/get_data/

strongly correlated with provider category in any survey in this report. Salary type is defined as receiving no pay, regular pay, and no regular pay but other pay such as per diem.

2.2.1.4. Client characteristics

This report examines characteristics of clients who receive ANC services. These characteristics, as defined by the client in the exit interview, include education (none, primary, and secondary or higher); age (under 20, 20-35, and 36 or older); number of weeks pregnant; first, second, or third trimester of pregnancy; the client's first pregnancy or not; and the visit number (first, second, third, or fourth and higher).

2.2.1.5. Outcomes

At the client level, this study analyzes three outcomes of integrated care received during ANC visits as observed during the SPA. The first is ITN counseling or distribution. The precise definition of these terms varied by country due to the differences in the questionnaire. In Malawi and Tanzania, the question noted if a provider counseled the client on sleeping under an ITN to prevent malaria during pregnancy. In Kenya, the variable refers to whether or not the health worker gave the client an ITN (or a voucher to obtain an ITN) or counseled the client on ITN use during the ANC visit for their current pregnancy. Only women who are attending their first ANC visit are included for this outcome in all three countries, for a total of 556 women in Kenya, 873 in Malawi, and 1,847 in Tanzania. The second variable is direct observation of provision and consumption of IPTp-SP. SP is not recommended for women in their first trimester; thus, this variable only includes women in the second or third trimester: 1,239 women in Kenya, 1,956 in Malawi, and 3,428 in Tanzania. The final outcome is if a client received HIV counseling and testing (HCT) during ANC. This variable measured whether the client was asked about her HIV status, had an HIV test, and received counseling, only among women who attended their first ANC visit. There is no observed potential outcome for TB/HIV.

2.2.1.6. Analysis

This study analyzed the three categories assessed by SPA surveys: facilities, providers, and clients. The first part of the analysis describes the background characteristics of facilities that offer ANC services, examines the availability of ID services at these facilities, and presents the percentage of ANC providers who provide and have recent training in each ID area.

Second, the indicators of integration (described above) are examined at the facility level. Chi square tests of independence tested for significant differences in the coverage of each integration component across facility characteristics. One-way analysis of variance tests (ANOVA) tested for significant differences in the mean overall integration scores for integration of ANC service with each ID services across facility characteristics.

Finally, the analysis tested differences among women attending ANC visits for receipt of three types of integrated care services (counseling or distribution of ITNs, direct observation of SP consumption, and HCT). We employed several types of statistical tests to understand these differences and potential associations. The chi square test of independence assessed associations between each of the three outcomes and background characteristics of women, providers, and facilities, including facility-level integration components. T-tests examined differences in mean overall integration scores between women who received integrated care and those who did not. When significant bivariate associations were found between overall integration and client outcomes, multivariable logistic regression models were conducted to understand the most highly associated co-factors of the receipt of integrated care. All independent variables relating to women, provider, and facility characteristics were included in the models.

When interpreting the results, it is important to consider national policy guidelines for each country, particularly for malaria. Guidelines for prevention and treatment of malaria in pregnancy in Tanzania are shifting to recommend provision of SP on the mainland only (PMI 2014); thus, the analysis of SP in Tanzania excludes women who attend ANC at facilities in Zanzibar. The integration indicators are calculated for Tanzania as whole, however. At the time of the survey, the voucher program that enabled distribution of ITNs during ANC had expired and a new program for direct distribution in ANC had not yet begun (PMI 2014).

For all analyses, data are weighted to account for disproportionate sampling in Kenya and Tanzania and for non-response. Since selection and response vary among facilities, providers, and clients, a different weight is applied for each unit of analysis. The analysis also accounts for the complex survey design according to each survey's design. For Malawi, confidence intervals estimation and significance testing were not performed for facility-level analyses because the Malawi SPA is a census of health facilities in the country and thus there were no sampling errors. However, confidence intervals and statistical tests of differences were still calculated when using Malawi's provider- and client -level data, since these are sub-samples of their respective populations. All analyses are conducted using Stata 14.0.

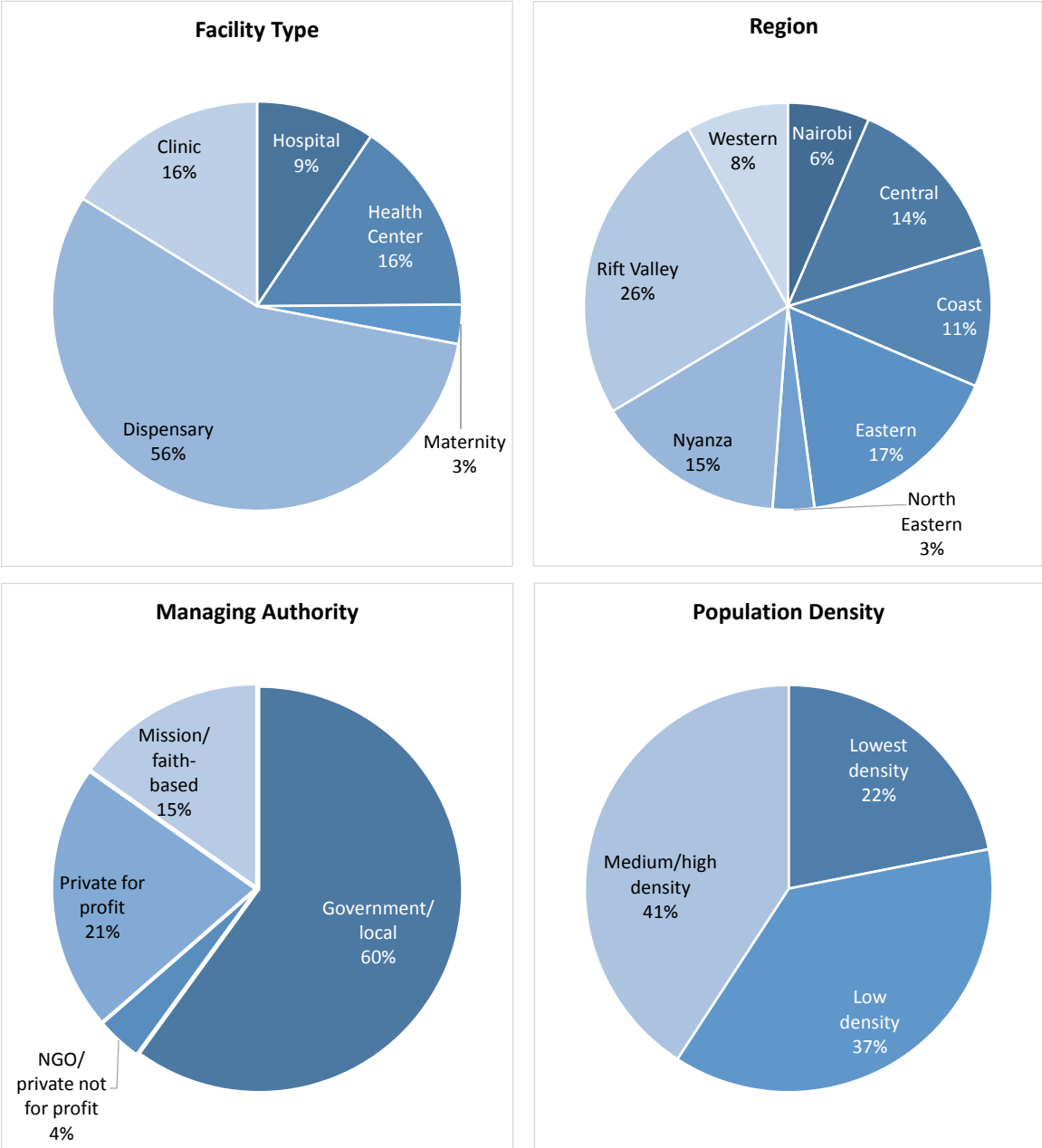
3. Results

3.1. Facilities and Providers That Provide ANC and Infectious Disease Services

3.1.1. What is the distribution of facilities with ANC services available?

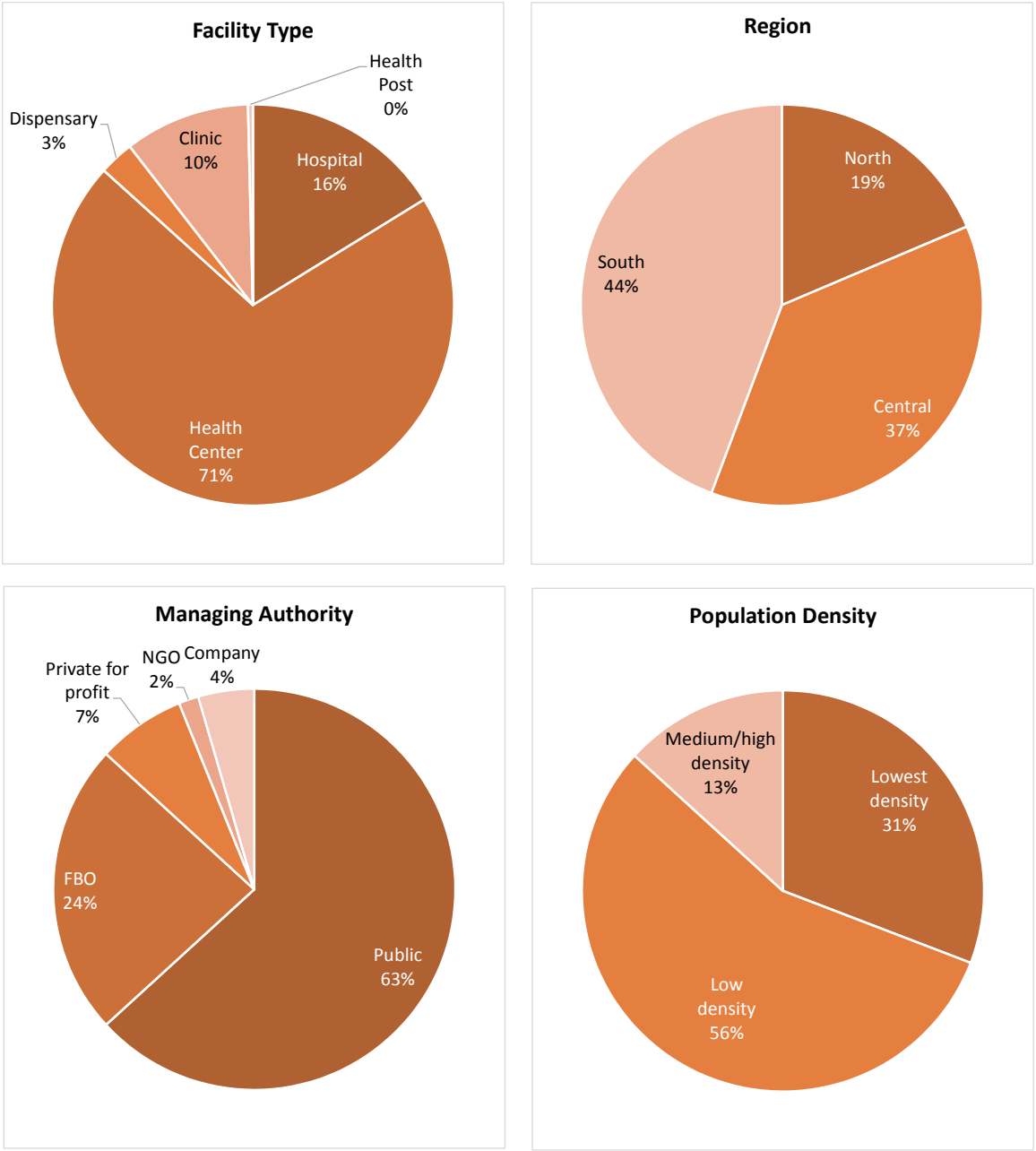
In Kenya, more than half of facilities with ANC services available are dispensaries (56%), followed by clinics (16%), health centers (16%), hospitals (9%), and maternity wards (3%) (see Figure 1). Geographically, the Rift Valley region has the greatest share of facilities with ANC services (26%), while the North Eastern region has the smallest share (3%). More than 40% of ANC facilities are found in medium/high density areas of Kenya, while just one-fifth (22%) are found in lowest-density areas. Most facilities with ANC services are public (60%).

Figure 1. Distribution of facilities with ANC by characteristics, Kenya SPA 2010



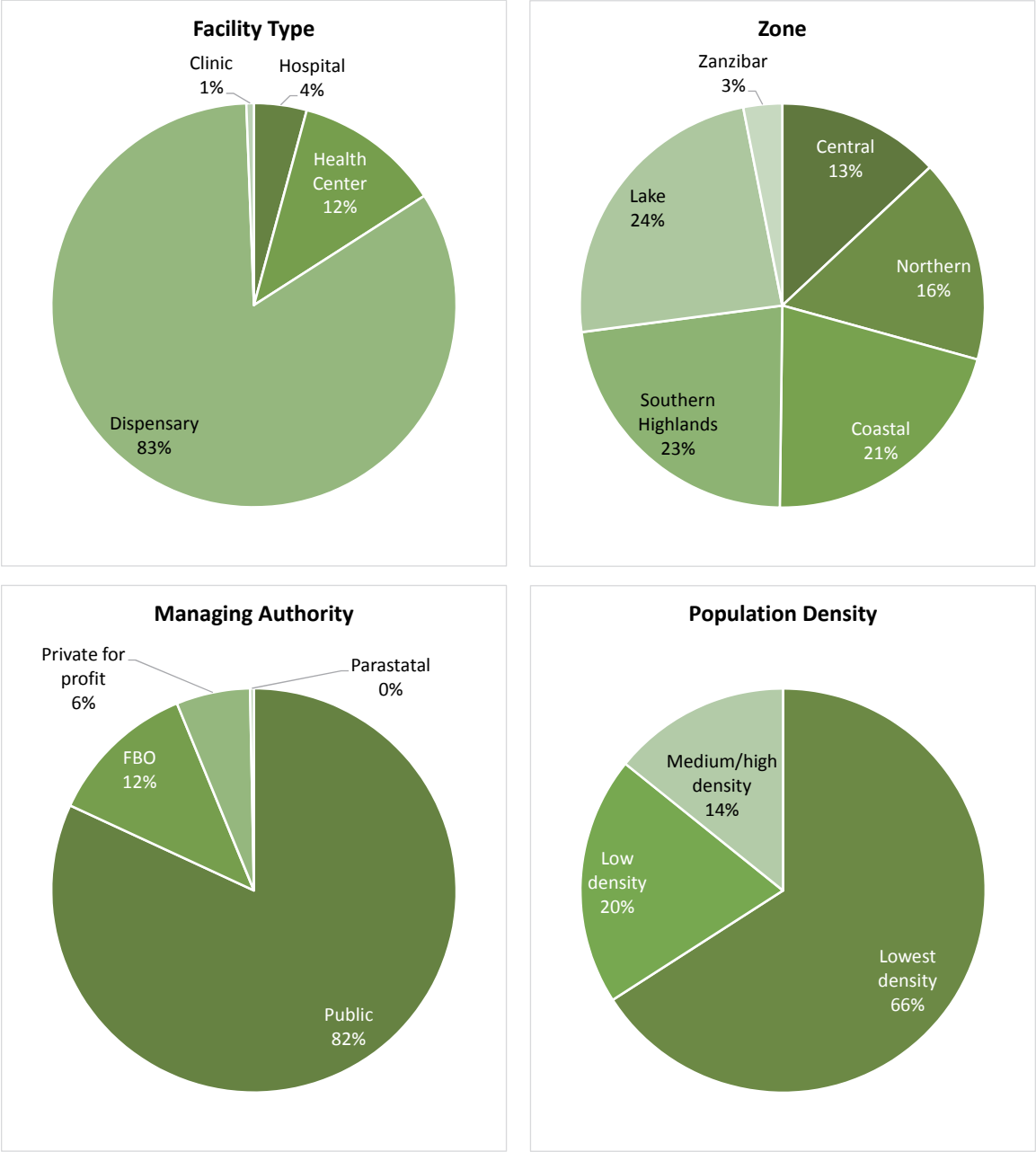
In Malawi, nearly three-quarters of facilities with ANC services are health centers (71%), followed by hospitals (16%), clinics (10%), and dispensaries (3%) (see Figure 2). The ANC facilities are primarily public (63%) and located in the South (44%) and Central (37%) regions, with a smaller share in the North (19%). Just 13% of the facilities are located in areas with medium or high population density.

Figure 2. Distribution of characteristics of facilities with ANC, Malawi SPA 2013-14



In Tanzania, the vast majority of facilities that provide ANC services are dispensaries (83%), with a smaller share of health centers (12%), hospitals (4%), and clinics (1%) (see Figure 3). Geographically, ANC facilities are distributed roughly evenly across the mainland regions, with 3% found in Zanzibar. Two-thirds of facilities with ANC services are found in areas with the lowest population density. As in Kenya and Malawi, most ANC facilities in Tanzania are public (82%).

Figure 3. Distribution of characteristics of facilities with ANC, Tanzania SPA 2014-15



3.1.2. What percent of ANC facilities provide PMTCT, TB, or malaria services?

As Figure 4 shows, in Kenya malaria services are nearly universal in facilities that offer ANC services, regardless of facility type, managing authority, region, or population density (see Figure 4, Appendix Table 1a). The availability of PMTCT and TB services in ANC facilities is lower and more variable across facility characteristics. Both PMTCT and TB services are more prevalent in hospitals, health centers, and maternity clinics than in dispensaries, clinics, and other ANC facilities, and are more common in public ANC facilities than in private/other facilities. The availability of PMTCT and TB services also varies across geographic regions, with PMTCT service availability lowest in the North Eastern region (35%), and TB service availability lowest in the North Eastern (31%) and Rift Valley (31%) regions.

Figure 4. Percent of facilities with ANC services that also have infectious disease services available, by background characteristics, Kenya SPA 2010

The patterns in availability of malaria, PMTCT, and TB services among ANC facilities in Tanzania and Malawi are similar to those described for Kenya (see Figures 5 and 6, Appendix Tables 1b-c). In all three countries, malaria services are nearly universal, PMTCT services are common, and PMTCT and TB services are more often available in hospitals, health centers, and maternity clinics than in dispensaries, clinics, and other facilities. Availability of TB services is notably lowest in Tanzania, although in all three countries availability of TB is lowest in the areas of lowest population density. Unlike in Kenya and Malawi, in Tanzania there is no difference in PMTCT or TB service availability in public versus private facilities.

Figure 5. Percent of facilities with ANC services that also have infectious disease services available, by background characteristics, Malawi SPA 2013-14

Note: Confidence intervals are not included since Malawi is a census of all facilities in the country. See methodology for more information.

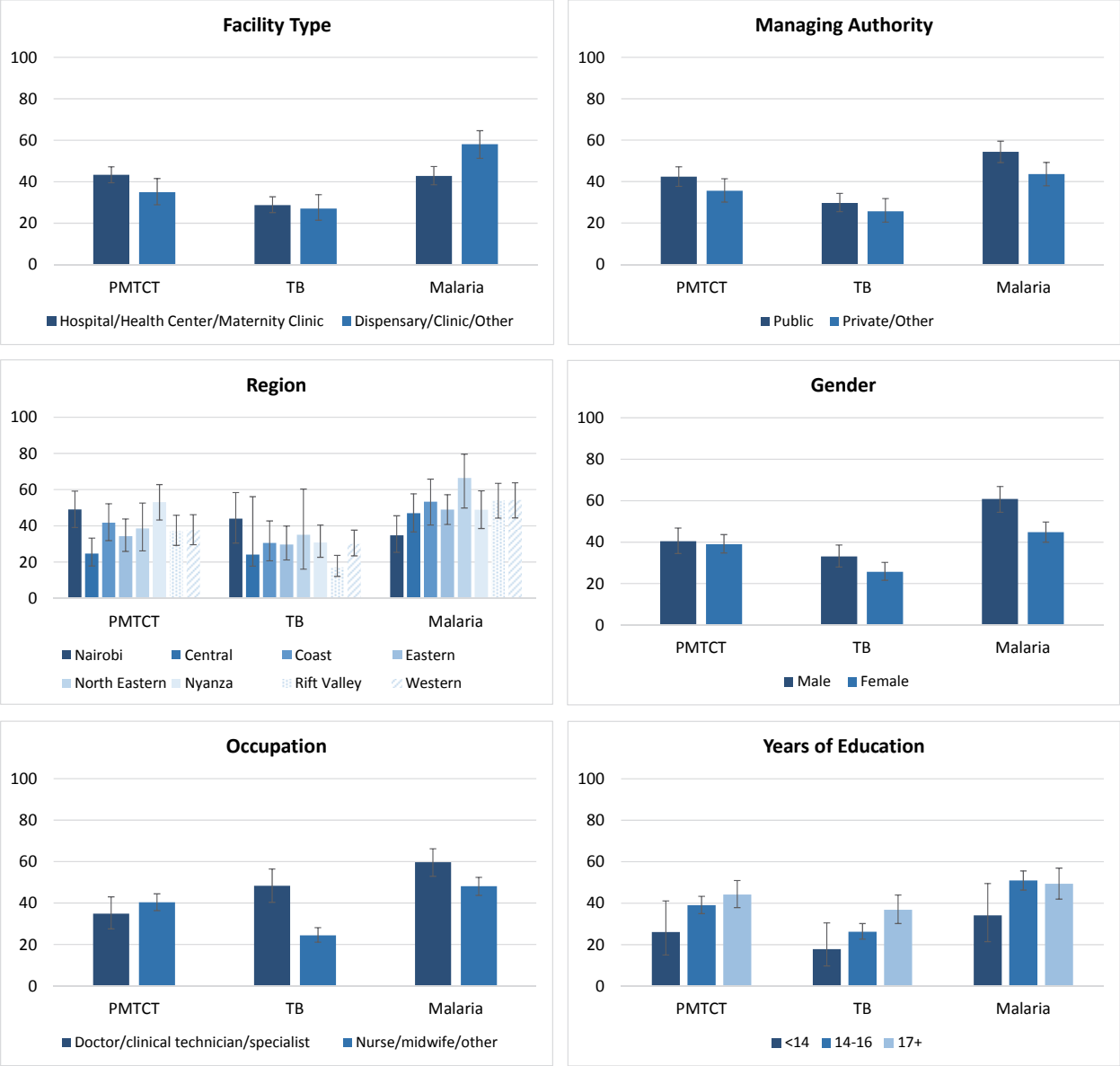
Figure 6. Percent of facilities with ANC services that also have infectious disease services available, by background characteristics, Tanzania SPA 2014-15

3.1.3. What percentage of ANC providers also provide services in each ID area?

Health workers analyzed in this study are those who provide ANC services. In all three countries, the majority of ANC providers are female nurses, midwives, or other less technical health professionals who work in public or government-managed facilities. Appendix Table 2 shows the distribution of ANC providers by their background characteristics and the facilities in which they work within each country.

