

2016

Demand And Supply Factors Affecting Maternal Healthcare Utilization Pattern In Nigeria

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DEMAND AND SUPPLY FACTORS AFFECTING MATERNAL HEALTHCARE
UTILIZATION PATTERN IN NIGERIA

by

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Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Philosophy in

Health Services Policy and Management

The Norman J. Arnold School of Public Health

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2016

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DEDICATION

To my parents, Raphael and Juliana Onyeajam for your financial and moral support in my academic pursuit. To my husband, Lloyd Powell for understanding our social life would be limited for a while. To my other family members Jerry Ugbekile, Isioma Ochie, Anthony Osadolor Ochie, the Mbulus, Lilian Emefiele, Otis Aliemeke and Frank Onyeajam for cheering me on. To my best friend, Abimbola Akinto Eyo and my undergraduate supervisor, Emilia Aghomo for your constant encouragement.

ACKNOWLEDGEMENTS

We acknowledge the Minister of Health and the senior management of the Federal Ministry of Health; the Executive Director and the senior management of the National Primary Health Care Development Agency (NPHCDA) and the World Bank for providing the data from the baseline survey of the Nigeria State Health Investment Project (NSHIP) for this dissertation.

ABSTRACT

Given poor maternal services utilization and associated high maternal mortality risk in Nigeria, we document policy-amenable supply and demand factors impacting women's use of skilled ANC and institutional delivery services. Using a cross-sectional design, we analyzed data from the Nigeria State Health Investment Project health facility and household surveys on 418 health facilities and 3,726 women with a pregnancy within 24 months prior to survey living in 241 geographic wards of two states. Logistic regression was used to study associations of women's use of each maternal service with ward facilities' ANC outpatient satisfaction, healthcare staff job satisfaction, surveyor-verified facility infrastructure, and maternal socio-demography. Skilled ANC use was predicted by staff satisfaction with work context and benefits (Adjusted Odds Ratio [AOR] 1.09, 95% CI 1.03-1.15), ownership of motorized means of transport (AOR 1.35, 95% CI 1.11-1.64), and frequent media exposure (AOR 1.45, 95% CI 1.06-1.97). Institutional delivery was associated with skilled ANC use (AOR 3.49, 95% CI 2.66-4.57), ANC outpatients' perceptions of a treatment-facilitating climate (clear care-related communication and ease of drug access, AOR 1.40, 95% CI 1.01-1.94), and availability functional delivery and neonatal care equipment (AOR 1.02, 95% CI 1.01-1.04) in the facilities. Skilled ANC utilization rate could be improved by mass media and community-based maternal health education, community-based ANC service expansion to communities with poor public transportation network coupled with incentivizing of local

leaders to recruit women into care, payment structure that incentivizes service quality and continuous technical and interpersonal relations training of providers. Improvement in ANC use supplemented by new patient flow design allowing easier access to medicines and other appended services for maternal clients and improved availability of functioning obstetric and neonatal equipment in health facilities will increase Nigeria's institutional delivery rate.

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CHAPTER 1

PROBLEM STATEMENT, PURPOSE AND SIGNIFICANCE

1.1 PROBLEM STATEMENT

Maternal healthcare utilization in Nigeria is very low with a nationwide antenatal care (ANC) utilization rate of 61%, institutional delivery rate of 36% and 48-hours post-natal care rate of 40% (National Population Commission [NPC] & ICF International, 2014). Consistent with the low utilization of maternal health services, maternal and neonatal outcomes have remained poor. With 2.45% of the world's population, Nigeria accounts for an estimated 19% of global maternal deaths, ranking among the top 16 countries in maternal mortality with 576 deaths per 100,000 live-births (NPC & ICF International, 2014; World Health Organization [WHO], United Nations Children's Fund [UNICEF], United Nations Population Fund [UNFPA], World Bank Group, & United Nations Population Division [UNPD], 2015; World Bank, 2015). This is despite a per capita GDP that is at the average level of lower-middle-income countries, a category with average maternal mortality of 253/100,000 (World Bank, 2015). Nigeria's neonatal mortality is also high, 37 deaths/1,000 live-births, compared to 25.8/1,000 for countries at a similar income level (NPC & ICF International, 2014; World Bank 2015).

Timely and appropriate utilization of skilled maternal services (antenatal, intra-partum and postal-natal services) reduce the mortality risk of high risk morbidities in

mothers and neonates including post-partum hemorrhage, preeclampsia/eclampsia, maternal anemia, uterine rupture, preterm birth, and severe neonatal infections - tetanus, sepsis, pneumonia (Akinyemi, Bamgboye, & Ayeni, 2015; Fournier, Dumont, Tourigny, Dunkley, & Dramé, 2009; Li, Luo, Deng, Jacoby, & De Klerk, 2007, Ntambue, Malonga, Dramaix-Wilmet, Ngatu, & Donnen, 2016; Pervin, et al., 2012; WHO, 2015; WHO, 2016a; UNICEF, 2016; Adamu, Salihu, Sathiakumar, & Alexander, 2003; Pervin, et al., 2012). Examples of documented effects of ANC includes the identification of women at risk of preeclampsia and management with low dose aspirin, which reduces the risk of eclampsia, preterm birth (before 32 weeks) and perinatal death (Coomarasamy, Honest, Papaioannou, Gee, & Khan, 2003; Duley, Henderson-Smart, Meher, & King, 2007). The use of prenatal iron supplements and malaria prophylactic therapy facilitates the resolution of persisting anemia (Ikeanyi & Ibrahim, 2015; Asa, Onayade, Fatusi, Ijadunola, & Abiona, 2008). The delivery of emergency obstetric and newborn care to identified high risk women and their newborn reduces perinatal and neonatal mortality risk (Ntambue, et al., 2016). Life-saving emergency care includes the administration of oxytocin or misoprostol by skilled professionals to women experiencing post-partum hemorrhage (McCormick, Sanghvi, Kinzie, & McIntosh, 2002; Derman et al., 2006; Hofmeyr et al., 2005).

1.2 PURPOSE

The purpose of this study is to identify policy-amendable supply-side factors (infrastructure, manpower, and service quality) and demand-side factors that impact maternal healthcare utilization pattern adjusted for maternal sociodemographic characteristics in Nigeria. The study seeks to evaluate a comprehensive set of maternal

and health system factors using empirical data from women with recent pregnancy/birth experience and their community health facilities. It will examine the impact of maternal sociodemographics, history, need factor, and healthcare-seeking pattern, and health facilities' structural capacity (manpower, equipment, and drugs), physical image, recent users' perceived quality of technical and interpersonal (e.g courtesy, respect for privacy, empathy) care, and staff motivation/satisfaction on the utilization of skilled antenatal care and institutional delivery services.

1.3 SIGNIFICANCE

Historically most efforts to improve maternal healthcare utilization have focused on generating demand from expectant mothers, however not much success have been achieved. The comprehensive assessment of factors that may influence maternal healthcare utilization in Nigeria, would result in the identification of major policy-amendable factors that attract and retain women in the spectrum of maternal healthcare in their community health facilities. The findings of this assessment can be used to inform on-going maternal and child healthcare improvement and expansion initiatives in Nigeria. Improvement in maternal healthcare utilization has the potential to reduce the current poor state of maternal and child health. The study will also shed more light on inter-state disparity in maternal care utilization, by observing whether the supply-side predictors eliminates differences in inter-state utilization pattern given maternal socio-demography. Thus, it will inform programs and policies directed at reducing the wide regional and state gaps in maternal healthcare utilization rates.

CHAPTER 2

LITERATURE REVIEW

2.1 OVERVIEW OF PREVIOUS STUDIES

Health service use is driven by supply-side and demand-side factors (Aday & Anderson, 1994; Ensor & Cooper, 2004). The supply-side factors are infrastructure and human resource characteristics of the health system, including availability of equipment, supplies, drugs, staff, amenities, provider behavior, technical skills and interaction with patients. These attributes impact the quantity, quality and cost of services produced and offered to patients. The demand-side factors affecting the population's decisions to seek and actually utilize care are sociodemographic and maternal factors, care seeking preferences, perceived healthcare needs, and perceptions or experience of care quality. Utilization of maternal healthcare services can be evaluated in this framework to identify specific interventions that are needed in Nigeria's context to improve antenatal care and institutional delivery utilization rates (Aday & Anderson, 1994).

Previous studies assessing factors that drive maternal healthcare utilization (antenatal care and institutional delivery services) in Nigeria have focused on demand-side factors - the expectant mother's demographics (age, education, birth order, media exposure), accessibility factors (household wealth, and geographical accessibility of healthcare facilities), and perceived need of care (Dahiru & Oche, 2015; Babalola & Fatusi, 2009; Onah, Ikeako, & Iloabachie, 2006; Fawole & Adeoye, 2015; Fagbamigbe &

Idemudia, 2015; Dairo & Owoyokun, 2010; Osubor, Fatusi, & Chiwuzie, 2006). Babalola & Fatusi (2009) examined the impact of community healthcare facility density on antenatal care and institutional delivery utilization. A few studies described the population's impression of supply-side factors that may be related to skilled ANC and delivery service utilization (Dairo & Owoyokun, 2010; Fagbamigbe & Idemudia, 2015; Onah et al, 2006; Osubor et al., 2006; Nwosu, Ugboaja, Obi-Nwosu, Nnebue, & Ifeadike, 2012).

Studies from other developing nations examined the impact of supply-side factors on maternal healthcare utilization (ANC or institutional delivery), however only one dimension of quality, health facilities' structural capacity (manpower, amenities, drugs, equipment), providers' clinical competence or service aspect of care (e.g provider behavior, wait time) was the focus (Acharya & Cleland, 2000; Chama-Chiliba, & Koch, 2015; Worku, Yalew, & Afework, 2013; Ghosh, Siddiqui, Barik, Bhaumik, 2015; Patel & Ladusingh, 2015, Hotchkiss, Krasovec, El-Idrissi, Eckert, & Karim, 2005). One study examined the impact of both clinical competence and services quality on community members ANC use, however, the communities' facilities' structural capacities were not evaluated (Rani, Bonu, & Harvey, 2008). Another study covered service quality, and facility structural characteristics, however, virtual data were used to model women's birth place decision making (Kruk et al., 2010). The impact of service aspect of care on institutional delivery is not justified by empirical data. This study used data (mostly obtained by observation) on dimension of care quality obtained from the health facility survey carried out in the same geographic area of the surveyed women. Also none of the studies explored the influence of facilities' staff job satisfaction/motivation on maternal

health care seeking behavior. Service quality is affected by staff's performance on the job which is potentially influenced by job satisfaction and motivation (Scotti, Harmon, Behson, & Messina, 2007). There might remain independent impact of staff satisfaction on maternal care utilization beyond observed patient perceived quality of care measures. In summary, none documented a comprehensive survey-based assessment capturing all three pillars of a successful maternal service program, (1) population need and maternal healthcare seeking pattern, (2) facility infrastructure and manpower including the functional element of human resources, and (3) interpersonal care and clinical competence of providers conveying what is important to women for seeking care at healthcare facilities.

In Nigeria, wide disparity exists across geographical regions and states in maternal healthcare seeking behavior, after taking into account maternal sociodemographics (Akinrefon, Adeniyi, Adejumo, Balogun, & Torsen, 2015; Ononokpono & Odimegwu, 2014; Dahiru & Oche, 2015; Yusuf & Ugalahi, 2015; Nwosu, Urama, & Uruakpa, 2012). This variation may be explained by differences in health system characteristics. Women in the northern region (mainly the North East and North West) appear to have lower preference for skilled maternal healthcare services than those in the south. For example, in the North Central, women of child bearing age had significantly higher likelihood of any use and number of use of antenatal care compared to the North West and the North East, adjusting for sociodemographic however, the southern regions had significantly higher odds for use than the all of the aforementioned northern regions (E. O. Nwosu et al., 2012; Ononokpono & Odimegwu, 2014; Yusuf & Ugalahi, 2015; Gayawan, 2013). Those in the North Central had significantly higher

likelihood of institutional delivery (like antenatal care utilization) compared to the North West and the North East (Ononokpono & Odimegwu, 2014). The South West experienced higher probability of institutional delivery in a health institution, the South-South lower, and the South East no difference in comparison to the North Central (Ononokpono & Odimegwu, 2014).

This regional disparity in maternal healthcare utilization have been attributed to religious and cultural practice, however the impact of the health system characteristics on this disparity is not documented in Nigeria and other African countries (Gazali, Muktar, & Gana, 2012). We hypothesize that supply-side factors may explain the disparity. We use data in one northern and a southern state to understand the disparity also reflected at the states level.

2.2 DEMAND-SIDE FACTORS

The demand-side predictors affects the population's decision to seek and actually utilize healthcare. These factors are represented by predisposing demographic, care-seeking preferences and perceived healthcare need variables, enabling factors, and perception/experience of care quality (Aday & Anderson, 1994).

2.2.1 Predisposing Factors

These factors prompts the expectant mother choice to seek or not seek skilled maternal healthcare. They include age, education, parity, religious, ethnicity, language, care preference, and perception of need.

Maternal age is positively associated with ANC use (Dairo & Owoyokun, 2010; Babalola & Fatusi 2009). Analysis of the 2008, as well as the 2013 Nigeria Demographic

and Health survey, showed that age had a positive impact on the utilization of institutional and skilled delivery (Babolola & Fatusi, 2009; Dahiru & Oche, 2015, Ononokpono & Odimegwu, 2014). Age also increased the odds of use of the minimum recommend number (4) of ANC before birth (Omer et al., 2014; Dahiru & Oche, 2015; Yusuf & Ugalahi, 2015; Nwosu et al., 2012). Younger mothers' lower utilization of maternal healthcare could be due to lower autonomy in healthcare decision, or the lack of knowledge on maternal health, place of care, or preparedness for pregnancy (Fawole & Adeoye, 2015; Tura, Afework, & Yalew, 2014; Asweto et al., 2014; Worku et al., 2013; Ghosh et al., 2015; Omer et al., 2014).

Different surveys have reported different influence of birth order (gravity or parity) on the use of maternal services in Nigeria and other African-Asian countries. Babalola & Fatusi (2009) in a study using the 2005 National HIV/AIDS and Reproductive Health Survey found no association of birth orders with maternal services use. In Bauchi state, Nigeria, women who had at least three pregnancy experiences had higher odds of use of the national recommended number of ANC (Omer et al., 2014). Jat, Ng, & San Sebastian (2011) reported similar impact in a state in India, with those who had less than three pregnancy experiences having lower likelihood to utilize ANC compared to those who had more. The lack of awareness of health facilities offering ANC, or preparedness for the first pregnancy, ignorance on what to do and expect in first pregnancies, and inabilities to take control over ones maternal healthcare need in early years of marriage might be responsible for this trend (Birmeta, Dibaba, & Woldeyohannes, 2013; Fawole & Adeoye, 2015; Omer et al., 2014). A negative impact of birth order on use of skilled delivery have been reported in Ethiopia, Bengal, and India

(Worku et al., 2013; Ghosh et al., 2015; Wilunda et al., 2015). The decreasing use of institutional/skilled delivery with increasing birth order could be due to perceptions that deliveries do not require skilled attendance, preferences for traditional attendance's interpersonal care reported to be absent in modern healthcare institutions or a lack of history of maternal complications (Gazali et al., 2012; Wilunda et al., 2015; Idris, Sambo, & Ibrahim, 2013).

Education is observed to increase utilization of maternal healthcare in Nigeria, as well as other African and Asian countries (Fawole & Adeoye, 2015; Omer et al., 2014; Dahiru & Oche, 2015; Babolola & Fatusi, 2009; Ononokpono & Odimegwu, 2014; E. O. Nwosu, et al., 2012; Akinrefon et al., 2015; Adewemimo, Msuya, Olaniyan, & Adegoke, 2014). An educated woman is more likely to have gained information and changed her perspective on maternal healthcare, thus enhancing utilization (Ye, Yoshida, Harun-Or-Rashid, & Sakamoto, 2010). Education empowers women to partake in their healthcare related decisions, and boosts self-efficacy to initiate care (Furuta & Salway, 2006; Singh, Bloom, Haney, Olorunsaiye, & Brodish, 2012; Asweto et al 2014; Fawole & Adeoye, 2015). Education also enhances communication between providers and clients, given the educated patients are less likely to have language-related communication barriers.

