

Scale up of community-based injectable contraceptives in Gombe State, Nigeria

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Candidate declaration

I OLUWASEUN O. AKINYEMI do solemnly declare, in accordance with Rule G27 that this thesis is my own work. This thesis is being submitted for the degree of Doctor of Philosophy at the University of the Witwatersrand, Johannesburg, and has not been used as a submission for any other degree or submitted at any other university.

Signature:

A handwritten signature in black ink, appearing to read 'Oluwaseun O. Akinyemi', written over a horizontal line.

Date

25 September 2020

Dedication

To the cherished memory of my late parents David and Titilayo Akinyemi. I am grateful to both for the solid legacy of scholarship and independence they gave me.

This work is also dedicated to my wife Mobolaji, and our children: Oba, Ire, and Oyin. Thanks for your unflinching support.

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Furthermore, I appreciate the support I received from colleagues at my home institution, the University of Ibadan both at the Department of Health Policy and Management and at the Faculty of Public Health. I acknowledge the understanding of my head of department, Prof. K.O. Osungbade and other colleagues in the department.

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Abstract

Rationale

Globally, many health innovations have contributed to improving the quality of life in the last few decades. These include interventions that have been used successfully to fight tuberculosis, malaria, AIDS, as well as to encourage contraceptive use among those not wishing to become pregnant. One such health innovation that has been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives by Community Health Extension Workers (CHEWs). This innovation entails enabling CHEWs to administer injectable contraceptives which previously was administered only by nurses and doctors and taking its provision beyond the health facilities into the community. Evidence now abounds that community health para-professionals can safely administer the injectable contraceptive Depo-Provera (medroxyprogesterone acetate), which is given every three months to reproductive age group women in the community who do not desire to get pregnant. This innovation has been shown to be safe and effective in demonstration projects in many African countries including Uganda, Kenya, Malawi, Ethiopia and Rwanda. Also, evidence abounds that access to family planning commodities is improved through community-based distribution (CBD) thereby giving potential users more choices with regards to the family planning methods to adopt.

Although some improvement has been made in the last few years, Nigeria has not fully exploited the potential of the innovation to expand access to family planning services. Uptake of family planning interventions is particularly imperative in this setting with low contraceptive prevalence rates (CPR) – 9.7% and 14.6% for modern methods and any method, respectively - and a wide rural-urban dichotomy. Presently, only 3% of Nigerian married women use injectable contraceptives. Increasing contraceptive prevalence is a priority for Nigeria where the fertility rate, currently 6 per woman, continues to be a public health

concern. The low CPR is a vital contributor to the country's maternal mortality ratio which currently stands at 576/100,000 live births. Maternal deaths are responsible for approximately a third of all deaths among women of reproductive age.

Although Nigeria has implemented CBD of oral contraceptives since 2003, it was only in 2007 that the country started reviewing its family planning policy. This resulted in a pilot study in 2010 in Gombe State, North-eastern Nigeria, which tested the feasibility of CHEWs dispensing injectable contraceptives at the community level. The pilot study demonstrated that CHEWs can administer injectable contraceptives safely in the community and that community-based access to injectable contraceptives was a more effective approach compared to the facility-based system. The pilot project demonstrated that the CBD approach produced a significantly higher couple of years of protection compared with the facility-based services. The pilot also shows that given the health worker shortage in the country, CHEWs can increase access to injectable contraceptives, particularly in the rural areas, in a more effective and efficient way.

In low- and middle-income countries in particular, it has been shown that scale up is necessary to make health innovations (such as CBD of injectable contraceptives) available to those who need them. Scale up ensures that proven health innovations are made available to more people, in many more locations through improved provision of human resources, financing materials and a more efficient health system. Sequel to a successful pilot in Nigeria, a decision was taken to scale up the intervention to a wider geographical area and to more users, starting with expansion to the rest of Gombe State and later spreading to other regions of the country. Scale up was planned to guarantee that the benefits of the innovation recognized in the pilot (carried out in one of the 36 states) are made available throughout the country. In 2014, a national NGO led the scale up process of the community administered injectable

contraceptives in Nigeria. The process commenced with the training of trainers and CHEWs. However, there is inadequate understanding on how to scale up this innovation effectively outside the original pilot location, and to scale up in ways that can increase uptake and address unmet needs. Of the available scale up frameworks, the AIDED model (Assess, Innovate, Develop, Engage and Devolve) proposed by Bradley and colleagues, was adopted for this work because it captures a set of interrelated factors that may affect innovation scale up. Assess measures the receptivity of the user groups; Innovate component deals with the process of designing and packaging the innovation to fit users' preferences while the Develop constituent entails enhancing support and addressing resistance to the innovation. The Engage component entails ensuring that the innovation is embedded in the routine practices of potential users and community members while Devolve refers to the process of spreading the innovation to newer groups.

Aims and Objectives

This study aims to explore the interplay between possible barriers and facilitators of the scale up of the community-based distribution of injectable contraceptives guided by the AIDED model in order to inform wider scale up of this innovation in Nigeria.

In relation to Gombe State Nigeria, the specific objectives of this study are:

- 1a. To assess the support and resistance for the community-based distribution of injectable contraceptives amongst users and the environmental contexts, and
- 1b. To explore whether and how support and resistance are considered in the process of scaling up.
2. To explore the fit between the design and packaging of the innovation and user wants and preferences.

3. To explore whether and how potential user groups and community members were engaged to facilitate the integration of the innovation within their routine practices.
4. To explore the potential for index users of community-distributed injectable contraceptives to influence the uptake of the innovation by new users in their social networks.

Methods

The study setting was Gombe State (Northeastern Nigeria). With a population of approximately 2.4 million people, Gombe State is divided administratively, into 11 Local Government Areas (LGAs) (according to the 2006 population and housing census). Women make up around 50% of the population and women of reproductive age group around a fifth (22.0%). Gombe State has one of the highest maternal mortality rates in the country (1,726/100,000) as well as low contraceptive prevalence rates (4.0% for any method and 3.5% for modern methods). This study focused primarily on two LGAs and explored the process of scaling up to other LGAs.

This sequential exploratory mixed-method study was cross-sectional in design. The study assessed the process of scale up, as a form of implementation research. In the sequential exploratory design, one phase of the mixed-method study builds on the other. In this mixed-method strategy, the qualitative data collection and analysis preceded the collection and analysis of quantitative data. Likewise, priority was given to the qualitative aspect of the study although the quantitative data and results helped to better interpret the qualitative findings.

The qualitative research component included in-depth interviews (IDIs), key informant interviews (KIIs), focus group discussions (FGDs), and document reviews, while the quantitative research methods included a social network analysis (SNA) survey. The purposively-selected respondents for the qualitative component included senior officials of the federal and state ministries of health, policy makers, program managers, health workers,

traditional and religious leaders, women of reproductive age group and other community members including men. Also, participants for the quantitative component were recruited purposively from those who participated in the focus group discussions - thus the design is sequential. The mixed methods enhanced complementarity and triangulation of data obtained through different methodological approaches. The decision to use mixed methods was guided by the study's objectives and because these methods are suitable for studying complex social processes and generating unique perceptions. This study was conducted in two phases. Phase one consisted of the qualitative methods while the SNA constituted the second phase. Twenty women who used community-based distributed injectable contraceptives were selected to participate in the SNA survey. Individual respondent (ego) was requested to list 10 women of childbearing age (alters), within their social networks with whom they are acquainted. They were asked questions about their connection with each alter (ego-alter relationship) and concerning perceived relationships among alters (alter-alter relationship). A structured, interviewer-administered questionnaire was used. UCINET social network software was used in analyzing the data. Important variables include density (number of ties out of a possible number of ties), homophily (similarity), cohesiveness of networks, degree centrality (popularity or prominence of actor) and betweenness centrality (how frequently an actor connects actor pairs who ordinarily might not connect).

Key findings

A conducive environment for scale up was provided by the availability of a policy context which supports task-sharing, in addition to the application of lessons learnt and proof from the pilot program. Scale up challenges arising from the health system included professional health groups' resistance to the policy on task-shifting, inadequate community health workers, poor funding and weak logistics management which adversely affected material distribution and availability. Nevertheless, there were some of health-worker inventions which sustained the

scale up. Occasionally, health workers used private funds to bridge logistics and funding gaps. Often, they adapted the process so as to adjust it to contextual realities.