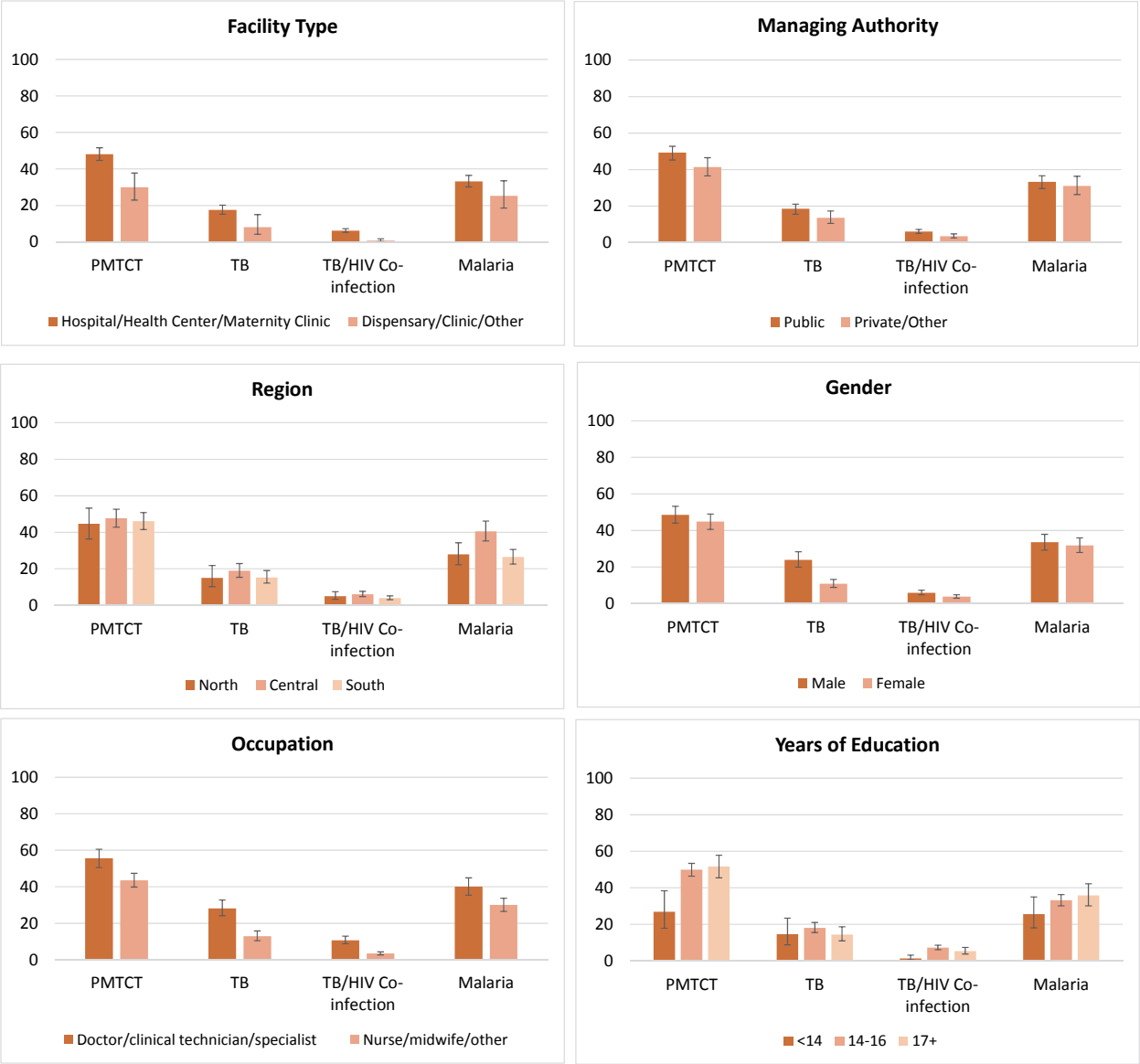
Figure 7 shows the differences in background characteristics of ANC providers who provide and have training in PMTCT, TB, and malaria in Kenya. Most of these differences are not significant. This information is also presented in Appendix Table 3a, with more information on lifetime training in these areas. Overall, more ANC providers also provide and have training in malaria services than in PMTCT or TB services. The percentage of ANC providers who provide and have training in PMTCT services is higher in public facilities than in private facilities. A higher percentage of doctors, clinicians, or specialists than nurses, midwives, or other qualifications provide and have training in TB and malaria services. For malaria services alone, a higher percentage of ANC providers also provide and have training in malaria services in dispensaries, clinics, or other facilities, compared with higher-level facilities, and in public facilities, compared with private or other facilities. Facilities in medium/high population density areas have the lowest percentage of ANC providers who provide and have training in malaria, compared with the low and lowest density areas (Appendix Table 3a).

Figure 7. Percent of ANC providers who provide and are recently trained in infectious disease services, by background characteristics, Kenya SPA 2010



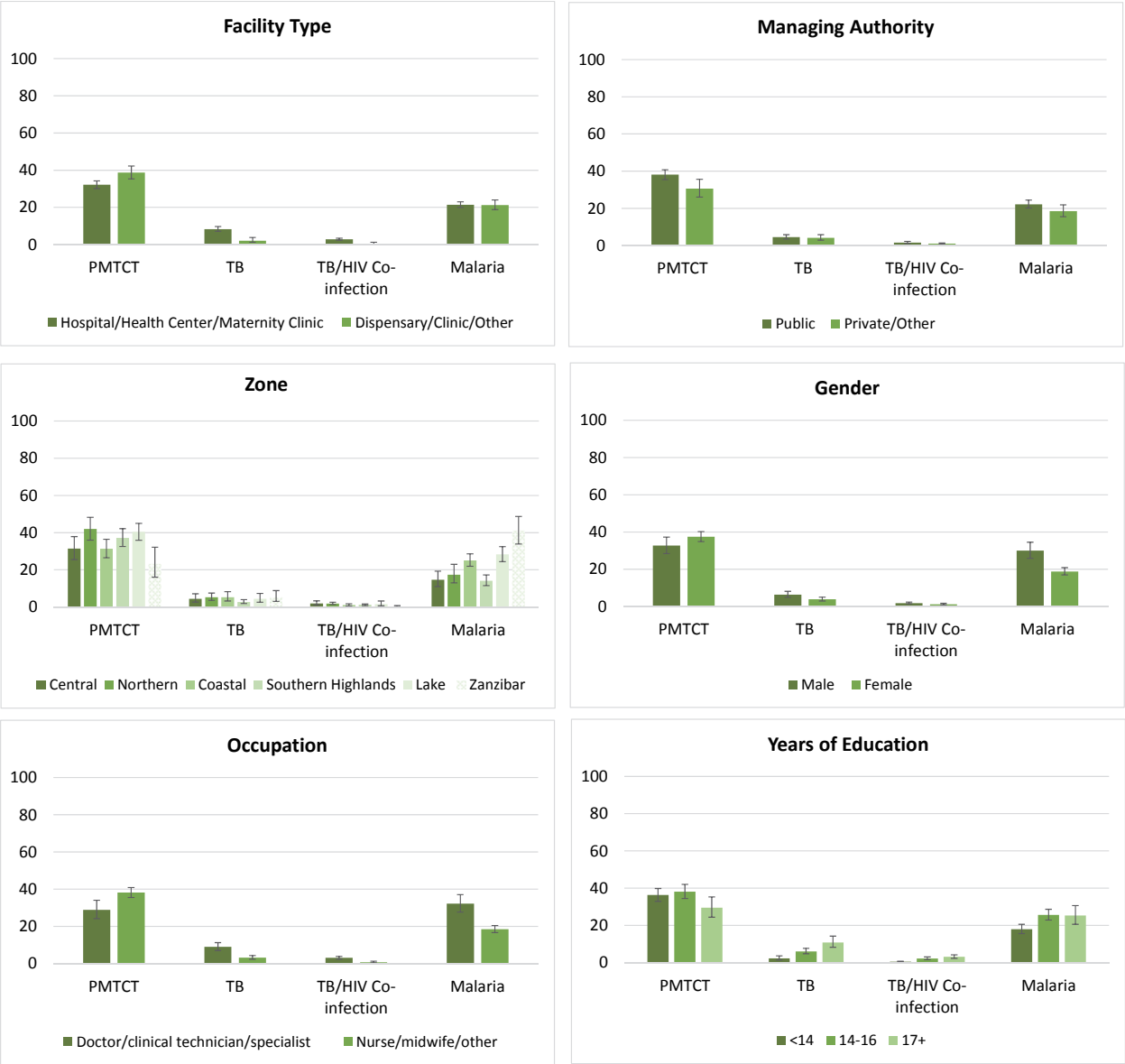
Figures 8 and 9 along with Appendix Table 3b and 3c show service provision and recent training in ID among ANC providers, by background characteristics, in Malawi and Tanzania. Unlike in Kenya, a higher percentage of ANC providers in Malawi and Tanzania provide and have recent training in PMTCT than provide and have recent training in malaria services. Both the Malawi and Tanzania survey questionnaires ask about provision of services and recent training in TB and HIV co-infection. In Malawi, this category has the lowest coverage, at less than 10%. In Malawi, the percentage of ANC providers who provide and are trained in PMTCT is higher in hospitals, health centers, and maternity clinics than in lower-level facilities; and is higher among those with more technical occupations and those with more years of education. This is also true for ANC providers who provide and are trained in any TB services (except for years of education, where the differences are less pronounced). For malaria, the percentage of ANC providers who provide and are trained in malaria services is highest among more qualified providers and providers in the Central region.

Figure 8. Percent of ANC providers who provide and are recently trained in infectious disease services, by background characteristics, Malawi SPA 2013-14



In Tanzania, there appear to be fewer ANC providers who provide services and are recently trained in all three ID service areas compared with Malawi and Kenya, although like the other two countries, fewer provide TB services, particularly TB/HIV co-infection services (less than 2%). Figure 9 and Appendix Table 3c show these results. The percentage of ANC providers who provide and are recently trained in PMTCT services is higher in lower-level facilities than in higher-level facilities, and is higher among staff in less-qualified positions, compared with doctors, clinical technicians, or specialists. Similar to Malawi, the percentage of ANC providers who are recently trained and provide any TB services is higher in higher-level facilities, and among those with higher-level occupations and more years of education. The percentage of ANC providers who are recently trained and provide malaria services is higher among men than women, and among those with higher-level occupations and more years of education.

Figure 9. Percent of ANC providers who provide and are recently trained in infectious disease services, by background characteristics, Tanzania SPA 2014-15



In all three countries, there were no differences for any ID area among different salary types and population density.

3.2. Integration within Facilities

3.2.1. What is the availability of different components of integration and how does that differ by facility characteristics?

In this study, five components are used to assess a facility's capacity to provide integrated services with infectious diseases. Table 2 describes each component of integration. Integration of ANC with each ID service is examined for differences among facilities, both by individual component and an overall average of components.

3.2.2. PMTCT

Tables 3a-3c show the integration of ANC with PMTCT services in Kenya, Malawi, and Tanzania for each component of integration, stratified by facility characteristics. In Kenya, there is a large gap between the availability of services and the actual capacity to provide these services. While more than half (59%) of all facilities with ANC services have both ANC and HCT services available at least three days per week, less than half have at least one provider who provides ANC and PMTCT services with recent training in PMTCT (48%), and offer HCT during ANC and have diagnostic capacity (45%). Only 7% offer ART during ANC/PMTCT and have the recommended ART available. Promisingly, three-quarters of all ANC facilities (75%) offer PMTCT at the same site as ANC services. Chi-square tests of independence show differences by facility type for all components of integration; higher-level facilities offer integrated services at a significantly higher percentage than lower-level facilities. While a higher percentage of public facilities have ART available and offer PMTCT at the same site, more privately managed facilities offer HCT and have testing capacity. There is significant variability by region and population density, although this variability is not consistent across the indicators.

Table 3a. Among facilities that provide ANC, percentage that provide integrated services with PMTCT, by background characteristics, Kenya SPA 2010

	ANC and HCT services available at least 3 days per week			At least one ANC provider who also provides and has recent training in PMTCT services			ANC and PMTCT offered at the same site			Offer HCT during ANC and have HIV testing capacity on-site			Provide ART as part of PMTCT and have recommended ART available			All ANC facilities
	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	N
Type of Facility			**<.001**			**<.001**			**<.001**			**<.001**			**0.001**	
Hospital/Health Center/ Maternity Clinic	74.9	67.5 - 81.1		74.6	67.8 - 80.3		87.3	81.5 - 91.5		73.8	66.4 - 80.0		20.9	16.4 - 26.3		126
Dispensary/Clinic/Other	54.2	46.4 - 61.8		39.0	31.1 - 47.4		70.6	62.4 - 77.7		35.3	27.7 - 43.7		2.5	1.2 - 5.4		383
Managing Authority			0.400			0.217			**0.030**			**0.003**			**<.001**	
Public	61.5	54.1 - 68.4		51.0	42.4 - 59.6		80.3	71.8 - 86.6		36.9	29.8 - 44.6		9.4	6.8 - 13.0		306
Private/Other	56.1	45.4 - 66.2		43.0	34.1 - 52.3		66.6	56.0 - 75.7		56.7	46.1 - 66.7		3.5	2.1 - 5.9		204
Region			**<.001**			0.088			**0.012**			0.227			**<.001**	
Nairobi	39.5	26.2 - 54.7		61.0	44.4 - 75.3		64.4	47.3 - 78.5		37.2	23.8 - 53.0		14.2	7.3 - 26.0		33
Central	75.7	54.5 - 89.0		28.8	18.6 - 41.8		74.2	53.5 - 87.8		57.4	37.3 - 75.3		1.5	0.4 - 4.7		71
Coast	72.3	52.7 - 85.9		50.7	32.8 - 68.5		60.0	41.4 - 76.2		57.7	41.4 - 72.4		10.2	5.2 - 19.2		57
Eastern	78.7	60.1 - 90.1		43.2	27.6 - 60.3		69.7	51.9 - 83.0		41.2	27.0 - 57.0		11.4	7.9 - 16.1		84
North Eastern	38.3	18.8 - 62.6		36.5	18.3 - 59.6		34.0	16.4 - 57.5		17.4	7.2 - 36.6		3.4	1.5 - 7.5		17
Nyanza	65.6	50.6 - 78.0		62.3	47.4 - 75.2		86.8	72.6 - 94.3		45.9	33.5 - 58.8		13.7	6.6 - 26.2		78
Rift Valley	32.5	19.8 - 48.4		46.7	31.0 - 63.2		79.8	61.8 - 90.7		40.4	25.8 - 56.8		1.4	0.7 - 3.1		130
Western	71.0	56.6 - 82.1		55.7	41.9 - 68.7		92.5	80.5 - 97.4		42.2	31.4 - 53.7		4.8	2.2 - 10.1		41
Population Density			0.096			0.252			0.156			**0.001**			**0.016**	
Lowest density	60.1	45.5 - 73.2		42.5	28.8 - 57.4		64.3	49.0 - 77.2		23.3	14.5 - 35.3		11.2	6.4 - 18.8		111
Low density	50.2	39.1 - 61.3		55.2	43.3 - 66.5		80.4	68.8 - 88.4		45.6	34.5 - 57.2		3.3	1.8 - 5.9		190
Medium/high density	67.2	57.5 - 75.7		43.9	35.6 - 52.5		75.3	66.0 - 82.7		55.6	45.8 - 65.0		8.4	5.4 - 12.6		208
Total	59.3	53.2 - 65.2		47.8	41.5 - 54.2		74.8	68.4 - 80.2		44.8	38.6 - 51.2		7.1	5.4 - 9.3		509

Note: Excludes stand-alone voluntary counseling and testing (VCT) clinics; testing includes external testing if results are returned and are provided to clients within the facility.

Although chi-square testing was not necessary using census data in Malawi, differences in percentages of facilities with availability of integrated services by facility characteristics are still evident, as Table 3b shows. Overall, facilities in Malawi appear well equipped to provide integrated services according to each integration component. Although only 50% of the facilities in Malawi have HCT and ANC available at least three days per week, 87% of all facilities offer HCT during ANC and have testing capacity, and 86% offer ART as part of PMTCT and have the recommended ARTs available. Across each integration component, the percentage of hospitals, health centers, and maternity clinics that are equipped to provide these integration components is twice as high as the percentage of dispensaries, clinics, and other types of facilities. It should be noted that higher-level facilities account for 85% of all facilities in the country. A higher percentage of public than private facilities offers each of these services.

In Table 3c the differences in PMTCT integration components by facility characteristics in Tanzania show similarities to Kenya. Overall availability of these services is higher in Tanzania than Kenya and is similar to Malawi. In Tanzanian facilities with ANC services, three-quarters (77%) have both ANC and PMTCT services available three days per week, while over 80% have testing and diagnostic capacity and offer PMTCT at the same site as ANC. Only 22% offer ART during ANC and have ART available, however. With the exception of PMTCT being located at the same site as ANC, facility type is associated with all PMTCT integration components; higher-level facilities are more likely than lower-level facilities to demonstrate availability of these components. Similar to Kenya, Tanzania's regions vary in the percentage of availability of integration components, and there are significant differences between regions in all components except having services at the same site. There is little difference by managing authority and population density.

Table 3b. Among facilities that provide ANC, percentage that provide integrated services with PMTCT, by background characteristics, Malawi SPA 2013-14

	ANC and HCT services available at least 3 days per week	At least one ANC provider who also provides and has recent training in PMTCT services	ANC and PMTCT offered at the same site	Offer HCT during ANC and have HIV testing capacity on-site	Provide ART as part of PMTCT and have recommended ART available	All ANC facilities
	%	%	%	%	%	N
Type of Facility						
Hospital/Health Center/ Maternity Clinic	53.5	68.5	79.6	92.0	91.8	548
Dispensary/Clinic/Other	27.2	36.1	47.1	52.2	49.8	84
Managing Authority						
Public	51.9	69.3	79.8	90.3	92.5	399
Private/Other	46.9	55.6	67.5	80.6	75.5	233
Region						
Northern	26.7	66.4	71.6	86.6	86.6	118
Central	61.5	63.9	73.8	87.6	83.0	235
Southern	50.2	63.6	78.0	86.0	88.8	280
Population Density						
Lowest density	27.7	58.3	76.1	86.8	86.8	194
Low density	57.9	66.8	76.9	89.8	89.0	352
Medium/high density	69.7	67.3	66.2	73.2	74.4	83
Total	50.0	64.2	75.3	86.7	86.2	632

Note: Missing population density data for two facilities. Confidence intervals are not included since Malawi is a census of all facilities in the country. See methodology for more information.

Table 3c. Among facilities that provide ANC, percentage that provide integrated services with PMTCT, by background characteristics, Tanzania SPA 2014-15

	ANC and HCT services available at least 3 days per week			At least one ANC provider who also provides and has recent training in PMTCT services			ANC and PMTCT offered at the same site			Offer HCT during ANC and have HIV testing capacity on-site			Provide ART as part of PMTCT and have recommended ART available			All ANC facilities
	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	N
Type of Facility			**0.008**			**<.001**			0.313			**<.001**			**<.001**	
Hospital/Health Center/ Maternity Clinic	83.4	79.9 - 86.4		77.4	73.5 - 81.0		86.3	83.2 - 89.0		95.0	92.9 - 96.5		55.6	51.1 - 60.0		160
Dispensary/Clinic/Other	76.2	71.5 - 80.2		61.4	56.2 - 66.3		83.9	79.7 - 87.4		84.9	80.9 - 88.2		15.5	12.1 - 19.7		845
Managing Authority			0.190			0.276			**0.008**			0.068			0.502	
Public	78.5	74.3 - 82.3		65.1	60.2 - 69.7		86.4	82.7 - 89.4		88.0	84.5 - 90.8		21.3	18.0 - 25.1		823
Private/Other	71.7	60.6 - 80.6		58.7	48.1 - 68.7		74.6	64.0 - 83.0		80.0	69.2 - 87.7		24.3	17.1 - 33.4		182
Zones			**0.033**			**0.015**			0.113			**0.028**			**0.008**	
Central	74.8	63.5 - 83.6		51.8	40.2 - 63.3		79.5	69.0 - 87.1		79.1	68.8 - 86.7		15.9	10.1 - 24.0		131
Northern	81.7	70.0 - 89.5		76.8	65.0 - 85.5		89.5	80.8 - 94.5		86.5	76.2 - 92.7		21.9	14.7 - 31.2		164
Coastal	84.2	74.5 - 90.6		61.3	50.7 - 70.9		86.8	78.0 - 92.4		91.6	82.8 - 96.1		31.2	23.3 - 40.4		210
Southern Highlands	80.4	71.6 - 86.9		61.0	51.6 - 69.7		87.8	79.3 - 93.1		91.1	83.3 - 95.4		22.1	15.6 - 30.2		228
Lake	66.8	58.5 - 74.2		68.9	59.8 - 76.8		79.5	70.7 - 86.2		84.5	76.3 - 90.2		19.6	14.3 - 26.3		241
Zanzibar	76.8	63.8 - 86.2		46.5	34.2 - 59.2		70.9	57.6 - 81.4		66.7	54.4 - 77.1		0.5	0.1 - 3.7		31
Population Density			0.336			0.362			0.540			0.545			**0.028**	
Lowest density	76.3	71.4 - 80.7		64.5	58.9 - 69.7		82.8	78.1 - 86.7		85.0	80.5 - 88.6		18.5	15.0 - 22.6		645
Low density	76.2	66.5 - 83.8		66.6	56.7 - 75.2		87.4	79.0 - 92.7		89.1	80.9 - 94.1		30.0	22.5 - 38.7		195
Medium/high density	85.0	72.6 - 92.4		56.2	43.9 - 67.8		85.0	75.2 - 91.3		88.0	78.0 - 93.8		25.4	16.5 - 36.9		139
Total	77.3	73.4 - 80.8		63.9	59.5 - 68.1		84.3	80.7 - 87.3		86.5	83.2 - 89.3		21.9	18.8 - 25.3		1,005

Note: Missing population density data for 26 facilities.

In summary, at least half of facilities in all three countries are equipped to provide most integrated ANC-PMTCT services, except for the provision of ART in Tanzania and Kenya. In all three countries, larger proportions of higher-level facilities are prepared to provide integrated services compared with lower-level facilities; for the most part, more of these facilities are public. There is variability by region, which appears more pronounced in Kenya and Tanzania than in Malawi. The differences by population density are generally non-significant and vary greatly by country and indicator within each country.

3.2.3. TB/HIV

Tables 4a-4c show the percentage of facilities that provide components of integrated services of ANC with TB/HIV, stratified by facility characteristics, for Kenya, Malawi and Tanzania respectively. The percentage of facilities in each country that provide components of integrated services of ANC with TB/HIV is much lower than the percentage that provide those same components of integrated services of ANC with PMTCT; at the time of the survey not more than about a third of all facilities in each country had any one of the TB/HIV integration indicators available. In each country, a higher percentage of higher-level facilities have integrated services capabilities compared with lower-level facilities.

The Kenya, the SPA did not include a question about the number of days per week (or month) that TB services are available or a question about training of staff in TB/HIV co-infection. Unlike Tables 4b and 4c for Malawi and Tanzania, Table 4a for Kenya shows any availability of services for TB and ANC and staff training on any aspect of TB, the components that are included in the calculation of Kenya's integration score. Therefore, the integration components and scores are not totally comparable across all three countries. Beyond the availability of services, the integration indicator most commonly available at facilities is having at least one ANC provider who also provides TB services and is recently trained in some aspect of TB care (36%). However, only 4% of ANC facilities offer TB treatment for HIV-positive patients and have preventive TB medications available. Similar to the integration of ANC and PMTCT, there are significant differences by facility type; this follows the same pattern of higher-level facilities having higher percentages of availability than lower-level facilities. There are fewer significant differences by other characteristics, as Table 4a shows.