Language differences between providers and patients, and poor patient's health literacy impact provider-patient effective communication, patients' adherence to care, treatment outcomes, patient satisfaction with care and future facility patronage for care (Fiscella, Franks, Doescher, & Saver, 2002; Fernandez et al., 2004; Woloshin, Schwartz, Katz, & Welch, 1997; Timmins, 2002). Media access is also an avenue of maternal health education and it positively influences community perception of maternal services value

(Bankole, Rodríguez, & Westoff, 1996; Ankomah et al., 2014; Perreira et al., 2002; Ankomah et al., 2014). Spousal/partner education has similar impact as expectant mothers' education on maternal healthcare utilization (Omer et al., 2014; Dahiru & Oche, 2015; Kabir, Iliyasu, Abubakar, & Asani, 2005).

Interaction of cultural-religious beliefs are documented to influence healthcare seeking behavior. In Nigeria, women living in the northern region, dominated by Hausa/Islam ethno-religious group, are less likely to utilize maternal services compared with those in other regions with different ethno-religious dominance (Babalola & Fatusi 2009, Austin et al 2015; Dahiru & Oche, 2015). To the contrary, Fawole & Adeoye (2015) reported lower likelihood of use of skilled ANC by the Yorubas, Igbos and other minorities compared with the Hausas using the 2008 Demographic health survey (DHS). Dahiru & Oche (2015) found on impact of religion on ANC use with the DHS 2013 data. A study in Ghana also reported less use of care by those of Islamic religion (Gyimah et al., 2006). Nwakoby (1994) reported lesser institutional delivery by traditionalist in southern Nigerian communities compared to their Christian counterparts. Cultural practices during delivery might also not align with those of modern healthcare, thus preventing utilization (Idris et al., 2013; Gazali et al., 2012). One study in Nigeria did find an opposite trend in use of antenatal care, with Muslims being more likely than the Christians to use maternal service, nevertheless religious affiliation of the households appear to affect utilization of maternal health services (Dairo & Owoyokun, 2010). Lack of trust on healthcare system seemed more common among the Hausa/Fulani ethnicity and Islamic religious group in Nigeria, and could be the driving factor for poorer utilization of maternal healthcare in this group (Ghinai, Willott, Dadari, & Larson, 2013).

Other preference patterns, like family/community preference for home delivery, and preferences for female providers' attendance have been documented (Adewemimo et al., 2014; Ezechi, Fasubaa, & Dare, 2000; Fagbamigbe & Idemudia, 2015).

Women's perception of benefits of maternal health services to the health of mother and fetus/newborn drives utilization (Griffiths & Stephenson, 2001). Our outcomes of interest are not acute or chronic diseases requiring medical care but are preventive healthcare intended to assure healthy state of the fetus and mother and manage any morbidities identified in the process. The belief that pregnancy is a completely healthy process and not requiring medical care except glaring for problems results in non-utilization of skilled maternal healthcare (Finlayson & Downe, 2013; Okafor, Sekoni, Ezeiru, Ugboaja, & Inem, 2014). History of complications during previous pregnancies also increases the potential to perceive a need for maternal healthcare, thus patronage of skilled maternal healthcare is likely (Mustafa & Mukhtar, 2015).

2.2.2 Enabling Factors

Enabling factors facilitates or impedes actual use of maternal services after an interest to seek care has been established, and includes economic status relative to cost of care (formal and informal fees), and travel logistics. To encourage higher utilization of maternal health services, Nigerian governments have waived service fees for select services in some public facilities (Okonofua, Lambo, Okeibunor, & Agholor, 2011). In facilities where fees are applicable, women of lower socioeconomic strata and lacking health insurance coverage are likely to experience barrier to maternal services utilization (Fawole & Adeoye, 2015; Babolola & Fatusi, 2009; Dahiru & Oche, 2015; Austin, Fapohunda, Langer, & Orobato, 2015; Hotchkiss et al., 2005; Arthur, 2012). The

employment status, of a woman (her earning potential) enhances her decision making power in the household, including decisions related to healthcare thus fostering maternal healthcare utilization (Dahiru & Oche, 2015; Fawole & Adeoye 2015). If she is gainfully employed, and educated she is more likely to have discretionary power over the use of household money and less likely to require permission from her husband or other family members to seek care (Furuta & Salway, 2006; Singh et al., 2012; Austin et al., 2015). The main occupational source of income impacts household wealth and stability of income. Households whose main income source is agriculture experience seasonal variability in income and are poorer than those in other sectors in the developing nations (Azzarri, Carletto, Davis, Fatchi, & Vigneri, 2006; David & Stampini, 2002).

The place of residence (urban or rural) interacts with the organization of health facilities in a country to impact healthcare utilization. Travel time is dependent on equitable geographical distribution of health facilities. Lower density of health facilities in the rural areas compared to the urban implies that the population in the rural areas will experience longer travel distance/time compared to those in the urban areas, thus limiting rural utilization (World Health Organization [WHO]; Riman & Akpan, 2012; Dahiru & Oche, 2015; Babalola & Fatusi, 2009; Fawole & Adeoye, 2015; Akinrefon et al., 2015, Omer et al., 2014, Ye et al., 2010; Yao, Murray, & Agadjanian, 2013; Müller, Smith, Mellor, Rare, & Genton, 1998). Time expended during travel is associated with an opportunity cost as time of travel could be spent on other competing family needs The opportunity cost of care is enormous compared with the actual cost of care for rural residents (Kowalewski, Mujinja, & Jahn, 2002). Topographic barriers and limited public transport are more likely in the lesser developed rural areas, creating additional

healthcare access barrier (Arthur, 2012; Ye et al., 2010). Not only is the time-related opportunity cost of accessing care a great burden for rural communities, the actual out-of-pocket costs associated with travel given longer distance might be of great burden for women in the rural areas (Kowalewski et al. 2002; , Seidel et al., 2006; Ye et al., 2010). Ownership of motorized means of transport reduces logistic burden of travel, thereby facilitating maternal healthcare utilization (Omer et al., 2014).

2.2.3 Quality Perception and Service Satisfaction

Patient quality perception is an interactive component of the demand-side and supply-side factors. We consider it demand-side factor based on our initial definition: patient's perception or experience impacting their decision to seek care in the health facilities. It is supply-side given the actual characteristics of the health facilities experienced by patients forms their perception. Potential users create an opinion of care quality based on their prior experience or the experience of others with the health facilities in the community. Patient's evaluation of the quality of care experienced impacts their satisfaction with services at the facility and creates an image of the facility type in their community. Satisfaction with care at a health facility or types of facilities (e.g public facilities) predicts revisit (more than one time use of antenatal care, facility delivery and post-natal care) and utilization by others in the community based on word of mouth recommendations (Kitapci, Akdogan, & Dortyol, 2014; Wu, 2011; Fan, Burman, McDonell, & Fihn, 2005; Schempf, Minkovitz, Strobino, & Guyer, 2007).

Courtesies and friendliness of administrative and clinical staff, personalized care, respect for privacy, short wait time, tangible characteristics (general appearance of the facility, comfortability of waiting and treatment units, availability of drugs), and cost of

care relative to perceived benefit are components of the health service experience that determines perception of service quality, patients satisfaction, and future utilization of care (Hernán García, Gutiérrez Cuadra, Lineros González, Ruiz Barbosa, & Rabadán Asensio, 2002, Adekanye et al., 2013; Mariko et al., 2003; Igboanugo & Martin, 2011; Idris et al., 2013). National surveys and local studies in Nigeria report poor attitude of clinical providers, and lack of privacy at consultation prompts non-utilization of maternal health services (Fagbamigbe & Idemudia, 2015, Adewemino et al., 2014, Igboanugo & Martin 2011, Uzochukwu, Onwujekwe, Akpala 2004, Ye et al., 2010). Patient-centered communication entailing the use of clear non-ambiguous words, empathy, and active listening enhances patient satisfaction with care, thus future use is likely (Korsch, Gozzi, Francis, 1968; Wanzer, Booth-Butterfield, & Gruber, 2004; Adekanye et al. 2013; Igboanugo & Martin, 2011). Consumers value their time, thus the opportunity cost of wait time at the healthcare facility relative to health benefit drives the use of care (Coffey, 1983). In case of preventive healthcare like antenatal care where the benefits are not imminent, perceived long wait time can adversely impact quality perception, and satisfaction with care (Dairo & Owoyokun 2010; Thompson & Yarnold, 1995; Camacho, Anderson, Safrit, Jones, Hoffmann, 2006; Bleustein et al., 2014). The general appearance and comfortability of wait area, consultation room, and availability of clean restrooms are attributes that define the facility's image (Nayyar, 2012; Wu, 2011).

2.3 SUPPLY-SIDE FACTORS

The supply-side predictors are characteristics of the health system that impacts the quality, quantity and cost of health services produced. Quantity of care refers to the volume of services produced. Example, the number of antenatal care consultation per

time period. The structural capacity of the health facilities determine the ability of the facilities in a geographical region to meet the expected healthcare needs of the catchment population and they include equipment, supplies, drugs, manpower, and professional strengthening (Aday & Anderson, 1994). From an efficiency stand point, the quantity of production per unit time could be evaluated against its expected productivity given the level of available inputs. An organization producing less than expected given its' input is not efficient.

The lack of infrastructure (equipment, supplies and drugs) interferes with the ability of providers to provide timely diagnosis, and treatment to high risk women, and reduce occurrence of adverse events (Ntambue et al., 2016). Such inadequacies could demoralize providers, and may further affect the provision of quality clinical care, as well as interpersonal service (Andrews, Burr, & Bushy, 2011; Scotti, Harmon, Behson, & Messina, 2007; Dehghan Nayeri, Nazari, Salsali, Ahmadi, & Adib Hajbaghery 2006). Demoralization impacts job satisfaction, staff turnover, adequacy of manpower, and capacity to effectively serve the population (Bonenberger, Aikins, Akweongo, & Wyss, 2014; Blaauw et al. 2013). Inadequate staffing results in overwhelmed provider caseload, causing burnout, job dissatisfaction, and potential poor quality of services (Andrews et al., 2011; Soler et al., 2008; Khamisa, Oldenburg, Peltzer, & Ilic, 2015). An overwhelmed caseload implies longer wait time, abrupt consultation time, inadequate patient-providers communication, impersonal care, and patient dissatisfaction with services (Korsch et al., 1968; Wanzer et al., 2004, Adekanye et al., 2013; Bleustein et al., 2014). Effective communication, that is engaging facilitates patients' adherence to treatment and recommend preventive behavior, thus effective communication indirectly

impacts health outcome, patient satisfaction with service outcome and future use of care (Abioye Kuteyi, Bello, Olaleye, Ayeni, & Amedi, 2010; Igboanugo & Martin, 2011).

Another entry characterizes of the healthcare system, as side wait time, is the hours of services. The more convenient service hours there are for maternal healthcare, the greater will be its demand, and subsequently supply to meet demand (Simons, Onyeajam, Wang, & Blake, 2014). Investment in continuing post-graduation training and development enhances providers' competences in services delivery (Okereke et al, 2015).

Job satisfaction impact quality of services produced (Scotti et al., 2007). Working relationships with colleagues and superiors, leadership of managements, job benefits (salaries, bonuses) and other job context (opportunities for growth, work recognition, accommodation and availability of schools for children in the community) are other determinants of job satisfaction (Ojaka, Olango, & Jarvis, 2014; Campbell & Ebuehi, 2011; Andrews et al., 2011; Bonenberger et al., 2014). The inability of providers to effectively communicate with one another and work as a team creates an uncondusive working environment that could impede timely and effective service delivery, patients care coordination (Khamisa et al., 2015; Andrews et al., 2011; Herald & Alexander, 2012). The presence of a strong management system that recognizes workers effort, involves staff in decision making process, acknowledges staff concerns, and creates opportunities for professional development is paramount to maintain motivated, satisfied and productive work force (Dehghan Nayeri et al., 2006; Harmon, Scotti, Behson, & Farias, 2003; Roberts-Turner at al., 2014; Okereke 2015; Khamisa et al., 2015; Scotti et al., 2007). The ability of management to keep its staff satisfied also impact cost of healthcare delivery, as the cost of turnover and absenteeism are minimized (Harmon et

al., 2003). Irregular and lower salaries in primary care centers, and less attractive living/working environment in the rural regions dis-attracts providers to these settings, which may result in poor staffing (Abimbola et al., 2015). Sporadic service availability due to inadequate manpower in these setting could adversely affect demand of skilled medical care, as patients seek for alternatives.

CHAPTER 3

METHODS

3.1 OBJECTIVES

Main Objective: To determine policy-modifiable supply-side, and maternal factors that drives maternal healthcare utilization in Nigeria.

Objective 1: To determine policy-amenable structural, technical and service quality characteristics of health facilities that impact skilled antenatal care utilization (at least one visit) for the last pregnancy among women aged 15-49 years with a pregnancy within 24 months prior to survey in two states in Nigeria.

Objective 2: To determine policy-amenable structural, technical and service quality characteristics of health facilities and maternal care seeking behavior that impact the use of institutional delivery service for the last pregnancy among women aged 15-49 years with a live or still birth within 24 months prior to survey in two states in Nigeria.

Objective 3: To determine whether the disparity in skilled antenatal care utilization pattern between the northern and southern states in Nigeria is explained by observed supply-side characteristics given maternal sociodemographic factors.

Objective 4: To determine whether the disparity in institutional delivery utilization pattern between the northern and southern states in Nigeria is explained by observed supply-side characteristics given maternal sociodemographic factors.

3.2 CONCEPTUAL FRAMEWORK

The study uses the Aday & Anderson (1994) framework for the study of access to medical care to examine the impact of supply-side and demand-side factors on maternal healthcare utilization (see Figure 3.1). At the demand-side are the target population characteristics (predisposing demography and perceived healthcare need, and enabling factors) and perception of health services quality (consumer satisfaction). The predisposing predictors prompt decision to seek maternal healthcare, and the enabling factors, socioeconomic status and other logistics facilitates or impedes actual utilization of care. The supply-side factors include characteristics of the health system impacting quality, quantity, and cost of services produced (structural capacity, professional strengthening, management, and staff motivation). With utilization of health services, quality perception is formed, which diffuses into the community. If quality expectation are met, reutilization, as well as community patronage occurs, else otherwise (Kitapci et al, 2014; Wu, 2011). If availability of services is poor, demand for care is affected.

Health policy and planning are higher level of health system organization that are aimed at modifying characteristics of health facilities (supply-side) and the population (demand-side). The geographical distribution of health facilities, and clinical manpower production and distribution impacts service availability, patients' travel time and wait time, which are associated with maternal healthcare utilization. Mechanisms of health system financing that limits cost-sharing for the poor (health insurance, vouchers) and/or adjust providers' payment per quality and quantity of services produced impacts demand (Government of India, 2016). Media and community-based educational outreach

positively influences attitude towards maternal healthcare (Bankole, et al., 1996; Ankomah et al., 2014; Perreira et al., 2002; Ankomah et al., 2014).