Sociocultural challenges to the scale up process included religious and traditional beliefs concerning reproduction, myths regarding contraceptives and family planning, patriarchy and men's fear of losing control of their partners. As a result of innate beliefs that reproduction should not be regulated and that children are blessings from God, participants described a subtle resistance to uptake of injectable contraceptives. Since Gombe is largely a male-controlled society, male involvement emerged as important to the success of meaningful innovation diffusion. Community leaders mostly described their participation in the scale up process as active, although they also identified scope for further involvement and recognition.

Although the innovation was designed to be community-based, little fit between the design of the innovation and users' preferences was found. However, by engaging with users, the packaging of the innovation was modified to take into account cultural, religious and programmatic factors, thereby improving the 'fit'. These included the discrete use of markets as mobile posts to distribute the injectables and to provide healthcare for women, outreach activities to women's gatherings and clients receiving contraceptives at community health extension workers' (CHEWs) homes. Other modifications were the recruitment of young female community volunteers as peer educators, partnering with patent medicine vendors and social marketing using mobile telephones in order to improve the use of contraception and its continuation among women not wishing to become pregnant. Community participation took place right from the planning stages to scale up through community-based organizations and community gate-keepers.

For the quantitative part of the study, 20 index participants (egos) were recruited and these generated 200 alters. Nearly 75% and 62% of the egos and alters, respectively were at least 30

years old. Approximately 98% of alters and all the egos were married. Similar actors, in majority of the networks, shared homophilic interactions according to some sociodemographic features including age, ethnicity, type of marriage and education. Most of the networks (greater than 90%) were cohesive with a density greater than 50%. Majority of members in these networks were injectable contraceptive users. Some actors with the highest betweenness centrality do not use injectable contraceptives in few of the networks.

Implications

This study revealed that diffusion of community-based distribution of injectable contraceptives (CBDIC) may be impeded by health system weakness. Similarly, it shows how scale up may be hampered when wider health system readiness and capacity are not considered. Although sustainability is uncertain, initiatives and actions taken by frontline health workers helped the scale up process. Diffusion of health innovation may not be successful if health system problems are not addressed despite benefits established during the pilot.

Furthermore, most of the modifications to the packaging of this innovation resulted from socio-cultural, religious and programmatic considerations. Innovation packaging should be context-specific and cost-effective. Also, there might be a need to combine strategies for synergy and to integrate community-based distribution with existing programs and infrastructures. Scale up approaches should include flexibility and allow for adaptation to fit local contexts within the areas that it is rolling out to.

Besides, scale up entails more than training health workers, getting innovation supplies or creating health sector implementing structures, but also involves preparedness which includes paying attention to complex environmental matters. This requires the health system and those who work in it, to go past a thin health ‘comfort zone’ by actively engaging with, and learning from community members, leaders and other stakeholders.

Also, this study demonstrates how SNA may be used to identify opinion leaders and champions among reproductive age group women. The possible influence of social networks on the scale up of community-based injectable contraceptives, and how homophilic and dense networks may have unexpected desirable effects were also shown. Similarly, the findings of this study showed the interrelatedness of network actors' choice to uptake a health innovation.

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Preface

Over the years, empirical data have shown that developing countries, including Nigeria, are very productive with formulating policy documents, however, implementation of the numerous policies has been suboptimal. Often, when some of these policies make it to implementation or pilot, scale up or widescale implementation and sustainability are often problematic. This is what inspired me to undertake this PhD.

I have worked in the Nigerian health system for more than 15 years. During this period, I have provided health services at the primary, secondary and tertiary levels. I have also worked in both public and private health sectors. As a public health physician who has worked among some disadvantaged populations like the refugees, internally displaced persons and urban slum dwellers, I have often noticed the inequity in access to health services in Nigeria and a few African countries. Thus, I have always wanted to understand why, despite the plethora of policy documents, implementation has been daunting and why health innovations that have been proven to be beneficial are often not scaled up for the use of the larger population.

Nonetheless, research evidence has shown that scale up of health innovations is essential for the attainment of universal healthcare especially in Nigeria where a number of barriers still exist to access to health care. These barriers include socio-cultural, religious, economic and programmatic hurdles. I undertook this study in order to understand the barriers and facilitators of health innovation scale up and how these influence access to certain health services nationwide. The study also explored the use of social networks in innovation spread particularly in a cultural and patriarchal society as northern Nigeria. My PhD was through the path of thesis with publications. Thus, this thesis has two parts: an integrating narrative which provides the background, rationale, research methods, key findings, contribution of the thesis to knowledge

and implications for policy and practice. The second part contains the four research papers that constitute part of this PhD.

Introduction and thesis overview

Introduction

Scale up is defined as all efforts to make a health innovation accessible to many more people at new places through improved provision of human resources, funding and materials within a more effective health system (1-3). Following the success of the 2010 pilot of community-based distribution (CBD) of injectable contraceptives, a policy decision was made to spread the intervention to a wider geographical area and to more users in Nigeria, starting with expansion in the rest of Gombe and later extending to other parts of the country (4). Scale up was proposed to guarantee that the innovation benefits recognized during the pilot implementation were made available throughout the country. Nevertheless, there is limited knowledge on how to effectively spread this health innovation outside the original pilot location, and to scale up in ways that can increase innovation spread and address unmet needs towards meeting the global sustainable development goals 3 and 10 on reducing infant and maternal mortality rates as well as reducing social inequalities (5).

Thesis overview and structure

Integrating narrative

There are four chapters in this integrating narrative. **Chapter one** includes the introduction and literature review – twelve sections in all. The background forms the first section which describes the pilot of the CBD of injectable contraceptives administered by Community Health Extension Workers (CHEWs) as well as the Nigerian health system context. The second section explored different definitions of ‘scale up’ in the literature and why effective health innovations might not be available on a large scale. The challenges to health innovation scale up are explored in section three while the fourth section describes the facilitators of the scale up process in developing countries like Nigeria. Section five discusses the health system and how

its capacity can influence spread of the innovation in low- and middle-income countries (LMICs).

Section six assesses how user preferences influence innovation packaging or presentation and subsequently scale up. In the same vein, sections seven and eight examine how sociocultural environment and social networks may affect innovation uptake respectively. The problem statement is presented in section nine followed by the rationale for the research in section ten. The eleventh section lays out the overall research approach while the final section presents the thesis framework – the AIDED model and research aims.

Chapter two presents the overall methodological approach for the four interconnected papers constituting this thesis. This chapter details the overall study design, setting, sampling, and participants selection. Full methods for each of the four studies comprising this study are available in appended papers 1 – 4. This chapter also describes how data from both qualitative and quantitative methods were integrated.

In **Chapter 3**, the summary of the main findings from the four studies is presented (complete results are presented in the different papers). **Chapter 4** discussed the implications of findings from the four studies. In particular, it discussed the influence of health system capacity, sociocultural context, innovation packaging as well as social networks on scaling up CBD of injectable contraceptives.

Original papers

Four original related study articles were written as part of this PhD. Three of the four manuscripts have been published while one is under review. The titles of the papers are presented below while the papers are added as appendices 36 – 39.

1. **Akinyemi, O.,** Harris, B., & Kawonga, M. (2019). Health system readiness for innovation scale-up: the experience of community-based distribution of injectable contraceptives in Nigeria. *BMC health services research*, 19(1), 1-11. (published)

Candidate 's role: conceptualisation, development of tools, data collection and analysis, writing the first and subsequent drafts of the paper in light of co-authors' inputs.

2. **Akinyemi O.O.,** Harris B., Kawonga M. (2020) Community-based delivery of injectable contraceptives in Nigeria: does the packaging of the innovation fit user preferences? *BMJ Open* (under review)

Candidate 's role: conceptualisation, development of tools, data collection and analysis, writing the first and successive drafts of the paper in light of co-authors' inputs.

3. **Akinyemi O.O.,** Harris B., Kawonga M. (2020) 'Our culture prohibits some things': qualitative inquiry into how sociocultural context influences the scale-up of community-based injectable contraceptives in Nigeria. *BMJ Open* 10(7), e035311. (published)

Candidate 's role: conceptualisation, tool development, data collection and analysis, writing the first and subsequent drafts of the paper in light of co-authors' inputs

4. **Akinyemi O.O.,** Harris B., Kawonga M. (2019) Innovation diffusion: how homogenous networks influence the uptake of community-based injectable contraceptives. *BMC public health* 19(1): 1520 (published)

Candidate 's role: conceptualisation, tool development, data collection and analysis, writing the first and subsequent drafts of the paper in light of co-author inputs

CHAPTER 1 BACKGROUND AND LITERATURE REVIEW

1.1 Background

Over the last few decades, there have been a number of health innovations that have been demonstrated to enhance the quality of life globally (6). These include interventions that have been used effectively to combat diseases, encourage decision-making in fertility and improve the efficiency of health systems (6-9). The CBD of injectable contraceptives administered by CHEWs is one of such health innovations that has been piloted with significant success around the world, including Nigeria. Evidence abounds that community health paraprofessionals can safely dispense injectable contraceptive Depo-Provera (medroxyprogesterone acetate), which is given every three months to reproductive age women in the community who do not desire to get pregnant (10-12). This innovation has been established to be safe and effective in pilot projects in African countries including Uganda, Kenya, Malawi, Rwanda and Ethiopia (13, 14). Similarly, research has revealed that CBD of family planning commodities enhances access and gives potential users more choices with regards to the family planning methods to adopt (15).