Table 4a. Among facilities that provide ANC, percentage that provide integrated services with TB/HIV, by background characteristics, Kenya SPA 2010

	ANC and TB services			At least one provider who also provides and has recent training in TB services			TB screening system for HIV+ patients and have TB diagnostics on-site			HIV screening system for TB+ patients and HIV diagnostics on-site			Offer TB prophylaxis for HIV+ patients and have medication available			All ANC facilities
	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	N
Type of Facility			**<.001**			**<.001**			**<.001**			**<.001**			**<.001**	
Hospital/Health Center/ Maternity Clinic	89.7	84.3 - 93.4		63.9	56.2 - 70.9		62.2	54.5 - 69.2		68.3	60.9 - 75.0		10.7	7.0 - 16.0		126
Dispensary/Clinic/Other	37.8	31.0 - 45.1		27.1	21.1 - 34.2		11.7	7.5 - 17.8		16.3	10.9 - 23.6		1.1	0.5 - 2.6		383
Managing Authority			**0.021**			0.320			0.155			0.864			0.615	
Public	57.0	49.4 - 64.2		38.6	31.5 - 46.2		26.9	21.3 - 33.4		28.8	23.2 - 35.2		3.2	2.0 - 5.1		306
Private/Other	41.2	32.0 - 51.1		32.7	25.0 - 41.4		20.1	14.5 - 27.3		29.8	21.4 - 39.8		3.9	2.1 - 7.3		204
Region			**0.002**			0.075			0.294			0.362			**<.001**	
Nairobi	52.6	37.0 - 67.7		45.6	30.4 - 61.7		28.2	16.6 - 43.7		28.6	19.8 - 39.3		15.3	7.4 - 29.2		33
Central	59.5	41.1 - 75.6		33.0	21.6 - 46.8		18.2	11.0 - 28.6		27.6	14.6 - 45.7		1.6	0.8 - 3.1		71
Coast	62.0	43.1 - 77.9		41.3	25.1 - 59.6		30.3	16.5 - 48.9		33.8	19.5 - 51.7		0.0			57
Eastern	51.3	35.7 - 66.6		39.5	25.0 - 56.1		19.5	12.2 - 29.6		19.3	12.0 - 29.5		5.5	3.0 - 10.0		84
North Eastern	30.3	15.1 - 51.4		29.8	14.6 - 51.2		25.6	11.3 - 48.0		17.2	7.0 - 36.2		0.0			17
Nyanza	60.1	45.6 - 72.9		42.6	29.8 - 56.4		34.9	23.9 - 47.8		39.5	27.5 - 52.9		3.8	1.4 - 9.9		78
Rift Valley	30.9	22.5 - 40.9		23.1	14.5 - 34.8		21.3	13.2 - 32.6		30.0	19.0 - 43.9		1.7	0.4 - 7.4		130
Western	69.9	56.3 - 80.7		52.8	39.5 - 65.7		21.0	14.0 - 30.4		29.3	20.5 - 40.1		4.6	1.4 - 13.7		41
Population Density			0.146			0.161			0.073			**0.013**			0.167	
Lowest density	41.4	28.8 - 55.2		27.2	17.0 - 40.4		14.9	8.9 - 23.8		14.5	8.6 - 23.5		1.1	0.3 - 4.4		111
Low density	48.1	38.0 - 58.3		34.9	26.4 - 44.4		24.5	18.0 - 32.4		32.6	23.8 - 42.8		3.8	1.9 - 7.5		190
Medium/high density	58.1	48.1 - 67.4		42.3	33.6 - 51.6		28.9	21.7 - 37.5		33.9	26.0 - 42.9		4.6	2.8 - 7.3		208
Total	50.7	45.2 - 56.1		36.3	31.2 - 41.7		24.2	20.2 - 28.7		29.2	24.4 - 34.5		3.5	2.4 - 5.1		509

Note: The indicator for ANC and TB services refers specifically to availability of services of each at least three days per week. These questions are not included in the Kenya SPA. Excludes stand-alone VCT clinics; testing includes external testing if results are returned and are provided to clients within the facility.

Table 4b shows that in Malawi over one-third (35%) of ANC facilities have both ANC and TB services available at least three days per week, although just 5% have a system for screening for TB among HIV-positive patients and the capacity for TB testing. In addition, only 8% of ANC facilities offer and have prophylactic TB medication available for these patients. Differences in facility preparedness in each of these components of integration are seen by type of facility (more higher-level than lower-level facilities provide services), managing authority (higher percentages of public compared with private facilities), region (the Central region has the highest percentage of services available), and population density (the lowest density areas have the least availability).

Tanzania has much less capacity to provide services in the integration of ANC and TB/HIV compared with Malawi and Kenya (where indicators are comparable, as Table 4c shows). Less than 10% of facilities in Tanzania have at least one ANC provider trained in TB/HIV co-infection (7%) or have a system for screening for TB and TB diagnostic capacity (7%). Only 1% of facilities provide TB prophylaxis and have medications available for HIV-positive patients. As in Kenya and Malawi, higher-level facilities have greater capacity to provide the components of integrated care compared with lower-level facilities. There are also significant but inconsistent differences for some indicators among zones; for most indicators, low-density areas tend to have a higher proportion of capacity for integrated services than those with the lowest population density.

Table 4b. Among facilities that provide ANC, percentage that provide integrated services with TB/HIV, by background characteristics, Malawi SPA 2013-14

	ANC and TB services 3 days per week	At least one provider who also provides and has recent training in TB/HIV services	TB screening system for HIV+ patients and have TB diagnostics on-site	HIV screening system for TB+ patients and HIV diagnostics on-site	Offer TB prophylaxis for HIV+ patients and have medication available	All ANC facilities
	%	%	%	%	%	N
Type of Facility						
Hospital/Health Center/ Maternity Clinic	39.8	32.8	5.1	29.1	8.7	548
Dispensary/Clinic/Other	4.9	10.0	3.7	7.6	0.0	84
Managing Authority						
Public	40.8	34.2	4.6	30.2	9.0	399
Private/Other	25.6	22.2	5.5	19.3	5.0	233
Region						
Northern	19.1	26.0	2.5	19.2	2.5	118
Central	41.8	35.6	5.8	23.5	10.7	235
Southern	36.4	26.5	5.3	31.4	6.9	280
Population Density						
Lowest density	16.6	26.2	1.5	16.1	3.0	194
Low density	44.0	32.0	4.4	30.1	9.1	352
Medium/high density	42.1	29.3	15.4	33.9	11.6	83
Total	35.2	29.8	4.9	26.2	7.5	632

Note: Missing population density data for two facilities. Confidence intervals are not included since Malawi is a census of all facilities in the country. See methodology for more information.

Table 4c. Among facilities that provide ANC, percentage that provide integrated services with TB/HIV, by background characteristics, Tanzania SPA 2014-15

	ANC and TB services 3 days per week			At least one provider who also provides and has recent training in TB/HIV services			TB screening system for HIV+ patients and have TB diagnostics on-site			HIV screening system for TB+ patients and HIV diagnostics on-site			Offer TB prophylaxis for HIV+ patients and have medication available			All ANC facilities
	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	N
Type of Facility			**<.001**			**<.001**			**<.001**			**<.001**			**0.001**	
Hospital/Health Center/ Maternity Clinic	63.5	58.8 - 67.9		27.9	24.1 - 32.0		31.2	27.4 - 35.2		71.4	66.7 - 75.7		3.3	2.1 - 5.0		160
Dispensary/Clinic/Other	15.8	12.2 - 20.1		3.5	2.1 - 6.0		1.8	0.8 - 4.1		11.9	8.8 - 15.9		0.2	0.0 - 1.7		845
Managing Authority			0.239			0.974			0.059			0.174			0.992	
Public	24.2	20.6 - 28.3		7.4	5.6 - 9.6		5.9	4.5 - 7.6		20.3	17.1 - 23.9		0.7	0.3 - 1.5		823
Private/Other	19.3	13.5 - 26.9		7.4	5.1 - 10.7		9.3	6.3 - 13.5		26.3	18.9 - 35.3		0.7	0.3 - 1.8		182
Zones			0.055			0.456			**0.003**			**0.016**			**0.007**	
Central	15.1	9.7 - 22.8		8.1	4.3 - 14.7		4.1	2.9 - 5.9		11.0	8.0 - 14.9		0.3	0.1 - 1.0		131
Northern	25.8	17.9 - 35.6		8.5	5.1 - 13.7		8.4	4.4 - 15.5		22.6	16.2 - 30.5		2.4	0.8 - 6.8		164
Coastal	26.8	19.0 - 36.4		9.0	5.3 - 14.8		4.2	3.1 - 5.5		24.3	17.3 - 33.0		0.9	0.5 - 1.7		210
Southern Highlands	19.0	13.2 - 26.6		5.0	3.2 - 7.7		4.9	3.8 - 6.3		17.4	12.3 - 24.2		0.3	0.1 - 0.9		228
Lake	24.7	18.4 - 32.3		6.5	3.7 - 11.2		10.7	7.2 - 15.6		27.4	20.6 - 35.3		0.2	0.0 - 0.8		241
Zanzibar	42.4	33.2 - 52.1		12.0	6.9 - 20.0		2.2	0.8 - 5.7		21.9	14.9 - 31.0		0.0			31
Population Density			**0.001**			**0.006**			**0.001**			**<.001**			0.153	
Lowest density	19.3	15.5 - 23.6		6.0	4.3 - 8.4		4.6	3.4 - 6.1		14.8	11.9 - 18.3		0.5	0.1 - 1.8		645
Low density	36.3	28.0 - 45.4		12.8	8.5 - 18.9		11.4	7.5 - 17.0		31.3	23.8 - 39.8		0.8	0.4 - 1.8		195
Medium/high density	27.6	18.3 - 39.2		6.8	4.1 - 10.9		8.6	5.1 - 14.1		34.6	24.3 - 46.6		1.7	0.9 - 3.1		139
Total	23.3	20.1 - 26.9		7.4	5.9 - 9.3		6.5	5.2 - 8.0		21.4	18.5 - 24.6		0.7	0.4 - 1.3		1,005

Note: Missing population density data for 26 facilities.

3.2.4. Malaria

Among facilities that provide ANC, Tables 5a-5c show the percentage that provide ANC integrated with malaria services. There is substantial variation in components of integrated services across the three countries overall, as well as by facility characteristics within each country.

Table 5a shows results for Kenya. As with TB services, the Kenya SPA does not ask how many days in a given time period services are provided. Therefore, Table 5a substitutes any availability of services for services available three days per week. The other four indicators of integration of ANC and malaria services are the same in each country. While a high percentage of facilities in Kenya have at least one ANC provider who provides and is recently trained in some aspect in malaria (71%) and have SP available (86%), only 6% routinely conduct RDT during ANC visits and have RDT available. As seen with the integration with other ID services, there are significant differences by type of facility, managing authority, region, and population density, although these differences are not seen among all indicators for each characteristic. In Kenya, there is a wide range of malaria prevalence across the country, which could account for the inconsistent findings for malaria services by facility characteristics. As mentioned in the Methods section, malaria endemicity is used to describe facilities in relation to integrated services with malaria. With the exception of facilities with trained staff, there are significant differences among the remaining three integration components by this characteristic. However, unlike having and providing RDT and ITNs available, having SP available is more common among areas of Kenya with lower malaria risk.

Table 5a. Among facilities that provide ANC, percentage that provide integrated services with malaria, by background characteristics, Kenya SPA 2010

	Offer malaria services and ANC at least 3 days per week			At least one ANC provider who also provides and has recent training in malaria services			Routinely conduct RDT and have RDT available			Routinely distribute ITNs and have ITNs available			Have SP available			All ANC facilities
	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	N
Type of Facility			0.352			**<.001**			**0.002**			0.123			0.119	
Hospital/Health Center/Maternity Clinic	100.0			83.3	77.2 - 88.0		11.1	7.9 - 15.5		57.9	51.2 - 64.3		90.7	85.4 - 94.3		126
Dispensary/Clinic/ Other	99.4	98.0 - 99.8		66.6	58.3 - 74.0		3.6	1.9 - 6.9		49.9	42.2 - 57.6		85.0	78.0 - 90.0		383
Managing Authority			0.187			0.326			0.153			**<.001**			**<.001**	306
Public	99.2	97.5 - 99.8		73.2	64.8 - 80.2		4.2	2.3 - 7.3		62.1	53.3 - 70.2		94.2	88.1 - 97.2		204
Private/Other	100.0			67.1	56.9 - 75.9		7.4	4.4 - 12.4		36.5	28.6 - 45.2		74.8	64.4 - 82.9		
Region			**<.001**			0.511			**<.001**			**<.001**			0.091	
Nairobi	94.0	78.1 - 98.6		57.6	42.7 - 71.3		3.5	0.6 - 17.2		12.2	5.4 - 25.1		59.4	44.1 - 73.1		33
Central	100.0			64.1	43.5 - 80.5		4.1	2.3 - 7.1		31.1	19.9 - 45.2		90.0	66.7 - 97.6		71
Coast	100.0			75.5	58.7 - 87.0		17.1	6.9 - 36.5		44.5	28.9 - 61.2		85.5	64.9 - 95.0		57
Eastern	100.0			74.0	55.8 - 86.5		1.5	0.4 - 5.7		79.2	61.5 - 90.0		93.2	78.9 - 98.1		84
North Eastern	100.0			53.6	30.4 - 75.4		12.7	3.9 - 34.5		0.7	0.1 - 4.6		90.7	64.8 - 98.1		17
Nyanza	100.0			66.7	51.7 - 78.9		8.8	4.8 - 15.6		72.2	58.6 - 82.6		89.0	76.6 - 95.3		78
Rift Valley	99.7	98.2 - 100.0		78.0	60.5 - 89.1		1.1	0.5 - 2.6		43.9	27.8 - 61.5		84.3	67.9 - 93.2		130
Western	100.0			71.3	57.6 - 82.0		5.9	2.3 - 14.4		80.7	69.5 - 88.5		89.1	77.8 - 95.0		41
Malaria Risk			0.316			0.230			**0.001**			**0.001**			**0.036**	
High risk	100.0			75.9	66.4 - 83.5		11.1	6.1 - 19.4		65.8	56.7 - 73.9		83.8	71.9 - 91.3		143
Epidemic/lowest risk/no information	99.4	97.9 - 99.8		68.7	60.5 - 75.9		3.3	2.2 - 4.9		46.4	39.0 - 54.0		87.4	81.4 - 91.7		366
Population Density			0.366			0.907			**0.023**			0.052			0.485	
Lowest density	100.0			68.8	54.0 - 80.5		3.5	1.3 - 9.0		48.0	33.9 - 62.4		93.6	83.9 - 97.6		111
Low density	100.0			70.2	57.9 - 80.1		3.1	1.5 - 6.0		62.5	50.9 - 72.9		90.0	79.6 - 95.3		190
Medium/high density	98.9	96.3 - 99.7		72.3	63.4 - 79.7		8.7	5.3 - 14.2		44.2	35.9 - 52.9		79.3	70.0 - 86.3		208
Total	99.5	98.5 - 99.9		70.7	64.3 - 76.4		5.5	3.8 - 7.9		51.9	45.8 - 57.8		86.4	81.1 - 90.4		509

Note: Excludes stand-alone VCT clinics; testing includes external testing if results are returned and are provided to clients within the facility.

Table 5b shows the percentage of facilities in Malawi with ANC services that provide components of integrated services of ANC with malaria. Nearly all facilities in Malawi are equipped to provide SP (99%) while only one-fifth (20%) offer and have RDT available for ANC clients. Some differences are seen by facility characteristics. More high-level than lower-level facilities appear ready to provide these integrated services, although the differences are more subtle and less patterned between public and private facilities, region, and population density. The Central region has a higher percentage of facilities that offer both services three days per week or more and has a higher percentage of facilities with at least one trained staff member. Medium/high density areas have almost half as many facilities that provide ITNs and have them available compared with low-density and lowest-density facilities, while facilities with ANC in medium/high density areas have RDT available more often than facilities in lower-density areas.

Table 5c shows facility capacity to provide the components of integrated services for ANC and malaria in Tanzania. Although 81% of facilities offer ANC and malaria services at least three days per week, the availability of other components is much more limited. Sixty-one percent have SP available and 43% have at least one trained staff to provide services, while only 13% have RDT available and 12% have ITNs. There are significant or borderline significant differences in the coverage of components of integration by facility type, similar to other services and countries. In Tanzania, there is significant variation across region as well. Although Zanzibar has the lowest prevalence of malaria in the country, ITNs are ubiquitous (88%) compared with other regions and with the country as a whole. However, there is almost no availability of SP in Zanzibar. The national policy on malaria in pregnancy does not recommend providing SP during ANC visits in Zanzibar because of the low prevalence.

Table 5b. Among facilities that provide ANC, percentage that provide integrated services with malaria, by background characteristics, Malawi SPA 2013-14

	Offer malaria services and ANC at least 3 days per week	At least one ANC provider who also provides and has recent training in malaria services	Routinely conduct RDT and have RDT available	Routinely distribute or counsel on ITNs and have ITNs available	Have SP availa ble	All ANC facilities
	%	%	%	%	%	N
Type of Facility						
Hospital/Health Center/ Maternity Clinic	55.1	55.4	21.3	82.7	99.1	548
Dispensary/Clinic/Other	34.6	28.3	15.0	49.5	96.2	84
Managing Authority						
Public	53.1	56.9	20.6	82.2	99.2	399
Private/Other	51.2	42.9	20.2	71.7	97.8	233
Region						
Northern	29.2	48.6	20.9	78.2	100.0	118
Central	64.4	62.7	21.7	77.7	99.6	235
Southern	52.1	43.9	19.2	78.9	97.5	280
Population Density						
Lowest density	29.2	42.0	18.3	80.7	99.5	194
Low density	64.4	55.5	19.8	84.6	98.8	352
Medium/high density	52.1	57.6	28.7	46.9	96.4	83
Total	52.4	51.8	20.4	78.3	98.7	632

Note: Missing population density data for two facilities. Confidence intervals are not included since Malawi is a census of all facilities in the country. See methodology for more information.

Table 5c. Among facilities that provide ANC, percentage that provide integrated services with malaria, by background characteristics, Tanzania SPA 2014-15

	Offer malaria services and ANC at least 3 days per week			At least one ANC provider who also provides and has recent training in malaria services			Routinely conduct RDT and have RDT available			Routinely distribute or counsel on ITNs and have ITNs available			Have SP available			All ANC facilities
	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value	N
Type of Facility			**0.001**			**<.001**			**<.001**			**<.001**			0.102	
Hospital/Health Center/ Maternity Clinic	87.8	84.6 - 90.4		63.9	59.3 - 68.2		29.5	25.7 - 33.5		26.7	23.1 - 30.7		65.7	61.6 - 69.6		160
Dispensary/Clinic/Other	79.4	75.1 - 83.1		39.3	34.9 - 44.0		10.3	7.5 - 14.0		8.6	6.3 - 11.7		60.5	55.5 - 65.3		845
Managing Authority			0.072			0.872			**<.001**			0.276			**0.004**	
Public	81.1	77.0 - 84.6		43.4	39.1 - 47.7		10.8	8.3 - 13.9		10.9	8.6 - 13.7		58.4	53.7 - 62.9		823
Private/Other	79.2	69.0 - 86.7		42.5	33.4 - 52.1		24.8	16.9 - 34.9		14.3	9.2 - 21.6		74.6	64.5 - 82.6		182
Zones			**0.001**			**<.001**			**0.005**			**<.001**			**<.001**	
Central	76.1	64.6 - 84.7		28.1	19.2 - 39.1		6.0	2.5 - 13.5		5.9	2.7 - 12.2		34.3	24.1 - 46.2		131
Northern	82.1	70.4 - 89.9		34.7	24.8 - 46.1		24.0	15.7 - 34.9		16.0	9.4 - 25.9		56.3	44.8 - 67.3		164
Coastal	87.3	78.5 - 92.9		57.2	48.3 - 65.6		14.8	8.9 - 23.7		7.1	3.7 - 13.1		70.7	60.0 - 79.5		210
Southern Highlands	87.8	80.7 - 92.6		31.6	24.4 - 39.9		12.2	8.3 - 17.7		7.8	4.4 - 13.4		74.7	65.4 - 82.2		228
Lake	68.5	60.3 - 75.7		53.1	45.0 - 61.0		9.3	5.6 - 15.1		9.1	5.2 - 15.3		66.0	57.3 - 73.7		241
Zanzibar	91.5	79.5 - 96.8		65.9	53.4 - 76.5		16.7	9.7 - 27.1		87.6	75.1 - 94.3		3.8	1.3 - 10.6		31
Population Density			0.153			0.190			**<.001**			**0.001**			0.727	
Lowest density	79.5	74.7 - 83.5		42.3	37.3 - 47.4		9.2	6.8 - 12.4		8.0	5.7 - 11.2		60.3	54.9 - 65.4		645
Low density	80.0	70.7 - 86.9		50.0	40.5 - 59.5		20.1	13.5 - 28.8		16.9	11.8 - 23.7		64.5	55.3 - 72.7		195
Medium/high density	90.0	79.3 - 95.5		36.6	26.5 - 48.0		25.4	16.0 - 37.8		17.9	11.9 - 26.1		63.2	50.2 - 74.5		139
Total	80.7	77.1 - 83.9		43.2	39.4 - 47.1		13.3	10.8 - 16.4		11.5	9.4 - 14.1		61.3	57.1 - 65.4		1,005

Note: Missing population density data for 26 facilities.

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3.2.5. What is the national average level of facility capacity to provide integrated services?

For each of the service areas, we calculated a national integration score by averaging the respective five integration components and standardizing to a scale of 0 to 100. Figures 10, 11, and 12 present national scores for integration of ANC with the three types of infectious disease services (PMTCT, TB, and malaria) for Kenya, Malawi, and Tanzania respectively. On average and bearing in mind the slight difference in components, ANC facilities in Kenya are better prepared to provide integrated antenatal and malaria services (score of 63) compared with the other two types of integrated services. Facilities in Malawi and Tanzania scored the highest in providing integrated antenatal and PMTCT services with scores of 73 and 67, respectively. The lowest national score was for the integration of ANC and TB/HIV services in all three countries, with scores of 29, 19 and 11 in Kenya, Malawi, and Tanzania respectively.