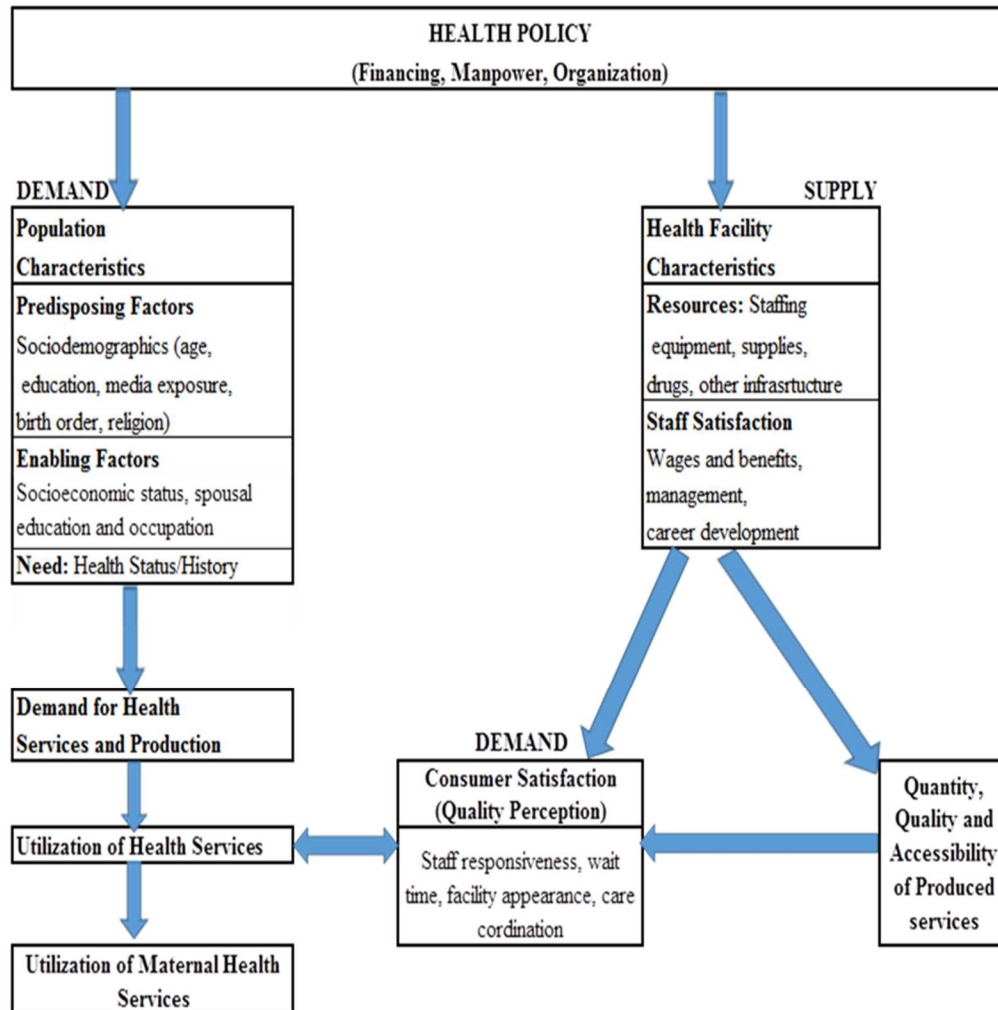


Figure 3.1: Conceptual Framework

3.3 SAMPLING PROCEDURE

3.3.1 Study Site Sampling

We use the Nigeria State Health Investment Project (NSHIP) 2013-2014 baseline survey data on households, healthcare facilities, clinical staff and antenatal outpatients for the study. The NSHIP is a joint project of the World Bank, the Federal Ministry of

Health, Nigeria, and the National Primary Health Care Development Agency (NPHCDA), Nigeria. The aim of the project is to implement and evaluate the impact of a performance based financing mechanism on the quantity and quality of maternal and child health (MCH) services production in three pilot states (Adamawa, Nasarawa and Ondo) in Nigeria, purposefully selected by policymakers. The project collected baseline data from the intervention states and three other matched control states. For our study, we randomly choose one northern and one southern state, Adamawa and Ondo. The states differ significantly in sociodemographic characteristics and maternal healthcare utilization: 35% of women of child bearing age lack formal education in Adamawa compared with 7.5% in Ondo, 50.2% have infrequently media exposure in Adamawa compared with 35.4% in Ondo (NPC & ICF International, 2014). In Adamawa, 85.1% of pregnant women utilized at least one skilled antenatal care compared to 78.6% in Ondo, and 33.4% of births in Adamawa was in a healthcare facility compared with 56.2% in Ondo (NPC & ICF International, 2014).

3.3.2 Household and Women Respondents Sampling

A multi-stage stratified sampling procedure was used to obtain representative sample of households in each states. Administratively, Nigeria is made up of 36 states and the Federal Capital Territory (FCT). Each state and the FCT are divided into Local Government Areas (LGAs) and in turn into wards. Wards are divided into localities, and in turn into census-based enumeration areas (EAs). All LGAs in the study states were selected in the first sampling stage. In the second stage the required numbers of EAs (the primary sampling unit or cluster) were selected by systematic random sampling; 12 EAs per LGAs in Ondo and 10 EA per LGAs in Adamawa. Households with women in the

reproductive age (15-49 years) were listed in the selected EAs and a random sample drawn.

Survey was administered to the household head (or representative) and one female member aged 15-49 years, with a pregnancy within 24 months prior to survey date after informed consent was obtained using a structured consent form. In addition to English language surveys, Hausa and Yoruba translations (major local languages) were offered for household survey. The household head provided household level data and the female maternal medical history and care data.

3.3.3 Healthcare Facility, Clinical Staff and ANC Outpatient Respondents Sampling

The Planning, Research and Statistics Department of the Federal Ministry of Health comprehensive list of health facilities, available by facility type, ward and LGA in the country was used for selecting health facilities. Within states, one to three public primary care facilities were selected in each ward from a drafted list of functional public primary care facilities. Functionality was based on the following criteria below.

1. Healthcare manpower: the facility should meet the proposed staffing pattern for primary health centers - one community health officer, one public health nurse, three community health extension workers, and four nurses/midwives
2. Consistent provision of outpatient care (including maternal and child care) in the prior year
3. Consistent provision of deliveries in the prior year
4. Consistent provision of immunization services in the prior year

5. Availability of at least one of the following sources of water supply – piped, borehole or well

All state owned public hospitals in the study states were included for survey. Due to logistic reasons, data were not collected from all the wards. Health facilities were surveyed on availability of equipment, supplies and drugs, availability of employed staff, amenities, and general appearance. Trained surveyors observed the available items against standard World Bank-approved checklists of essential items. At each facility, three clinical staff (those who are mandated/allowed to provide clinical service) were randomly sampled from the staff roster and surveyed on job satisfaction. Three antenatal outpatients exiting the facility (on a first exit basis during the surveyors' visit) were interviewed regarding service quality and satisfaction with services after obtaining verbal consent using a structured consent form. In addition to English language surveys, Hausa and Yoruba translations (major local languages) were offered for ANC outpatient survey.

3.4 DATA QUALITY

3.4.1 Household Survey Data Quality

Survey instruments were adapted from standard World Bank surveys developed for household surveys in developing countries. A pre-tests of three language-based versions of the questionnaires, English, Hausa (major local language in Adamawa), and Yoruba (predominate local language in Ondo), was undergone in two purposively selected Enumeration Areas in the study area. Back translations into English of the Yoruba and Hausa versions were done by persons other than the initial translators to assure accuracy of translations.

Field training of surveyors was carried out focusing on the following;

1. Clarification of concepts/key terms
2. Interviewing skills
3. Obtaining informed consent
4. Research ethics/human rights
5. Supervisor quality control checks

Role play was also used in the training to enhance competency. Surveying team members were National Population Commission (NPC) staff previously involved with Demographic and Health Surveys and all had a minimum of Ordinary National Diploma, OND (some college certification). The Survey Management Committee also independently conducted quality checks in the field by observing data collection process with a monitoring checklist and verifying collected data with an abridge version of survey instrument. Eight of these visits took place in Adamawa, and 12 in Ondo. The CSPro software package was used for all data entry and double entry was applied to assure integrity.

3.4.2 Health Facility Survey Data Quality

Survey instruments was adapted from standard World Bank surveys developed for health system assessments in developing countries and pretested in the field. The National Bureau of Statistics (NBS) was in charge of the facility level survey. They used their personnel with minimum qualification of the Ordinary National Diploma, OND (some college certification) for the health facility based survey. Training was organized for surveyors on appropriate administration of the instruments, informed consent, human

rights and research ethics and it included the use of role play to enhance competency. NBS data management team also visited the surveyors in the field to monitor their activities and assure integrity of data collected. The CSPro software package was used for all data entry and double entry was applied to assure integrity.

3.5 STUDY SETTING AND POPULATION

3.5.1 Overview of the Study Sites

Nigeria is located in West Africa. It has a landmass of 923,770 square kilometers, an estimated 177.5 million residents, and a gross domestic product (GDP) per capita of \$5,639 in 2011 International dollars (World Bank, 2015). Life expectancy at birth is 54 years (WHO, 2016b). Per capital expenditure on health is \$118 of which 72% is out-of-pocket (WHO, 2016b). Unemployment rate is 23.9% and there are 22 healthcare facilities per 100,000 population (National Bureau of Statistics [NBS], 2012).

Adamawa is in the North East zone of Nigeria, with a population of 3.67 million on a landmass of 39,742 square kilometers (Adamawa State Government, 2015; NBS, 2012). The major occupation is agriculture and fishing. There are two major religions: Christianity and Islam, with a traditionalist minority (Adamawa State Government, 2015). About 34.5% of women of child bearing age (15-49 years) have no formal education compared with 13.9 of their male counterparts (15-49 years) in the state (NPC & ICF International, 2014). There are 28 healthcare facilities per 100,000 population (NBS, 2012). About 33.8% of the working age group are unemployed in Adamawa (NBS, 2012). Ondo is located in the South West region, with a population of 4.01 million on a landmass of 14,793 square kilometres (Ondo State Government, 2015; NBS, 2012). The states' labour force is mostly in the agricultural sector. Most of the state's residents

are Christians (Ondo State Government, 2015). About 7.5% of women of child bearing age have no formal education compared to 1.5% of their male counterparts (NPC & ICF International, 2014). There are 20 healthcare facilities per 100,000 population (NBS, 2012). About 12.5% of the working age adults are unemployed (NBS, 2012).

3.5.2 Study Sample

The unit of analysis is the woman. Our target population for the study is all community-dwelling women aged 15-49 years with a live-birth, still-birth, abortion or miscarriage in the prior 24 months to the household survey. A sub-population; women aged 15-49 years with a live-birth or still-birth in the prior 24 months to the household survey was used to study institutional delivery utilization pattern. A total of 6,129 households (2,926 Adamawa, 3,203 Ondo) were surveyed and 4,771 study-eligible women interviewed (2,514 in Adamawa and 2,257 in Ondo) in 319 wards. We excluded women from wards with no supply-side data, resulting in 3,779 study-eligible women from 246 wards.

Supply-side data were available for 418 health facilities in the 246 wards. An average score for each indicator was computed per ward. Of 246 wards, 47 wards had missing data on one or more supply-side variable: drugs availability, presence of employed clinical staff and patient ratings of service quality (three constructs based on factor analysis: treatment-facilitation, assurance-reliability, and responsiveness-empathy). We used multiple imputation technique (50 imputations) to impute missing data from models on variables with the least missing data, namely: delivery and neonatal care equipment availability, general facility appearance and amenities, staff satisfaction with their work relationships, and staff satisfaction with the work context and benefits.

Multiple imputation predicts missing data values based on available data to produce stable estimates (Marchenko, 2010). The final analytical sample consisted of 3,726 women (2,339 in Adamawa, 1,387 in Ondo) in 241 wards (152 in Adamawa, 89 in Ondo). Of them, 3,638 women had a live-birth or still-birth (2,301 in Adamawa and 1,337 on Ondo). See Table 3.1 for the number of facilities, clinical staff and ANC outpatients used to compute data for supply-side variables. The NSHIP was approved by the Nigeria Institutional Review board under the Federal Ministry of Health and the University of South Carolina Institutional Review Board approved the use of the NSHIP data for our study.

Table 3.1: Number of health facilities, staff and ANC outpatient respondents used to score supply-side variables by state.

	Adamawa	Ondo	Total
LGAs	20	18	38
Wards	152	89	241
Number of Health Facility	273	145	418
Healthcare providers	629	343	972
ANC exit patients	554	267	821

3.6 STUDY VARIABLES

3.6.1 List of Study Variables

1. Dependent (outcome) Variables
 - a. Utilization of at least one skilled antenatal care (ANC), yes or no
 - b. Institutional delivery (delivery in a healthcare facility), yes or no
2. Independent Variables; Demand-Side
 - a. Predisposing and Need Factors

- i. Age (years)
 - ii. Education
 - iii. Religion
 - iv. History of pregnancy complication
 - v. Number of prior live-births
 - vi. Media exposure
 - vii. Household language
 - viii. Spouse/partner education
- b. Enabling Factors
- i. Spouse/partner occupation
 - ii. Household per capita income
 - iii. Residence (urban or rural)
 - iv. Owns motorized transport
- c. Perceived Quality of Care
- i. Treatment-facilitation
 - ii. Assurance-reliability
 - iii. Responsiveness-empathy
3. Independent Variables; Supply–Side
- a. Infrastructure
- i. Availability of equipment and supplies
 - ii. Availability of drugs
 - iii. Availability of clinical staff
 - iv. General appearance and amenities

b. Staff Job Satisfaction

- i. Work relationships
- ii. Work context and benefits

3.6.2 Description of Independent Study Variables

a. Predisposing and Need Factors

- i. Age (years): Age of the women was collected in years and categorized into <20, 20-34, and 35-49 age-groups.
- ii. Education: Each woman was asked about the level of education she attended last and what year in that level she attained. Those who had no education, attended only preschool or attended primary school but did not get up to grade 6 was classed as “None/some primary”, while those who attended primary school and attained grade 6 was classed “completed primary”. Women who attended secondary and attained grade 6 and those who had any higher education was classed as “completed at least secondary”.
- iii. Religion: Each woman was asked about her religion; Islam, Christian Catholic, Christian other, traditionalist, or others. This was Re-categorized as “Christians or others. Given the very small number of traditionalist and others, and most studies referencing Christians, we grouped traditionalist and others with persons of Islamic religion.
- iv. History of pregnancy complication (a need factor): The women were queried about any history of an abortion, miscarriage, or still birth.

- Women who had any of these before the last pregnancy had a complication history and was categorized as “yes” otherwise “no”.
- v. Number of prior live-births: For women reporting no child before the last pregnancy we categorized as “0”, if just one child “1”, otherwise “ ≥ 2 ”.
 - vi. Media exposure: Each woman was asked about listening to radio, watching TV and reading the newspaper at least once a week. If she was exposed to any of the three media at least once a week she had a “high” media exposure, if exposed only infrequently (less than once a week) to any one of the aforementioned media, without a weekly exposure to the others she had a “low” exposure. Anyone not exposed to all media sources was classed as “none”.
 - vii. Household language: The language used by the main respondent in a household during the interview was recorded as the household language. If respondent language was a local language, we categorized as “local language concordant” (respondent local language was the same as the major state local language) or “local language discordant”, if English we categorized as “English”. Thus if the household language at interview was Yoruba and the state of residency was Ondo, then this would be local language concordant, same applies for Hausa in Adamawa state. We assume that women who are not fluent in English (the official national language) but speak the dominant local language would not experience a language barrier for healthcare.

- viii. Spouse/partner education: Based on Household heads reported education, categorized as “none/some primary education”, “completed primary”, and “complete at least secondary. See women’s education for details.
- b. Enabling Factors
- i. Spouse/partner occupation: Based on occupation of household head, categorized into farming/fishing, and others to account for seasonality in income for households whose main occupation was in the agricultural sector.
 - ii. Household per capita income: Data on the number of months worked in last year, and wage earned per pay period for all household members aged 15 years and above were recorded. This was used to compute each adults (> 15 years) annual income and then summed up to obtain total household annual income. Household per capita annual income was the total household annual income divided by the total number of household members.
 - iii. Residence: The women’s locality of residence were categorized as “rural” or “urban” based on the National Population Commission’s listing.
 - iv. Owns motorized transport: Households that possessed a motor vehicle, motorbikes or bicycle were categorized as ‘yes’, for the skilled antenatal care outcome otherwise “no”. For institutional delivery only motor vehicles and motorbike was considered for ownership of motorized transport.

- c. Perceived Quality of Care: We used ANC outpatients' quality scores as a surrogate for community perceptions of care quality, assuming that clients communicate their care experience to community members, creating a community-wide perception of care quality that may influence the community's utilization of the facility (Kitapci et al., 2014). For each variable, the patients' scores in a facility were averaged to compute facility level score. Facilities scores in a ward were averaged to compute ward scores, and assigned to all surveyed women in the ward.
- i. Treatment-facilitation: an aggregate of items scores on provider communication (regarding maternal and fetal health conditions and treatment), and ease of access to drugs. Both components impact patient adherence to treatment, the medical outcome and patient satisfaction with care (Abioye et al., 2010).
- ii. Assurance-reliability: Assurance "*the knowledge and courtesy of providers, and their ability to elicit a sense of trust and confidence*", reliability "*ability to perform the promised service dependably*", see Appendix A1 for details on items scored and aggregated to compute factor score for each patient.
- iii. Responsiveness-empathy: Responsiveness "*willingness of the facility to provide prompt service*", empathy "*individualized care and respect for privacy*", see Appendix A1 for details on items scored and aggregated to compute factor score for each patient.