Nigeria had not fully exploited the potential of this innovation to expand access to family planning services until about 2014. Increased use of family planning interventions is especially imperative in this country with low contraceptive prevalence rates (CPR) (16, 17). According to the latest demographic and health survey, CPR among currently married women is 12% for modern methods and 17% for any method (17), with a wide rural-urban dichotomy (18, 19) and sub-national and regional variations (20). Modern contraceptive methods include injectables, pills, condoms, intrauterine devices, male and female sterilization and implants (17), while non-modern (traditional) methods refer to withdrawal, rhythm and lactational amenorrhea method (21).

Presently, only 3% of Nigerian married women use injectable contraceptives (22). Currently, male condom is the most popular (21%) among women of reproductive age, followed by injectables (5%) and pills (4%) (23). Increasing contraceptive prevalence is a priority for Nigeria where the total fertility rate (TFR) is still high. The country has a TFR of 5.3 per woman (17), and an yearly population growth rate of 2.7% (24). The low CPR is an important contributor to the maternal mortality ratio which currently stands at 576/100,000 live births with maternal deaths responsible for about a third of all deaths among women of reproductive aged group (22). Factors influencing contraceptive uptake in Nigeria include age, level of education, wealth index, place of residence, marital status, religion, parity and spousal communication about family size (20, 25-27).

Although Nigeria has implemented CBD of oral contraceptives through health workers since 2003, it was only in 2007 that the country started revising its family planning policy to introduce CBD delivery of injectables by lay health workers (like CHEWs) through task shifting (see Figure 1). This resulted in a pilot study in 2010 in Gombe State, North-eastern Nigeria, which tested the feasibility of CHEWs administering injectable contraceptives at households and community settings (4). The pilot study demonstrated that CHEWs can administer injectable contraceptives safely in the community and that community-based access to injectable contraceptives was a more effective approach compared to the facility-based system (4). The pilot project demonstrated that the CBD approach produced a significantly higher couple-year protection rate compared with the facility-based contraceptive services (4). The pilot also showed that given the health worker shortage in the country, CHEWs can bridge the human resource for health gap and increase access to injectable contraceptives, particularly in the rural areas, in a more effective and efficient way (28).



**Family planning*

Figure 1: Timeline for pilot study and scale up

Also, it has been shown, particularly in low- and middle-income countries (LMICs), that scale up is imperative for health innovations (such as CBD of injectable contraceptives) to achieve their goals (1, 2). Scale up involves making health innovation accessible to many more people in more locations through improved provision of human resources, funding and materials within an effective health system (1-3). Following the success of the 2010 pilot of CBD of injectable contraceptives, a policy decision was made to scale up the intervention in Nigeria, starting with expansion in the rest of Gombe and later extending to other parts of the country (4). Scale up was proposed to guarantee that the innovation advantages recognized in the pilot implementation phase were made available throughout the country.

1.1.1 The innovation

Prior to the revision of the Nigerian family planning policy and the adoption of the community based injectable contraceptives (CBDIC), injectable contraceptives were usually administered at the health facilities by nurses and doctors. Thus, this CBDIC innovation entails task-shifting the administration of this contraceptive to CHEWs and taking its provision beyond the health facilities into the community. CHEWs are “a low cadre of trained medical professionals” (29) and frontline health workers (30) who have completed two to three years of training at schools of health technology (29). They are expected to spend about 80% of their time in the community and the

rest in health facilities (31). CHEWs are usually engaged in the public sector and they operate largely at the primary health care level where they treat ailments like malaria, minor injuries and dispense public health commodities like contraceptives, vaccines, insecticide-treated nets, among others (32). The Community Health Practitioners' Registration Board of Nigeria regulates the training certification and practice of CHEWs (32).

In 2014, the scale up of the CBD of injectable contraceptives started in Nigeria led by a national NGO. The process started with the training of trainers as well as CHEWs (33). By 2016, widespread community-based delivery of injectable contraceptives has started in Gombe State (North East) and Kebbi State (North West). Also, a plan was ongoing to start the scale up in Ebonyi State (South East Nigeria). However, there is inadequate understanding on how to scale up this innovation effectively outside the original pilot location, and to scale up in ways that can increase uptake and address unmet needs.

1.2 What is scale up?

'Scaling up' does not have a uniform definition in the literature, although it is generally used to describe making a health innovation available over a wider geographical area in order to benefit more people (3, 34). It has also been described as increasing financial or human resources earmarked for a health program in order to enhance coverage (34, 35). Scaling up a cost-effective health innovation can be a complex process as there is no one-size-fits-all method (1, 36, 37). The success of the process also depends heavily on the strength of the leadership and the initiative of the drivers of the innovation (3, 6, 38).

Recently, the resources available to health services have increased alongside political will and funding thus creating the opportunity to bring evidence-based services to more people around the world (1, 39). The lack of guidance on how to scale up is, however, one of the reasons why many

health innovations which have been proven to work in research or small-scale demonstration projects are not available to the wider population, despite efforts at scaling up (10, 39, 40). The literature, however, shows that research on health innovation scale up is limited, especially in LMICs with limited research capacity (41), but is an important component of implementation research that seeks to narrow the policy to implementation gap. Such implementation research is needed to address the barriers to effective replication of proven health innovations (42, 43). Available research identifies some of the challenges and facilitators for scale up.

1.3 Challenges to health innovation scale up in developing countries

Studies have shown that in order to achieve universal health access, improve child survival and achieve global development goals in developing countries, scaling up of effective health innovations is imperative (44-47). For example, a number of health innovations have been scaled up to combat the challenge of health worker shortage (48, 49) as well as improve service delivery in the management of chronic diseases (50), malaria (51) and mental health in LMICs (52). But, as Eaton and colleagues opine, health innovation scale up has only marginally achieved its primary goal of improving universal access in developing countries (8).

There are a number of varied and context-dependent reasons why scale up of health innovations has not been largely effective in developing countries. These reasons relate to peculiarities with the innovation itself, preferences and characteristics of the potential users including their readiness to adopt the innovation, and difficulties in adapting the innovation to the local environment (social, political and economic) (44, 53, 54). Regarding the health system context, the method of dissemination of the innovation – whether facility- or community-based distribution and support from the ministry of health may affect scale up (10, 39, 53). For example, in Nigeria, the low utilization of orthodox health facilities (25.6% in northern Nigeria) (22, 55) affects the uptake of

health innovations that are provided through the facility-based approach. This provides justification for the community-based distribution approach to the scale up of injectable contraceptives. Other challenges include inadequate human resources, inadequate supervision, poor leadership in public health, over-centralised and weak health systems as well as insurgency which has recently exposed health workers to untold dangers in some settings (including northern Nigeria) (8, 49, 56, 57). The *Boko Haram* insurgency has negatively impacted community-based services provided by CHEWs and other community health workers in this part of the country. Also, uptake of health innovation may be impaired by weak logistics systems leading to frequent commodity stock out as experienced in the pilot program to expand access to injectable contraception in Burkina Faso, Senegal, Uganda and Niger between 2014 and 2016 (58).

Furthermore, Nigeria's experience with polio immunization scale up shows that demand-side factors influence scale up of an innovation. Religious beliefs, as well as the community's lack of trust in the proponents of the innovation, and previous negative experience with failed health interventions (59) all impeded the scale up of an available and effective polio vaccine (55, 60). Evidence has shown that lack of active community participation in the design and implementation of innovations hampers successful scale up (39, 53, 61).

Regarding the political and economic contexts, although in the past few years, there has been increased funds allocation to public health interventions in LMICs, the recent global financial recession has reduced the pool of funds available for health and development programs in LMICs (44, 56). This has resulted in massive budget cuts and scaling back of previously planned health interventions. Poor political will as demonstrated by the low priority that decision-makers often give health issues in developing countries is another important barrier to scaling up (8, 53). Also, inadequate or non-involvement of program implementers and other stakeholders in the design of

interventions and throughout the implementation process has been described as a major challenge to innovation scale up (62, 63). Additionally, poor documentation of successful scale up efforts hinders the provision of a model that can guide future scale up in other regions (8).