Figure 10. National average integration scores, Kenya SPA 2010

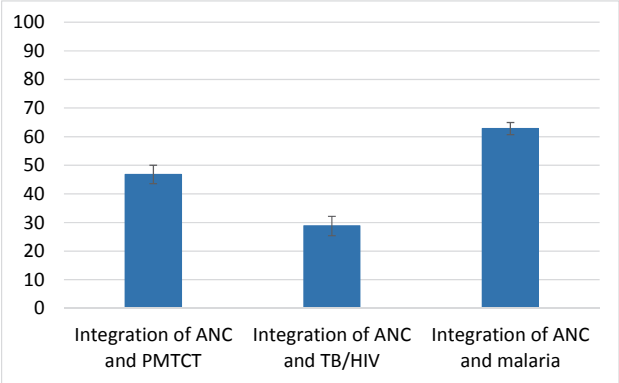


Figure 11. National average integration scores, Malawi SPA 2013-14

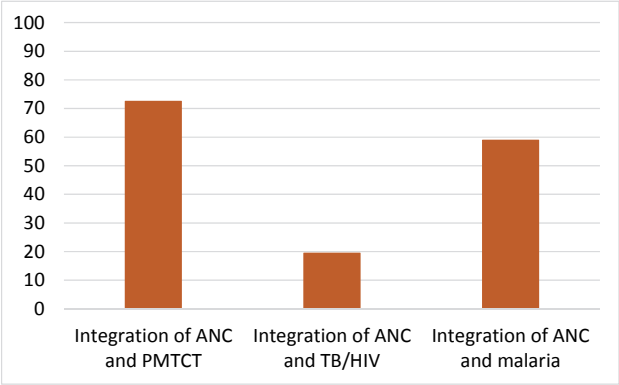
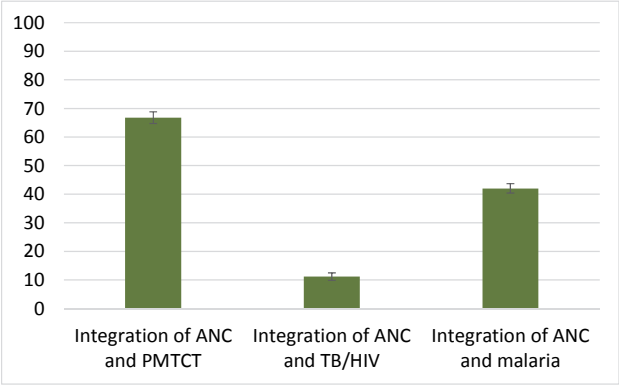


Figure 12. National average integration scores, Tanzania SPA 2014-15



3.2.6. How does the integration score vary by facility characteristics?

Figures 13-15 show differences in the national integration score by facility characteristics for the three countries studied. Integration scores within facility characteristics are compared with the national average, using one-way ANOVA to test for differences. The p-values are presented in Appendix Table 4. Similar to the variation seen in individual components, the largest notable differences by facility characteristic in integration scores are between high-level and low-level facilities—that is, hospitals, health centers, and maternity clinics versus dispensaries, clinics, and other facilities. There is a general trend for public facilities to be better equipped to provide these services, except in Tanzania for TB/HIV and malaria, but the differences are not significant. There is some variation by region or zone in Kenya and Tanzania, while differences by population density are less apparent in all three countries.

Figure 13. Average integration scores of ANC with infectious disease services, by facility background characteristics, Kenya SPA 2010

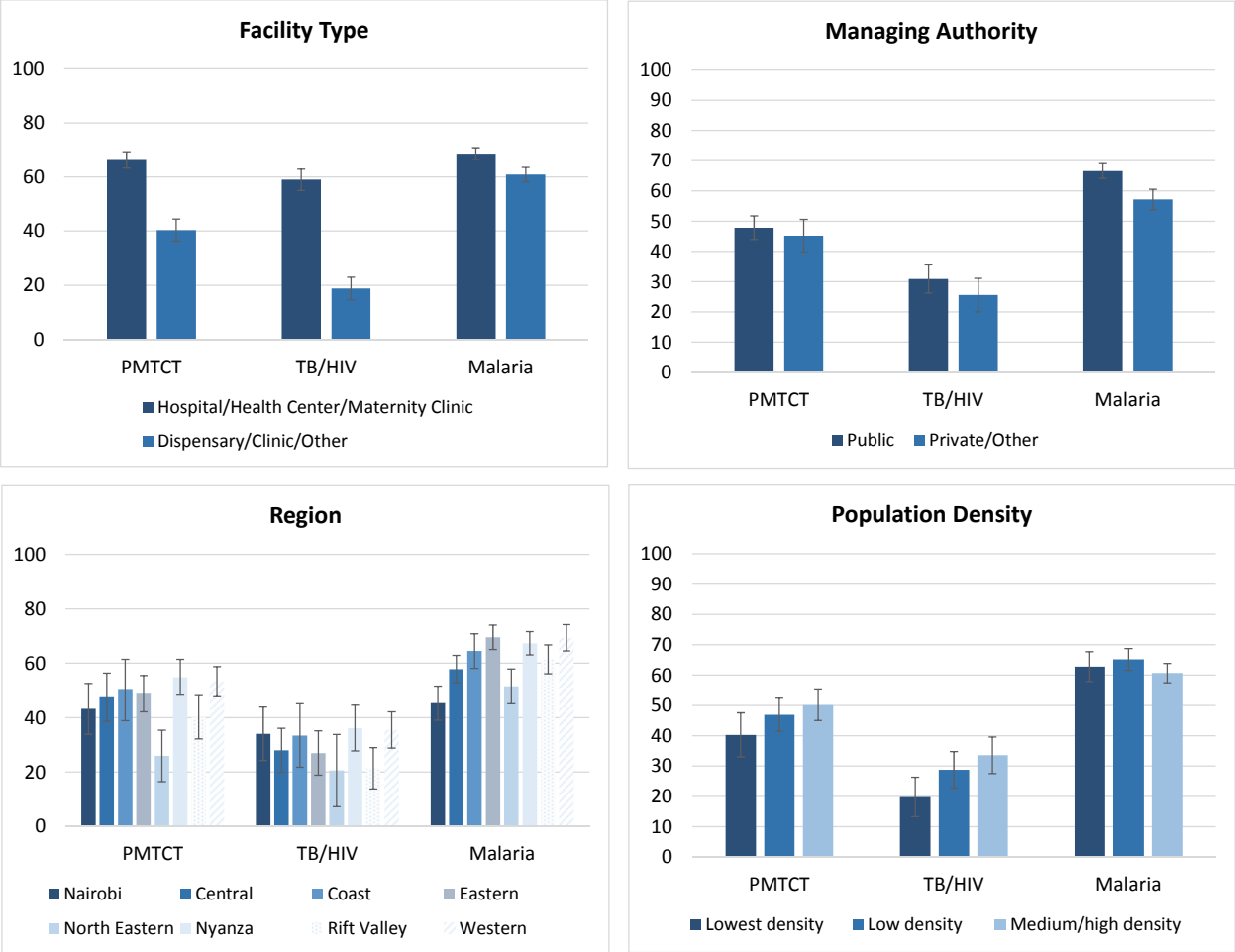


Figure 14. Average integration scores of ANC with infectious disease services, by facility background characteristics, Malawi SPA 2013-14

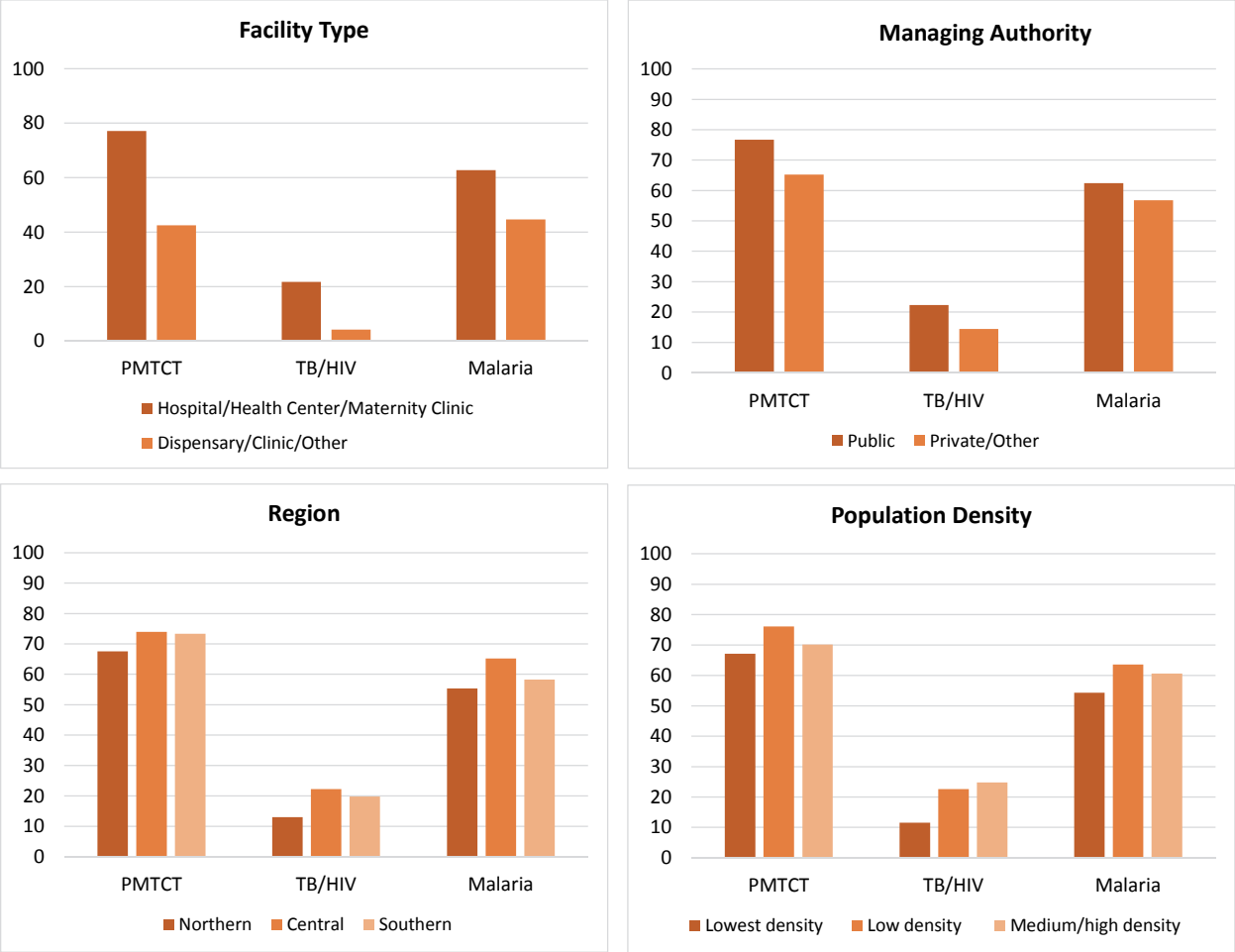


Figure 15. Overall integration of ANC with infectious disease services, by facility background characteristics, Tanzania SPA 2014-15

3.3. Integrated Services Observed in ANC

3.3.1. How often are women receiving integrated care and are there differences by background characteristics?

As part of the SPA surveys, 1,409 ANC consultations were observed in Kenya; 2,068 in Tanzania, and, 4,007 in Malawi. More than half of the pregnant women in each country were age 20-35; between 68% and 75% were pregnant with their first child, and most were present for their first or second ANC visit. The majority of observed ANC visits took place at public facilities, and for 74% to 85% of these ANC visits the provider was female (see Appendix Table 5 for more detailed background information on observed ANC visits).

Tables 6a-6c show the percentage of women who received integrated care during their observed ANC visits, according to background characteristics in Kenya, Malawi, and Tanzania respectively.

Kenyan women were significantly more likely to receive an ITN during their first ANC visit if they attended a public facility rather than a private one; if the facility was in a high-malaria risk area rather than an area with low or no risk; if the provider was a nurse, midwife, or other provider rather than a doctor, clinical technician, or specialist; and if the provider had at least 14 years of education.

In Kenya, receiving SP in the second and third trimester was significantly related to the client's trimester in pregnancy, the number of ANC visits she had completed, the facility's managing authority and region, and the provider's occupational category and gender. Women were significantly more likely to receive SP if they visited a public facility, and if the provider was female and a nurse, midwife, or other provider.

The integration of HIV (PMTCT) services into observed ANC visits (as measured by whether women were asked about their HIV status, received counseling, and were given an HIV test during first ANC visit) was significantly related to the facility's managing authority, the population density around the facility, and the provider's occupational category, years of education, and gender. Women who visited public facilities, those who visited facilities in areas with medium or high population density, and those who saw providers who were female, nurses, midwifes, or other occupations, and those whose providers had fewer years of education were more likely to have PMTCT services integrated into their ANC visit.

Unlike Kenya, few client and facility characteristics in Malawi were associated with receiving integrated care among the ANC clients observed. Receiving SP was associated with the client's stage in pregnancy and number of ANC visits completed. Clients in the second trimester of pregnancy were more likely to receive SP than those in the third trimester. More than half of the first-visit and second-visit ANC clients received SP compared with 19% among those for whom the observed visit was their fourth visit or higher. A greater percentage (64%) of first-visit ANC clients at higher-level facilities (hospitals, health centers, or maternity clinics) discussed or received ITNs than those at lower-level facilities, such as dispensaries and clinics (24%). We did not find any evidence of significant associations between client and facility characteristics and the integration of HIV counseling and testing services into ANC. The integrated care during ANC visits did not appear to differ by any of the provider characteristics.

In Tanzania, despite the low level of integration of malaria services into ANC (measured by discussing or receiving an ITN during first ANC visit and receiving SP in the second or third trimester), some client, facility, and provider characteristics were associated with women receiving integrated care. Over 40% of first-visit ANC clients at facilities in Zanzibar discussed or received ITNs during the observed visit compared with 6% to 14% in other regions. Clients seen by a female provider were more likely to be counseled about ITNs or receive ITNs. Receiving SP was significantly associated with the client's trimester in pregnancy, the number of ANC visits completed, and the provider's category. The integrated PMTCT services during ANC visits was only associated with region. Clients at facilities in Zanzibar were the least likely to receive HCT during their first ANC visit.

Table 6a. Background characteristics of women observed receiving integrated services during ANC visit, Kenya SPA 2010

	Percent of women who discussed or received ITN during first ANC visit			Percent of women in the second and third trimester who received SP			Percent of women asked about their HIV status, received counseling and given an HIV test during first ANC visit		
	%	CI	p-value	%	CI	p-value	%	CI	p-value
Education			0.183			0.686			0.052
None	47.2	32.7 - 62.2		38.7	18.8 - 63.2		19.5	6.6 - 45.2	
Primary	65.8	57.0 - 73.6		45.2	38.6 - 52.1		48.5	40.2 - 56.9	
Secondary or higher	62.8	52.2 - 72.3		42.0	35.5 - 48.9		50.1	38.8 - 61.4	
Age			0.667			0.231			0.758
<20	62.2	46.8 - 75.5		45.2	36.0 - 54.9		51.2	37.4 - 64.9	
20-35	63.5	55.9 - 70.5		41.5	35.8 - 47.5		46.3	38.2 - 54.7	
36+	69.3	55.6 - 80.2		49.2	39.3 - 59.2		49.7	36.1 - 63.4	
Weeks pregnant			0.890			**0.001**			0.440
4-13	60.0	33.8 - 81.5					33.9	14.5 - 60.6	
14-27	65.7	56.1 - 74.1		54.1	45.6 - 62.4		47.2	37.5 - 57.2	
28-40	64.1	55.3 - 72.2		38.9	32.8 - 45.3		51.2	41.5 - 60.8	
First Pregnancy			0.271			0.312			0.702
No	65.6	57.4 - 72.9		42.2	35.6 - 49.1		46.2	37.8 - 54.9	
Yes	59.1	48.5 - 68.8		46.7	39.4 - 54.3		48.6	37.8 - 59.6	
Visit			na			**<.001**			na
First visit	63.4	56.5 - 69.8		55.3	47.2 - 63.1		47.0	39.5 - 54.6	
Second visit				48.9	39.5 - 58.4				
Third visit				25.8	18.2 - 35.1				
Fourth or higher				23.8	16.6 - 32.9				
Type of Facility			0.171			0.875			0.613
Hospital/Health Center/ Maternity Clinic	59.7	51.5 - 67.3		44.0	38.3 - 49.9		48.6	41.1 - 56.3	
Dispensary/Clinic/Other	70.3	56.7 - 81.1		43.0	31.5 - 55.2		44.1	29.4 - 59.9	
Managing Authority			**0.039**			**<.001**			**0.001**
Public	67.3	59.0 - 74.6		49.0	42.3 - 55.7		52.9	44.1 - 61.5	
Private/Other	51.2	38.4 - 63.9		24.4	16.6 - 34.2		27.5	17.4 - 40.6	
Region			**<.001**			**0.002**			0.241
Nairobi	13.8	6.1 - 28.4		33.0	21.6 - 46.9		41.1	18.0 - 68.8	
Central	59.7	37.6 - 78.4		64.2	50.2 - 76.2		28.4	13.4 - 50.5	
Coast	87.1	73.3 - 94.3		58.2	39.0 - 75.1		39.3	19.7 - 63.2	
Eastern	86.2	70.2 - 94.3		26.9	17.9 - 38.4		64.4	45.7 - 79.5	
North Eastern	5.5	1.4 - 19.2		20.4	7.4 - 45.0		9.4	3.0 - 25.8	
Nyanza	69.7	55.2 - 81.2		34.7	23.2 - 48.4		53.2	37.2 - 68.6	
Rift Valley	52.9	35.5 - 69.7		51.1	35.3 - 66.6		41.0	24.4 - 59.9	
Western	78.8	64.1 - 88.5		55.4	45.2 - 65.2		52.0	37.4 - 66.3	
Malaria Risk			**0.020**			0.337			
High risk	76.1	66.4 - 83.7		47.5	38.3 - 56.8				
Epidemic/lowest risk/no information	55.7	46.6 - 64.4		41.9	35.1 - 49.0				
Population Density			0.164			0.260			**0.035**
Lowest density	49.9	33.9 - 66.0		32.3	17.8 - 51.2		32.7	15.8 - 55.7	
Low density	69.2	57.6 - 78.9		48.5	38.4 - 58.9		39.0	29.2 - 49.7	
Medium/high density	63.2	54.0 - 71.6		43.4	36.7 - 50.4		56.4	46.3 - 66.0	
Provider Occupational Category			**<.001**			**<.001**			**<.001**
Doctor/clinical technician/specialist	14.1	4.1 - 38.6		2.8	0.6 - 11.7		4.9	0.6 - 29.9	
Nurse/midwife/other	65.2	58.0 - 71.7		45.0	39.3 - 50.8		48.4	40.7 - 56.1	
Provider Years of Education			**0.011**			0.444			**0.016**
<14	27.2	12.1 - 50.4		39.7	24.9 - 56.7		38.9	14.1 - 71.2	
14-16	67.1	58.7 - 74.4		45.5	38.7 - 52.4		51.9	43.0 - 60.6	
17+	58.2	44.2 - 71.1		39.1	30.8 - 48.1		27.8	17.7 - 40.9	
Provider Salary Type			0.617			0.553			0.529
None	64.5	57.2 - 71.1		44.4	38.6 - 50.4		48.7	41.3 - 56.2	
Monthly or daily salary	50.0	50.0 - 50.0		0.0			0.0		
No regular salary but other pay	60.4	35.6 - 80.7		46.1	22.3 - 71.8		37.8	12.7 - 71.7	
Provider Gender			0.560			**0.010**			**0.025**
Male	59.7	44.0 - 73.6		27.7	16.9 - 41.9		31.5	18.7 - 48.0	
Female	64.7	57.1 - 71.7		48.5	42.3 - 54.8		51.8	44.0 - 59.6	
Total	63.5	56.6 - 69.9		43.6	38.1 - 49.4		47.0	39.5 - 54.6	
N	556			1,239			556		

Table 6b. Background characteristics of women observed receiving integrated services during ANC visits, Malawi SPA 2013-14

	Percent of women who discussed or received ITN during first ANC visit			Percent of women in the second and third trimester who received SP			Percent of women asked about their HIV status, received counseling and given an HIV test during first ANC visit		
	%	CI		%	CI	p-value	%	CI	p-value
Education			0.918			0.716			0.731
None	64.4	52.5 - 74.8		47.2	39.4 - 55.1		8.5	3.9 - 17.6	
Primary	61.9	54.0 - 69.2		44.5	40.6 - 48.5		6.9	4.1 - 11.3	
Secondary or higher	62.8	50.9 - 73.4		43.6	37.5 - 49.9		7.8	4.4 - 13.4	
Age			0.354			0.829			0.304
<20	67.5	58.3 - 75.5		43.2	36.8 - 49.8		4.4	1.9 - 10.0	
20-35	62.1	54.2 - 69.4		45.1	40.8 - 49.6		8.4	5.2 - 13.4	
36+	59.8	49.0 - 69.7		44.8	39.6 - 50.0		7.5	3.5 - 15.4	
Weeks pregnant			0.427			**<.001**			0.908
4-13	64.1	51.2 - 75.2					3.1	1.1 - 8.7	
14-27	64.3	56.2 - 71.6		52.2	47.1 - 57.2		8.8	5.1 - 14.7	
28-40	57.2	45.5 - 68.1		37.8	33.1 - 42.8		4.2	1.5 - 10.8	
First Pregnancy			**0.041**			0.080			0.545
No	60.1	51.9 - 67.8		46.1	42.0 - 50.2		7.7	4.4 - 13.2	
Yes	70.1	61.3 - 77.6		40.3	34.4 - 46.4		6.3	3.4 - 11.2	
Visit						**<.001**			
First visit	62.5	55.2 - 69.3		56.3	50.2 - 62.3		7.4	4.5 - 11.9	
Second visit				51.5	45.2 - 57.8				
Third visit				33.1	26.9 - 40.1				
Fourth or higher				18.8	13.4 - 25.9				
Type of Facility			**0.003**			0.316			0.822
Hospital/Health Center/ Maternity Clinic	63.5	56.0 - 70.3		45.0	41.2 - 48.8		7.3	4.4 - 12.0	
Dispensary/Clinic/Other	24.0	8.5 - 51.7		33.4	16.1 - 56.6		8.9	1.6 - 36.3	
Managing Authority			**0.048**			0.075			0.570
Public	58.9	50.3 - 66.9		46.9	42.7 - 51.0		6.8	3.6 - 12.6	
Private/Other	73.3	61.3 - 82.6		38.7	31.2 - 46.7		9.0	4.3 - 18.0	
Region			0.195			0.322			0.140
North	73.6	53.4 - 87.2		45.7	35.4 - 56.3		16.0	6.9 - 32.9	
Central	55.9	43.6 - 67.6		47.6	42.0 - 53.3		8.1	3.4 - 18.4	
South	66.0	56.9 - 74.1		41.7	36.3 - 47.3		4.8	2.5 - 9.0	
Population Density			0.066			0.862			0.245
Lowest density	71.8	59.3 - 81.6		42.6	34.6 - 50.9		10.8	4.9 - 22.0	
Low density	64.8	56.8 - 72.0		45.3	40.7 - 50.0		5.0	2.8 - 8.7	
Medium/high density	44.7	25.0 - 66.3		44.6	34.9 - 54.7		12.0	3.6 - 33.5	
Provider Occupational Category			0.160			0.375			0.341
Doctor/clinical technician/specialist	43.8	22.5 - 67.6		36.5	20.9 - 55.5		0.0		
Nurse/midwife/other	63.3	55.8 - 70.2		45.0	41.2 - 48.9		7.7	4.7 - 12.4	
Provider Years of Education			0.563			0.964			0.068
<14	75.9	58.3 - 87.7		42.9	29.0 - 57.9		11.1	4.2 - 26.3	
14-16	62.2	54.8 - 69.1		44.4	39.8 - 49.1		5.5	3.1 - 9.3	
17+	59.7	38.8 - 77.6		45.0	38.2 - 52.0		14.4	6.1 - 30.5	
Provider Salary Type			0.956			0.986			0.707
None	60.2	40.9 - 76.7		43.7	32.5 - 55.7		11.5	4.3 - 27.0	
Monthly or daily salary	62.1	47.6 - 74.7		44.8	38.4 - 51.5		7.0	2.3 - 19.6	
No regular salary but other pay	63.3	54.8 - 71.0		44.7	40.0 - 49.6		6.8	4.0 - 11.2	
Provider Gender			0.757			0.301			0.601
Male	60.7	46.8 - 73.1		41.5	34.4 - 49.0		5.9	2.3 - 14.5	
Female	63.1	54.7 - 70.7		45.7	41.6 - 49.9		7.8	4.4 - 13.4	
Total	62.5	55.2 - 69.3		44.7	40.9 - 48.5		7.4	4.5 - 11.9	
N	873			1,956			873		