- d. Health Facility Infrastructure and manpower: For each variable, facilities scores in a ward were averaged to compute ward scores, and assigned to all surveyed women in the ward.
- i. Availability of equipment and supplies: Surveyors observed for the availability of functional 51 general, delivery and neonatal equipment and supplies. Each item was assigned a score of “1” if at least 2 was present. For the following supplies: intravenous tube, surgical sets, tourniquet, ringers, colloids, drip stands at least 4 units was required to be assigned a score of “1”. Scales, height and tape measures required at least one unit, while towels, and needles and syringes required at least 20 pieces, to obtain score of “1” When the criteria defined above was not met a score of “0” was assigned. Item scores were added to compute the facility score and presented as percentage of maximum possible score. For antenatal care study, only general items scores were used to compute the score on equipment availability, see Appendix B1 for items.
- ii. Availability of drugs: Forty-eight (48) drug items including antibiotics, vitamins and minerals, antihistamines, analgesics, antimalarial, antihypertensive, diagnostic kits, emergency obstetrics and TT vaccine were surveyed, see Appendix B2 for items. Drug items were scored, “1’ if at least one dose was available on the day of survey without any stock-out recorded in the last 30 days and summed up to compute facility score.
- iii. Availability of clinical staff: The proportion of all employed clinical staff (doctors, nurses, midwives, auxiliary nurses, laboratory technologists,

pharmacists, technicians, community health officers and community health extension workers) present on the day of survey in each facility.

- iv. General appearance and amenities: Scored on 25 items including waiting area, adequate protection from the elements, Ac/fans, clean environment, privacy of the consulting and delivery unit, untorn beds, adequate lighting, and restrooms with adequate water, see Appendix B3 for details. To study skilled ANC, only the items on Outpatient Setting were used to score this variable.
- e. Health Facilities' Staff Job Satisfaction: For each variable, the clinical staff scores in a facility were averaged to compute facility level score. Facilities scores in a ward were averaged to compute ward scores, and assigned to all surveyed women in the ward.
 - i. Work relationships: An aggregate of staff rating on relationship with colleagues, supervisors, management, and quality of management, see Appendix A1 for details.
 - ii. Work context and benefits: An aggregate of staff rating on training and promotional opportunities, salary, benefits, living accommodations, and availability of schooling for children, see Appendix A1 for details.

3.7 STATISTICAL ANALYSIS

The staff satisfaction factors (5-items on work relationships, and 7-items on work context and benefits) were extracted from 12 items job satisfaction-instrument (Likert scale: satisfied, neutral, dissatisfied) based on exploratory factor analysis using principal factor method, promax rotation, and specifying simple structure to ensure discriminant

validity, see Appendix A1 for details. Loading criterion was a standardized regression coefficient of > 0.35 . To further assure validity of the factors, we used a multivariable logistic regression analysis to model the likelihood of overall job satisfaction, adjusting for staff sociodemographics and they were all significant predictors (result not shown). With same technique and loading criterion, the assurance-reliability (6-items) and responsiveness-empathy (4-items) perceived quality of care factors were extracted from 14 items (Likert scale: agree, neutral, disagree). Of the remainder, 2 items were combined to give treatment-facilitation factor, and the others were not used in the study. All three factors predicted outpatient overall satisfaction with antenatal care in a multivariable logistic regression analysis adjusted for maternal sociodemographics, further assuring validity (result not shown).

We conduct univariate and bivariate analyses for descriptive statistics. We used logistic regression modeling, accounting for clustering of women within wards to study associations of demand-side and supply-side factors with institutional delivery likelihood, as well as skilled ANC utilization pattern, adjusted for demographic factors. The final model excluded supply-side variables with p-values >0.5 . A p-value of <0.05 was considered statistically significant; Stata version 14 was used for analysis.

CHAPTER 4

PREDICTORS OF ANTENATAL CARE UTILIZATION IN NIGERIA: THE INDEPENDENT IMPACT OF PROVIDERS' JOB SATISFACTION¹

INTRODUCTION

Maternal healthcare utilization in Nigeria is very low with a nationwide antenatal care (ANC) utilization rate of 61%, and institutional delivery rate of 36% (National Population Commission [NPC] & ICF International, 2014). Consistent with the low utilization of maternal healthcare services, maternal and neonatal outcomes have remained poor. With 2.45% of the world's population, Nigeria accounts for an estimated 19% of global maternal deaths, ranking among the top 16 countries in maternal mortality with 576 deaths per 100,000 live-births (NPC & ICF International, 2014; World Health Organization [WHO], United Nations Children's Fund [UNICEF], United Nations Population Fund [UNFPA], World Bank Group, & United Nations Population Division [UNPD], 2015; World Bank, 2015). This is despite a per capita GDP that is at the average level of lower-middle-income countries, a category with average maternal mortality of 253/100,000 (World Bank, 2015). Nigeria's neonatal mortality is also high,

¹ Powell, D. J., Xirasagar, S., Khan, M., Hardin, J. W., Demir, I., & Odutolu, O. To be submitted to the International Journal of Gynecology and Obstetrics.

37 deaths/1,000 live-births, compared to 25.8/1,000 for countries at a similar income level (NPC & ICF International, 2014; World Bank 2015).

Timely and appropriate frequency of ANC facilitates early identification and management of pre-natal morbidities (e.g pre-eclampsia, anemia, hepatitis and HIV infection) associated with high risk of obstetric emergencies and maternal mortality (Duley et al., 2007; Ikeanyi & Ibrahim, 2015; Asa et al., 2008; Akinyemi et al., 2015; Ntambue, Malonga, Dramaix-Wilmet, Ngatu, & Donnen, 2016; Pervin, et al., 2012). ANC utilization also increases the likelihood of institutional/skilled delivery (Dahiru & Oche, 2015; Mustafa & Mukhtar, 2015). Institutional/skilled delivery ensures hygienic birth practices, and enables effective management of obstetric and neonatal emergencies such as obstructed labor, eclampsia, postpartum hemorrhage, preterm birth, neonatal infections (sepsis, pneumonia, tetanus) and asphyxia (Fournier et al., 2009; Derman et al., 2006). Thus reducing the risk of mortality from these major causes of maternal and neonatal mortality in Nigeria and other developing countries (Pervin, et al., 2012; WHO, 2015; WHO, 2016a; UNICEF, 2016; 2015; Ujah et al., 2005; Omo-Aghoja et al., 2010; Oladapo, Sule-Odu, Olatunji, & Daniel, 2005).

Health service use is driven by supply-side and demand-side factors (Aday & Anderson, 1994; Ensor & Cooper, 2004). The supply-side factors are infrastructure and human resource characteristics of the health system, including availability of equipment, supplies, drugs, staff, amenities, provider behavior, technical skills and interaction with patients. The demand-side factors affecting the population's decisions to utilize care are sociodemographic and maternal factors, perceived healthcare needs, and perceptions or experience of care quality. Utilization of skilled ANC can be evaluated in this framework

to identify specific interventions that are needed in Nigeria's context to improve ANC utilization rate (Aday & Anderson, 1994).

Previous studies examining factors driving the use of ANC in Nigeria focused on demand-side factors (Dahiru & Oche, 2015; Babalola & Fatusi, 2009; Fagbamigbe & Idemudia, 2015; Fawole & Adeoye, 2015; Dairo & Owoyokun, 2010). As a result, current efforts to increase skilled ANC use are directed at increasing patient demand. Babalola & Fatusi (2009) examined the impact of community facility density on antenatal care utilization. Fagbamigbe & Idemudia (2015) described the population's impression of supply-side factors that may be related to skilled ANC use. Studies from other developing nations examined the impact of supply-side factors on ANC use, however, only one dimension of care quality, the health facility's structural capacity (manpower, amenities, drugs, equipment), provider's clinical competence or service aspect of care (e.g provider behavior, wait time) was the focus (Acharya & Cleland, 2000; Chama-Chiliba, & Koch, 2015). One study examined the impact of clinical competence and services quality on community members ANC use, however, structural capacity was not evaluated (Rani, Bonu, & Harvey, 2008). Also none of the studies explored the influence of facilities' staff job satisfaction/motivation on maternal healthcare seeking behavior. Service quality is affected by staff's performance on the job which may be influenced by job satisfaction and motivation (Scotti, Harmon, Behson, & Messina, 2007). There might remain independent impact of staff satisfaction on ANC utilization beyond observed patient perceived quality of care measures. In summary, none documented a comprehensive survey-based assessment capturing all three pillars of a successful maternal service program, (1) population need, (2) facility infrastructure and manpower including human

resource motivators, and (3) provider interpersonal care and clinical competence conveying what is important to women for seeking care at healthcare facilities. Given Nigeria's maternal and neonatal mortality rate, we study the impact of policy-amendable facility infrastructural capacity, staff performance indicators (users' perceptions of provider's competence and service quality, and staff satisfaction) and maternal healthcare need factor on skilled ANC utilization.

METHODS

We used a cross-sectional study design to explore the role of modifiable supply-side and maternal healthcare need factors (demand-side) affecting women's use of skilled antenatal care. We used the 2013-2014 baseline survey data on households, health facilities, healthcare staff, and ANC outpatients collected as baseline data to inform policy interventions under the World Bank-assisted Nigeria State Health Investment Project (NSHIP). The NSHIP is a maternal and child health services expansion initiative covering two states in the south and four in the north selected by policy makers. For our study, two states were randomly chosen, one southern, Ondo and one northern state, Adamawa. Within each state, a multistage stratified sampling was employed to obtain a representative sample of households. States are administratively divided into Local Government Areas (LGAs), wards, and census enumeration areas (CEAs). All LGAs in the study states were selected, followed by selection of a random sample of CEAs within each LGA for household survey. Households with women in the reproductive age group (15-49 years) in each CEA were listed and a random sample drawn. The head of the household and women who had a pregnancy or childbirth in the prior 24 months were surveyed. Women provided maternal sociodemographic, history and care data, and the

household head (or representative) provided household level data, after verbal consent was obtained using a structured consent form.

To obtain supply-side data, all state-owned hospitals and a random sample of functioning government primary care facilities (defined as those with consistent provision of maternal and child healthcare in the prior year) were surveyed for facility-level data (building, amenities, drugs, delivery and neonatal care equipment). Trained surveyors observed the available items against standard World Bank-approved checklists of essential items and manpower. At each selected facility, three antenatal outpatients exiting the facility (on a first exit basis during the surveyors' visit) were interviewed regarding service quality and satisfaction with services after obtaining verbal consent. Three clinical provider staff were randomly selected from staff rosters and surveyed for job satisfaction. Pretested instruments adapted from standard World Bank surveys developed for health system assessments and household surveys in developing countries were used. In addition to English language surveys, Hausa and Yoruba translations (major local languages) were offered for household and outpatient exit surveys. The study was approved by the University of South Carolina Institutional Review Board.

The unit of analysis is the woman, and the outcome variable is utilization of skilled antenatal care (yes, or no), defined as ANC by a doctor, nurse, midwife, community health officer or community health extension worker. All community-dwelling women aged 15-49 years with a pregnancy in the prior 24 months were eligible for maternal survey. We excluded women from wards with no supply-side data. A total of 6,129 households were surveyed and 4,771 study-eligible women interviewed in 319

wards. Of them, 3,779 women from 246 wards with supply-side data were included for analysis.

Supply-side data were available for 418 health facilities in 246 wards. An average score for each indicator was computed per ward, 47 wards had missing data on one or more health facility survey derived variables: availability of drugs, availability of clinical staff on day of survey, and patient ratings of service quality (three constructs based on factor analysis: treatment-facilitation, assurance-reliability, and responsiveness-empathy). We used multiple imputation technique (with 50 imputations) to impute missing data from models on variables with the least missing data, namely: equipment availability, general facility appearance and amenities, staff satisfaction with their working relationships, and staff satisfaction with the work context and benefits. Multiple imputation predicts missing data values based on available data to produce stable estimates (Marchenko, 2010). The final analytical sample consisted of 3,726 women living in 241 wards.

The demand-side predictor variables are represented by predisposing demographic variables, healthcare need variables, and enabling factors. Maternal demographic variables included age (<20, 20-34, 35-49), education (none/some primary, completed primary, completed at least secondary schooling), religion (Christian, other), number of prior live-births (0, 1, ≥ 2), exposure to media (high: weekly exposure to newspaper, magazine, TV, or radio; low: less than weekly exposure; and none), spouse/partner education level, (same educational categories as for the women) and household spoken language (local language concordant: household language is same as major state language, local language discordant, English). We assume that women who

are not fluent in English (the official national language) but speak the dominant local language would not experience a language barrier for healthcare. Healthcare need factor was a history of pregnancy complications (abortion, miscarriage, or stillbirth), yes or no (Mustafa & Mukhtar, 2015). Enabling factors representing care affordability and accessibility are: household per capita income, residence (urban or rural), household ownership of motorized personal transport (car, motor bike, or bicycle, yes/no), and spouse/partner occupation (farming/fishing, others).

Supply-side predictor variables are facility infrastructure and manpower, clinical staff's job satisfaction, and facility-level aggregate scores on ANC outpatients' perceptions of service quality, all aggregated at the ward level and assigned to all surveyed women in the ward. Facility infrastructure characteristics were equipment availability, drugs availability, general appearance and amenities, and availability of employed clinical staff on the day of survey. Examples of essential general equipment were adult scales, height measure, tape, blood pressure meter, stethoscope, fetoscope, otoscope, aspirator, ambubag etc. Each item was assigned a score of "1" if available and functional, or "0" otherwise, and item scores were added to compute the facility score. Facility appearance and amenities were scored on waiting area, adequate protection from the elements, clean environment, privacy of the consulting unit, untorn beds, adequate lighting, and restrooms with adequate water. Drug items were scored, "1" if at least one dose was available on the day of survey without any stock-out recorded in the last 30 days and summed up. Surveyed drugs included antibiotics, vitamins and minerals, antihistamines, analgesics, antimalarial, antihypertensive, diagnostic kits and emergency obstetrics.

We used ANC outpatient quality scores as a surrogate for community perceptions of care quality, assuming that clients communicate their care experience to community members, creating a community-wide perception of care quality that may influence the community's utilization of the facility (Kitapci, Akdogan, & Dortyol, 2014). Two quality of care factors were extracted from 14 items (Likert scale: agree, neutral, disagree) based on exploratory factor analysis using principal factor method, promax rotation, and specifying simple structure to ensure discriminant validity. The factors extracted were assurance-reliability (assurance "*the knowledge and courtesy of providers, and their ability to elicit a sense of trust and confidence*", reliability "*ability to perform the promised service dependably*") and responsiveness-empathy (responsiveness "*willingness of the facility to provide prompt service*", empathy "*individualized attention*"), see Appendix A1. These items are consistent with the items of assurance, reliability, empathy, and responsiveness that are globally documented for outpatient settings (Dean, 1999; Lin, Xirasagar, & Laditka, 2004). Another quality variable was treatment-facilitation, an aggregate of items scores on provider communication (regarding maternal and fetal health conditions and treatment), and ease of access to drugs. Both components impact patient adherence to treatment, the medical outcome and patient satisfaction with care (Abioye et al., 2010). Two factors measuring provider job satisfaction were identified by factor analysis: work relationships (with colleagues, supervisors and management), and work context and benefits (training and promotional opportunities, salary, benefits, living accommodation and schooling for children), see Appendix A1. Item scores were added to compute factor scores. All facility, provider and outpatient variables were kept as continuous variables in the analysis.

We estimated logistic regression models, accounting for clustering of women within wards using the `vce (cluster ward)` command in STATA to study associations of demand-side and supply-side factors with skilled ANC utilization pattern, adjusted for maternal demographic factors. We evaluated the impact of presence of a government hospital in study ward, to reduce bias given better availability and quality of infrastructure and manpower. However this was insignificant and removed from the final model. The final model excluded supply-side variables with p-values >0.5 . A p-value of <0.05 was considered statistically significant; Stata version 14 was used for analysis.