1.4 Facilitators of the scale up process in developing countries

Strong political will, availability of resources, a clear legal framework and strong stakeholder advocacy facilitate successful scale up of health innovations (8, 44, 53, 64). Advocacy helps to draw attention to service gaps thereby promoting the need to scale up health services, ensuring greater financial commitment from the government and donors as well as infrastructural strengthening for better sustainability (8, 65-69). Although not sufficient in themselves, enabling health policies are important to guide the scale up process (8, 54, 70, 71).

Likewise, evidence is growing that task sharing is a veritable strategy to deal with the challenge of inadequate human resource (48, 69). This strategy has been used successfully in many areas of health including family planning, immunization, tuberculosis and HIV/AIDS management, pre-eclampsia, mental health, and TB, among others (48, 72-77).

Research has shown that for scale up of health interventions to occur successfully and sustainably, there must be a close partnership between researchers, policymakers and non-governmental organizations; barriers to scale up must also be addressed in an integrated manner (8, 66). Furthermore, there must be flexibility and novelty in the way innovations are designed and packaged in order to meet the challenges of the times – this is an important lesson from the global polio eradication movement (78-82).

1.5 How health system capacity influences innovation scale up in Low- and Middle-Income Countries

Political commitment, finances, human and material resources are indispensable in the scaling up process (35, 83-85). Nevertheless, political prioritization and conducive policy environment to improve spread of proven interventions are inadequate in LMICs (84, 86). However, political will and a favorable policy context are crucial if scale up of health innovation would be successful (84, 87, 88). Additionally, there is limited availability of proven health interventions in many LMICs because scale up is often commenced without prior proper assessment of the capacity of the health system (4, 10, 88, 89).

Furthermore, success of scale up activities is directly influenced by health system's strength and absorptive capabilities (35, 90, 91). Challenges in the health system like weak governance and leadership (87), insufficient human resources (8, 92, 93), uncertain financing (44, 84), absence of a strong legal framework (94), weak stakeholder support (95, 96) and over-centralized health systems (64) impede the system's capability to utilize enhanced donor funding (35) and to scale up interventions (92).

Research has shown that for scale up goal to be achieved, the readiness of health systems should be evaluated and augmented when necessary (87, 89). Evans and Etienne (97) submitted that increasing funds and resources may not automatically result in improved output if the health system is fragile. This is particularly so in Nigeria, where the health system has been described as complex and weak (98, 99). It must however be mentioned that the Nigerian health system is not only comprised of the formal set up but also the community and other informal systems

. The Nigerian National Health Act 2014 has legally incorporated the informal sectors and community structure into the Nigerian health system (100, 101). The Nigerian health system is largely divided into public and private sectors. Each of these sector can be further categorized into primary, secondary and tertiary tiers (102). Majority of the Nigerian population patronizes the private sector including informal health sectors. In many cases patent medicine vendors are the first line of consultation in most communities (22). Available data show that 60% of women of reproductive age in Nigeria obtain family planning services and information from the private health sector (22). According to Bradley and colleagues (86), evaluating the health system setting where an innovation will be distributed is very vital in the scale up process. However, health system preparedness to spread the CBD of injectable contraception has not been documented in Nigeria despite a policy to scale up the innovation (4).

1.6 User preferences, packaging and innovation scale up

Innovation denotes ways of doing something differently, even though it entails risks and challenges (103, 104). It may also refer to the process of developing a new item, adopting the new item or the new item itself (105). It can also be a new way of thinking about a product, process or service (103, 106). In health, innovation may involve the creation of new products, teams, roles or markets; or the rejigging or modification of existing processes, ideas or systems (107-109). Innovations have the potential to influence not just immediate or present users but also the networks in which these users are embedded (107, 110).

Innovation packaging refers to the way in which an innovation is presented, including the messaging, the materials and the media used (106). One of the main reasons why scale up of innovations fail is the inability to adapt health innovation packaging to the preferences of potential users (86). Innovation packaging has been demonstrated to influence the preferences of potential

users of such innovation. In a New Zealand study done among young people, plain packaging and warning labels significantly reduced users' preferences for sugar-sweetened beverages (111), while tobacco companies have also used packaging and innovation with product development to improve the uptake of their products by young adults (112). Similarly, food packaging has been shown to affect the perception of the healthiness of such food items (113).

Integrating and involving all stakeholders including potential users in the innovation packaging galvanizes the process and improves the chances of successful diffusion and implementation (107, 114). Knowledge of potential users' expectations, perceptions, and attitudes towards the innovation helps program implementers to better plan for innovation scale up as these drive public perceptions and shape acceptability (115, 116). However, potential users' opinion and preferences may not necessarily be in sync, or 'fitted', with expert opinions and submissions (114, 117, 118).

According to Kühne and colleagues (107), packaging does not change the main characteristics of an innovation but provides additional desired benefits, for example, in the case of community-based injectable contraceptives, flexibility, and confidentiality. Thus, packaging is not a substitute for innovation quality and safety (107). However, it is a key component of whether and how the innovation will be adopted on scale up.

1.7 How sociocultural context influences innovation uptake

The socio-cultural background, which includes gender and societal norms and attitudes, cultural and religious beliefs, is a vital predictor of the adoption of a health innovation in a population (35, 119). The sociocultural environment may facilitate or impede health utilization (120). For instance, cultural beliefs and practices have been demonstrated to influence the utilization of a range of health services including breast cancer screening (35, 120, 121), male circumcision (122), and

contraceptive use (123, 124). Without due attention to the socio-cultural environment, health innovation development, distribution and scale up is unlikely to proceed as planned (125).

There is abundant evidence about the influence of the socio-cultural environment on the uptake of contraceptive innovations. For example, Colleran and Mace (126), in a study in rural Poland, stated that sociocultural and religious factors influence the uptake of contraceptive use more than individual characteristics. Also, Dalaba and colleagues (127) in their study in northern Ghana stated that poor male participation resulted in resistance towards female reproductive freedom. Furthermore, interventions at the societal level, such as adequate male mobilization together with appropriate community-based distribution strategies were shown to be effective in improving contraceptive uptake (127). In Nigeria, a study found that about two-thirds of rural women who had spousal approval were reported to use contraceptives while all those who were forbidden by their husbands did not use any family planning method (128). In a patriarchal society like Northern Nigeria, women are expected - by prevailing norms, even if not in law - to obtain their spouses' approval before obtaining contraceptives. However, health providers will not ask about the women's marital status or whether they have their spouses' approval – these are not criteria for them to be served. Thus, understanding how the socio-cultural context influences scale up of contraceptive innovation is imperative.

According to Bradley and colleagues (86), assessing the receptivity and willingness of community members to adopt a health innovation within their environmental and socio-cultural background is one of the important first steps in the scale up process. Poor understanding by implementers of potential users' sociocultural setting will impede scale up efforts, while good understanding will help program managers to recognize contextual factors that may enhance or inhibit the uptake of an innovation (86, 129-131).

1.8 Social network analysis and innovation diffusion

Both genuine messages and rumors can spread through social networks (132); thus, social networks can facilitate equally positive and undesirable behaviors (133, 134). Nonetheless, research evidence has shown that social networks can facilitate health innovation uptake (134-136).

Social network analysis (SNA) involves mechanisms for the understanding of human behaviors as interactions occur among actors (137). Individuals linked together by one or more ties or relations are referred to as a social network (138). Network members communicate and share experience as well as learn behaviors through these ties (133). SNA has been used to explore human behaviour with regard to several health and health-related conditions (see examples in Box 1). In Nigeria, SNA has been used to investigate social structures as they influence conditions such as new vaccine introduction (136), mental health utilization (139, 140), human and sex trafficking (141, 142), counter-terrorism (143), information diffusion in agribusiness (144) and community policing (145). It is noteworthy that no study utilizing SNA to explore the diffusion of CBD of injectable contraceptives was found.

Social network studies are utilized to evaluate several characteristics of social networks, a few of which were explored in this study. For instance, degree centrality defines the position that each member occupies relative to other actors in the network. Density – the connections formed within a network as a percentage of total potential ties – measures interconnection among network members. In a network, some actors are central or dominant (those with the greatest number of ties to others), while others may be marginal (those with few ties or direct connections to others). Homophily is another network feature; it is a measure of how much an actor relates with other

actors with similar characteristics or sameness (146). Additionally, betweenness centrality assesses how many times an actor links network members who may ordinarily not be connected (147, 148).