Table 6c. Background characteristics of women observed receiving integrated services during ANC visits, Tanzania SPA 2014-15

	Percent of women who discussed or received ITN during first ANC visit			Percent of women in the second and third trimester who received SP			Percent of women asked about their HIV status, received counseling and given an HIV test during first ANC visit		
	%	CI	p-value	%	CI	p-value	%	CI	p-value
Education			0.444			0.423			0.411
None	10.1	5.5 - 17.8		19.2	14.4 - 25.2		39.6	30.4 - 49.5	
Primary	10.7	7.7 - 14.7		21.3	17.9 - 25.2		44.1	38.2 - 50.1	
Secondary or higher	14.5	9.2 - 22.2		17.4	11.8 - 24.7		47.6	39.3 - 56.1	
Age			0.370			0.382			0.482
<20	11.5	6.7 - 18.9		22.8	17.8 - 28.7		39.4	31.4 - 48.1	
20-35	12.2	8.7 - 17.0		19.8	16.3 - 23.9		43.9	37.8 - 50.3	
36+	8.8	5.6 - 13.7		19.5	15.7 - 23.9		45.5	38.1 - 53.1	
Weeks pregnant			0.181			**0.009**			0.578
4-13	13.1	6.1 - 25.8					48.8	37.0 - 60.8	
14-27	12.2	8.7 - 16.8		23.1	19.2 - 27.5		43.3	37.8 - 49.0	
28-40	6.8	3.6 - 12.4		17.7	14.2 - 21.8		42.4	34.8 - 50.4	
First Pregnancy			0.575			0.368			0.390
No	10.7	7.6 - 15.0		19.8	16.5 - 23.4		42.8	37.2 - 48.6	
Yes	12.3	7.8 - 18.8		21.7	17.1 - 27.2		46.1	38.9 - 53.5	
Visit			na			**0.003**			na
First visit	11.1	8.1 - 15.0		24.0	19.7 - 29.0		43.5	38.4 - 48.9	
Second visit				17.8	14.2 - 22.0				
Third visit				18.3	13.6 - 24.3				
Fourth or higher				14.3	10.2 - 19.8				
Type of Facility			0.451			0.053			0.082
Hospital/Health Center/ Maternity Clinic	9.8	7.7 - 12.3		24.3	20.8 - 28.2		48.8	44.3 - 53.3	
Dispensary/Clinic/Other	11.8	7.7 - 17.7		18.0	13.7 - 23.4		41.0	33.8 - 48.6	
Managing Authority			0.174			0.408			0.683
Public	12.0	8.6 - 16.6		19.6	16.0 - 23.9		44.0	37.9 - 50.2	
Private/Other	7.0	3.3 - 14.3		22.9	16.8 - 30.3		41.7	33.1 - 50.8	
Region			**<.001**			0.543			**<.001**
Central	9.0	4.2 - 18.5		20.2	13.3 - 29.4		56.1	44.1 - 67.4	
Northern	7.7	3.3 - 16.6		18.8	12.3 - 27.5		59.8	47.4 - 71.0	
Coastal	6.4	2.7 - 14.6		25.7	19.6 - 33.0		43.2	28.9 - 58.6	
Southern Highlands	13.5	7.5 - 22.9		22.1	15.6 - 30.5		58.9	45.1 - 71.4	
Lake	7.1	3.7 - 13.4		18.0	12.6 - 25.1		35.8	27.3 - 45.3	
Zanzibar	41.5	21.4 - 64.9		na			13.6	7.2 - 24.0	
Population Density			**0.028**			0.953			0.580
Lowest density	7.3	4.9 - 10.9		20.5	16.2 - 25.5		45.8	38.4 - 53.5	
Low density	13.0	7.3 - 21.9		21.5	15.6 - 28.9		39.8	30.2 - 50.3	
Medium/high density	20.7	10.4 - 37.0		19.3	11.6 - 30.5		41.4	30.8 - 52.9	
Provider Occupational Category			0.220			**0.018**			0.245
Doctor/clinical technician/specialist	5.6	1.7 - 17.2		7.0	2.4 - 18.6		31.8	16.0 - 53.3	
Nurse/midwife/other	11.5	8.4 - 15.5		21.2	17.8 - 25.0		44.3	39.0 - 49.7	
Provider Years of Education			0.122			0.459			0.254
<14	8.9	5.5 - 13.9		20.5	16.3 - 25.4		40.4	33.8 - 47.3	
14-16	14.2	9.6 - 20.5		19.0	14.5 - 24.6		47.0	39.0 - 55.2	
17+	18.0	7.9 - 35.8		26.8	18.0 - 38.0		50.2	35.9 - 64.5	
Provider Salary Type			0.075			0.290			**0.048**
None	7.4	3.5 - 14.9		17.3	11.9 - 24.3		35.5	25.0 - 47.6	
Monthly or daily salary	7.5	4.1 - 13.3		17.9	12.9 - 24.1		54.3	44.5 - 63.7	
No regular salary but other pay	14.4	9.7 - 20.7		22.8	17.8 - 28.7		41.9	34.7 - 49.4	
Provider Gender			**0.036**			0.116			0.662
Male	5.2	2.3 - 11.2		14.1	8.0 - 23.5		40.6	27.2 - 55.5	
Female	12.3	8.8 - 16.9		21.6	18.1 - 25.5		44.1	38.6 - 49.8	
Total	11.1	8.1 - 15.0		20.3	17.1 - 23.9		43.5	38.4 - 48.9	
N	1,847			3,428			1,847		

Note: Since SP is not provided in ANC in Zanzibar, women in that area were excluded.

3.3.2. Is receiving integrated services in each area associated with higher integration capacity and/or integration components?

Figures 16-18, for Kenya, Malawi, and Tanzania respectively, show the difference in the facility-level integration score of ANC with malaria and PMTCT among women attending ANC and their receipt of integrated care services related to malaria and PMTCT. Women who did not receive integrated care such as ITNs, SP, or HCT during ANC are compared with women who did, by their facility's integration score. A t-test is applied to test the significance of these differences; Appendix Table 6 presents the corresponding p-values. Testing shows significant differences between women's receipt of care and facility integration for overall facility integration of ANC with malaria and women's receipt or counseling of ITNs in Kenya (p <.001), direct observation of SP consumption in Kenya (p <.001) and Tanzania (p <.001); and among women's receipt of HCT and ANC-PMTCT integration in Tanzania (p <.001).

Figure 16. Average facility integration score by receipt of integrated care among women in ANC, Kenya SPA 2010

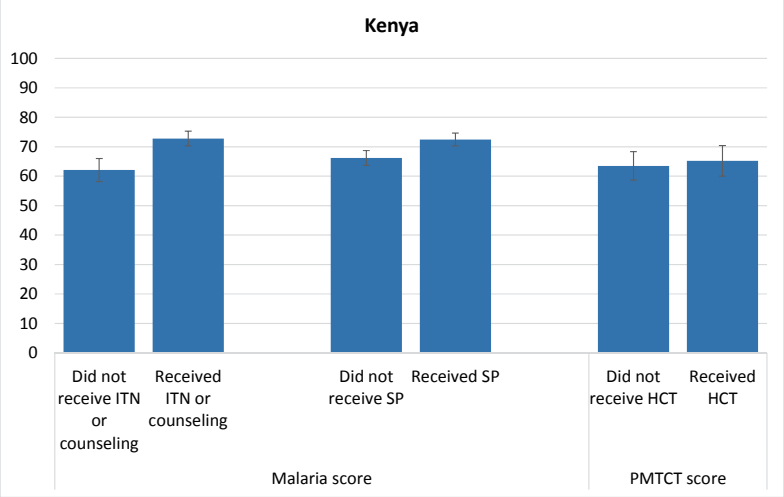


Figure 17. Average facility integration score by receipt of integrated care among women in ANC, Malawi SPA 2013-14

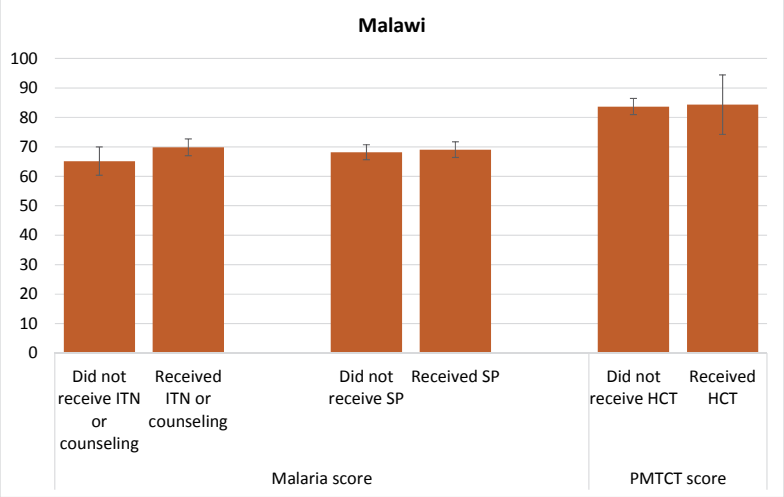
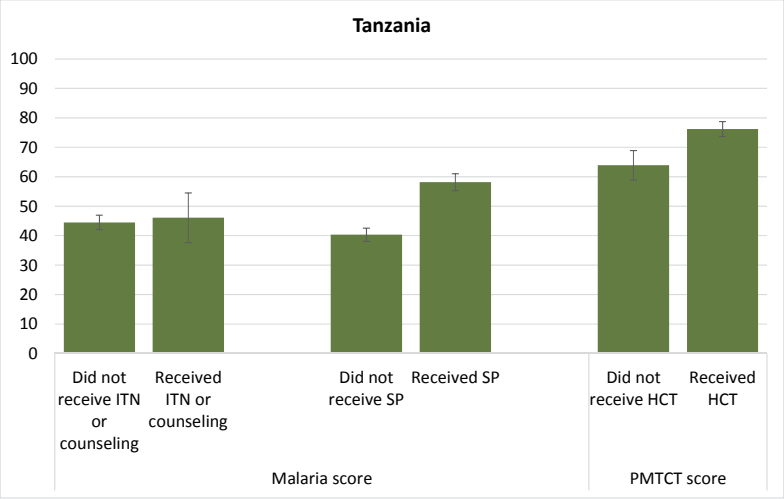


Figure 18. Average facility integration score by receipt of integrated care among women in ANC, Tanzania SPA 2014-15



Since facility capacity to provide components of integration varied within each ID service area in a country, the potential differences in receipt of care was examined by availability of each component of integration. This was done to assess whether any single or combination of components influenced the associations with an overall score more strongly than another. With a chi-square test of independence, bivariate associations examined receipt of integrated care services and the various components of integration in the relative areas. Tables 7-9 present these results.

Table 7 shows the percentage of women who discussed or received ITN during first ANC visit, by components of malaria integration in the three countries. As expected, the percentage of women who received or discussed ITNs during ANC is more than twice as high among women who received care in facilities that routinely distribute and have ITNs available. This is true even in Tanzania, where at the time of the survey there was no government-sponsored program to distribute free ITNs or vouchers. The only other significant association between women's receipt of an ITN and any malaria-related integration component is by facilities with RDT available in Tanzania, although the association is not in the expected direction; a higher percentage of women received or discussed ITN use at facilities where RDT is not routinely given or available than women at facilities with RDT.

Table 7. Percent of women who discussed or received ITN during first ANC visit, by components of malaria integration in Kenya, Malawi, and Tanzania

	Kenya			Malawi			Tanzania		
	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value
ANC and malaria services			0.180			0.703			0.877
No	54.6	43.0 - 65.7		64.5	52.0 - 75.3		11.7	5.2 - 24.3	
Yes	63.6	56.6 - 70.0		61.7	52.7 - 69.9		11.0	7.8 - 15.2	
Trained staff			0.396			0.384			0.517
No	57.0	40.5 - 72.1		58.5	48.5 - 67.8		9.8	5.9 - 15.9	
Yes	64.7	57.0 - 71.8		64.5	54.6 - 73.4		12.2	8.0 - 18.2	
Malaria RDT			0.652			0.163			**0.043**
No	63.9	56.4 - 70.8		64.8	56.1 - 72.7		11.9	8.5 - 16.5	
Yes	59.8	42.7 - 74.8		54.2	41.5 - 66.3		6.7	4.1 - 10.6	
ITNs			**<.001**			**<.001**			**0.001**
No	34.4	25.4 - 44.7		26.7	13.2 - 46.4		8.1	5.6 - 11.6	
Yes	80.8	72.0 - 87.3		70.3	63.8 - 76.0		23.5	14.1 - 36.6	
IPTp			0.401						0.080
No	56.6	38.9 - 72.8		*			14.5	9.0 - 22.5	
Yes	64.5	57.1 - 71.2		62.6	55.3 - 69.4		8.6	5.9 - 12.2	
Total	63.5	56.6 - 69.9		62.5	55.2 - 69.3		11.1	8.1 - 15.0	
N	556			873			1,847		

Note: Since SP is not provided in ANC in Zanzibar, women in that area were excluded from the Tanzania analysis.

Table 8 shows the percentage of women who received SP during an ANC visit in their second and third trimester, by components of malaria integration. There are significant differences in SP consumption by certain integration components among women in Kenya and Tanzania, but not in Malawi. In both Kenya and Tanzania, women who attended ANC at facilities with at least one ANC provider who also provided and had recent training in malaria services were significantly more likely to consume SP than women at facilities without malaria-trained ANC providers, by over 10 percentage points in each country. In Kenya, women who attended ANC at facilities with ITNs available also consumed SP more often than women who at facilities without ITNs. As expected, women who attended ANC at facilities with SP consumed SP more than women at facilities without SP (p <.001 in Kenya and Tanzania). In Tanzania, no women at facilities without SP received SP during ANC. In Kenya, 15% of women still consumed SP at facilities without SP, and it is unclear where the women in these facilities obtained SP.

Table 8. Percent of women in the second and third trimester who received SP, by components of malaria integration in Kenya, Malawi, and Tanzania

	Kenya			Malawi			Tanzania		
	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value
ANC and malaria services			0.100			0.330			0.175
No	54.6	43.0 - 65.7		41.5	34.2 - 49.2		13.8	8.3 - 22.0	
Yes	43.6	38.0 - 49.4		45.8	41.6 - 50.2		19.5	16.3 - 23.2	
Trained staff			**0.024**			0.230			**0.001**
No	31.9	22.9 - 42.5		41.6	35.9 - 47.5		12.5	9.1 - 16.9	
Yes	46.1	39.7 - 52.6		46.2	41.5 - 51.1		23.4	19.0 - 28.4	
Malaria RDT			0.558			0.396			**0.039**
No	44.0	38.1 - 50.2		45.5	41.1 - 49.9		17.1	13.9 - 20.9	
Yes	39.4	26.4 - 54.1		41.8	34.7 - 49.2		25.4	18.7 - 33.4	
ITNs			**0.011**			0.736			0.091
No	34.8	27.5 - 42.8		46.2	36.7 - 55.9		19.5	16.0 - 23.7	
Yes	48.7	41.5 - 56.0		44.3	40.3 - 48.4		13.9	9.9 - 19.2	
IPTp			**<.001**						**<.001**
No	15.2	6.7 - 31.0		*		0.370	0.0	0.0 - 0.2	
Yes	46.9	41.2 - 52.6		44.7	41.0 - 48.5		33.5	28.7 - 38.6	
Total	43.6	38.1 - 49.4		44.7	40.9 - 48.5		20.3	17.1 - 23.9	
N	1,239			1956			3,428		

Note: Since SP not provided in ANC in Zanzibar, women in that area were excluded from the Tanzania analysis.

Table 9 shows the percentage of women who were asked about their HIV status, received counseling, and given an HIV test during their first ANC visit, by components of PMTCT integration in the three countries. Women's receipt of HCT varied significantly across integration components only in Tanzania. In Tanzania, women who attended ANC at a facility with at least one ANC provider who also provides and has recent training in PMTCT, at clinics with PMTCT available at the same site as ANC, and at facilities with testing services available on-site received HCT significantly more than women at facilities without these services.

Table 9. Percent of women asked about their HIV status, received counseling and given an HIV test during first ANC visit, by components of PMTCT integration in Kenya, Malawi, and Tanzania

	Kenya			Malawi			Tanzania		
	%	95% CI	p-value	%	95% CI	p-value	%	95% CI	p-value
ANC and HCT services			0.300			0.740			0.329
No	38.5	22.2 - 57.8		8.2	4.2 - 15.3		38.4	26.9 - 51.2	
Yes	49.4	41.5 - 57.3		7.0	3.5 - 13.4		45.3	39.6 - 51.1	
Trained staff			0.890			0.910			**0.002**
No	47.8	34.2 - 61.8		7.0	2.5 - 17.8		30.6	22.7 - 40.0	
Yes	46.7	37.9 - 55.6		7.4	4.2 - 12.8		48.9	42.4 - 55.3	
Same site			0.469			0.851			**<.001**
No	39.7	22.0 - 60.7		6.7	2.3 - 18.1		23.3	15.1 - 34.1	
Yes	47.9	39.9 - 56.1		7.5	4.3 - 12.9		47.9	42.0 - 53.9	
HIV testing			0.721			0.276			**<.001**
No	49.3	33.6 - 65.1		0.0			10.5	4.2 - 23.8	
Yes	45.9	37.9 - 54.1		7.9	4.8 - 12.7		49.2	43.5 - 54.8	
PMTCT ART			0.721			0.582			0.161
No	46.5	38.2 - 55.1		11.2	2.3 - 40.4		41.0	34.4 - 48.0	
Yes	49.6	35.5 - 63.8		7.1	4.2 - 11.8		48.6	40.7 - 56.5	
Total	47.0	39.5 - 54.6		7.4	4.5 - 11.9		43.5	38.4 - 48.9	
N	556			873			1,847		

The final phase of analysis used logistic regression models to test for associations between women's receipt of integrated care and integration capacity at the facility while controlling for characteristics of women, providers, and facilities. The multivariable analysis included only outcomes in countries for which bivariate associations with overall integration are found: SP consumption in Kenya and Tanzania, and HCT in Tanzania. A logistic regression model was not used to examine predictors of receipt or counsel of ITNs

among women in Kenya because malaria prevalence varies throughout the country, the national malaria program's provision of ITNs is not universally executed throughout Kenya, and there was a small sample of women observed attending the first ANC visit for that pregnancy in malaria-endemic and other areas. For the three remaining areas where integration is significantly associated with receipt of integrated care, the analysis required two models for each. One examined overall integration as the main predictor and the second with each integration component. One integration component was removed from the second model because of the circular relationship between the covariate and the outcome. For consumption of SP in ANC, the component of SP availability was excluded; for HCT, the component of availability of HIV diagnostic capacity was also excluded.

Table 10 shows the results of the logistic regression models that tested for associations of consumption of SP among women in their second or third trimester in Kenya and Tanzania with characteristics of women, facilities and providers. In Kenya, the odds of a women consuming SP increase by 4% for every one unit increase in the overall facility integration score ($p < .001$). Because this integration score is standardized and represents an average of the availability of five components of integration multiplied by 100, we cannot conclude that one unit is equal to one integration component. If the integration score is de-standardized (re-scaled to an average of components on a scale of 0 to 5) and included in the model instead, the odds ratio increases to 2.01 (results not shown). Therefore, the odds of consuming SP increase by 200%, or approximately doubles for every additional integration component available at a facility. However, this analysis does not explore whether or not each integration item is weighted equally. Given the redundancy between the outcome and one component of the integration score (women receiving SP and availability of SP at the facility), these results should be interpreted with caution. Similarly, in Tanzania, the odds of receiving SP were 5% higher for every unit increase in the integration score, with approximately 2.5 times the odds of receiving SP for every additional integration component available at the facility where the women attended their ANC visit. Women in Zanzibar were excluded from this analysis because there were differing policies on the island.

To further explore the relationship between integrated services available at facilities and the receipt of integrated care, the facility's integration score was replaced with the individual components in the model and the component for having SP available within the facility was excluded. In Kenya, there are associations with other integration components, as well as some characteristics of women, facilities, and providers. Women had almost twice the odds of receiving SP if they attended a facility with at least one ANC provider who also provides and has training in malaria services (odds ratio (OR) = 1.91, $p<.05$), and had 2.3 times the odds of consuming SP at a facility that also routinely distributed or provided counseling on ITNs and had them available (OR = 2.26, $p<.01$). Women age 36 or older were more likely than women under age 36 (OR = 1.7, $p<.01$), women at private (or other) facilities versus public facilities (OR = 2.87, $p<.001$), and women with a female versus male provider (OR = 2.83, $p<.01$) were also more likely to have been observed consuming SP during their ANC visit. Women were less likely to receive SP if their provider was a doctor, clinical technician, or specialist compared with a nurse, midwife, or other occupation (OR = 0.13, $p < .05$) or if they were attending their third or fourth visit (OR = .25, $p<.001$ and OR = .24, $p<.001$, respectively).

In Tanzania as in Kenya, if the facility had at least one ANC provider who also provided and had recent training in malaria, women had two and a half times the odds of receiving SP (OR = 2.51, $p<.001$). Unlike Kenya, however, no provider or facility characteristics in Tanzania were significantly associated with receiving integrated care. Only education (women with primary education compared with none, OR = 1.56, $p<.05$) and visit number (women attending their second visit compared with first, OR = .64, $p<.01$ and women attending their fourth visit, OR = .47, $p<0.1$) were associated with receiving integrated care. All models controlled for region, high or low malaria endemicity (Kenya only), population density, client's first or subsequent pregnancy, client's second versus third trimester, provider education, and provider salary. All differences were non-significant (results not shown).