RESULTS

A total of 4,771 women with a birth in the prior 24 months were interviewed in selected 319 wards, of them 1,045 women were excluded due to lack of facility level data in their ward. The final analytical sample consist of 3,726 study-eligible women (2,339 in Adamawa and 1,387 on Ondo) in 241 wards. Table 4.1 presents the distribution of the women by sociodemographic variables and use of skilled ANC: 83% utilized skilled ANC. The mean age of the women was 28 years, 29.1% completed at least secondary education, 16.8% had a history of pregnancy complication, and 62.9% had at least 2 prior live-births. Table 4.2 presents ward-level summary scores on health facility structural capacity, ANC outpatients' quality perception and staff job satisfaction. Ward scores were generally poor on availability of general equipment (on average, 29.2% of essential items available) and drugs (11.3 items out of required 48), and general appearance and amenities of the out-patient clinics (51.9% of criteria met). Clinical staff rated their work context and benefit poorly (mean score 6.3 out of a maximum possible

score of 14) but work relationships were rated highly. Patients gave generally high ratings on service quality and providers' competence.

Table 4.3, presents the results of logistic regression analysis predicting the likelihood of skilled ANC. The odds of skilled ANC use increased by 9% with each unit increase in staff contentment with work context and benefits at the ward's health facilities (AOR 1.09, 95% CI 1.03-1.15). Notably, history of pregnancy complication and prior live-birth experiences were not associated with skilled ANC use. Women of Adamawa state (vs. Ondo) and urban women (vs. rural) had higher odds of skilled ANC use (AOR 2.30, 95% CI 1.54-3.43 and 1.92, 95% CI 1.37-2.68 respectively). Compared to women whose household did not possess motorized means of transport, women whose household possessed such had 35% higher odds of skilled ANC use (AOR 1.35, 95% CI 1.11-1.64). Weekly exposure of women to mass media was associated with a 45% increase in ANC use likelihood (AOR 1.45, 95% CI 1.06-1.97). Primary and secondary educated women had higher odd of skilled ANC use compared to uneducated women (AOR 1.48, 95% CI 1.16-1.89, and 2.22, 95% CI 1.56-3.16 respectively). Outpatients' ratings on assurance-reliability, responsiveness-empathy and treatment-facilitation were not significantly associated with the community women's use of ANC.

Table 4.1: Distribution of study women by sociodemographic factors and skilled antenatal care (ANC) use in two states of Nigeria. N=3,726

Characteristics Demographics	All Respondents n(%)	Use of Skilled ANC ^{a,b}	
		Yes n(%)	No n(%)
Total	3,726	3,093 (83.0)	633 (17.0)
Age (years)			
<20	293 (7.8)	245 (83.6)	48 (16.4)
20-34	2,793 (75.0)	2,314 (82.8)	479 (17.2)
35-49	640 (17.2)	534 (83.4)	106 (16.6)

Table 4.1 continued

Characteristics	All Respondents	Use of Skilled ANC^{a,b}		
		n(%)	Yes n(%)	No n(%)
Demographics				
Education				
None/some primary	1,321 (35.5)	995 (75.3)	326 (24.7)	
Completed primary	1,320 (35.4)	1,109 (84.0)	211 (16.0)	
Completed at least secondary	1,085 (29.1)	989 (91.1)	96 (8.9)	
Religion				
Christian	2,339 (62.8)	1,946 (83.0)	393 (16.8)	
Others	1,387 (37.2)	1,147 (82.7)	240 (17.3)	
History of pregnancy complications ^c				
Yes	625 (16.8)	529 (84.6)	96 (15.4)	
No	3,101 (83.2)	2,564 (82.7)	537 (17.3)	
Number of prior live-births				
0	713 (19.1)	603 (84.6)	110 (15.4)	
1	671 (18.0)	563 (83.9)	108 (16.1)	
≥ 2	2,342 (62.9)	1,927 (82.3)	415 (17.7)	
Media exposure ^d				
None	1,045 (28.1)	791 (75.7)	254 (24.3)	
Low	743 (19.9)	627 (84.4)	116 (15.6)	
High	1,938 (52.0)	1,675 (86.4)	263 (13.6)	
Household per capita income, Naira (mean, std)	922,426 (353,227)	979,174 (65,690)	645,148 (113,459)	
Spouse/partner Education				
None/some primary	1,056 (28.3)	771 (73.0)	285 (27.0)	
Completed primary	963 (25.9)	796 (82.7)	167 (17.3)	
Completed at least secondary	1,707 (45.8)	1,526 (89.4)	181 (10.6)	
Household Language ^e				
Local language concordant	3,391 (91.0)	2,830 (83.5)	561 (16.5)	
Local language discordant	73 (2.0)	58 (79.5)	15 (20.5)	
English	262 (7.0)	205 (78.2)	57 (21.8)	
Owns motorized Transport ^f				
Yes	1,992 (53.5)	1,709 (85.8)	283 (14.2)	
No	1,734 (46.5)	1,384 (79.8)	350 (20.2)	

Table 4.1 continued

Characteristics Demographics	All Respondents n(%)	Use of Skilled ANC ^{a,b}	
		Yes n(%)	No n(%)
Spouse/partner			
Occupation			
Farming/fishing	1,375 (36.9)	1,109 (80.6)	266 (19.4)
Other	2,351 (63.1)	1,984 (84.4)	367 (15.6)
Residency			
Urban	997 (26.8)	905 (90.8)	92 (9.2)
Rural	2,729 (73.2)	2,188 (80.2)	541 (19.8)
State			
Adamawa	2,339 (62.8)	1,942 (83.0)	397 (17.0)
Ondo	1,387 (37.2)	1,151 (83.0)	236 (17.0)

^a Differences in the distributions of institutional and home delivery are significant at $p < 0.05$, see text in bold font.

^b Skilled ANC: Antenatal care with doctor, nurse, midwife, trained community health or extension worker.

^c History of pregnancy complications: Abortion, miscarriage or still birth

^d Media exposure: High (weekly exposure to newspaper, magazine, TV, or radio), low (less than weekly exposure to the above media without weekly exposure to any), none (no media use).

^e Household language: Local language concordant: household language is same as major state language, discordant (household language is not same as major state language)

^f Owns motorized transport: Owns car, truck, motor bike or bicycle

Table 4.2: Mean Ward-level summary scores of health facility structural capacity, staff satisfaction, and ANC outpatients' quality perceptions. N=241.

Ward-Level Characteristics	Mean (std.dev)	Maximum possible score
ANC Outpatients' Perception of Service Quality		
Treatment facilitation ^a	3.6 (0.7)	4
Assurance-reliability ^b	11.3 (1.2)	14
Responsiveness-empathy ^c	7.1 (1.2)	8
Infrastructure and Manpower (observed by surveyors)		
Availability of general equipment (%)	29.2 (15.3))	100
Availability of drugs	11.3 (8.1)	48
Availability of clinical staff (%) ^d	72.4 (23.9)	100
General appearance and amenities, outpatient clinic (% criteria satisfied)	51.9 (23.0)	100

Table 4.2 - continued

Ward-Level Characteristics	Mean (std.dev)	Maximum possible score
Staff Satisfaction		
Work relationships ^e	9.2 (0.9)	10
Work context and benefits ^f	6.3 (3.3)	14

^a Treatment-facilitation: Effective provider communication regarding maternal and fetal health condition and treatment, and ease of access to prescription drugs.

^b Assurance-reliability: Provider courtesy and accessibility, and trust in provider's skill and treatment decisions.

^c Responsiveness-empathy: Waiting and consultation time, privacy, and service hours.

^d Availability of clinical staff: Percentage of employed clinical staff (doctors, nurses, midwives, auxiliary nurse, pharmacist, laboratory technologist, technicians, community health officers, community health extension workers) available on date of survey

^e Work relationships: Relationship with colleagues, management, and supervisors, and quality of management

^f Work context and benefits: Training opportunities, recognition of effort, salary, benefits, promotion opportunities, living accommodation, and availability of schooling for children.

Table 4.3: Demand and supply factors significantly associated with skilled antenatal care (ANC) use in Nigeria.^{a,b} N=3,726

Sociodemographic Characteristics	Unadjusted Odds Ratio (95% Confidence Interval)	Adjusted Odds Ratio (95% Confidence Interval)
Education		
None/some primary (ref)	1.00	1.00
Completed primary	1.72 (1.42-2.09)	1.48 (1.16-1.89)
Completed at least Secondary	3.38 (2.64-4.31)	2.22 (1.56-3.16)
Media exposure ^c		
None (ref)	1.00	1.00
Low	1.74 (1.36-2.21)	1.24 (0.90-1.70)
High	2.05 (1.69-2.48)	1.45 (1.06-1.97)
Per capita income (in 10,000 Naira unit)	1.00 (1.00-1.00)	1.00 (1.00-1.00)
Spouse/partner Education		
None/some primary (ref)	1.00	1.00
Completed primary	1.76 (1.42-2.18)	1.71 (1.32-2.21)
Completed at least Secondary	3.12 (2.54-3.83)	2.21 (1.70-2.89)

Table 4.3 - continued

Sociodemographic Characteristics	Unadjusted Odds Ratio (95% Confidence Interval)	Adjusted Odds Ratio (95% Confidence Interval)
Owens Motorized Transport ^d		
Yes	1.53 (1.29-1.81)	1.35 (1.11-1.64)
No (ref)	1.00	1.00
Residency		
Urban	2.43 (1.92-3.07)	1.92 (1.37-2.68)
Rural (ref)	1.00	1.00
State		
Adamawa	(0.84-1.20)	2.30 (1.54-3.43)
Ondo (ref)	1.00	1.00
Ward Staff Satisfaction		
Work context and benefits ^e	1.07 (1.01-1.13)	1.09 (1.03-1.15)

^a Statistical significance, $p < 0.05$

^b Skilled ANC: Antenatal care with doctor, nurse, midwife, trained community health or health extension workers.

^c Media exposure: High (weekly exposure to newspaper, magazine, TV, or radio), low (less than weekly exposure to the above media without weekly exposure to any), none (no media use).

^d Owns motorized transport: Owns car truck, motor bike or bicycle.

^e Work context and benefits: Training opportunities, recognition of effort, salary, benefits, promotion opportunities, living accommodation, and availability of schooling for children.

All other demand and supply side factors were insignificant.

DISCUSSION

Main Findings

We observed 83% of pregnant women utilized at least one skilled ANC. This is slightly higher than the observed national rate (61%) and could be attributed to our inclusion of community health works (who are trained to provide ANC) as part of our skilled providers, not included in the Demographic and Health Survey statistics (NPC & ICF International, 2014). The study used empirical data obtained from recently pregnant women, health facilities, clinical staff and recent ANC users in surveyed facilities to

identify the factors that are important to the women for the initiation of skilled antenatal care in Nigeria. Expectant mothers' use of skilled ANC is influenced by the media most likely exposing women to information regarding ANC benefits, and where/how to seek ANC, secondly, ease of travel represented by household ownership of personalized motorized means of transport and lastly, an indirect impact of the surrounding health facilities staff motivation to provide quality service embodied in their satisfaction with their work context and benefits. At least primary education of women and urban residence also predisposed women to ANC use. Skilled ANC utilization pattern was higher in Adamawa, the northern state compared to Ondo, adjusted for observed demand and supply side factors.

Strengths and Limitations

Previous studies that examined the supply-side characteristic given demand-side factors, assessed one or two aspect of quality of care dimension (Donabedian, 1988). Unlike these studies, we evaluate the independent impact of facility structural characteristics (equipment, drugs, manpower, physical image), perceived technical competence of providers, service quality and staff satisfaction, as well as maternal need factors on women's use of skilled ANC adjusting for maternal demography (Babalola & Fatusi, 2009; Fagbamigbe & Idemudia; Acharya & Cleland, 2000; Chama-Chiliba, & Koch, 2015; Rani, Bonu, & Harvey, 2008). Given limited resources, a comprehensive evaluation of the dimension of care quality will better inform direction of funds for effective and efficient modification of drivers of ANC use. No study has explored the influence of clinical providers' satisfaction with work relationships, and work context and benefits. Service quality is affected by staff's performance on the job which may be

influenced by job satisfaction and motivation (Scotti et al., 2007). There might remain independent impact of staff satisfaction on maternal care utilization beyond observed patient perceived quality of care. We observed an independent impact of staff job satisfaction on women's use of skilled ANC.

The study has some limitations. The study lacked data on health facility density and women's travel distance to the nearest health facility, which may, however, be mitigated by the urban-rural variable (Babalola & Fatusi, 2009). Bias is possible due to the exclusion of about 22% of surveyed women lacking data on health facility characteristics. Excluded women were less likely to utilize skilled ANC and differed from the study sample on the women and their spouse educational attainment, media exposure, ownership of motorized transport, state and rurality of residence. Excluded women may have been from wards with non-functional facilities, and thus we may have missed some predictors. We were unable to adjust for the impact of socio-physical seclusion and male dominance over women's reproductive health on skilled ANC use (Gazali, Muktar, & Gana, 2012; Bloom, Wypij, & Das Gupta, 2001; Fawole & Adeoye, 2015). Furthermore, women who provided the patient satisfaction ratings were different from, and more recent facility users compared to the community-dwelling women whose ANC utilization pattern is studied. However, there was no state-wide quality improvement initiative in the last 2 years in study states.

Interpretation

We found a positive impact of staff satisfaction with work context and benefits on women's use of skilled ANC. Health facilities provision of job training, recognition of staff efforts in service quality, payment of market competitive salaries and benefits, and

the provision of other performance enhancers is documented to impact the quality of care (technical and interpersonal care) providers deliver and in turn patients perceived quality of care (Scotti, Harmon, Behson, & Messina, 2007; Okereke et al., 2015). Patients who are satisfied with care quality are more likely to continue seeking services, as well as influence other women's decision to use the health facilities for care, which could significantly increase the population's use of care (Wu, 2011; Kitapci et al., 2014; Fan, Burman, McDonnell, & Fihn, 2005; Schempf, Minkovitz, Strobino, & Guyer, 2007).

Consistent with other studies we find that exposure to mass media influences women's ANC seeking behavior (Akinrefon et al., 2015; Rahman, Islam, & Rahman, 2010, Babalola & Fatusi, 2009; Birmeta et al., 2013). Aside the direct impact on maternal healthcare seeking behavior, mass media also enhances adherence to recommended preventive health behavior during pregnancy needed to protect maternal and child health (Ankomah et al., 2014). The policy implication is an expansion of mass media coverage for the dissemination of ANC targeted messages, and the nearest place of care. Such efforts should be supplemented by community-based outreach in poor remote communities with poor media access (Perreira et al., 2002).

Our finding of an influence of household ownership of personalized motorized means of transport on women's utilization of ANC is documented (Omer et al., 2014), This reduces the challenges of travel logistic for women seeking care, also observed among residents in communities with efficient transportation network (Ye, Yoshida, Harun-Or-Rashid, & Sakamoto, 2010; Arthur, 2012). Also, rural residents are more likely to experience greater travel logistic burden compared to urbanites, given better availability and distribution of health facilities, and better roads and public transportation

networks in the urban than rural areas, supporting our observation of a greater likelihood of use of skilled ANC by the urban women compared to the rurals , also reported in other studies (WHO, n.d; Dairo & Owoyokun 2010; Akinrefon et al., 2015; Fawole & Adeoye 2015; Babalola & Fatusi, 2009; Ghosh, Siddiqui, Barik, & Bhaumik, 2015; Kowalewski, Mujinja, & Jahn 2002; Asweto et al., 2014). Although differences in structural and service quality characteristics of the health facilities between the study states did not account for the persisting differences in skilled ANC utilization pattern, higher facility density may account for the observed higher likelihood of use in Adamawa state than Ondo (Babalola & Fatusi, 2009; NBS, 2012). We were unable to account for this at the ward level given lack of data.