- Tuberculosis (149)
- Sexually transmitted infections (150)
- Diabetes type 2 (151)
- Obesity and physical inactivity (152-154)
- Mental health (155-157)
- Suicide surveillance (158)
- Adolescent tobacco and drug use / peer group structure (159-162)
- Hospital patient management (155, 163)
- Adherence to treatment (164)
- Evidence-informed decision-making (165)
- Street children (166, 167)
- Primary health care management (168, 169)
- Health systems research (170-173)
- Health program implementation and management (137, 138, 174, 175)
- Research to policy networks (176)
- Social epidemiology (177)
- Health informatics (178, 179)
- Health advocacy and promotion (180-182)
- Continuing education among health professionals (183)

Box 1: Some health-related conditions in which SNA has been employed in literature

1.9 Problem Statement

Despite evidence that injectable contraceptives are an effective and convenient family planning method (10-12, 184, 185), and that CBD can increase its accessibility (4, 7, 58, 186), this

innovation is still out of the reach of many women, particularly those who live in rural areas in LMICs including Nigeria (4, 10, 24). Although some data exist on scaling up innovations, research on the scale up of the CBD of injectable contraceptives in LMICs is limited, especially as this innovation is fairly new (10). Similarly, there is a paucity of research assessing whether the scale up of CBD of injectables in Nigeria has taken into consideration possible barriers and facilitators, in order to optimize the success of the scale up process (10). Given the initiatives in Nigeria to move from pilot project to wider implementation of CBD of injectable contraceptives, research is needed to assess the possible facilitators and barriers to scale up of the CBD of injectables for consideration by policymakers when designing and implementing the scale up. Furthermore, implementation research to understand how factors related to the potential users and to their socio-cultural context may influence scale up of the innovation is needed to inform strategies for bridging the policy-implementation gap in LMICs like Nigeria (42, 187).

1.10 Rationale for research on scale up of injectable contraceptives in Gombe, Nigeria

It is instructive to analyze the scale up process of the CBD of injectable contraceptives in Gombe in order to understand the factors that may contribute to making the process successful (24, 188-191) and to understand possible barriers. This understanding is needed in order to inform guidelines on how to make further scale up a guided process (34, 192).

Although the pilot of the CBD of injectable contraceptives in Gombe State done in 2010 was adjudged successful, (29) this does not mean that large scale diffusion will automatically get ahead. Many global health interventions have failed despite successful pilots because they could not successfully navigate the “pilot-to-practice journey” in order to meet the needs of people beyond the pilot site. (193) According to Woltering, most pilot programs succeed because they are done in a sort of controlled environment with a lot of attention and funding, often without the real

contextual challenges – politics, inadequate funding, market forces, infrastructural problems and so on. (194) Thus, this study is interested in what happens beyond the pilot project and to learn in what ways contextual challenges might be influencing the scale up of the innovation and how the transformation from pilot to practice may advance towards sustainability. (193)

Also, this study contributes evidence to aid understanding of the barriers and facilitators to the scale up of the community-based distribution of injectable contraceptives intervention in Nigeria. Understanding these factors will also help to develop a practical model for scaling up this health innovation in Nigeria that could also be applied to other health innovations in other low- and middle-income countries, and add to available information about the process of transiting from pilot study to wider-scale implementation of interventions (10, 39, 195).

Additionally, SNA was utilized to explore the possibility of index users of CBD of injectable contraceptives to encourage the use of the innovation by new adopters in their networks. Knowledge about how social networks may improve the adoption of the community based injectable contraceptives is sparse. The index users were reproductive age group women who had adopted the CBD of injectable contraceptives at the time of the Gombe state pilot project. To the best of my knowledge, no study has examined how social networks aid the spread of injectable contraceptives in Nigeria, particularly from users' viewpoints. Therefore, this study examined characteristics of the social networks (homophily and density) of index users of CBD injectable contraceptives and assessed the degree to which index users communicated with women in their networks about the innovation.

1.11 Overall research approach

This research is guided by the definition of scale up as making a health innovation available over a wider geographical area in order to benefit more people (3, 34). The research (the objectives as well as the individual studies) will be guided by the AIDED model (described in detail in the section below).

1.12 Thesis framework and research aims

1.12.1 Thesis framework

This research adopted the definition of scale up that refers to the process of extending the innovation to a greater number of new users and extending the geographic reach of the product (34, 35, 196, 197). Of the available scale up frameworks (198-201), the AIDED model proposed by Bradley and colleagues. (86), was appropriate for this work because it captures a set of interrelated factors that may affect innovation scale up (related to the user, the innovation, and the environment in which the innovation was introduced) whereas most other frameworks focused on actors or context (61, 202, 203). Hence, this study analyzed the uptake of CBD of injectable contraceptives in Nigeria guided by the AIDED framework – a model for distribution, spread and scale up of family planning innovations in LMICs (10). AIDED is an acronym for the model's five interrelated, iterative components: Assess, Innovate, Develop, Engage and Devolve. These steps reflect Bradley and colleagues' recommendations for innovation scaling-up process, based on their review of the evidence on the barriers and enablers for scaling up innovations from pilot demonstration projects in low- and middle-income countries (10, 86). This model (Figure 1) was proposed based on the experiences in developing countries, but has not been applied previously to guide research assessing health innovation scale up.

The Assess component is about assessing how receptive the user groups (both current and potential users) are to the innovation and factors in the environmental context that may support the implementation of the innovation. The Innovate component deals with the process of designing and packaging the innovation to fit the user groups' needs and wants (10). The Innovate component also entails adapting the innovation to the existing health system structures while ensuring that it is socially and culturally acceptable. The Develop component of the AIDED model involves building on existing sources of support for the innovation (amongst users and the environmental context) as well as addressing resistance in order to provide a conducive environment for increasing uptake among the intended users. The Engage component entails engaging with potential user groups and the broader community to enhance the process of embedding the innovation into their routine practices. Finally, the Devolve component refers to index users releasing and spreading the innovation to new groups through various means, including their social networks. The endpoint of releasing the innovation may be replication, adaptation or failure of the innovation. For the Devolve component, this study assumes that the injectable contraceptives are available and are being distributed by CHEWs in the community. Figure 2 is a diagrammatic representation of the model. This study draws upon this framework to assess whether the current scale up efforts in Gombe State, Nigeria are being applied according to the components of the AIDED model, while Table 1 gives more insight into the different components and how this work drew on the model. Also, this study identified possible barriers and facilitators to scale up within each component and contributed data on the experience of using the elements of the AIDED model to guide the analysis of scale up.

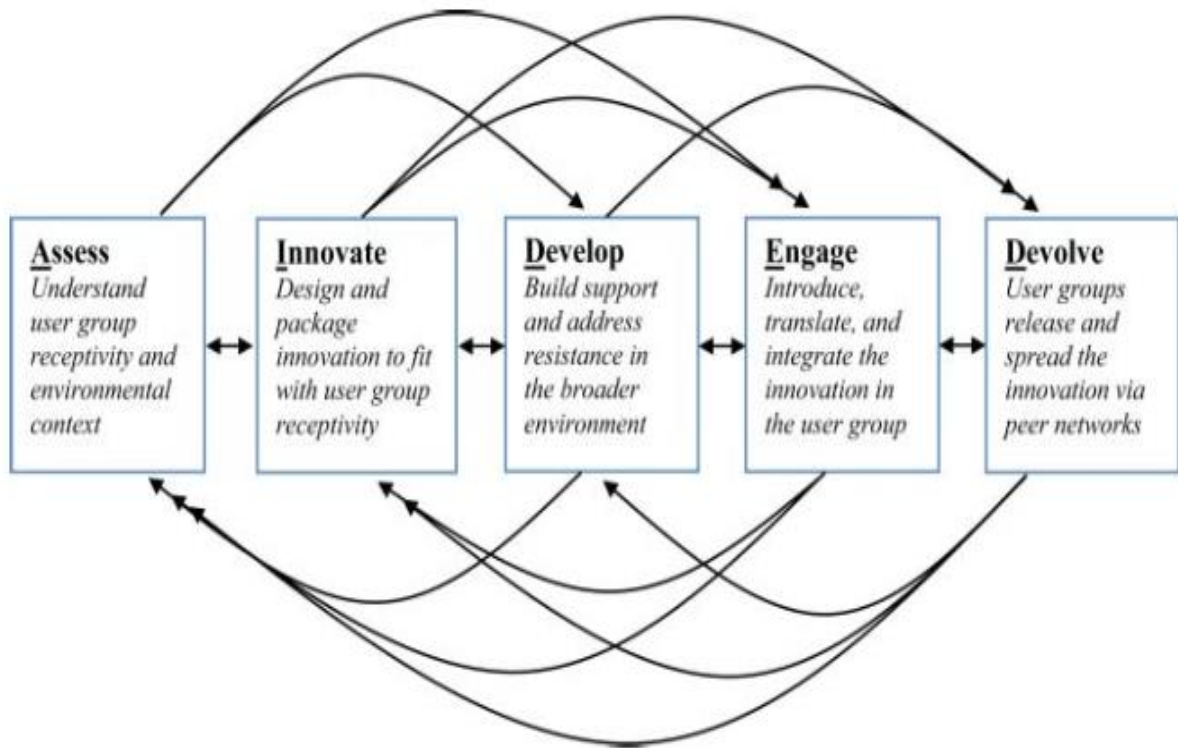


Figure 2: AIDED model of dissemination, diffusion and scale up in low-income countries
[Source: Bradley and colleagues (86)]

The research explored the following research questions in relation to the framework (Table 1).