Table 10. Adjusted odds ratios of receipt of SP in the second or third trimester during ANC visits, Kenya and Tanzania

	Kenya				Tanzania			
	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI
Overall malaria integration	**1.04*** **	1.02 - 1.05			**1.05*** **	1.04 - 1.06		
ANC and malaria services			1.74	0.40 - 7.52			1.33	0.67 - 2.61
Trained staff			**1.91***	1.09 - 3.35			**2.51*** **	1.55 - 4.06
Malaria RDT			0.93	0.44 - 1.97			1.39	0.84 - 2.28
ITNs			**2.26** **	1.24 - 4.10			1.11	0.67 - 1.81
IPTp			na				na	
Education								
None	0.94	0.39 - 2.27	0.89	0.37 - 2.13	1.64	0.97 - 2.75	1.45	0.87 - 2.41
Primary	0.98	0.65 - 1.48	0.93	0.61 - 1.42	**1.64***	1.05 - 2.55	**1.56***	1.02 - 2.37
Secondary or higher	1.0	-	1.0	-	1.0	-	1.0	-
Age								
<20	1.0	-	1.0	-	1.0	-	1.0	-
20-35	1.02	0.64 - 1.64	1.02	0.63 - 1.64	0.82	0.58 - 1.18	0.89	0.63 - 1.26
36+	**1.91***	1.05 - 3.48	**1.87***	1.01 - 3.45	0.73	0.49 - 1.09	0.78	0.53 - 1.16
Visit								
First visit	1.0	-	1.0	-	1.0	-	1.0	-
Second visit	0.70	0.45 - 1.11	0.73	0.46 - 1.17	**0.65** **	0.47 - 0.89	**0.64** **	0.47 - 0.88
Third visit	**0.25*** **	0.14 - 0.42	**0.25*** **	0.15 - 0.43	0.71	0.49 - 1.01	0.71*	0.51 - 1.00
Fourth or higher	**0.24*** **	0.13 - 0.44	**0.24*** **	0.13 - 0.45	**0.43** **	0.26 - 0.72	**0.47** **	0.29 - 0.75
Type of Facility								
Hospital/Health Center/ Maternity Clinic	1.0	-	1.0	-	1.0	-	1.0	-
Dispensary/Clinic/Other	1.35	0.75 - 2.45	1.20	0.64 - 2.25	**1.74***	1.03 - 2.95	1.10	0.67 - 1.79
Managing Authority								
Public	1.0	-	1.0	-	1.0	-	1.0	-
Private/Other	**2.88*** **	1.56 - 5.32	**2.87*** **	1.55 - 5.32	0.91	0.54 - 1.52	0.82	0.49 - 1.37
Provider Occupational Category								
Doctor/clinical technician/ specialist	**0.15***	0.03 - 0.83	**0.13***	0.02 - 0.76	0.37	0.11 - 1.24	0.37	0.11 - 1.27
Nurse/midwife/other	1.0	-	1.0	-	1.0	-	1.0	-
Provider Gender								
Male	1.0	-	1.0	-	1.0	-	1.0	-
Female	**2.91*** **	1.56 - 5.45	**2.83** **	1.51 - 5.30	1.34	0.67 - 2.71	1.40	0.70 - 2.83
N	1,205		1,205		3,371		3,371	

Note: The integration variables in the model are for the availability of these services; the reference category for each is the absence of availability. Models also adjusted for: region, malaria risk (Kenya only), population density, if it was a client's first pregnancy, if she was in her second versus third trimester, provider education, and provider salary. Except for region in Kenya, all other covariates were not significant in the final adjusted model; SP is not routinely provided in ANC in Zanzibar so women in that area were excluded for the analysis of receipt of SP; Women who did not have complete background information for all variables were excluded from the regression analysis; P-values are represented by asterisks: *<0.05, **<0.01, ***<0.001.

Table 11 shows the results of the multivariable logistic regressions on women's receipt of HCT during the first ANC visit in Tanzania. Women who received HCT were 2% more likely to receive HCT for every unit increase in PMTCT integration score. This translates to an increase of about one and a half times the odds of receiving HCT for every additional integration component available at the facility. When the individual PMTCT integration components (except for indicator for routinely providing tests and having diagnostic equipment available) are substituted for the overall score, only having PMTCT available at the same site as ANC is significantly associated with receiving HCT during ANC. Women who attended a facility that had PMTCT at the same site as ANC had almost two and half times the odds of receiving HCT than women who attended ANC at facilities without this structure available (OR = 2.41, p<.01). This model controlled for all other covariates, although no significant associations were found except for region. Women in Zanzibar were less likely to receive HCT compared with women in the Central zone (OR = .17, p<.001) (results not shown).

Table 11. Adjusted odds ratios of whether a client was asked about their HIV status, received counseling, and was given an HIV test during first ANC visit, Tanzania

	AOR	95% CI	AOR	95% CI
Overall PMTCT integration	**1.02****	1.01 - 1.03		
ANC and HCT services			1.09	0.59 - 2.02
Trained staff			1.54	0.91 - 2.61
Same site			**2.42****	1.28 - 4.58
HIV testing			na	
PMTCT ART			0.85	0.51 - 1.43
N	1,687		1,687	

Note: The integration variables in the model are for the availability of these services, and the reference category for each is the absence of availability. Models also adjusted for: type of facility, managing authority, region, population density, if it was a client's first pregnancy, number of weeks pregnant, client age and education, provider occupation, provider education, provider salary, and provider sex. All covariates were not significant except region. Women who did not have complete background information for all variables were excluded from the regression analysis; P-values are represented by asterisks: *<0.05, **<0.01, ***<0.001.

4. Discussion

4.1. Overview of Findings

The three countries examined in this study—Kenya, Malawi, and Tanzania—demonstrate both similarities and differences in overall availability of ID services at facilities with ANC services, health worker provision and training in multiple service areas, capacity to provide integrated services at facilities, and provision of integrated services during observed ANC visits. In all three countries, malaria services within ANC facilities are widely available and, to a lesser extent, PMTCT services. Availability of TB services is notably lowest in Tanzania, and in all three countries the availability of TB services is lowest in areas with the lowest population density. A larger percentage of hospitals, health centers, and maternity clinics have both ANC and PMTCT or TB services available compared with dispensaries, clinics, or other facilities. In Kenya and Malawi, these services are more available in public versus private facilities. Less than half of the ANC providers in each country offer and have recent training in PMTCT, and even fewer provide and are recently trained in malaria. Few provide ANC and TB services and have recent training in TB or TB/HIV co-infection.

At the national level in each country, integrated services for ANC with TB/HIV are least common. The average PMTCT integration score is higher in Malawi and Tanzania than in Kenya, although integration with malaria is highest in Kenya. Across the countries, there is substantial variation in the availability of components of integrated malaria services; this may be due to differences in national and sub-national policies related to malaria in pregnancy. Thus, national-level results should be interpreted with caution. Among women observed in ANC, receipt of integrated services varied by the specific service and country, with fewer similarities seen across the countries. The integration score and select integration components are significantly associated with receiving integrated care for consuming SP in Kenya and Tanzania, as well as HCT in Tanzania. Further discussion of the integration with each infectious disease appears below.

4.2. ANC and PMTCT

In all three countries, about half of facilities that offer ANC services are equipped to provide each component of integrated ANC-PMTCT services, except for ARTs in Kenya and Tanzania. The average ANC-PMTCT integration score is higher in Malawi and Tanzania than in Kenya. In Malawi and Tanzania, the national integration score equates to facilities having about three and a half integration components available, compared with about two and a half in Kenya. In all three countries, higher-level facilities are prepared to provide integrated services at higher proportions than lower-level facilities, and for the most part public facilities are more prepared than private facilities, both for the individual components and across the national averages. The differences by region and population density are less pronounced.

Just under half of the women observed during their first ANC visit were asked if they knew their status, given an HIV test, and counseled on HIV in Kenya and Tanzania; in Malawi, however, only 7% of women received this full package of services under direct observation of the interviewer. At the bivariate level of analysis, there were no significant differences by women's background characteristics. A limited number of differences by facility characteristics appeared, although these differences were not consistent across the countries. Several provider characteristics were significantly associated with women's receipt of HCT during ANC in Kenya only; most notable was the higher percentage of women who received HCT if attended by a nurse, midwife, or other occupation versus a doctor, clinical technician, or specialist.

In Tanzania, the facility integration score for ANC with PMTCT was significantly associated with receipt of HCT (among women in their first ANC visit), at the bivariate level. This association remained significant after controlling for background characteristics of women, providers, and facilities. One important caveat in this model is that the integration score included the component that assessed whether the facility had

HIV diagnostic capacity. This component likely influenced the significance of the association between receipt of HCT and overall integration. After the second model excluded HIV diagnostic capacity, only one component remained significantly associated with receipt of HCT: having ANC and PMTCT services at the same site—which is the essence of integrated services (Foreit, Hardee, and Agarwal 2002). This finding contrasts with previous research that found that co-location was not sufficient for patient care, although the earlier study focused on integration of TB/HIV services (Uyei et al. 2014).

In Malawi, there is a large disparity between availability of integrated PMTCT services and receipt of care. While the integration score was higher in Malawi than in the other two countries, receipt of HCT during ANC was the lowest by far. This finding is quite troublesome, for several reasons. First, according to the most recent DHS surveys in the three countries, Malawi has the highest HIV prevalence. Second, this finding differs from the information reported in the DHS, where 86% of women say they were counseled for HIV during ANC, and 79% say they were counseled, tested, and received the results during ANC (Malawi 2011b). The Malawi AIDS Progress Report of 2015 reports findings similar to the DHS (Malawi 2015).

As defined in this study, this indicator is based on whether a client was asked if she knew her status, if she received counseling and if a test was performed during the visit. When examining each of these elements of HCT separately, further analysis revealed that in Kenya and Tanzania the percentage of women being asked their status during ANC is comparable to the percentage of women receiving the same services in Kenya and Tanzania, but fewer women receive counseling in Malawi (41%) than in Kenya (58%) or Tanzania (74%). Even more striking is the difference in the percent of women who have a test performed during the visit. Only 9% of women in their first ANC visit received the test in Malawi, compared with 79% in Kenya and 62% in Tanzania (results not shown). Incidentally, in Malawi 44% are referred for testing compared with 24% in Kenya and 10% in Tanzania. After combining internal and external testing, still only 52% of women in Malawi receive tests, compared with 87% in Kenya and 71% of women in Tanzania.

Why aren't women observed at ANC facilities in Malawi receiving HIV counseling and testing services as often as in nearby countries with similar HIV prevalence, particularly when facilities and health workers in Malawi are so relatively well equipped to provide these services? Malawi's national response to the HIV/AIDS epidemic has been a model for successful treatment with ART and reduction of HIV mortality (Dasgupta et al. 2016). WHO recommends that women should be offered testing whether or not their status is known (WHO 2011) and the Malawi National Guidelines for Management of HIV specify that provider-initiated counseling and testing (PITC) should be offered if the patient has tested negative or if that test was not done in the last three months (Malawi 2011a). Although the SPA questionnaire does not assess whether or not the test was offered and refused or if it was offered at all, qualitative research with women attending ANC in Malawi found that women feel they cannot refuse, or were not given an option to refuse the test (Angotti, Dionne, and Gaydosh 2011; Obermeyer et al. 2014). It does not appear that stock-outs of RDTs were a problem at the time of the survey, since only 33% of the health facilities that offer HIV RDT in 2014 reported any stock-out in the previous 12 months (Malawi 2015). Our findings of availability of HIV RDT at the time of the survey also do not indicate that the availability of RDT available was an issue.

One other explanation for the low level of observed HIV testing in Malawi is that testing occurs in another room dedicated to HCT and not in the room where the ANC visit is conducted. In Malawi, two items in the inventory questionnaire confirm that the vast majority of facilities with ANC services (87%) have a system that assures ANC procedures will occur prior to the observation of an ANC visit; these include HCT. This practice was reported or observed in 80% of all ANC facilities. A provider may not be observed performing the test, but since a woman does not require a referral to an outside source, she is not documented as being referred for testing either. Therefore, while the facilities are in fact equipped to perform multiple services under one roof, women who receive HCT are not actively observed receiving these integrated services and are therefore not accurately accounted for. In Tanzania, only 48% of facilities with ANC routinely provide

HCT prior to the ANC visit. (This question is not asked in the Kenya SPA). While this percentage is less than in Malawi, the difference in the system of service provision may explain the differences between observed HCT in ANC visits in Malawi and Tanzania.

4.3. ANC and TB/HIV

The capacity to provide integrated ANC-TB or ANC-TB/HIV services is much lower than the capacity to provide integrated ANC-PMTCT or ANC-malaria services. ANC providers are not as often trained in TB as other services. Across all three countries, more males and higher-qualified providers also provide and have training in TB services. Having the capacity to provide any one integrated service for ANC and TB or TB/HIV services is only seen in one-third or less of all facilities in all three countries, with the national average for each country less than 30%. This means that, on average, only approximately one and a half components of ANC and TB/HIV integration are available in Kenya, one in Malawi, and less than one in Tanzania. It is important to note that in Kenya, the score is perhaps more lenient. Service availability in Malawi and Tanzania requires availability three days per week for ANC and TB, whereas in Kenya, the survey does not capture the number of days per week. In each country, a greater percentage of higher-level facilities have integrated services capabilities compared with lower-level facilities; integrated services are offered at public facilities more than private facilities, and are least available at facilities in the areas with lowest population density. This is true among the components of integration as well as the national average.

Although TB/HIV co-infection occurs in one-third to one-half of all people living with HIV in the three countries in this report, less than 10% of facilities in all three countries offer TB prophylactic medication to HIV patients or have the medication available, and less than 1% in Tanzania. These findings are consistent with other research that shows the capacity to diagnose and treat TB or TB/HIV co-infection as insufficient to halt the spread of TB, particularly with the emergence of drug-resistant forms of TB (Zumla et al. 2012). More financing for diagnostics and drugs will be needed to meet the goals of the End TB Strategy and the Sustainable Development Goals, which aim to eliminate or nearly eliminate TB (WHO 2015a).

4.4. ANC and Malaria

The availability of integrated ANC-malaria services is much more varied by indicator and country, as well as facility characteristics within the countries. Surprisingly, few facilities in the three countries offer malaria-RDT during ANC and have RDT available. Similar to integration with TB, the service availability indicator in Malawi and Tanzania pertains to facilities with services available at least three days per week. With this exception in mind, Kenya scored slightly higher than Malawi and 20 percentage points higher than Tanzania for average availability of integrated services of ANC and malaria. These scores are roughly equivalent to having about three of the five integration components available at Kenyan and Malawian facilities, and roughly two components available in Tanzanian facilities. In Kenya, integration of ANC and malaria is more common than PMTCT; in Malawi and Tanzania, however, the opposite is true.

The two outcomes that assessed whether or not malaria prevention and treatment is currently being integrated into ANC visits were counseling or distribution of ITNs and consumption of SP during the ANC visit. The proportion of women who received these services was roughly the same in Kenya and Malawi. Just under two-thirds of women in both countries received counseling or received an ITN during their first visit and just under half received and consumed SP. In Tanzania, these proportions are much lower. Only 11% of women were counseled on or received an ITN and one-fifth of women (on the mainland) received SP. The low levels of malaria prevention interventions in ANC are consistent with results from other studies (Hill et al. 2013; van Eijk et al. 2011).

Receipt of integrated ANC-malaria services, specifically direct observation of SP, was significantly associated with overall integration in Kenya and Tanzania. This was true even after controlling for the

characteristics of women, providers, and facilities. Like the receipt of HCT and having HIV diagnostic capacity, receipt of SP and the availability of SP within a facility are tautological. Thus, a second model within each country excluded this component and evaluated each remaining component for associations with the outcome. These models showed that a facility with at least one staff person who provides both ANC and malaria services and has received recent training in malaria is significantly associated with women's receipt of SP.

Many barriers to consumption of SP have been identified, such as women's lack of knowledge about the benefits or health risks, delayed initiation of ANC, the cost of medication, poor knowledge or confusion on the part of the health worker, and frequent stock-outs (Hill et al. 2013; PMI 2009). Recommendations for the provision of SP have changed over time in both the timing of the provision and the number of doses to provide, and this may have contributed to confusion about the administration of IPTp-SP (WHO 2014). This may be seen in our finding that women in the third or fourth visit were less likely to receive SP than women in their first visit. In Kenya, there was a significant association between women attending facilities that provide counseling or distribute ITNs and receipt of SP. It is possible that these facilities are better stocked, are located in areas with higher prevalence of malaria, and are more prepared to manage malaria prevention and treatment. However, the model in Kenya controlled for malaria endemicity, and this variable was not significantly associated with the outcomes.

When considering the availability and provision of integrated services with ANC and malaria, it is important to consider the endemicity of the region and region-specific malaria policies, particularly at the time of the survey. In Kenya and Tanzania, the prevalence of malaria varies greatly by region. At the time of the most recent AIS/MIS survey in Tanzania, the prevalence among children age 6-59 months was less than 1% in some regions and as high as 32% in another (TACAIDS 2013). In Kenya, the malaria prevalence in children tested during the 2010 MIS ranged from less than 1% to 38%. Therefore, it is not surprising that our findings show the distribution of ITNs and coverage of IPTp-SP to be distributed unevenly across geographical areas in these countries. This could also be due in part to regional policies (Zanzibar may revise their policy to discontinue IPTp-SP because of the low prevalence of malaria (PMI 2014)), or focused promotions of selected interventions, such as the distribution of ITNs to pregnant women in malaria-endemic areas (Kenya 2009).

4.5. Strengths and Limitations

This study benefits the body of literature in integrated services because it examines the capacity of health facilities to provide integrated services of ANC with multiple types of ID in areas of high need. The high prevalence of these infectious diseases and co-morbidities in these three countries in East Africa warrants attention to health service delivery in order to identify the most efficient and effective ways to provide critical interventions where they are needed. This study links integration at the facility level to outputs at the client level related to receiving integrated service delivery. In addition, the analysis examines overall integration as a composite of multiple components that represent service availability and readiness related to integrated services, as well as by individual components. The study concludes that certain facets of integration may not be as important as others.

The main limitation of this study is that the SPA questionnaires focus on vertical services and cannot fully measure integrated services. Thus, only through combining responses from several questions can we infer that integrated services are possible. One example of the SPA's limited ability to capture integrated services is in Malawi, and to a lesser extent in Tanzania, where women can go to one facility to obtain multiple services, although the services are not delivered in the same room. This may fall in the middle of the integrated services continuum, somewhere between no integration and full integration. In addition, the survey design and the design of the variables used in this study are not sensitive enough to assess gradations of integrated services. There may be more direct ways of measuring integration with questionnaires

designed to examine the nuances of whether women who are attending ANC are also assessed and treated for certain infectious diseases during the same visit. The SPA surveys also do not measure all aspects of integration, such as an integrated financing, management, or surveillance systems.

Another limitation of this study is that The DHS Program revised the standardized SPA survey between the time of the Kenya 2010 SPA and the most recent Malawi and Tanzania SPA surveys. Thus, the questions in the most recent Kenya SPA survey do not always match the questions in the Malawi and Tanzania surveys. These differences in questions prohibit making general comparisons across the three countries.

Finally, policies and programs on malaria in pregnancy and prevalence differ by malaria endemicity of regions in Tanzania and Kenya. This makes it difficult to draw conclusions at the national level. It is difficult to know how malaria-specific or HIV-specific campaigns have affected women's need for receiving the integrated services measured in the report. For example, an ITN distribution campaign that occurred prior to the ANC visit would have precluded the need for taking home an ITN during the observed visit.

4.6. Conclusions

With the high burden of infectious disease and with less than half of women attending the recommended number of at least four ANC visits in the three countries studied in this report, there is a great need to make the most of the time women spend at formal health facilities. Integrated services, which offer women care for multiple health-related needs in one visit, can improve efficiency and help ensure that women receive the care they need. Our study shows that, in some cases, having ANC providers on site who also provide and have training in ID service areas and providing key services at the same location are significant predictors for receiving care during pregnancy that addresses the need to prevent transmission of malaria and passing HIV from mother to child. However, our findings are not consistent across countries or by the ID services studied in this report. This study identified the need for more precise tools and definitions for measuring integration, and the need to ensure that measurement accounts for the country context and for programs and policies that may influence integration activities. Further research within each country, perhaps in each region, would provide more information on the most essential elements of integrated services. More investigation could also identify potential synergies of combined integrated services, and how such synergy could affect the desired outcomes. Regardless, for integration to be successful, health systems must be strengthened in ways that assure an adequate number of trained and motivated health workers who have the resources they need to do their job in a way that optimizes health outcomes and contains the costs of service delivery.

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Appendix

Appendix Table 1a. Percent of facilities with ANC services that also have infectious disease services available, by background characteristics, Kenya

	PMTCT		TB		Malaria		All facilities with ANC
	%	95% CI	%	95% CI	%	95% CI	N
Type of Facility							
Hospital/Health Center/ Maternity Clinic	93.1	88.3 - 96.0	89.7	84.3 - 93.4	100.0		126
Dispensary/Clinic/Other	73.5	65.5 - 80.3	37.8	31.0 - 45.1	99.4	98.0 - 99.8	383
Managing Authority							
Public	83.0	74.6 - 89.1	57.0	49.4 - 64.2	99.2	97.5 - 99.8	306
Private/Other	71.5	61.2 - 79.9	41.2	32.0 - 51.1	100.0		204
Region							
Nairobi	65.0	47.8 - 79.0	52.6	37.0 - 67.7	94.0	78.1 - 98.6	33
Central	80.6	59.2 - 92.3	59.5	41.1 - 75.6	100.0		71
Coast	64.4	45.2 - 79.9	62.0	43.1 - 77.9	100.0		57
Eastern	78.2	61.5 - 88.9	51.3	35.7 - 66.6	100.0		84
North Eastern	34.7	16.9 - 58.0	30.3	15.1 - 51.4	100.0		17
Nyanza	88.2	73.8 - 95.2	60.1	45.6 - 72.9	100.0		78
Rift Valley	82.1	63.5 - 92.3	30.9	22.5 - 40.9	99.7	98.2 - 100.0	130
Western	92.5	80.5 - 97.4	69.9	56.3 - 80.7	100.0		41
Population Density							
Lowest density	68.3	53.2 - 80.3	41.4	28.8 - 55.2	100.0		111
Low density	83.8	72.4 - 91.1	48.1	38.0 - 58.3	100.0		190
Medium/high density	78.9	69.7 - 85.8	58.1	48.1 - 67.4	98.9	96.3 - 99.7	208
Total	78.4	72.2 - 83.5	50.7	45.2 - 56.1	99.5	98.5 - 99.9	509

Note: Excludes stand-alone VCT clinics; testing includes external testing if results are returned and are provided to clients within the facility.