Consistent with prior studies, the study finds that primary school or higher educated women and women with primary or higher educated spouse/partner are more likely to use skilled ANC (Babalola & Fatusi, 2009; Fawole & Adeoye, 2015; Mustafa & Mukhtar, 2015; Akinrefon, Adeniyi, Adejumo, Balogun, & Torsen, 2015; Dahiru & Oche, 2015; Omer et al., 2014). Education fosters women's self-efficacy and autonomy to seek maternal healthcare, and informed spouse support use (Fawole & Adeoye, 2015; Singh, Bloom, Haney, Olorunsaiye, & Brodish, 2012; Asweto, Aluoch, Obonyo, & Ouma, 2014).

Contrary to intuitive expectation, we observed that outpatient's rating on providers' assurance-reliability (courtesy in interaction and technical competence), responsiveness-empathy (prompt unrushed service, convenient clinic hours, and respect for patient privacy) and treatment-facilitation (effective care-related communication, and ease of access to prescribed medicines) were not associated with community women's

use of skilled ANC. Interpersonal and technical care evaluated by patients is reported to impact patients' satisfaction with ANC and community use of ANC (Rani et al., 2008; Handler, Rosenberg, & Raube, 2003). Our finding could be a statistical artifact due to little variability among ward health facilities on these variables.

Also to the contrary, health facilities structural characteristics (availability of general equipment, drugs, and staff) did not predict women's likelihood of ANC use. Advance staff knowledge of the survey date may have caused more staff to be present, or the finding could be confounded by uneven distribution of facility caseload. The busiest quintile of facilities in Nigeria experience a disproportionate case load than the national average, while having the lowest absenteeism rate (Martin & Odutolu, 2014). Pharmacy wait time and false unavailability of government-owned drugs created by staff that may illegally sell their privately purchased drug stocks to patients (as a source of supplementary income) may confound the impact of drug availability on ANC use (McCoy et al., 2008).

Conclusions and Implications for Action

We observe staff job satisfaction, media exposure, and travel logistics influence women's use of skilled ANC. The NSHIP should consider incorporating provider training on ANC technical and interpersonal care in addition to its health facility and staff pay for performance program. This payment structure enhances the earning potential of providers while incentivizing the provision of patient-centered care. A similar incentive structure implemented in India improved quality of care in government facilities, maternal healthcare utilization rates, and maternal health indicators (Government of India, 2016; WHO, 2007; WHO, 2016b). The Nigerian government should expand its media coverage

on antenatal care education, and supplement same with community outreach by local leaders and public health workers to ensure reach in remote communities with poor media coverage. To reduce logistic burden of travel in rural communities with poor public transportation networks, community health workers should be sent to the field to deliver ANC to women, and their incentives could be partly based on the number of women attended to, to further motivate recruitment of women into care. Partnership should be forged between community health workers and local women leaders, and the latter should also be incentivized, for identification and recruitment of women into antenatal care. Other countries have successfully used this incentive-driven methods to recruit women into maternal care (Powell_Jackson, Mazumdar, & Mills; 2015; Carvalho, Thacker, Gupta, & Salomon, 2014). Lastly, continued investment in female education cannot be overemphasized, while the gender equity bill is underway, government should collaborate with community stakeholders on the education of the female child.

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CHAPTER 5

INCREASING INSTITUTIONAL DELIVERY USE AMONG UNDERSERVED POPULATIONS: FINDINGS FROM A POPULATION-BASED STUDY IN NIGERIA²

INTRODUCTION

Maternal healthcare utilization in Nigeria is very low with a nationwide antenatal care (ANC) utilization rate of 61%, institutional delivery rate of 36% and 48-hours post-natal care rate of 40% (National Population Commission [NPC] & ICF International, 2014). Consistent with the low utilization of maternal healthcare services, maternal and neonatal outcomes have remained poor. With 2.45% of the world's population, Nigeria accounts for an estimated 19% of global maternal deaths, ranking among the top 16 countries in maternal mortality with 576 deaths per 100,000 live-births (NPC & ICF International, 2014; World Health Organization [WHO], United Nations Children's Fund [UNICEF], United Nations Population Fund [UNFPA], World Bank Group, & United Nations Population Division [UNPD], 2015; World Bank, 2015). This is despite a per capita GDP that is at the average level of lower-middle-income countries, a category with average maternal mortality of 253/100,000 (World Bank, 2015). Nigeria's neonatal

² Powell, D. J., Xirasagar, S., Khan, M., Hardin, J. W., Demir, I., & Odutolu, O.

Submitted to BJOG: An International Journal of Obstetrics and Gynaecology, 6/24/2016.

mortality is also high, 37 deaths/1,000 live-births, compared to 25.8/1,000 for countries at a similar income level (NPC & ICF International, 2014; World Bank, 2015).

Timely initiation and appropriate frequency of ANC facilitates early identification and management of pre-natal morbidities, and may increase the likelihood of institutional delivery (Duley et al., 2007; Ikeanyi & Ibrahim, 2015).⁵ Institutional or skilled home delivery ensures hygienic birth practices, and enables effective management of obstetric and neonatal emergencies such as obstructed labor, eclampsia, postpartum hemorrhage, preterm birth, neonatal infections (sepsis, pneumonia, tetanus) and asphyxia. (Li et al., 2007; Fournier et al., 2009; McCormick et al., 2002; Ntambue, Malonga, Dramaix-Wilmet, Ngatu, & Donnen, 2016; Derman et al., 2006). These are the leading causes of maternal and neonatal mortality in Nigeria and other developing nations (WHO, 2015; WHO, 2016a; UNICEF, 2016; 2015).

Health service use is driven by supply-side and demand-side factors (Aday, & Anderson, 1974; Ensor & Cooper, 2004). The supply-side factors are infrastructure and human resource characteristics of the health system, including availability of equipment, supplies, drugs, staff, amenities, provider behavior, technical skill and interaction with patients. The demand-side factors affecting the population's decisions to utilize care are sociodemographic and maternal factors, perceived healthcare needs, and perceptions or experience of care quality. Utilization of institutional delivery can be evaluated in this framework to identify specific interventions that are needed in Nigeria's context to improve the institutional delivery rate (Aday, & Anderson, 1974).

Previous studies examining factors associated with institutional delivery utilization in Nigeria focused on demand-side factors (Fawole & Adeoye, 2015; Babalola

& Fatusi, 2009; Adamu & Salihu, 2002; Dahiru & Oche, 2015). As a result, current efforts to increase institutional delivery are directed at increasing patient demand. Babalola & Fatusi (2009) examined the impact of community facility density on skilled delivery services use. One Nigerian study described the population's impression of supply-side factors that may be related to delivery service utilization. (Onah, et al., 2006). Studies from other low-income and lower-middle-income countries examined the impact of supply-side factors on institutional delivery, mostly focused on infrastructure and manpower availability (Worku, Yalew, & Afework, 2013; Ghosh, Siddiqui, Barik, Bhaumik, 2015; Patel & Ladusingh, 2015, Hotchkiss, Krasovec, El-Idrissi, Eckert, & Karim, 2005). None of the studies covered service aspects of care quality (e.g. provider behavior, wait time), or staff motivation/satisfaction that may influence service quality. Service quality is a documented predictor of clients' intention to return to a healthcare facility and to recommend it to friends and relatives (Fan, Burman, McDonell, & Fihn, 2005; Herald & Alexander, 2012; Schempf, Minkovitz, Strobino, & Guyer, 2007; Kitapci, Akdogan, & Dortyol, 2014). Service quality, in turn is affected by staff's performance on the job which may be influenced by job satisfaction and motivation (Scotti, Harmon, Behson, & Messina, 2007).

In summary, while many studies have described either demographic, healthcare facility or patient quality perception factors that are of importance to institutional delivery use in the African region, none have documented a comprehensive survey-based assessment capturing all three pillars of a successful maternal service program, (1) population need and maternal healthcare seeking pattern, (2) facility infrastructure and manpower including the functional element of human resources, and (3) patient

perceptions of quality conveying what is important to them for seeking care at healthcare institutions. Given Nigeria's maternal and neonatal mortality rates, this study documents policy-amenable supply-side factors (infrastructure and service quality), and mothers' healthcare seeking pattern that impacts institutional delivery use.

METHODS

We used a cross-sectional study design to explore the role of modifiable supply-side factors, infrastructure and staff performance indicators (users' perceptions of service quality, and staff satisfaction) and demand-side factors affecting women's choice of institutional delivery. We used the 2013-2014 baseline survey data on households, health facilities, healthcare staff, and ANC outpatients collected as baseline data to inform policy interventions under the World Bank-assisted Nigeria State Health Investment Project (NSHIP). The NSHIP is a maternal and child health services expansion initiative covering two states in the south and four in the north selected by policy makers. For our study, two states were randomly chosen, one southern and one northern state, Ondo and Adamawa. Within each state, a multistage stratified sampling was employed to obtain a representative sample of households. States are administratively divided into Local Government Areas (LGAs), wards, and census enumeration areas (CEAs). All LGAs in the study states were selected, followed by selection of a random sample of CEAs within each LGA for household survey. Households with women in the reproductive age group (15-49 years) in each CEA were listed and a random sample drawn. The head of the household and women who had a pregnancy or childbirth in the prior 24 months were surveyed. Women provided maternal history and care data, and the household head (or

representative) provided household level data, after verbal consent was obtained using a structured consent form.

To obtain supply-side data, all state-owned hospitals and a random sample of functioning government primary care facilities (defined as those with consistent provision of maternal and child healthcare in the prior year) were surveyed for facility-level data (building, amenities, drugs, delivery and neonatal care equipment). Trained surveyors observed the available items against standard World Bank-approved checklists of essential items and manpower. At each selected facility, three antenatal outpatients exiting the facility (on a first exit basis during the surveyors' visit) were interviewed regarding service quality and satisfaction with services after obtaining verbal consent. Three clinical provider staff were randomly selected from staff rosters and surveyed for job satisfaction. Pretested instruments adapted from standard World Bank surveys developed for health system assessments and household surveys in developing countries were used. In addition to English language surveys, Hausa and Yoruba translations (major local languages) were offered for household and outpatient exit surveys. The study was approved by the University of South Carolina Institutional Review Board.

The unit of analysis is the woman, and the outcome variable is place of delivery, healthcare facility or home/other location. All community-dwelling women aged 15-49 years with a live-birth or still-birth in the prior 24 months were eligible for study. We excluded women from wards with no supply-side data. A total of 6,129 households were surveyed and 4,622 study-eligible women were interviewed in 319 selected wards. Of them 3,670 women from 246 wards with supply-side data were included for analysis.

Supply-side data were available for 418 health facilities in 246 wards. An average score for each indicator was computed per ward. Of 246 wards, 47 had missing data on one or more facility variables: drugs availability, proportion of employed clinical staff on the day of survey, and patient ratings of service quality (three constructs based on factor analysis: treatment-facilitation, assurance-reliability, and responsiveness-empathy). We used multiple imputation technique (with 50 imputations) to impute missing data from models on variables with the least missing data, namely: delivery and neonatal care equipment availability, general facility appearance and amenities, staff satisfaction with their working relationships, and staff satisfaction with the work context and benefits. Multiple imputation predicts missing data values based on available data to produce stable estimates (Marchenko, 2010). The final analytic sample consisted of 3,638 women living in 241 wards.

Because Nigeria's health system is not designed to support skilled home delivery services, our study focuses on institutional delivery. Skilled home delivery is defined by the World Health Organization as delivery performed by a doctor, midwife or nurse who can manage uncomplicated births with the necessary delivery and neonatal equipment and supplies, promptly identify complications, and facilitate referral and transportation to higher levels of care (WHO, 2004).

The demand-side predictor variables are represented by predisposing demographic variables, healthcare need variables, and enabling factors (Aday & Anderson, 1994). Maternal demographic variables included age (<20, 20-34, 35-49), education (none/some primary, completed primary, completed at least secondary schooling), religion (Christian, other), number of prior live-births (0, 1, ≥ 2), exposure to

media (high: weekly exposure to newspaper, magazine, TV, or radio; low: less than weekly exposure; and none), use of skilled ANC during the pregnancy (yes or no), spouse/partner education level, (same educational categories as for the women) and household spoken language (local language concordant: household language is same as major state language, local language discordant, English). We assume that women who are not fluent in English (the official national language) but speak the dominant local language would not experience a language barrier for healthcare. Healthcare need factor was a history of pregnancy complications (abortion, miscarriage, or stillbirth), yes or no (Mustafa & Mukhtar, 2015). Enabling factors representing care affordability and accessibility are: household per capita income, residence (urban or rural), household ownership of motorized personal transport (car or motor bike, yes/no), and spouse/partner occupation (farming/fishing, others).

Supply-side predictor variables are facility infrastructure and manpower, clinical staff's job satisfaction, and facility-level aggregate scores on ANC outpatients' perceptions of service quality, all aggregated at the ward level and assigned to all surveyed women in the ward. Facility infrastructure characteristics were equipment availability, drugs availability, general appearance and amenities, and availability of employed clinical staff on the day of survey. Examples of essential equipment for delivery and neonatal equipment were adult and neonatal scales, blood pressure meter, stethoscope, fetoscope, delivery bed, intravenous set, minor and major surgical sets, aspirators, uterine dilator, Guedel airways-neonatal, incubator, etc.. Each item was assigned a score of "1" if available and functional, or "0" otherwise, and item scores were added to compute the facility score. Facility appearance and amenities were scored on

waiting area, adequate protection from the elements, clean environment, privacy of the consulting and delivery unit, untorn beds, adequate lighting, and restrooms with adequate water. Drug items were scored, “1” if at least one dose was available on the day of survey without any stock-out recorded in the last 30 days and summed up. Surveyed drugs included antibiotics, vitamins and minerals, antihistamines, analgesics, antimalarial, antihypertensive, diagnostic kits and emergency obstetrics.

We used ANC outpatient quality scores as a surrogate for community perceptions of care quality, assuming that clients communicate their care experience to community members, creating a community-wide perception of care quality that may influence the community’s utilization of the facility (Kitapci et al., 2014). Two quality of care factors were extracted from 14 items (Likert scale: agree, neutral, disagree) based on exploratory factor analysis using principal factor method, promax rotation, and specifying simple structure to ensure discriminant validity. The factors extracted were assurance-reliability (assurance “*the knowledge and courtesy of providers, and their ability to elicit a sense of trust and confidence*”, reliability “*ability to perform the promised service dependably*”) and responsiveness-empathy (responsiveness “*willingness of the facility to provide prompt service*”, empathy “*individualized attention*”), see Appendix A1. These items are consistent with the items of assurance, reliability, empathy, and responsiveness that are globally documented for outpatient settings (Dean, 1999; Lin, Xirasagar, & Laditka, 2004). Another quality variable was treatment-facilitation, an aggregate of items scores on provider communication (regarding maternal and fetal health conditions and treatment), and ease of access to prescribed drugs. Both components impact patient adherence to treatment, medical outcome and patient satisfaction (Abioye et al., 2010).

Two factors measuring provider job satisfaction were identified by factor analysis: work relationships (with colleagues, supervisors and management), and work context and benefits (training and promotional opportunities, salary, benefits, living accommodation and schooling for children), see Appendix A1. Item scores were added to compute factor scores. All facility, provider and outpatient variables were kept as continuous variables in the analysis.

We estimated logistic regression model, accounting for clustering of women within wards using the `vce (cluster ward)` command in STATA to study associations of demand-side and supply-side factors with institutional delivery likelihood, adjusted for maternal demographic factors. To assess for bias that may be associated with better availability and quality of infrastructure and manpower at higher levels of care in Nigeria, we evaluated the impact of presence of a government hospital in study wards, however this was insignificant and removed from the model. In place of skilled ANC use, we evaluated the impact of each woman's predicted probability of skilled ANC use (based on significant predictors in our sample) holding other variables constant. This was not associated with women's use of institutional delivery services. A two part model (one with skilled ANC use, and that without) was then used to explain institutional delivery use, in an efforts to capture any direct effect of sociodemographic factors on institutional delivery, which also explained skilled ANC use. The final model of each excluded supply-side variables with p-values >0.5. A p-value of <0.05 was considered statistically significant; Stata version 14 was used for analysis.