Table 1: Applying the components of the AIDED model to this research

AIDED model component	Research question	Topic of paper/manuscript
Assess	What is the degree of support for the innovation among the user groups and in the environmental context (political, regulatory, economic, socio-cultural health system)?	Health system readiness for innovation scale-up: the experience of community-based distribution of injectable contraceptives in Nigeria (Paper 1)
Innovate	In what way or how has the innovation been adapted/fitted to user groups' needs and wants?	Community-based delivery of injectable contraceptives in Nigeria: does the packaging of the innovation fit user preferences? (Paper 2)
Develop	To what extent have the sources of support been built upon and resistance addressed in order to optimise uptake of the innovation?	"Our culture prohibits some things": Qualitative inquiry into how sociocultural context influences the scale up of community-based injectable contraceptives in Nigeria (Paper 3)
Engage	What resources presently exist within the user groups, which may help the process of introducing, translating and integrating the innovation?	
Devolve	Are there opportunities for index users to spread this innovation to new potential users through their social networks?	Innovation diffusion: How homogenous networks influence the uptake of community-based injectable contraceptives (Paper 4)

Adapted from Bradley and colleagues (10)

1.12.2 Aim and Objectives

The aim of this study is to explore the interplay between possible barriers and facilitators of the scale up of the community-based distribution of injectable contraceptives guided by the AIDED model in order to inform wider scale up of this innovation in Nigeria.

In relation to Gombe State Nigeria, the specific objectives of this study are:

- 1a. To assess the support and resistance for the community-based distribution of injectable contraceptives amongst users and the environmental contexts, and
- 1b. To explore whether and how support and resistance are considered in the process of scaling up.
2. To explore the fit between the design and packaging of the innovation and user wants and preferences.
3. To explore whether and how potential user groups and community members were engaged to facilitate the integration of the innovation within their routine practices.
4. To explore the potential for index users of community-distributed injectable contraceptives to influence the uptake of the innovation by new users in their social networks.

Figure 3 below shows where the objectives and papers are situated within the AIDED framework. It must, however, be highlighted that each of the components of this model is not independent, but rather, there is a lot of overlap between them as the arrows in the model show.

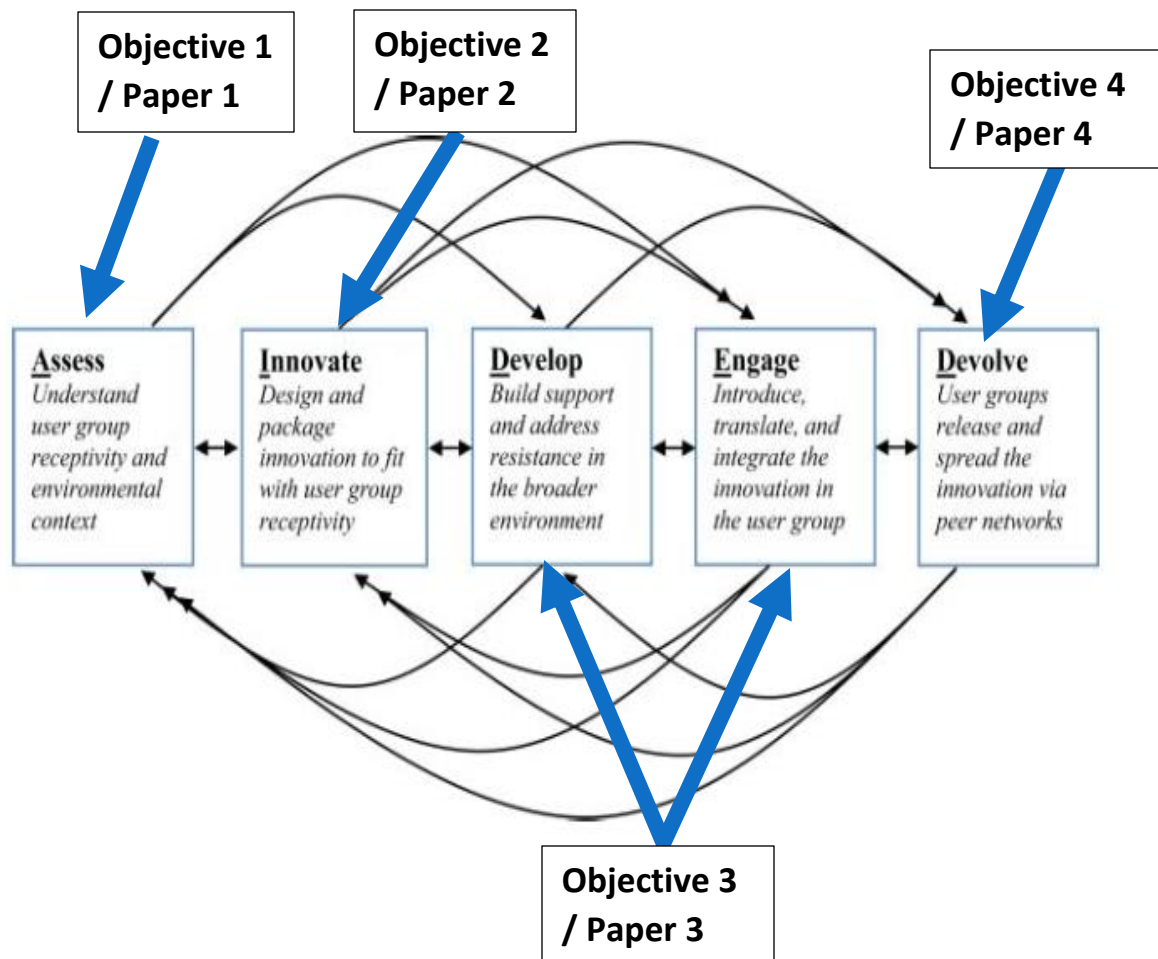


Figure 3: Thesis framework – linking the AIDED model and research objectives to the papers

CHAPTER 2 METHODS

The overall methodological approach for the four inter-related studies is described in this chapter.

The specific methods for each paper are presented in appendices 36 – 39.

2.1 Overview and summary of research methods

2.1.1 Study design, setting, sampling and participants

Setting

The Federal Republic of Nigeria has 36 federating units called States and a federal capital territory – Abuja. There are three levels of health governance - federal, state and local government levels.

The research was carried out in Gombe State (Northeastern Nigeria). Gombe (Figure 4) is divided into 11 Local Government Areas (LGAs) administratively and has a population of 2,353,879 people according to the 2006 census comprising about 50% women and about 22% women of childbearing age. Gombe State has one of the highest maternal mortality rates in the country (1,726/100,000) as well as low contraceptive prevalence rates (4.0% for any method and 3.5% for modern methods) (4, 24).