Appendix Table 1b. Percent of facilities with ANC services that also have infectious disease services available, by background characteristics, Malawi

	PMTCT	TB	Malaria	All facilities with ANC
	%	%	%	N
Type of Facility				
Hospital/Health Center/Maternity Clinic	97.1	56.0	99.3	548
Dispensary/Clinic/Other	56.0	18.8	96.4	84
Managing Authority				
Public	95.7	57.1	99.5	399
Private/Other	84.8	40.7	97.9	233
Region				
Northern	91.7	42.6	100.0	194
Central	89.7	49.3	97.9	352
Southern	93.4	56.1	99.3	83
Population Density				
Lowest density	91.8	40.4	99.0	118
Low density	94.2	56.0	99.2	235
Medium/high density	80.4	54.0	97.5	280
Total	91.7	51.1	98.9	632

Appendix Table 1c. Percent of facilities with ANC services that also have infectious disease services available, by background characteristics, Tanzania

	PMTCT		TB		Malaria		All facilities with ANC
	%	95% CI	%	95% CI	%	95% CI	N
Type of Facility							
Hospital/Health Center/Maternity Clinic	98.8	97.4 - 99.5	81.3	76.6 - 85.3	99.9	99.3 - 100.0	160
Dispensary/Clinic/Other	93.4	90.3 - 95.5	19.9	16.1 - 24.5	99.9	99.7 - 100.0	845
Managing Authority							
Public	95.0	92.3 - 96.8	29.1	25.3 - 33.3	100.0		823
Private/Other	90.9	82.1 - 95.6	32.4	24.1 - 42.1	99.6	98.8 - 99.9	182
Zones							
Central	86.8	76.8 - 92.8	19.6	13.3 - 27.9	100.0		131
Northern	94.7	85.0 - 98.2	29.5	21.7 - 38.7	99.9	99.3 - 100.0	164
Coastal	99.5	98.5 - 99.8	31.1	22.9 - 40.7	99.8	98.9 - 100.0	210
Southern Highlands	93.6	85.8 - 97.3	21.1	15.2 - 28.6	100.0		228
Lake	94.4	87.6 - 97.6	39.6	31.7 - 48.1	100.0		241
Zanzibar	92.0	78.2 - 97.4	50.2	39.1 - 61.3	99.5	96.2 - 99.9	31
Population Density							
Lowest density	93.7	90.2 - 96.0	23.4	19.5 - 27.8	100.0		645
Low density	94.5	85.9 - 97.9	43.4	34.5 - 52.7	100.0		195
Medium/high density	95.7	89.6 - 98.3	37.9	27.3 - 49.8	99.5	98.4 - 99.9	139
Total	94.3	91.7 - 96.1	29.7	26.3 - 33.4	99.9	99.8 - 100.0	1,005

Appendix Table 2. Distribution of all ANC providers interviewed in SPA surveys, Kenya, Malawi, Tanzania

Kenya				Malawi				Tanzania			
	%	95% CI	N		%	95% CI	N		%	95% CI	N
Type of Facility											
Hospital	33.7	30.8 - 36.8	512	Hospital	34.4	31.5 - 37.5	392	Hospital	16.3	15.0 - 17.7	684
Health Center	20.6	17.7 - 23.9	314	Health Center	56.9	53.8 - 59.9	647	Health Center	20.3	19.0 - 21.6	851
Maternity	4.2	3.3 - 5.2	64	Dispensary	1.9	1.1 - 3.1	21	Dispensary	62.8	60.7 - 64.8	2,634
Dispensary	29.1	26.0 - 32.5	443	Clinic	6.8	5.5 - 8.3	77	Clinic	0.6	0.4 - 1.0	26
Clinic	12.3	9.1 - 16.5	188	Health Post	0.1	0.0 - 0.4	1				
Managing Authority											
Government/ local municipality	57.8	52.8 - 62.6	878	Public	64.7	60.6 - 68.6	736	Public	76.1	72.5 - 79.3	3,192
NGO/ private not for profit	2.9	1.6 - 5.4	45	FBO	25.4	21.7 - 29.5	289	FBO	17.1	14.3 - 20.3	716
Private for profit	19.0	15.8 - 22.7	289	Private for profit	5.7	4.4 - 7.5	65	Private for profit	6.1	4.3 - 8.4	254
Mission/ faith-based	20.3	16.1 - 25.3	308	NGO	1.2	0.7 - 2.2	14	Parastatal	0.8	0.4 - 1.5	33
				Company	2.9	1.9 - 4.5	33				
Region											
Nairobi	10.2	8.2 - 12.7	155	North	16.0	13.9 - 18.3	182	Central	12.6	11.1 - 14.3	528
Central	11.2	9.4 - 13.3	170	Central	41.6	38.6 - 44.7	474	Northern	17.7	15.8 - 19.7	741
Coast	11.3	8.5 - 15.0	172	South	42.4	39.5 - 45.3	482	Coastal	23.2	20.8 - 25.7	972
Eastern	17.5	15.2 - 20.2	267					Southern Highlands	20.6	19.1 - 22.3	866
North Eastern	1.9	1.3 - 2.7	29					Lake	23.4	21.5 - 25.4	980
Nyanza	15.3	12.8 - 18.1	232					Zanzibar	2.6	2.1 - 3.1	108
Rift Valley	23.5	20.5 - 26.8	357								
Western	9.0	7.6 - 10.6	137								
Population Density											
Lowest density	14.6	11.3 - 18.6	222	Lowest density	20.6	17.6 - 23.9	233	Lowest density	56.6	52.6 - 60.5	2,325
Low density	33.1	28.1 - 38.6	503	Low density	60.4	55.5 - 65.1	685	Low density	24.2	21.0 - 27.7	994
Medium/high density	52.3	46.9 - 57.6	795	Medium/high density	19.0	15.1 - 23.7	216	Medium/high density	19.2	16.0 - 22.9	789
Occupational Category											
Doctor/clinical technician/ specialist	14.9	13.1 - 17.0	227	Doctor/clinical technician/ specialist	25.3	23.3 - 27.4	287	Doctor/clinical technician/ specialist	20.3	18.8 - 21.9	853
Nurse/midwife/ other	85.1	83.0 - 86.9	1,293	Nurse/midwife/ other	74.7	72.6 - 76.7	850	Nurse/midwife/ other	79.7	78.1 - 81.2	3,342
Years of education											
<14	4.6	3.3 - 6.3	70	<14	16.1	13.3 - 19.4	183	<14	55.4	53.0 - 57.6	2,322
14-16	74.7	71.3 - 77.8	1,136	14-16	63.0	60.0 - 65.9	717	14-16	35.4	33.3 - 37.7	1,487
17+	20.7	17.8 - 23.8	314	17+	20.9	18.5 - 23.5	237	17+	9.2	8.1 - 10.4	386
Salary type											
None	86.6	83.5 - 89.1	1,312	None	14.7	12.4 - 17.5	168	None	22.3	20.1 - 24.8	938
Monthly or daily salary	2.0	1.3 - 3.2	31	Monthly or daily salary	36.6	33.4 - 40.0	416	Monthly or daily salary	30.7	27.8 - 33.7	1,286
No regular salary but other pay	11.4	9.0 - 14.4	173	No regular salary but other pay	48.6	45.4 - 51.9	553	No regular salary but other pay	47.0	44.0 - 50.0	1,971
Gender											
Male	31.4	28.0 - 35.0	477	Male	45.5	42.6 - 48.4	517	Male	22.9	21.0 - 24.8	959
Female	68.6	65.0 - 72.0	1,043	Female	54.5	51.6 - 57.4	620	Female	77.1	75.2 - 79.0	3,236
Total	50.2	47.2 - 53.3	1,520	**Total**	42.8	40.4 - 45.2	1,137	**Total**	61.1	58.7 - 63.5	4,195

Note: Providers with missing information were excluded from distribution of each characteristic; distribution of providers in Kenya excludes those who work at stand-alone VCT clinics.

Appendix Table 3a. Provision of care and training in infectious disease services among providers who provide ANC care, Kenya

	ANC				PMTCT						TB								Malaria						
	Ever trained in ANC		Recent training in ANC		Provide PMTCT services		Provide PMTCT services & ever trained in PMTCT		Provide PMTCT services & recently trained in PMTCT		Provide TB services		Provide TB services & ever trained in TB		Provide TB services & recently trained in TB		Provide TB services & recently trained TB/HIV co-infection		Provide Malaria services		Provide Malaria services & ever trained in Malaria		Provide Malaria services & recently trained in Malaria		All ANC providers
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	N
Type of Facility																									
Hospital/Health Center/Maternity Clinic			69.7	65.9 - 73.3	90.9	87.6 - 93.4			43.3	39.5 - 47.2	51.8	47.7 - 56.0			28.7	25.1 - 32.7			72.9	69.5 - 76.1			42.8	38.5 - 47.3	826
Dispensary/Clinic/Other			64.2	57.2 - 70.6	79.3	72.6 - 84.6			34.9	28.9 - 41.5	46.4	39.1 - 53.8			27.1	21.4 - 33.7			90.9	83.9 - 95.1			58.1	51.3 - 64.6	694
Managing Authority																									
Public			67.4	62.5 - 71.9	90.6	85.7 - 94.0			42.4	37.7 - 47.1	52.6	47.5 - 57.7			29.7	25.5 - 34.3			82.7	78.1 - 86.5			54.4	49.2 - 59.5	878
Private/Other			66.9	60.8 - 72.5	78.7	72.7 - 83.6			35.6	30.1 - 41.4	44.8	38.3 - 51.6			25.7	20.4 - 31.8			79.0	74.6 - 82.8			43.6	38.0 - 49.3	642
Region																									
Nairobi			81.8	72.0 - 88.7	85.9	76.2 - 92.1			49.1	39.1 - 59.2	53.8	39.4 - 67.6			44.0	30.5 - 58.4			69.2	60.5 - 76.8			34.8	25.4 - 45.6	155
Central			57.0	45.8 - 67.5	78.5	67.7 - 86.5			24.7	17.8 - 33.2	45.9	34.6 - 57.8			24.1	17.7 - 32.0			77.9	73.3 - 81.9			47.0	36.6 - 57.7	170
Coast			65.5	55.4 - 74.3	79.0	66.8 - 87.6			41.7	31.8 - 52.2	51.7	42.0 - 61.3			30.6	20.7 - 42.7			74.6	55.4 - 87.4			53.4	40.5 - 65.8	173
Eastern			68.6	59.7 - 76.4	89.2	79.9 - 94.5			34.3	25.9 - 43.8	47.6	38.3 - 57.1			29.7	21.2 - 39.9			79.4	72.1 - 85.3			49.0	40.8 - 57.2	267
North Eastern			66.5	54.7 - 76.6	81.8	64.3 - 91.8			38.6	26.2 - 52.6	49.7	27.4 - 72.1			35.1	16.1 - 60.3			89.1	73.9 - 95.9			66.4	49.9 - 79.6	29
Nyanza			71.9	61.9 - 80.1	91.0	77.6 - 96.7			53.1	43.2 - 62.8	56.1	44.3 - 67.2			30.8	22.6 - 40.5			85.1	78.9 - 89.8			48.9	38.5 - 59.4	232
Rift Valley			65.7	56.2 - 74.1	86.0	77.7 - 91.6			37.1	29.2 - 45.8	43.0	34.6 - 51.8			17.1	12.1 - 23.7			85.9	79.9 - 90.3			54.0	44.3 - 63.5	357
Western			58.4	47.6 - 68.5	85.5	68.4 - 94.1			37.5	29.6 - 46.1	53.7	43.6 - 63.4			30.0	23.4 - 37.6			89.5	84.6 - 93.0			54.3	44.4 - 63.8	137
Population Density																									
Lowest density			65.9	55.9 - 74.7	91.6	83.5 - 95.9			38.5	29.3 - 48.7	50.9	40.4 - 61.2			22.2	15.6 - 30.5			89.6	81.9 - 94.2			58.2	48.9 - 66.9	222
Low density			68.1	60.7 - 74.7	87.0	78.9 - 92.3			42.5	35.8 - 49.5	51.6	43.6 - 59.5			27.8	22.2 - 34.2			88.0	84.0 - 91.1			56.5	48.6 - 64.0	503
Medium/high density			66.9	62.2 - 71.4	83.0	78.3 - 86.8			37.9	33.3 - 42.7	47.5	42.2 - 52.8			29.7	24.8 - 35.2			74.5	69.3 - 79.0			43.2	38.3 - 48.3	795
Occupational Category																									
Doctor/clinical technician/specialist			61.6	53.5 - 69.0	76.8	67.9 - 83.8			34.9	27.5 - 43.0	82.4	74.7 - 88.1			48.3	40.3 - 56.4			95.5	90.4 - 98.0			59.7	52.9 - 66.2	227
Nurse/midwife/other			68.2	63.9 - 72.1	87.1	82.9 - 90.4			40.3	36.3 - 44.4	43.5	39.2 - 48.0			24.4	21.1 - 28.1			78.6	75.3 - 81.6			48.1	43.7 - 52.4	1,293
Years of education																									
<14			62.8	46.1 - 77.0	70.6	51.8 - 84.3			26.0	15.0 - 41.1	41.9	26.9 - 58.6			17.8	9.7 - 30.5			65.6	48.0 - 79.8			34.1	21.4 - 49.5	70
14-16			67.3	62.8 - 71.5	85.4	81.1 - 88.8			39.0	34.9 - 43.3	48.3	43.4 - 53.2			26.2	22.6 - 30.1			83.7	81.1 - 86.0			50.9	46.3 - 55.5	1,136
17+			67.6	60.8 - 73.7	89.6	83.4 - 93.7			44.2	37.8 - 50.9	54.9	48.5 - 61.2			36.8	30.1 - 43.9			75.5	66.6 - 82.6			49.4	41.9 - 56.9	314
Salary type																									
None			67.1	63.3 - 70.6	86.8	83.5 - 89.5			39.0	35.2 - 42.9	50.0	45.7 - 54.2			27.1	23.7 - 30.9			80.6	77.0 - 83.7			49.0	44.9 - 53.1	1,312
Monthly or daily salary			84.4	64.4 - 94.2	75.7	40.3 - 93.5			55.8	32.0 - 77.3	51.3	28.8 - 73.3			37.8	20.0 - 59.7			89.2	78.2 - 95.0			73.3	53.8 - 86.7	31
No regular salary but other pay			64.0	49.5 - 76.3	78.0	60.9 - 89.0			39.6	28.5 - 51.9	43.7	32.2 - 56.0			32.2	22.4 - 44.0			83.5	76.6 - 88.7			50.9	38.4 - 63.3	173
Gender																									
Male			68.1	61.2 - 74.3	84.6	78.7 - 89.1			40.5	34.5 - 46.8	56.7	49.8 - 63.3			33.1	28.0 - 38.6			89.8	85.6 - 92.9			60.8	54.4 - 66.8	478
Female			66.7	62.1 - 71.0	86.0	81.3 - 89.7			39.0	34.7 - 43.6	46.0	41.3 - 50.7			25.7	21.6 - 30.2			77.2	73.3 - 80.7			44.8	40.0 - 49.7	1,043
Total in Kenya (N =1520)			67.2	63.4 - 70.7	85.6	82.1 - 88.5			39.5	35.9 - 43.2	49.3	45.3 - 53.4			28.0	24.6 - 31.6			81.2	78.0 - 83.9			49.8	45.9 - 53.7	1,520

Note: Recent training is within the last 36 months. Excludes providers at stand-alone facilities.

Appendix Table 3b. Provision of care and training in infectious disease services among providers who provide ANC care, Malawi

	ANC				PMTCT						TB								Malaria						
	Ever trained in ANC		Recent training in ANC		Provide PMTCT services		Provide PMTCT services & ever trained in PMTCT		Provide PMTCT services & recently trained in PMTCT		Provide TB services		Provide TB services & ever trained in TB		Provide TB services & recently trained in TB		Provide TB services & recently trained TB/HIV co-infection		Provide Malaria services		Provide Malaria services & ever trained in Malaria		Provide Malaria services & recently trained in Malaria		All ANC providers
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	N
Type of Facility																									
Hospital/Health Center/Maternity Clinic	44.8	41.5 - 48.1	22.3	19.7 - 25.1	91.7	89.1 - 93.7	75.7	72.3 - 78.7	48.1	44.7 - 51.6	56.7	53.1 - 60.2	31.4	28.4 - 34.7	17.6	15.2 - 20.2	6.2	5.3 - 7.3	87.9	84.6 - 90.5	66.7	63.5 - 69.7	33.2	30.1 - 36.5	1,039
Dispensary/Clinic/Other	42.6	34.6 - 51.0	14.2	9.1 - 21.6	84.3	76.9 - 89.7	71.4	62.9 - 78.5	29.9	22.9 - 37.8	46.0	37.4 - 54.7	25.0	19.3 - 31.9	8.1	4.2 - 15.0	0.8	0.3 - 1.8	90.0	81.6 - 94.8	73.8	63.8 - 81.8	25.3	18.6 - 33.5	99
Managing Authority																									
Public	47.0	43.2 - 50.9	23.1	20.1 - 26.4	92.5	89.5 - 94.6	76.7	72.5 - 80.4	49.3	45.2 - 53.5	56.7	52.3 - 61.0	33.0	29.4 - 36.9	18.5	15.6 - 21.8	6.1	5.1 - 7.3	87.4	83.2 - 90.7	66.4	62.5 - 70.0	33.3	29.6 - 37.2	736
Private/Other	40.2	35.0 - 45.6	18.8	15.0 - 23.4	88.4	84.1 - 91.7	72.8	68.1 - 77.1	41.4	36.5 - 46.5	54.2	48.9 - 59.3	26.9	22.6 - 31.8	13.6	10.5 - 17.3	3.5	2.6 - 4.8	89.2	84.9 - 92.4	69.0	64.1 - 73.5	31.1	26.3 - 36.3	402
Region																									
North	45.7	39.0 - 52.6	22.0	16.7 - 28.4	95.7	93.0 - 97.4	79.4	70.2 - 86.3	44.6	36.3 - 53.2	56.6	48.4 - 64.4	26.2	20.5 - 32.9	15.1	10.2 - 21.8	5.0	3.3 - 7.4	91.3	79.2 - 96.6	66.0	59.0 - 72.3	27.9	22.2 - 34.3	182
Central	47.3	41.9 - 52.7	23.2	19.2 - 27.7	91.5	87.7 - 94.2	75.4	70.5 - 79.6	47.7	42.8 - 52.7	57.8	51.9 - 63.5	34.4	29.7 - 39.4	18.9	15.4 - 22.9	6.1	4.8 - 7.6	85.6	80.8 - 89.3	72.8	67.8 - 77.3	40.5	35.2 - 46.1	474
South	41.6	37.2 - 46.1	19.9	16.5 - 23.8	88.8	84.5 - 92.0	73.7	68.8 - 78.1	46.1	41.5 - 50.8	53.5	48.9 - 58.0	29.2	25.0 - 33.8	15.3	12.2 - 19.0	4.0	3.1 - 5.2	89.3	84.7 - 92.6	62.4	57.8 - 66.7	26.4	22.6 - 30.6	482
Population Density																									
Lowest density	42.7	36.8 - 48.9	19.8	15.4 - 25.0	93.3	88.9 - 96.0	77.1	70.9 - 82.3	46.9	40.8 - 53.2	59.2	52.9 - 65.3	33.8	28.1 - 40.0	20.9	15.7 - 27.3	5.6	4.1 - 7.6	86.3	79.3 - 91.2	63.4	57.4 - 69.1	32.2	26.7 - 38.3	233
Low density	43.9	39.8 - 48.1	21.6	18.5 - 25.1	90.5	87.0 - 93.2	74.8	70.5 - 78.7	46.1	42.0 - 50.2	57.2	52.5 - 61.7	30.7	26.9 - 34.8	16.8	14.0 - 19.9	5.7	4.6 - 7.1	88.0	84.0 - 91.1	66.7	62.6 - 70.5	30.5	27.2 - 34.2	685
Medium/high density	48.9	41.9 - 55.8	23.6	18.4 - 29.7	90.2	85.1 - 93.6	74.9	67.2 - 81.3	47.8	39.5 - 56.3	48.2	40.4 - 56.1	28.7	22.4 - 36.0	12.6	8.6 - 17.9	2.8	1.8 - 4.2	89.9	81.3 - 94.8	72.9	65.4 - 79.3	38.9	30.3 - 48.1	216
Occupational Category																									
Doctor/clinical technician/specialist	37.6	33.0 - 42.5	18.6	15.1 - 22.8	94.1	91.5 - 95.9	80.9	76.6 - 84.6	55.6	50.5 - 60.5	84.0	80.2 - 87.2	45.6	41.0 - 50.3	28.2	24.1 - 32.7	10.7	8.8 - 12.9	99.6	97.1 - 99.9	71.6	67.1 - 75.7	40.0	35.4 - 44.9	287
Nurse/midwife/other	47.0	43.3 - 50.7	22.6	19.7 - 25.8	90.0	86.9 - 92.4	73.4	69.6 - 76.9	43.5	39.8 - 47.3	46.2	42.2 - 50.4	25.9	22.5 - 29.6	12.9	10.5 - 15.8	3.4	2.6 - 4.3	84.1	80.4 - 87.3	65.8	62.1 - 69.4	30.0	26.5 - 33.7	850
Years of education																									
<14	42.4	32.6 - 52.8	15.1	9.5 - 23.0	72.7	61.4 - 81.7	55.9	44.5 - 66.8	26.9	17.9 - 38.3	55.2	44.5 - 65.4	37.6	28.4 - 47.8	14.6	8.8 - 23.4	1.4	0.7 - 3.1	55.4	44.3 - 66.0	60.0	48.5 - 70.4	25.6	18.1 - 35.0	183
14-16	43.3	39.9 - 46.7	22.0	19.4 - 24.9	94.1	92.1 - 95.6	77.3	74.3 - 80.1	49.9	46.3 - 53.4	56.6	53.0 - 60.2	29.7	26.5 - 33.0	18.1	15.5 - 21.0	7.3	6.1 - 8.6	93.3	90.6 - 95.3	65.9	62.9 - 68.8	33.2	30.1 - 36.3	717
17+	50.4	43.8 - 56.9	25.3	20.4 - 31.0	95.9	93.2 - 97.6	84.1	79.4 - 87.9	51.7	45.5 - 57.8	53.8	47.5 - 60.0	29.3	24.4 - 34.8	14.4	10.9 - 18.7	5.3	3.7 - 7.4	97.4	94.6 - 98.8	77.1	71.3 - 82.0	35.9	30.1 - 42.2	237
Salary type																									
None	37.3	29.7 - 45.7	13.5	8.6 - 20.5	85.3	77.1 - 91.0	64.0	55.3 - 71.9	35.4	26.1 - 46.1	44.1	35.1 - 53.4	22.7	15.1 - 32.5	11.8	7.1 - 19.0	2.6	1.4 - 4.7	89.8	81.4 - 94.7	57.9	48.8 - 66.5	22.9	16.5 - 30.8	168
Monthly or daily salary	44.7	40.2 - 49.4	21.3	17.8 - 25.3	92.8	89.0 - 95.4	77.6	72.6 - 81.9	50.0	45.2 - 54.8	55.8	50.8 - 60.6	31.5	27.2 - 36.1	14.8	11.7 - 18.5	4.9	3.6 - 6.5	85.4	80.1 - 89.5	68.2	63.3 - 72.8	33.2	28.9 - 37.8	417
No regular salary but other pay	46.7	42.6 - 50.9	24.3	20.9 - 28.0	91.4	88.0 - 93.9	77.0	72.8 - 80.7	47.3	42.7 - 52.0	59.3	55.1 - 63.4	32.9	29.0 - 37.1	19.8	16.5 - 23.5	6.3	5.1 - 7.8	89.5	85.3 - 92.6	69.4	65.4 - 73.2	35.0	31.0 - 39.2	553
Gender																									
Male	40.1	35.4 - 45.0	21.2	17.6 - 25.2	88.3	84.0 - 91.6	73.1	68.4 - 77.3	48.6	44.0 - 53.2	70.9	65.9 - 75.5	41.8	37.3 - 46.3	23.9	19.9 - 28.3	5.9	4.8 - 7.2	84.0	78.9 - 88.1	63.2	58.4 - 67.8	33.5	29.2 - 37.9	517
Female	48.4	44.5 - 52.3	22.0	19.0 - 25.3	93.3	90.9 - 95.1	77.2	73.4 - 80.5	44.8	40.6 - 49.0	43.1	38.9 - 47.4	21.8	18.7 - 25.3	10.8	8.8 - 13.2	3.8	2.9 - 4.8	91.4	88.2 - 93.8	70.7	67.3 - 73.9	31.8	27.9 - 35.9	620
Total in Malawi (N = 1137)	44.6	41.5 - 47.7	21.6	19.2 - 24.2	91.0	88.7 - 92.9	75.3	72.2 - 78.2	46.5	43.4 - 49.7	55.8	52.4 - 59.1	30.9	28.0 - 33.9	16.8	14.6 - 19.2	5.0	4.3 - 5.9	88.0	85.0 - 90.5	67.3	64.3 - 70.2	32.5	29.6 - 35.6	1,137

Note: Recent training is 24 months in Malawi.