RESULTS

A total 4,622 women with a birth in the prior 24 months were interviewed in 319 selected wards, of them, 984 women were excluded due to lack of facility level data in their ward of resident. The final analytical sample consist of 3,638 study-eligible women (2,301 in Adamawa, and 1,337 in Ondo) residing in 241 wards. Table 5.1 presents the distribution of the women by sociodemographic variables, and delivery location: 75.2% had institutional delivery and 83.6% had used skilled ANC for that pregnancy. The mean age of the women was 28 years, 29% of them completed at least secondary education, 16% had a history of pregnancy complications (abortion, miscarriage, still-birth), and 63% had at least 2 prior live-births. Table 5.2 presents the ward-level summary scores on health facility infrastructure, manpower, ANC outpatients' quality perceptions, and staff job satisfaction. Ward scores were generally poor on equipment availability (on average, 26.2% of essential equipment available), drugs (11.3 items out of 48 required items), and general appearance and amenities (49.4% of criteria met). Clinical staff rated their work context and benefits poorly (mean score 6.3 out of a maximum possible score of 14), but work relationships were rated highly. Patients gave generally high ratings on service quality and providers' competence.

Table 5.3 presents the results of logistic regression analysis predicting the likelihood of institutional delivery. Education and urban/rural residence have direct impact on institutional delivery use independent of their ANC use intermediary pathway effect. We summarize the result from model with ANC. Compared to those without an ANC visit, women who had completed at least one skilled ANC visit had three and a half times the odds of an institutional delivery (AOR 3.49, 95% CI 2.66-4.57), adjusted for

co-variates. Institutional delivery odds increased by 40% with each unit increase in patient ratings of treatment-facilitation at the ward’s healthcare facilities (AOR 1.40, 95% CI 1.01-1.94). Each percentage increase in required functioning essential equipment (general purpose, delivery and neonatal equipment) in the ward’s healthcare facilities was associated with a 2% increase in institutional delivery likelihood (AOR 1.02, 95% CI 1.01-1.04). Notably prior live-birth experience(s) was not a significant factor in adjusted analyses. Women of Adamawa state (vs. Ondo) and urban women (vs. rural) had higher odds of institutional delivery (AOR 2.19, 95% CI 1.48-3.26, and 1.48, 95% CI 1.04-2.11 respectively). Interactions between state and the above factors were not significant.

Table 5.1: Distribution of study women by sociodemographic factors and delivery location in two states of Nigeria. N=3,638

Characteristics	All Respondents n(%)	Institutional Delivery Use ^{a,b}	
		Yes n(%)	No n(%)
Demographics			
Total	3,638	2,737 (75.2)	901 (24.8)
Age (years)			
<20	285 (7.8)	211 (74.0)	74 (26.0)
20-34	2,730 (75.1)	2,055 (75.3)	675 (24.7)
35-49	623 (17.1)	471 (75.6)	152 (24.4)
Education			
None/some primary	1,296 (35.6)	940 (72.5)	356 (27.5)
Completed primary	1,294 (35.6)	964 (74.5)	330 (25.5)
Completed at least Secondary	1,048 (28.8)	833 (79.5)	215 (20.5)
Religion			
Christian	2,276 (62.6)	1,664 (73.1)	612 (26.9)
Others (ref)	1,362 (37.4)	1,073 (78.8)	289 (21.2)
History of pregnancy complications ^c			
Yes	601 (16.5)	465 (77.4)	136 (22.6)
No	3,037 (83.5)	2,272 (74.8)	765 (25.2)
Number of prior live-births			
0	682 (18.7)	519 (76.1)	163 (23.9)
1	658 (18.1)	475 (72.2)	183 (27.8)
≥ 2	2,298 (63.2)	1,743 (75.8)	555 (24.2)

Table 5.1 - continued

Characteristics	All Respondents n(%)	Institutional Delivery Use ^{a,b}	
		Yes n(%)	No n(%)
Demographics			
Media exposure ^d			
None	1,028 (28.3)	749 (72.9)	279 (27.1)
Low	721 (19.8)	556 (77.1)	165 (22.9)
High	1,889 (51.9)	1,432 (75.8)	457 (24.2)
Per capita income, Naira (mean, std)	924,008	1,019,082 (73,153)	635,200 (83,824)
Spouse/partner			
Education			
None/some primary	1,042 (28.6)	754 (72.4)	288 (27.6)
Completed primary	939 (25.8)	689 (73.4)	250 (26.6)
Completed at least Secondary	1,657 (45.6)	1,294 (78.1)	363 (21.9)
Household Language ^e			
Local language Concordant	3,312 (91.0)	2,506 (75.7)	806 (24.3)
Local language Discordant	72 (2.0)	53 (73.6)	19 (26.4)
English	254 (7.0)	178 (70.1)	76 (29.9)
Owns motorized Transport ^f			
Yes	1,683 (46.3)	1,318 (78.3)	365 (21.7)
No	1,955 (53.7)	1,419 (72.6)	536 (27.4)
Spouse/partner Occupation			
Farming/fishing	1,351 (37.1)	1,001 (74.1)	350 (25.9)
Other	2,287 (62.9)	1,736 (75.9)	551 (24.1)
Residence			
Urban	946 (26.0)	766 (81.0)	180 (19.0)
Rural	2,692 (74.0)	1,971 (73.2)	721 (26.8)
State			
Adamawa	2,301 (63.3)	1,824 (79.3)	477 (20.7)
Ondo	1,337 (36.7)	913 (68.3)	424 (31.7)
Skilled ANC use ^g			
Yes	3,041 (83.6)	2,439 (80.2)	603 (19.8)
No	596 (16.4)	298 (50.0)	298 (50.0)

^a Differences in the distributions of institutional and home delivery are significant at $p < 0.05$, see text in bold font.

^b Institutional delivery: delivery in a healthcare facility.

^c History of Pregnancy complications: Abortion, miscarriage or still birth

^d Media exposure: High (weekly exposure to newspaper, magazine, TV, or radio), low (less than weekly exposure to the above media without weekly exposure to any), none (no media use).

^e Household language: Local language concordant: household language is same as major state language, discordant (household language is not same as major state language)

^f Owns motorized transport: Owns car or motor bike

^g Skilled ANC: Antenatal care with doctor, nurse, midwife, trained community health or extension workers.

Table 5.2: Mean Ward-level summary scores of health facility structural capacity, staff satisfaction, and ANC outpatients' quality perceptions. N=241 wards

Ward-level Characteristics	Mean (std.dev)	Maximum possible score
ANC Outpatients' Perception of Service Quality (Demand-Side)		
Treatment-facilitation ^a	3.6 (0.7)	4
Assurance-reliability ^b	11.3 (1.2)	14
Responsiveness-empathy ^c	7.1 (1.2)	8
Infrastructure and Manpower (observed by surveyor) (Supply-Side)		
Structural Characteristics		
Availability of equipment (%)	26.2 (14.5)	100
Availability of drugs	11.3 (8.1)	48
Availability of clinical staff (%) ^d	72.4 (23.9)	100
General appearance and amenities (%)	49.4 (22.5)	100
Staff Satisfaction		
Work relationships ^e	9.2 (0.9)	10
Work context and benefits ^f	6.3 (3.3)	14

^a Treatment-facilitation: Effective provider communication regarding maternal and fetal health condition and treatment, and ease of access to prescription drugs.

^b Assurance-reliability: Provider's courtesy and accessibility, and trust in providers' skills and treatment decisions.

^c Responsiveness-empathy: Waiting and consultation time, privacy, and service hours.

^d Availability of clinical staff: Proportion of employed clinical staff (doctors, nurses, midwives, auxiliary nurses, pharmacists, laboratory technologists, technicians, community health officers, community health extension workers) available on date of survey

^e Work relationship: relationship with colleagues, management, and supervisors, and quality of management.

^f Work context and benefits: Training opportunities, recognition of efforts, salary, benefits, promotion opportunities, living accommodation and availability of school for children.

Table 5.3: Two-part model showing demand-side and supply-side factors significantly associated with institutional delivery in Nigeria.^{a,b} N=3,638.

Sociodemographic Characteristics	Model without ANC AOR (95% CI)^c	Model with ANC AOR (95% CI)
Skilled ANC use ^d		
Yes	-	3.49 (2.66-4.57)
No (ref)	-	1.00
Education		
None/some primary (ref)	1.00	1.00
Completed primary	1.26 (1.00-1.60)	1.17 (0.92-1.50)
Completed at least Secondary	1.60 (1.19-2.15)	1.41 (1.04-1.91)
Residence		
Urban	1.68 (1.19-2.37)	1.48 (1.04-2.11)
Rural (ref)	1.00	1.00
State		
Adamawa	2.37 (1.58-3.55)	2.19 (1.48-3.26)
Ondo (ref)	1.00	1.00
Patient Perceptions of Service Quality (ward-level aggregate)		
Treatment-facilitation ^e	1.41 (1.04-1.93)	1.40 (1.01-1.94)
Assurance-reliability ^f	0.81 (0.67-0.98)	0.81 (0.66-0.99)
Ward Facilities Infrastructure		
Availability of equipment	1.02 (1.01-1.04)	1.02 (1.01-1.04)

^a Statistical significance at $p < 0.05$.

^b Institutional Delivery: Delivery in a healthcare facility.

^c AOR (95% CI): Adjusted Odds Ratio and 95% Confidence interval.

^d Skilled ANC: Antenatal care with doctor, nurse, midwife, trained community health officers or community health extension workers.

^e Treatment-facilitation: Effective provider communication regarding maternal and fetal health condition and treatment, and ease of access to prescription drugs.

^f Assurance-reliability: Provider's courtesy and accessibility, and trust in providers' skills and treatment decisions.

All other demand and supply side factors adjusted for were insignificant

DISCUSSION

Main Findings

We observed that 75.2% of births were institutional. A much lower percentage is observed nationwide (35.8%), though similar proportion (69%) is observed in southern

Nigeria (NPC & ICF International, 2014). The study used empirical data obtained from stakeholders and facilities to identify the factors that are important for institutional delivery use in Nigeria, based on its population's preferences and care experiences. Mothers' institutional delivery decisions in their latest pregnancy, combined with data on the state of infrastructure and service quality are yielding three critical conclusions: first, that mothers' use of skilled antenatal care is the gateway for institutional delivery use; second, favorable health facility provider behaviors and actions to create a treatment-facilitating climate is influential in skewing mothers' decisions towards institutional delivery; and third, functional maternal and neonatal care equipment is a highly influential factor. Of all factors, maternal ANC use had the greatest predictive impact, followed by a treatment-facilitating climate. Functioning equipment was also very important. Although the increased odds per unit of equipment appears small (2%), it adds up to a high impact, considering that the average availability of equipment was only 26% in the study states. There remained a huge and significant difference in institutional delivery utilization pattern between Adamawa, the northern and Ondo the southern state, and the former had 119% greater likelihood of use than the later.

Strengths and Limitations

Unlike previous studies, we studied the impacts of health facility resources (infrastructure and manpower), service-related quality of care, and staff satisfaction (Fawole & Adeoye, 2015; Babalola & Fatusi, 2009; Adamu & Salihu, 2002; Dahiru & Oche, 2015; Worku et al., 2013; Ghosh et al., 2015; Patel & Ladusingh, 2015, Hotchkiss, et al., 2005). While prior studies documented some evidence for each of these elements, the current study documents the independent importance of each factor after accounting

for other factors, maternal demographics and birth experiences. The only other study covering both facility resources and service quality in a developing country used virtual data to model women's birth place decision making (Kruk et al., 2010). Our study's empirical validation of provider-patient interaction elements that are relevant for the local population based on factor analysis, measures of patient-experienced ease of access to treatment, and staff job satisfaction levels ensures findings that provide a robust basis for policy decisions. No study from low- or lower-middle-income countries has explored the influence of clinical providers' work relationships, and work context and benefits (Fawole & Adeoye, 2015; Babalola & Fatusi, 2009; Adamu & Salihu, 2002; Dahiru & Oche, 2015; Worku et al., 2013; Ghosh et al., 2015; Patel & Ladusingh, 2015, Hotchkiss, et al., 2005; Kruk et al., 2010, Exavery et al., 2014; Wilunda et al, 2015; Shah et al., 2015). While we did not find an independent association of providers' job satisfaction with institutional delivery, a proxy for job satisfaction may be treatment-facilitation, comprising patient-perceived adequacy of provider communication and ease of access to treatment. The latter calls for provider efforts to design patient-friendly logistics for pharmacy, laboratory and other services. Lack of statistical significance of job satisfaction may be because satisfied providers may be motivated to provide high quality care, both technical and interpersonal, captured by patients' experience of a treatment-facilitating climate (Scotti et al., 2007). Another reason may be that our survey measured provider satisfaction within a narrow range of scores (1-3) which may not have discriminated different levels of staff satisfaction to demonstrate its impact.

A strength of the study is the distinction drawn between physical availability of maternal care drugs as verified by a surveyor, and patient-experienced ease of access to

drugs (part of treatment facilitation). Physical availability of drugs does not necessarily mean patient access to medicines. Wait times at the pharmacy unit could be a major access barrier, especially as drug collection happens at the end of the care episode, after patients have waited for long periods to be registered, seen by the doctor and complete the various care procedures. Furthermore, some staff may illegally sell their privately purchased drug stocks to patients (as a source of supplementary income), which may incentivize them to create a false impression of unavailability of government-provided drugs (McCoy et al., 2008).

The study has some limitations. The study lacked data on health facility density and women's travel distance to the nearest health facility, which may, however, be mitigated by the urban-rural variable (Babalola & Fatusi, 2009). Bias is possible due to the exclusion of 20% of surveyed women for lack of facility derived data. Excluded women were less likely to deliver in a healthcare facility and differed from the study sample on educational attainment, media exposure, state and rurality of residence. Excluded women may have been residents of wards with non-functional health facilities, thus we may have missed some important predictors. Furthermore, women who provided the patient satisfaction ratings were different from, and more recent facility users compared to the community-dwelling women whose delivery pattern is studied. However, no state-wide quality improvement initiatives was implemented in the last 2 years in the study states. Another limitation is that the study states (selected for the NSHIP program by policy-makers) had double the nationwide institutional delivery rate (75% vs. 36% nationally) which may bias the estimates.

Interpretation

Other studies have shown that skilled ANC use is associated with institutional delivery, including one from Nigeria (Dahiru & Oche, 2015; Mustafa & Mukhtar, 2015; Worku et al., 2013; Ghosh et al., 2015, Shah et al., 2015). Our study strengthens the evidence by documenting an independent, high-impact role of skilled ANC use in delivery decisions after accounting for a comprehensive range of facility, staff and service quality factors. Any ANC visit more than doubled the odds of institutional delivery, similar to studies from Ethiopia and Sudan (Mustafa & Mukhtar, 2015; Worku et al., 2013). ANC visits present an opportunity to advise expectant mothers about institutional delivery, and to facilitate them to plan the logistics, which should enhance actualization of intent (Tura, Afework, & Yalew, 2014; Fotso, Ezech, Madise, Ziraba, & Ogollah, 2009). The policy implication is that mass media supplemented by personalized, community-based outreach to disseminate targeted messages about ANC and recruit women early in pregnancy may be a key strategy to rapidly increase institutional delivery use (Perreira et al., 2002; Rahman et al., 2010). One good ANC experience should elicit repeat use of the facility (Fan et al., 2005; Schempf et al., 2007; Kitapci et al; 2014; Wu, 2011). Because ANC is a critical gateway for subsequent institutional delivery use, ensuring that every patient experiences high quality ANC, every time, is important, and can be actualized through appropriate staff and clinical provider incentive structures.

Other studies have reported on the role of infrastructural factors (Worku et al., 2013; Patel & Ladusingh, 2015; Kruk et al., 2010). In our study, delivery and neonatal care equipment was the only significant infrastructural factor, similar to a finding from northern India (Patel & Ladusingh, 2015). In southwest Ethiopia, both equipment and

drugs were associated with institutional delivery decisions, and in the northwest, drug availability was a significant factor (Worku et al., 2013; Kruk et al., 2010). Our study finds a widespread lack of functional maternal and neonatal care equipment in the study states. Each percentage increase in essential equipment item translated into 2% higher odds of institutional delivery, which adds up to a substantial missed opportunity, given that only 26.2% of equipment was available, on average. Asphyxia is among the top causes of newborn deaths in Nigeria. Lack of critical equipment (e.g. resuscitation bags) could result in fatal outcomes and demoralize the community regarding the usefulness of institutional delivery (UNICEF, 2016).