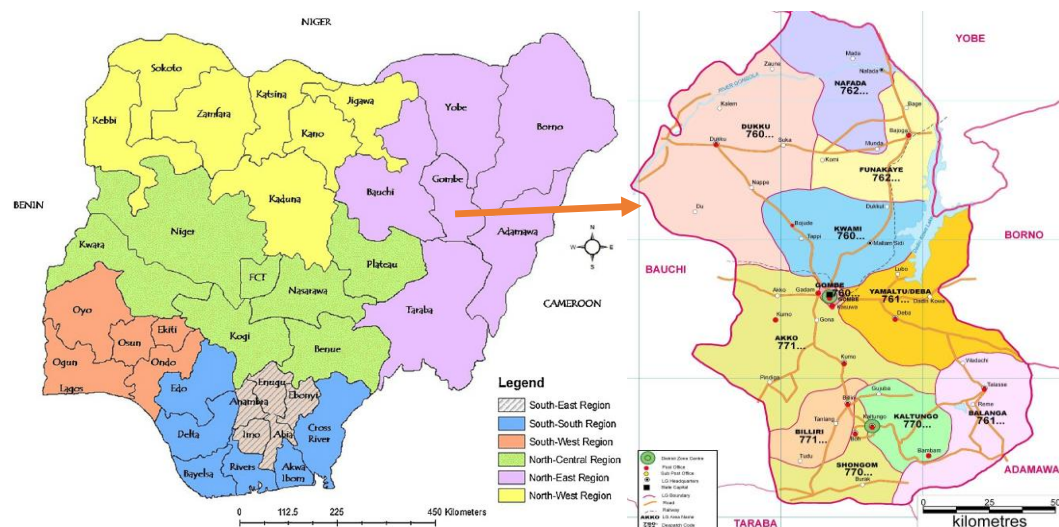


Figure 4: Nigerian map showing Gombe State with its Local Government Areas

Gombe is one of the Nigerian North-eastern states affected by the Boko Haram insurgency which started in 2011 (204, 205). This insurgency has endangered the security and lives of health workers in this region and has affected the implementation of polio immunization and other health programs (56, 57). The CBD of injectable contraceptives pilot project was executed in Funakaye and Yamaltu/Deba LGAs of Gombe State between 2008 and 2010 by the Federal Ministry of Health, Nigeria in collaboration with FHI 360 (an international NGO) and the Association of Reproductive and Family Health (a national NGO) (4). Gombe State was selected for the pilot project because it has a low contraceptive prevalence rate (CPR) and a high maternal mortality rate. The State also had a political commitment to the program (by taking ownership of the program and supporting the Federal Ministry of Health and other implementing partners) and an existing CBD for family planning commodities (condoms, pills etc) on which injectable contraceptives could piggyback (29). However, due to the *Boko Haram* insurgency in Funakaye, the research took place primarily in Gombe and Yamaltu/Deba LGAs.

Study design

This was a cross-sectional, sequential exploratory mixed-method study (Figure 5) that assessed the process of scale up, as a form of implementation research (206-208).

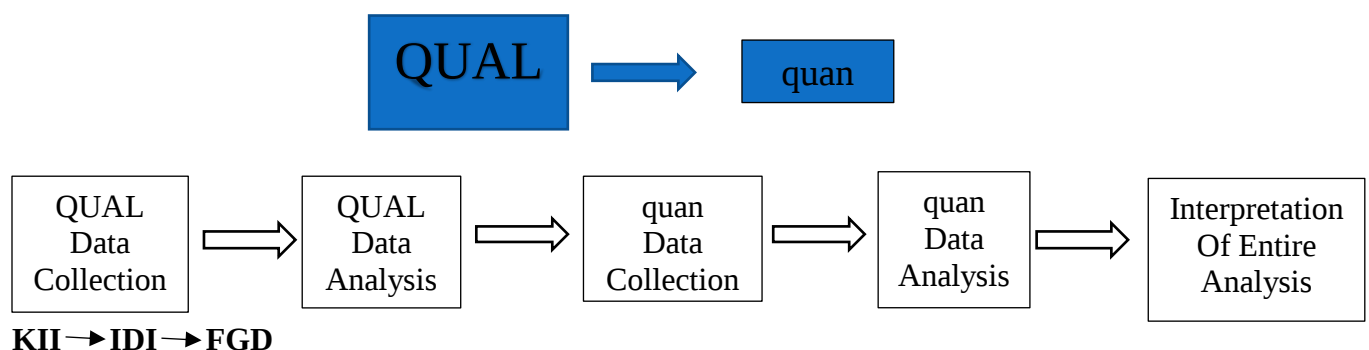


Figure 5: Sequential Exploratory Design [Adapted from Creswell (Creswell, 2013)]

Note: “QUAL” stands for qualitative, “quan” stands for quantitative, capital letters indicate high weight or priority while lower case letters signify lower weight or priority. (209, 210)

In the sequential exploratory design, one phase of the mixed-method study builds on the other. In this mixed-method strategy, the qualitative data collection and analysis preceded the collection and analysis of quantitative data (210). Likewise, priority was given to the qualitative aspect of the study although the quantitative data and results may help to better interpret the qualitative findings (210). In this study, however, the exploratory sequential approach was more within the qualitative component as the quantitative component was not necessarily informed by the qualitative methods. However, participants for the quantitative component were recruited from those who participated in the focus group discussions (FGDs) - thus the design was sequential. The qualitative research component included key informant interviews (KIIs), in-depth interviews (IDIs), FGDs, and document reviews, while the quantitative research method included an SNA survey. The mixed methods enhanced complementarity and triangulation of data obtained through different methodological approaches (206, 211, 212). The decision to use mixed methods was guided by the study's objectives and because these methods were suitable for studying complex social processes and generating unique perceptions (213-215). This research was conducted in two phases. Phase one consisted of the qualitative methods while the social network analysis constituted the second phase.

The qualitative data were collected first in order to explore the facilitators and barriers to the scale up, while the social network data collection followed to examine in particular the findings about the potential spread of the innovation through social networks of index users. In the qualitative phase, data collection followed a sequence of firstly KIIs with the policymakers and NGO project managers, which informed issues explored secondly in IDIs with the health workers, community leaders, and religious leaders. Thirdly, themes that emerged from the KIIs and IDIs were integrated into questions explored with women and community members in the FGDs (See Figure 3).

However, the integration of the data from both qualitative and quantitative methods occurred during the interpretation of findings through narrative in accordance with the exploratory nature of the study design (207, 210, 216). In this study, the staged approach to integrating through narrative, where the qualitative and the quantitative findings are published separately, was adopted in the data integration (216).

Study population and sampling

The study population included adults (over 18 years), both male and female:

1. Senior MoH officials (mid- and upper-level health and family planning managers and policymakers at each level of the health system - national, state and local). The policymakers at the national level were those from the Federal Ministry of Health Abuja who participated in the pilot program in Gombe and those who were currently involved in the scale up process
2. Program managers of the two participating NGOs (Association for Reproductive and Family Health and FHI360) who were involved in the pilot and the scale up of injectable contraceptives
3. Health workers (doctors, nurses, and CHEWs) in Gombe who were involved in the administration of the community-based injectable contraceptives
4. Traditional community leaders (chiefs) and religious leaders. These were selected purposively based on their awareness of and involvement with the introduction of the injectable contraceptives program at the community level
5. Women who were current users of the CBD of injectable contraceptives (index users or early adopters), and

6. Broader members of the community (including men [married and single], women in the reproductive age group [18 – 49 years] who were not using the innovation, and older women not using the innovation). Women below 18 years were excluded from the study irrespective of their marital status.¹

In all, 15 IDIs, seven KIIs and 10 FGDs each comprising of eight people, were conducted to obtain data from health workers, religious and traditional leaders as well as community members (see Table 2).

¹ Women less than 18 years were excluded from this study (irrespective of their marital status) because

- Ethical issues of including a minor in a research which may necessitate parental consent
- The official age of marriage in Nigeria is 18 years

Table 2: Study sites, data collection methods, and participants' description

Study sites	Data collection method	No. of interviews/discussions	No. of participants	Participants' description
-	Desk-top review	-	-	Contraceptive policies and guidelines, task-shifting policy documents
Gombe	IDI	15	15	Health workers (CHEWs ^a , Nurses,)
	SNA questionnaire	20	20* ²	Current contraceptive users (these were selected from the FGD sessions)
	KII	3	3	Senior official of State MoH ^b , State Family Planning (FP) coordinator, Director PHC ^b
	FGD	10	80**	Current contraceptive users, married and single men, younger women non-users (in reproductive age group), older women non-users,
Abuja	KII	3	3	NGO ^c program manager (physicians), FP coordinators at the Federal MoH ^b
Ibadan	KII	1	1	NGO program manager (physician)
Total participants			102	

^a Community Health Extension Workers; ^bMinistry of Health; ^cNon-Governmental Organization

*This number does not add to the total figure, in order to avoid double counting since these

**Each FGD comprised of 8 participants

Overall, a total of 102 people participated in the study. Participants comprised an array of stakeholders, including traditional and religious leaders, health workers as well as community members. These participants were recruited through a purposive sampling method. In purposive sampling, participants are selected based on characteristics of interest, availability, and ability to provide relevant information to the research question (217, 218). The exact number of focus group

² Each network includes 20 participants, but in SNA study, the unit of analysis (sample) is not the people but the links between them.

discussions [index users (early adopters) and broader community members] depended on the principle of saturation in qualitative enquiry – when no new information is evolving (219). Snowball sampling was used to obtain the samples. For the SNA survey, participants were recruited purposively from the FGDs (women who currently use injectable contraceptives). Twenty women were recruited to participate in the SNA. Each of the 20 purposively selected women who currently uses community-based distributed injectable contraceptives was invited to list 10 women of reproductive age within their social networks, whom they related with. Each of these women (egos) were asked certain questions about their relationships with the women (alters) they have earlier listed (ego-alter relationship). Furthermore, each ego was asked for the perceived relationship among alters (alter-alter relationship) (See appendix 4). The sample size for analysis in the social network survey was the total number of connections among members in the ego network and not the 20 women (220).