Appendix Table 3c. Provision of care and training in infectious disease services among providers who provide ANC care, Tanzania

	ANC				PMTCT						TB								Malaria						
	Ever trained in ANC		Recent training in ANC		Provide PMTCT services		Provide PMTCT services & ever trained in PMTCT		Provide PMTCT services & recently trained in PMTCT		Provide TB services		Provide TB services & ever trained in TB		Provide TB services & recently trained in TB		Provide TB services & recently trained TB/HIV co-infection		Provide Malaria services		Provide Malaria services & ever trained in Malaria		Provide Malaria services & recently trained in Malaria		All ANC providers
	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	N
Type of Facility																									
Hospital/Health Center/Maternity Clinic	37.8	36.0 - 39.8	13.8	12.4 - 15.3	89.3	87.8 - 90.7	57.6	55.6 - 59.6	32.2	30.1 - 34.3	35.6	33.4 - 37.8	18.4	16.8 - 20.1	8.3	7.1 - 9.7	2.8	2.4 - 3.4	69.8	67.3 - 72.1	43.9	42.0 - 45.7	21.4	19.9 - 23.0	1,535
Dispensary/Clinic/ Other	34.3	31.1 - 37.7	11.8	9.6 - 14.4	89.3	85.9 - 91.9	59.3	55.4 - 63.0	38.7	35.3 - 42.2	16.0	12.7 - 20.0	6.8	5.0 - 9.3	2.1	1.2 - 3.8	0.4	0.1 - 1.2	90.0	86.7 - 92.6	48.8	45.6 - 52.0	21.3	18.8 - 24.0	2,660
Managing Authority																									
Public	36.4	33.9 - 38.9	12.3	10.6 - 14.2	91.9	89.9 - 93.5	60.6	57.8 - 63.2	38.1	35.5 - 40.8	24.6	21.7 - 27.8	11.3	9.6 - 13.3	4.5	3.5 - 5.8	1.6	1.1 - 2.2	86.5	84.3 - 88.5	49.6	47.1 - 52.2	22.2	20.2 - 24.4	3,192
Private/Other	33.2	29.0 - 37.6	13.3	10.2 - 17.1	81.1	74.9 - 86.0	52.7	46.8 - 58.5	30.6	26.1 - 35.6	18.7	15.3 - 22.5	10.1	7.9 - 12.8	4.1	2.9 - 5.8	1.0	0.8 - 1.4	70.1	64.4 - 75.2	38.5	34.6 - 42.7	18.5	15.5 - 21.9	1,003
Zones																									
Central	38.6	33.5 - 44.0	18.7	14.8 - 23.4	83.4	73.5 - 90.1	49.4	42.5 - 56.3	31.4	25.5 - 37.9	17.2	12.4 - 23.4	8.4	5.9 - 11.8	4.4	2.7 - 7.1	1.9	1.1 - 3.3	74.3	66.3 - 80.9	39.6	33.9 - 45.6	14.6	11.0 - 19.3	528
Northern	35.5	30.1 - 41.2	11.0	7.5 - 15.8	91.0	87.0 - 93.9	63.6	57.2 - 69.5	42.0	36.0 - 48.2	25.4	20.4 - 31.2	13.3	9.8 - 17.8	5.2	3.6 - 7.5	1.8	1.3 - 2.6	84.1	80.3 - 87.2	46.5	40.6 - 52.4	17.4	13.0 - 23.0	741
Coastal	36.2	31.4 - 41.3	11.4	8.6 - 15.0	90.4	84.8 - 94.0	59.2	52.9 - 65.3	31.3	26.5 - 36.4	19.2	14.8 - 24.4	11.1	8.2 - 14.7	5.2	3.2 - 8.3	1.0	0.6 - 1.7	73.2	67.4 - 78.3	46.7	42.8 - 50.6	25.1	21.9 - 28.6	972
Southern Highlands	37.6	32.7 - 42.8	13.4	10.2 - 17.4	90.9	85.9 - 94.3	60.0	54.9 - 64.8	37.2	32.6 - 42.1	20.9	16.1 - 26.6	9.1	7.0 - 11.7	2.7	1.9 - 4.0	1.2	0.8 - 1.6	91.7	88.9 - 93.9	47.6	42.7 - 52.5	14.1	11.5 - 17.3	866
Lake	29.8	25.8 - 34.2	10.7	7.7 - 14.6	90.2	86.4 - 93.0	58.5	53.6 - 63.2	40.4	35.9 - 45.0	30.9	25.0 - 37.4	12.4	9.0 - 16.7	4.4	2.6 - 7.3	1.5	0.7 - 3.2	89.5	85.6 - 92.4	49.8	45.5 - 54.0	28.3	24.4 - 32.5	980
Zanzibar	52.8	45.2 - 60.3	13.6	9.6 - 18.8	75.7	66.4 - 83.0	57.0	49.0 - 64.7	23.2	16.0 - 32.2	22.1	16.5 - 29.1	12.1	8.4 - 17.1	5.2	3.0 - 8.8	0.2	0.1 - 0.8	62.5	51.1 - 72.7	59.0	51.3 - 66.3	41.1	33.9 - 48.7	108
Population Density																									
Lowest density	35.2	32.0 - 38.4	13.6	11.4 - 16.1	91.1	88.4 - 93.2	59.9	56.4 - 63.3	39.4	36.2 - 42.7	21.7	18.4 - 25.4	9.8	8.0 - 11.9	3.9	2.9 - 5.3	1.7	1.1 - 2.5	89.2	86.9 - 91.0	50.8	47.7 - 53.9	22.7	20.1 - 25.4	2,325
Low density	38.9	35.2 - 42.8	12.8	10.1 - 16.2	89.6	85.3 - 92.8	58.0	52.8 - 62.9	35.9	31.7 - 40.4	31.7	26.9 - 36.9	15.2	12.1 - 18.9	6.3	4.4 - 8.9	1.8	1.2 - 2.5	80.8	77.2 - 84.0	45.2	41.3 - 49.2	22.7	19.4 - 26.3	994
Medium/high density	33.9	29.4 - 38.7	9.7	7.0 - 13.2	83.8	76.7 - 89.0	57.0	50.6 - 63.2	27.2	22.9 - 31.9	16.9	13.1 - 21.5	9.9	7.1 - 13.4	3.7	2.3 - 6.1	0.7	0.5 - 1.1	64.7	56.8 - 71.8	38.7	33.7 - 44.0	15.3	12.3 - 18.8	789
Occupational Category																									
Doctor/clinical technician/specialist	27.6	23.1 - 32.6	10.6	8.0 - 14.0	83.6	79.3 - 87.1	52.0	46.7 - 57.3	28.9	24.2 - 34.0	43.5	38.6 - 48.6	26.8	22.7 - 31.3	9.0	7.0 - 11.3	3.1	2.4 - 3.9	98.8	97.2 - 99.5	66.9	62.0 - 71.5	32.2	27.7 - 37.1	853
Nurse/midwife/other	37.6	35.2 - 40.2	13.0	11.3 - 15.0	90.8	88.6 - 92.6	60.4	57.6 - 63.1	38.2	35.6 - 40.9	18.0	15.6 - 20.6	7.0	5.7 - 8.7	3.2	2.4 - 4.4	0.8	0.5 - 1.3	78.5	75.8 - 80.9	41.9	39.4 - 44.4	18.5	16.7 - 20.5	3,342
Years of education																									
<14	33.6	30.5 - 36.8	11.6	9.6 - 13.9	89.3	86.7 - 91.5	57.1	53.5 - 60.6	36.3	32.9 - 39.8	16.1	13.3 - 19.3	5.6	4.2 - 7.6	2.3	1.4 - 3.6	0.5	0.3 - 0.8	82.8	79.9 - 85.4	41.7	38.4 - 45.1	17.9	15.5 - 20.6	2,323
14-16	37.0	33.3 - 40.9	13.8	11.3 - 16.7	89.8	87.0 - 92.1	61.4	57.7 - 64.9	38.1	34.4 - 42.0	29.8	26.4 - 33.5	15.4	13.1 - 18.1	6.0	4.7 - 7.7	2.2	1.6 - 3.0	83.1	80.2 - 85.6	52.6	48.8 - 56.3	25.6	22.8 - 28.6	1,487
17+	42.2	35.9 - 48.8	13.6	10.4 - 17.6	87.2	82.1 - 91.0	57.9	51.2 - 64.4	29.5	24.4 - 35.3	40.5	34.4 - 46.8	26.7	21.3 - 32.9	10.8	8.2 - 14.2	3.1	2.3 - 4.2	79.4	74.2 - 83.7	57.4	51.2 - 63.3	25.3	20.6 - 30.6	386
Salary type																									
None	26.1	21.8 - 31.0	9.5	6.9 - 13.1	86.4	82.2 - 89.8	47.3	41.8 - 52.9	28.5	23.6 - 33.9	17.2	13.4 - 21.8	5.2	3.5 - 7.7	2.5	1.4 - 4.7	0.4	0.1 - 0.9	79.8	74.8 - 84.0	33.6	28.9 - 38.6	15.6	12.1 - 19.9	938
Monthly or daily salary	38.4	34.2 - 42.8	14.3	11.4 - 17.7	89.4	85.2 - 92.5	59.0	54.6 - 63.3	37.4	33.4 - 41.5	20.8	17.4 - 24.6	11.3	9.0 - 14.1	3.9	2.6 - 5.9	1.2	0.8 - 1.7	78.9	74.9 - 82.3	48.7	44.7 - 52.6	23.3	20.4 - 26.4	1,287
No regular salary but other pay	38.3	35.0 - 41.6	12.8	10.8 - 15.2	90.6	88.0 - 92.7	63.9	60.5 - 67.1	39.4	36.2 - 42.7	27.6	24.3 - 31.1	13.6	11.4 - 16.2	5.6	4.3 - 7.2	2.1	1.5 - 2.9	86.4	84.0 - 88.5	52.2	48.9 - 55.6	22.8	20.2 - 25.6	1,971
Gender																									
Male	26.0	22.1 - 30.3	12.6	9.8 - 16.0	86.1	82.3 - 89.2	51.6	47.1 - 56.1	32.7	28.4 - 37.2	33.2	29.1 - 37.5	18.9	15.8 - 22.3	6.3	4.9 - 8.1	1.8	1.4 - 2.3	94.5	92.7 - 95.8	55.1	50.5 - 59.6	30.0	25.8 - 34.5	959
Female	38.4	35.8 - 41.2	12.5	10.8 - 14.5	90.3	87.9 - 92.2	60.8	57.9 - 63.6	37.4	34.8 - 40.1	20.2	17.7 - 23.0	8.7	7.3 - 10.4	3.8	2.9 - 5.0	1.1	0.8 - 1.7	79.1	76.4 - 81.5	44.6	42.1 - 47.1	18.7	16.9 - 20.8	3,236
Total in Tanzania (N=4,195)	35.6	33.4 - 37.8	12.5	11.0 - 14.2	89.3	87.2 - 91.1	58.7	56.1 - 61.2	36.3	34.1 - 38.7	23.2	20.8 - 25.7	11.0	9.6 - 12.6	4.4	3.6 - 5.4	1.4	1.1 - 1.7	82.6	80.5 - 84.5	47.0	44.9 - 49.1	21.3	19.6 - 23.1	4,195

Appendix Table 4a. Overall integration of ANC with infectious disease services, by facility background characteristics, Kenya

	PMTCT			TB/HIV			Malaria			All ANC facilities
	Mean	95% CI	p-value	Mean	95% CI	p-value	Mean	95% CI	p-value	N
Type of Facility			**<.001**			**<.001**			**<.001**	
Hospital/Health Center/Maternity Clinic	66.3	63.28 - 69.29		59.0	55.01 - 62.90		68.6	66.42 - 70.80		126
Dispensary/Clinic/Other	40.3	36.27 - 44.37		18.8	14.67 - 22.94		60.9	58.23 - 63.55		383
Managing Authority			0.241			**0.046**			**<.001**	
Public	47.8	43.92 - 51.73		30.9	26.25 - 35.57		66.6	64.11 - 69.03		306
Private/Other	45.2	39.78 - 50.58		25.6	20.01 - 31.11		57.2	53.75 - 60.58		204
Region			**<.001**			**0.008**			**<.001**	
Nairobi	43.3	33.90 - 52.63		34.1	24.25 - 43.86		45.4	39.06 - 51.64		33
Central	47.5	38.71 - 56.33		28.0	19.87 - 36.10		57.9	52.82 - 62.89		71
Coast	50.2	38.94 - 61.41		33.5	21.76 - 45.16		64.5	58.13 - 70.90		57
Eastern	48.8	42.15 - 55.50		27.0	18.90 - 35.13		69.6	65.10 - 74.07		84
North Eastern	25.9	16.48 - 35.40		20.6	7.25 - 33.87		51.5	45.11 - 57.96		17
Nyanza	54.9	48.28 - 61.47		36.2	27.76 - 44.60		67.4	63.04 - 71.66		78
Rift Valley	40.2	32.22 - 48.13		21.4	13.81 - 29.03		61.4	56.10 - 66.74		130
Western	53.3	47.73 - 58.77		35.5	28.85 - 42.19		69.4	64.57 - 74.25		41
Population Density			**0.004**			**<.001**			**0.027**	
Lowest density	40.3	33.03 - 47.55		19.8	13.32 - 26.30		62.8	57.90 - 67.66		111
Low density	46.9	41.48 - 52.39		28.8	22.76 - 34.79		65.2	61.58 - 68.74		190
Medium/high density	50.1	45.04 - 55.10		33.6	27.53 - 39.59		60.7	57.51 - 63.85		208
Total	46.8	43.56 - 49.97		28.8	25.36 - 32.18		62.8	60.72 - 64.90		509

Appendix Table 4b. Overall integration of ANC with infectious disease services, by facility background characteristics, Malawi

	PMTCT	TB/HIV	Malaria	All ANC facilities
	Mean	Mean	Mean	N
Type of Facility				
Hospital/Health Center/Maternity Clinic	77.1	21.8	62.7	548
Dispensary/Clinic/Other	42.5	4.2	44.7	84
Managing Authority				
Public	76.8	22.3	62.4	399
Private/Other	65.2	14.4	56.8	233
Region				
Northern	67.6	13.0	55.4	118
Central	74.0	22.3	65.2	235
Southern	73.3	19.8	58.3	280
Population Density				
Lowest density	67.1	11.6	54.4	194
Low density	76.1	22.6	63.6	352
Medium/high density	70.2	24.8	60.6	83
Total	72.5	19.4	60.3	632

Appendix Table 4c. Overall integration of ANC with infectious disease services, by facility background characteristics, Tanzania

	PMTCT			TB/HIV			Malaria			All ANC facilities
	Mean	**95% CI**	**p-value**	**Mean**	**95% CI**	**p-value**	**Mean**	**95% CI**	**p-value**	**N**
Type of Facility			**<.001**			**<.001**			**<.001**	
Hospital/Health Center/Maternity Clinic	79.6	77.94 - 81.16		37.8	35.46 - 40.22		54.7	52.91 - 56.52		160
Dispensary/Clinic/Other	64.4	61.97 - 66.76		6.2	4.63 - 7.69		39.6	37.71 - 41.54		845
Managing Authority			**0.001**			0.439			**<.001**	
Public	67.9	65.66 - 70.07		11.0	9.44 - 12.50		40.9	39.08 - 42.72		823
Private/Other	61.9	56.79 - 66.97		12.2	9.21 - 15.22		47.1	43.34 - 50.84		182
Zones			**<.001**			**0.023**			**<.001**	
Central	60.2	55.39 - 65.06		7.2	5.23 - 9.14		30.1	26.01 - 34.11		131
Northern	71.3	66.21 - 76.31		12.8	8.98 - 16.69		42.6	37.53 - 47.76		164
Coastal	71.0	67.18 - 74.85		12.1	8.86 - 15.37		47.4	44.24 - 50.59		210
Southern Highlands	68.5	63.56 - 73.37		9.0	6.53 - 11.47		42.8	39.58 - 46.08		228
Lake	63.9	59.43 - 68.30		13.2	10.20 - 16.25		41.2	37.69 - 44.69		241
Zanzibar	52.3	45.99 - 58.60		13.5	10.10 - 16.91		53.1	49.27 - 56.91		31
Population Density			**0.049**			**<.001**			**<.001**	
Lowest density	65.4	62.89 - 68.00		8.5	7.01 - 10.01		39.9	37.79 - 41.90		645
Low density	69.9	64.75 - 74.98		17.2	13.32 - 21.08		46.3	42.15 - 50.44		195
Medium/high density	67.9	62.96 - 72.86		15.4	10.87 - 19.84		46.6	42.41 - 50.84		139
Total	66.8	64.74 - 68.82		11.2	9.86 - 12.53		42.0	40.39 - 43.66		1,005

Appendix Table 5. Background characteristics of women observed in ANC visits, percent distribution, Kenya, Malawi, and Tanzania

	Kenya			Malawi			Tanzania		
	%	95% CI	N	%	95% CI	N	%	95% CI	N
Education									
None	7.5	5.4 - 10.4	105	14.0	12.0 - 16.1	289	23.3	20.9 - 26.0	935
Primary	54.7	50.9 - 58.5	767	61.3	58.6 - 63.9	1,268	60.3	57.6 - 62.9	2,415
Secondary or Higher	37.8	33.9 - 41.8	529	24.7	22.3 - 27.4	512	16.4	14.7 - 18.3	657
Age									
<20	14.0	11.8 - 16.5	195	19.7	17.7 - 21.8	407	19.0	17.2 - 20.9	761
20-35	67.2	63.8 - 70.4	939	53.0	50.7 - 55.2	1,096	53.8	51.5 - 56.0	2,155
36+	18.9	16.3 - 21.6	264	27.4	25.2 - 29.6	566	27.2	25.4 - 29.2	1,091
Weeks pregnant									
4-13	1.6	1.0 - 2.7	21	4.2	3.1 - 5.6	86	4.5	3.6 - 5.7	180
14-27	30.8	27.0 - 34.8	388	45.8	42.3 - 49.2	934	46.5	44.0 - 49.0	1,846
28-40	67.6	63.5 - 71.4	851	50.0	46.5 - 53.6	1,022	49.0	46.4 - 51.5	1,943
First Pregnancy									
Yes	68.4	64.6 - 72.0	964	75.6	73.3 - 77.8	1,564	74.5	72.4 - 76.5	2,979
No	31.6	28.0 - 35.4	445	24.4	22.2 - 26.7	505	25.5	23.5 - 27.6	1,020
Visit									
First visit	39.4	35.0 - 44.1	556	42.2	38.2 - 46.3	873	46.1	43.3 - 48.9	1,847
Second visit	27.6	23.9 - 31.5	389	24.0	21.6 - 26.6	497	25.4	23.3 - 27.7	1,019
Third visit	19.2	16.3 - 22.4	270	18.9	16.6 - 21.5	392	18.1	16.0 - 20.4	725
Fourth or higher	13.8	11.8 - 16.1	194	14.8	12.7 - 17.2	307	10.4	9.1 - 11.8	416
Type of Facility									
Hospital/Health Center/Maternity Clinic	63.2	59.8 - 66.5	890	97.2	95.2 - 98.4	2,011	34.0	31.8 - 36.3	1,362
Dispensary/Clinic/Other	36.8	33.5 - 40.2	519	2.8	1.6 - 4.8	57	66.0	63.7 - 68.2	2,645
Managing Authority									
Public	75.2	70.5 - 79.4	1,060	73.7	68.3 - 78.4	1,523	81.1	77.5 - 84.2	3,249
Private/Other	24.8	20.6 - 29.5	349	26.3	21.6 - 31.7	545	18.9	15.8 - 22.5	758
Population Density									
Lowest density	16.3	11.7 - 22.1	229	18.2	14.6 - 22.4	376	54.3	49.6 - 58.8	2,115
Low density	35.7	29.6 - 42.3	503	65.8	59.4 - 71.7	1,361	26.1	21.9 - 30.7	1,016
Medium/high density	48.0	42.1 - 54.0	677	16.0	11.0 - 22.7	331	19.7	15.9 - 24.1	768
Provider Occupational Category									
Doctor/clinical technician/specialist	4.4	2.9 - 6.7	62	4.0	2.6 - 6.2	83	5.9	4.1 - 8.6	238
Nurse/midwife/other	95.6	93.3 - 97.1	1,347	96.0	93.8 - 97.4	1,985	94.1	91.4 - 95.9	3,769
Provider Years of Education									
<14	4.3	2.4 - 7.7	60	6.6	4.5 - 9.7	130	58.6	54.5 - 62.7	2,343
14-16	79.1	74.0 - 83.3	1,092	69.5	63.1 - 75.2	1,364	35.3	31.1 - 39.6	1,408
17+	16.6	12.8 - 21.3	230	23.9	18.3 - 30.5	468	6.1	4.6 - 8.1	244
Provider Salary Type									
None	92.4	88.1 - 95.2	1,275	11.2	7.8 - 15.7	231	22.5	18.6 - 27.0	903
Monthly or daily salary	0.5	0.1 - 2.3	7	35.8	30.4 - 41.6	741	25.8	22.5 - 29.5	1,035
No regular salary but other pay	7.1	4.4 - 11.3	98	53.0	46.9 - 59.0	1,097	51.6	46.9 - 56.3	2,069
Provider Gender									
Male	25.6	20.1 - 32.0	361	25.1	20.9 - 29.7	518	15.4	12.3 - 19.1	617
Female	74.4	68.0 - 79.9	1,048	74.9	70.3 - 79.1	1,550	84.6	80.9 - 87.7	3,390
Total			1,409			2,068			4,007
	Mean	**95% CI**		**Mean**	**95% CI**		**Mean**	**95% CI**	
Malaria Facility Integration Score	63.1	60.4 - 65.8		82.7	80.6 - 84.9		69.7	67.3 - 72.0	
PMTCT Facility Integration Score	68.5	66.7 - 70.4		68.6	66.5 - 70.7		45.3	43.4 - 47.2	

Note: Clients with missing background or provider information were excluded from the distribution.

Appendix Table 6. Mean integration score by services provided during ANC, Kenya, Malawi, and Tanzania

	Kenya			Malawi			Tanzania		
	Mean	**95% CI**	**p-value**	**Mean**	**95% CI**	**p-value**	**Mean**	**95% CI**	**p-value**
PMTCT Score									
Did not receive HCT	63.5	58.65 - 68.31	0.626	83.7	80.94 - 86.44	0.898	63.9	58.93 - 68.89	**<.001**
Received HCT	65.2	59.99 - 70.40		84.4	74.25 - 94.44		76.2	73.69 - 78.77	
Malaria Score									
Did not receive ITN or counseling	62.1	58.15 - 66.04	**<.001**	65.2	60.36 - 69.97	0.078	44.5	42.05 - 46.97	0.733
Received ITN or counseling	72.8	70.28 - 75.29		69.8	66.99 - 72.67		46.1	37.61 - 54.54	
Did not receive SP	66.2	63.68 - 68.67	**<.001**	68.2	65.62 - 70.70	0.518	40.3	38.04 - 42.59	**<.001**
Received SP	72.5	70.27 - 74.65		69.0	66.36 - 71.69		58.2	55.27 - 61.02	