Our finding of an insignificant role of clinical provider availability (measured on the day of survey) was surprising, given prior studies in Nigeria reporting staff absenteeism as a critical barrier to maternal service utilization (Osubor et al., 2006; Adewemimo et al., 2014). Advance staff knowledge of the survey date may have caused more staff to be present, or the finding could be confounded by uneven distribution of facility caseloads. The Nigerian Service Delivery Indicators study found that while the average caseload nationwide was 1.5 patients/provider/day (P/P/D), it was 15.6 P/P/D in the busiest quintile of facilities which also had the lowest provider absenteeism rate (Martin & Odutolu, 2014).

The results also suggest the importance of ANC outpatients' perceptions of provider-patient communication regarding their health (part of treatment-facilitation). Effective provider communication skills that engage the patient have the potential to increase institutional delivery use in developing countries (Kruk et al., 2009). ANC is an

effective avenue to relay important maternal health information valued by women in developing countries (Perreira et al., 2002; Nigenda et al., 2003).

Consistent with prior studies, the study finds that secondary school or higher educated women and urban women are more likely to utilize institutional delivery (Dahiru & Oche, 2015; Worku et al., 2013; Ghosh et al., 2015; Mustafa & Mukhtar, 2015; Wilunda et al., 2015; Babalola & Fatusi, 2009). Better availability of health facilities and lesser travel challenges in the urban than rural area accounts for the urban-rural differences (Babalola & Fatusi, Ghosh, et al., 2015; 2009; WHO, n.d.). Although differences in structural and service quality characteristics of the health facilities between the study states did not account for the persisting differences in institutional delivery utilization pattern, higher facility density may account for the observed higher likelihood of institutional delivery in Adamawa state than Ondo (Babalola & Fatusi, 2009; NBS, 2012). We were unable to account for this given lack of data at the ward level.

Contrary to intuitive expectations, our study found that outpatients' rating of providers' assurance-reliability (providers' courtesy in interaction and professional skill) was negatively associated with the community's utilization of institutional delivery. This may be an artefact due to confounding with other unobserved factors. Also a contrary finding, responsive-empathic care (prompt, unrushed service, convenient clinic hours, and respect for patient privacy) was not associated with institutional delivery use, similar to a study from Nepal (Shah et al., 2015). Our finding could also be a statistical artifact due to little variability among health facilities on this variable (mean score 7.1, SD 1.2). Other studies show that women who experienced disrespect, lack of privacy, or otherwise

inferior delivery care are unlikely to return to the facility for future care (Kujawski et al, 2015; Ith, Dawson, & Homer, 2012).

Conclusions and Implications for Action

The outstanding finding of the study is that, after adjusting for area facility infrastructure, care quality, and maternal demographic characteristics, ANC utilization remained the single largest predictor of institutional delivery use, followed by treatment-facilitating climate (staff behavior and care logistics), and availability of functioning equipment. The findings present a significant window of policy opportunities that could be leveraged by the NSHIP investments currently underway. Community outreach to encourage ANC use, and incentivizing community health workers to recruit pregnant women into ANC early in the pregnancy may pay rich dividends. Other countries have successfully used incentive-driven methods to recruit women into maternal care using community-based female advocates, and incentive structures that eliminate barriers to using private sector providers which creates a competitive dynamic and client-responsive climate in government health facilities. An example is India's Janani Suraksha Yojana (Mothers Protection Program) launched as part of its National Rural Health Mission in 2005, which was followed by a reduction in maternal mortality by two-thirds of the baseline level (from 540/100,000 births to 174), and a concurrent doubling of the institutional delivery rate to 85% (Government of India, 2016; WHO, 2007; WHO; 2016b). Other desired impacts includes effective outreach to the most underserved population segments (Powell_Jackson, Mazumdar, & Mills; 2015; Carvalho, Thacker, Gupta, & Salomon, 2014).

The NSHIP may be significantly strengthened by incorporating a purposively planned program of provider training in interpersonal communication and outpatient logistics management for establishing a patient-friendly, treatment-facilitating climate. Treatment-facilitation involves all steps of the treatment process, from patient-provider discussion regarding the medical condition through enabling access to needed investigations, treatment and drugs. Finally, the NSHIP data speak to the importance of functioning equipment. A 10% increase in essential equipment availability translates into a 20% increase in institutional delivery odds. Many facilities had very low equipment availability (the average was 26.2%). Incorporating mechanisms to ensure functional critical equipment at all times will be an essential complement to community outreach policies to expand ANC, and provider training in treatment-facilitation. Strengthening these three pillars addresses the triad of partners critical to any healthcare process - patients, doctors and facilities.

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CHAPTER 6

CONCLUSIONS

Although maternal healthcare utilization in our study states is higher than the national average, a significant amount of women did not utilize care: 17% did not utilize any skilled ANC services, and 25% gave birth outside the healthcare facility. The findings of the study remain relevant across the study states and the nation, given behavioral response to external demand and supply factors are similar. After adjusting for area facility infrastructure, care quality, and maternal socio-demographic characteristics, staff satisfaction with their work context and benefit in the ward health facilities, frequent exposure to mass media (potentially increasing exposure to ANC targeted message and place to seek care), household ownership of personal motorized means of transport (which limits travel burden) and at least primary school education of females influenced women's use of skilled ANC. The drivers of institutional delivery use were skilled ANC use, treatment-facilitating climate (clear care-related communication, and access to medicines and other treatment), availability of essential general, obstetric and neonatal equipment and supplies in health facilities, and at least secondary education of women. The observed supply-side characteristics did not explain the differences between the northern state of Adamawa and the southern state of Ondo. The difference may be partly explained by health facility density, which is greater in Adamawa. Better facility density implies shorter travel distance, accessibility of services for residents and their utilization.

The greatest influencer of institutional delivery was women's use of skilled ANC, as such efforts aimed at promoting ANC will result in improvement in the utilization of both skilled ANC and institutional delivery. The completion of secondary education by women was the greatest predictors of ANC in our study population. A large gender inequity exist in educational attainment in Nigeria (NPC & ICF International, 2014). The unsuccessful passage of the gender equity bill, early marriage and belief of no or limited education for the female child especially among the impoverished pose barriers to the Girl-Child education. Government at all levels should initiate dialogues with community stakeholders such as prominent religious and sociocultural leaders on the education of the female child. There is a need to expand mass media coverage on ANC targeted messages, and nearest places of care. To reach the impoverished in remote areas with limited access to mass media, the federal and state ministries of health should collaborate with local leaders to implement community based maternal educational outreach. To limit utilization barrier posed by travel logistic burden for residents in rural areas with poor road and public transportation network, community health workers should be sent into the community to deliver door-to-door or group ANC to pregnant women. Community leaders in these areas should be incentivized to identify and recruit pregnant women into antenatal care. Such community partnership has been successful in increasing maternal and child services use in India (Powell_Jackson, Mazumdar, & Mills; 2015; Carvalho, Thacker, Gupta, & Salomon, 2014).

There is documented evidence that a motivating work environment encompassing staff training support, market competitive salaries and benefits, incentive structure that promotes high quality care, supportive management and other motivators impact the

quality of care providers deliver (technical and interpersonal) to patients and patients' satisfaction with care (Scotti et al., 2007, Aiken et al., 2012). Patients' care experience impacts community-wide perception of service quality in the health facilities, and utilization of the spectrum of maternal care (Kitapci et al., 2014). As such, health facilities' management should invest in maternal and child health related technical training and interpersonal relations, while government should incentivize the delivery of qualitative care. The pay for performance pilot program designed to reimburse health facilities based on quality and quantity of maternal and child healthcare, as well clinical staff bonus pay tied to service quality (a potential for higher earnings) should be expanded to other states once adequate structure of implementation have been learned in the NSHIP pilot states. Similar incentive structure implemented in India prompted competition among health facilities forcing improvement in service quality with resultant increase in maternal care utilization and reduction in maternal mortality (Government of India, 2016; WHO, 2007; WHO; 2016b). In addition to technical training, antenatal, obstetric, neonatal and related emergency care guidelines and maternal health information guide should be provided in all units and adhered to. Training on interpersonal relations should include communication skills (entailing the use of simple word, listening skills and shared decision making necessary to build women's self-efficacy in the implementation of prophylactic treatment and preventive behavior at home), and the provision of respectful compassionate individualized care (Ohnishi, Nakamura, & Takano, 2007). Health facility management should also implement maternal-friendly care logistics that facilitates access to medicines, laboratory and ultrasound services for expectant mothers. For example these units could have different

service line for maternal patients. A quality assurance and improvement plan should be put in place at the state and facility level. Lastly, to improve the poor state of health facilities' infrastructure, the Nigerian government should increase facilities funding to enable the purchase of up-to-date essential obstetric and neonatal equipment, supplies and drugs.

In conclusion, media and community-based maternal health targeted messaging, the elimination of travel logistics in rural settings with poor public transportation network, continuous staff training on technical and interpersonal care, improvement in the availability of essential obstetric equipment and the use of payment structure to incentivize service quality should improve maternal service utilization in Nigeria and potentially improve maternal health outcomes.

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APPENDIX A

RESULT OF FACTOR ANALYSIS FOR ANTENATAL OUTPATIENT SATISFACTION AND STAFF SATISFACTION ITEMS

Table A.1: Promax rotated factor loadings pattern of items measuring patients' satisfaction and staff satisfaction

Patient Satisfaction Items	Standardized Coefficient	
	Factor 1a	Factor 2a
The health staff are courteous and respectful	0.3918	0.1022
The health workers in this facility are extremely thorough and careful.	0.4100	0.2204
You trust in the skills and abilities of the health workers of this facility.	0.6762	0.0387
You completely trust the health worker's decisions about medical treatments in this facility.	0.6491	-0.0730
The health workers in this facility are very friendly and approachable.	0.6945	-0.1135
The health workers in this facility are easy to make contact with.	0.4253	0.1272
The amount of time you spent waiting to be seen by a health provider was reasonable.	-0.0012	0.3793
You had enough privacy during your visit.	0.0286	0.4038
The health worker spent a sufficient amount of time with you	-0.0445	0.6458
The hours the facility is open are adequate to meet your needs	-0.0327	0.6077
Staff Satisfaction Items	Factor 1b	Factor 2b
Working relationships with other facility staff	0.4809	-0.0885
Working relationships with Management staff within the health facility	0.5913	-0.1053
Quality of the management of the health facility by the management staff within the health facility	0.4751	0.0343
Your opportunity to discuss work issues with your immediate supervisor	0.3831	0.0593
Your immediate supervisor's recognition of your good work	0.3955	0.0462

Table A.1 - continued

Your opportunities to upgrade your skills and knowledge through training	0.1039	0.4327
Your opportunity to be rewarded for hard work, financially or otherwise.	0.0362	0.5263
Your salary	-0.0220	0.7159
Your benefits (such as housing, travel allowance, bonus including performance bonus, etc.)	-0.1368	0.7129
Your opportunities for promotion	-0.0571	0.6545
Living accommodations	0.0597	0.5629
Available schooling for your children	0.0610	0.5853
Bold front: Factor loading		
Factor 1a: Assurance (reliability coefficient: 0.74)		
Factor 2a: Responsiveness-empathy (reliability coefficient: 0.55)		
Factor 1b: Work relationship (reliability coefficient: 0.54)		
Factor 2b: Work context and benefit (reliability coefficient: 0.80)		
Inter-factor correlation, Factor1a-Factor2a: 0.48		
Inter-factor correlation, Factor1b-Factor2b: 0.30		

APPENDIX B

EQUIPMENT, DRUGS, GENERAL APPEARANCE AND AMENITIES ITEMS

OBSERVED FOR IN STUDY SURVEY

Table B.1: Equipment and Supply Items Observed

General	Delivery-Neonatal
Timer or clock with seconds hand	Resuscitation bag, newborn
Adult weighing scale	16- or 18-gauge needles
Children's weighing scale (250 gram)	Intravenous tube
Infant weighing scale (100 gram)	Intravenous fluids, normal saline (20)
Height measure	Umbilical cord clamp
Tape measure	Suturing material
Blood pressure instrument	Clean towels (20)
Thermometer	Clean razor blade (unopened packet)
Stethoscope	Examination gloves (unopened packet)
Fetoscope	Sterile cotton or gauze (unopened packet)
Otoscope	Hand soap or detergent, unopened packets
Suction/aspirating device	Sterile tray
Oxygen tank	Stethoscope, Pinard fetal
Ambubag	Lined Plastic container for medical waste
Drip Stand	Kidney basin
Flashlight	Steel bowl
Stretcher	Tourniquet
Wheel chair	Needle holder
Minor surgical	Syringes and disposable needles (20)
Ringer Lactate (in Liters)	Speculum, vaginal
Colloids (number of bags)	Vacuum extractor
Oral Rehydration Therapy (ORT) corner with equipment (container, cups, spoon, guideline)	Uterine dilator
	Curette, uterine
	Guedel airways-neonatal, and adult
	Scissors
	Vaginal retractor
	Partograph
	Delivery light
	Delivery table/bed

Table B.2: Drug Class and Items Observed

General Drugs	Malaria Drugs
Tetracycline ophthalmic ointment	Chloroquine
Paracetamol (Panadol) tabs	Quinine (IM)
Amoxicillin (tabs or capsule)	Quinine tab
Amoxicillin (syrup)	Sulphadoxine-Pyrimethamine
chlorpheniramine or other antihistamine	Coartemether
Salbutamol inhaler	Cardiovascular Drugs
Glibenclamide cap or tab	Nifedipine cap
Oral Rehydration Solution (ORS) packets	Captopril cap or tab
Iron tabs (with or without folic acid)	Simvastatin cap or tab
Folic acid tabs	Propranolol or Atenolol capsule or tab
Cotrimoxazole tab	Emergency Obstetric Care
Cotrimoxazole suspension	Magnesium Sulfate
Vitamin A	Diazepam Injection
erythromycin tab	Diazepam cap or tab
Doxycycline cap	Misoprostol
Ciprofloxacin cap or tab	Oxytocin
Metronidazole tab	Methergine
gentamicin IV	Vaccine
Ampicillin IV	Tetanus Toxoid (TT)
Penicillin V tab	Diagnostic Kits
Omeprazole cap or tab	Malaria rapid diagnostic kits
Medendazole tab	HIV test kit
Promethazine tab	Pregnancy testing kit
Promethazine IV	Rapid plasma reagin (RPR)
Dextrose	Urine testing kit
Ibuprofen capsule	
Acetyl salicylic Acid tab	

Table B.3: Items Observed for General Appearance and Amenities

S/no	Out-patient
1	Is there a waiting room or area in this facility?
2	Are there fans/air conditioners in patient waiting areas in this facility?
3	Is the patient waiting area covered from sun/rain in this facility?
4	Is there a toilet for the use of outpatient clients of the facility?
5	Are the walls of consulting room made of durable materials, well painted, floor paved with cement without fissures, undamaged ceiling?
6	Are the consultancy room and waiting space separated assuring confidentiality?
7	Are there observation beds (not-torn with plastic cover mattress)?

Table B.3 - continued

8	Do the windows have curtains or non-transparent glass?
9	Does the consultation room have functional door with lock?
10	Is there at least one garbage bin with lid in the courtyard or at entrance for the use of clients?
11	Is the courtyard and the lawn clean (No garbage or medical waste in the courtyard or lawn)?
12	Are the health care wastes placed inside the facility pit/tank and not visible from outside?
	In-Patient
13	In the delivery room, is there sufficient water with soap?
14	Is there a functional light in the delivery room?
15	Is the delivery room wall made of durable materials and painted?
16	Is there a curtain between delivery bed and the entrance door?
17	Is the delivery room floor cement and the ceiling not damaged?
18	Are there window curtains in the delivery room and are the curtains on doors and windows functional?
19	Is the delivery room clean and/or smell disinfectants?
20	Are there separate toilet facilities for men and women?
21	Are the toilets and showers clean? (floor clean and no fecal matter visible)
22	Can the doors of toilets and showers be locked from inside but not from outside
23	Are wall of toilets and showers made of sturdy, durable materials with roof?
24	Do all toilets and showers have functional lighting?
25	Are wastes from toilets and showers are evacuated in a sanitary manner (does not flow out in the open, connected to main or tank)?