2.2 Data collection and management

Key informant interview guides were used to collect qualitative data from MOH officials and NGO program managers (Appendix 1), as well as health workers (doctors and CHEWs) and community leaders (Appendix 2). Focus group discussion guides were used to collect data in FGDs with four different groups: a) current users (index users); b) older women non-users; c) younger women non-users (in reproductive age group); and d) married and single men (see Appendix 3). The social network analysis (SNA) survey explored whether the index users who participated in the FGD (egos) shared information and experiences about using contraceptives through the CBD approach with other women in their social and peer networks (alters). An interviewer-administered ego network analysis questionnaire (221) was used to collect the quantitative SNA data from index users (egos) (see appendix 4). A desk-top review of documents was performed – including

contraceptive policy and guidelines, the task-shifting policy, (222), reports documenting the CBD pilot project processes and outputs, National Reproductive Health Policy, (223) as well as the National Family Planning/Reproductive Health Policy Guidelines and Standards of Practice (224). Table 3 below describes the data collection methods for each objective of the study and the data that were collected.

Table 3: Data Collection Methods for each objective

Objective	Issues explored	Data collection method	Papers / Manuscript
1. 1a. To assess the support and resistance for the community-based distribution of injectable contraceptives amongst users and the environmental contexts, and 1b. To explore whether and how support and resistance are considered in the process of scaling up.	• Features in the environmental context that can support /resist the innovation: - Political context: availability (or otherwise) of enabling policies - Health system context: e.g. supportive service delivery platforms, perceptions of medical professionals • User-related factors that may support/resist the innovation - e.g. women's perceptions about injectable contraceptives and the CBD approach • Whether assessments were carried out prior to, during or after the pilot study – of the environmental landscape, stakeholder views, and consumer perceptions. • Whether and how sources of support and resistance have been identified and addressed in the process of scale up.	• Desk-top review of documents • Review of published literature • KIIs • IDIs • FGDs	Paper 1
2. To explore the fit between the design and packaging of the innovation and user wants and preferences	• Wants and preferences of current users and potential users. • Whether and how modifications have been made to the design and packaging of the innovation to fit the user wants and preferences.	• KIIs • IDIs • FGDs	Paper 2
3. To explore whether and how potential user groups and community members were engaged to facilitate the integration of the innovation within their routine practices	• Socio-cultural context: socio-Cultural and religious norms in the community • Whether and how communities are engaged to leverage their resources to facilitate introduction and dissemination of the innovation (e.g. engagement with opinion leaders, educational systems or changes to societal norms/cultures)	• KIIs • IDIs • FGDs	Paper 3

4. To explore the potential for index users of community-distributed injectable contraceptives to influence the uptake of the innovation by new users in their social networks	• Whether users interact with non-users in their peer and social networks • The extent to which users share information with non-users in their networks about the experiences and benefits of using the innovation • Constructs explored included density, betweenness centrality and homophily.	• Social Network Analysis survey	Paper 4
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Three research assistants (a male and two females) who were fluent in Hausa with at least a Bachelor's degree and experienced in qualitative methods and community-based research were recruited and trained to help with the organization of the FGDs, as well as to conduct the FGDs and some in-depth interviews with community leaders. The training of research assistants included familiarization with the aim and objectives of the study, role plays in qualitative data collection – interviews and FGDs as well as in research ethics. All KIIs and most social network interviews (questionnaires) were led by the researcher and supported by the research assistants.

All interviews with MoH officials and health workers were in English, and the KII guide for community leaders and the FGD guide were translated to Hausa – the language spoken widely in Gombe State and northern Nigeria. Interviews and FGDs were tape-recorded and transcripts typed in the language in which the data collection was done and then translated into English. All data were saved in two password-protected computers to which only the lead researcher and one research assistant had access.

2.3 Data analysis

With the aid of NVIVO (version 10) software, transcripts were analyzed using thematic analysis with inductive and deductive reasoning (225, 226). This is an iterative process of analysis that

started right after the first interview and continued throughout the research. From the emerging themes in the interviews and discussions, a thematic framework was developed. These themes were indexed as they developed and were related to successive interviews and FGDs. While the number of FGDs and interviews were preset based on practical guidance, nevertheless in the course of analysis, it was established that saturation (225) where no new information was obtained, was actually reached before the set number was reached in both FGDs and interviews.

SNA data were analyzed with the aid of UCINET social network software, (<http://www.analytictech.com/>) after they were imported from Microsoft Excel. Twenty one-mode matrices were developed (one per ego network). Similarly, 20 sociograms were generated (one for each ego network) to graphically depict the networks. Individual ego network shows ego-alter and alter-alter associations. Each node in the sociogram signifies a network member. Measures of the network size, composition and structural properties of each ego network were computed, including density (cohesiveness of communication with alters) and homophily (extent to which women share information with similar others) (221). In the SNA, only descriptive analysis was done, no inferential statistical analysis, hence the convenience sampling of 20 participants from the FGDs.

2.4 Quality and trustworthiness of the study

Reliability and validity are essential in both qualitative and quantitative studies in order to ensure the credibility of findings (227). Trustworthiness in a qualitative study is very essential from data collection to the reporting of the findings. This entails appropriate sampling method as well as use of validated data collection instruments (227). Based on the research questions, a broad coding framework was developed and applied to the transcripts in order to derive emergent and opposing themes. A thematic framework was developed from emerging themes in the interviews. This was done after each interview to enrich subsequent interviews. As themes emerge, these were indexed

and compared with themes from subsequent interviews until a sense of attainment of saturation was achieved (228). A team approach was adopted to the data analysis. This approach, which involved using two coders, is a standard method of ensuring inter-coder reliability. Furthermore, member-checking/respondent validation through the presentation of initial results to some participants – a key activity in ensuring the credibility of the data – was carried out. This has been used in previous studies to establish the credibility of the qualitative and document review findings (10, 214, 229-231).

Also, a number of trustworthiness issues exist with social network analysis such as reliability, construct validity (232). In order to address these issues, face validity of the SNA questionnaire was done with the supervisor. Afterwards, ambiguous or redundant questions were modified. Also, questionnaires were double-checked for completeness onsite and properly numbered in order to ensure the quality of data entry. In addition, a robust software (UCINET) was used in the data analysis to generate appropriate network measures like density and homophily (220).

This study primarily examines factors facilitating or impeding scale up of injectable contraceptives in Nigeria. I am male, Nigerian and a physician. As a male physician working with reproductive rights through an innovation directly targeted at women, although important for men, I learned that since more than half of my respondents were females, my gender could be a challenge to getting quality information, particularly in the rather conservative northern Nigeria. However, being supported by research assistants, two of whom were female and working directly with participants as well as having two female supervisors offered me insights into the gender issues in this study. With the research assistants and my supervisors, we had debriefing discussions to engage with our different perspectives and understandings of the ‘same’ issue. By reflecting on who I am in respect to the innovation and data collection/analysis with others, I was able to reach insights about gender

and medicine in a patricarchal context, where women's decisions about their reproductive health are shaped in ways that go beyond the clinical rationale for the innovation. As a physician working with an innovation administered by CHEWs, I realised that I needed to engage with these health workers more as a researcher rather than a physician, given the inter-cadre rivalry among health worker groups in the Nigerian health system (233, 234).

Therefore being male, physician and Nigerian with situated national knowledge was critical to my understanding of the issues, and to how I was perceived by the respondents. However, with the help of other research team members who were female, non-physicians and non-Nigerians my views and or biases were scrutinized from other perspectives.

2.5 Assessing health system readiness for innovation scale up

Adopting the AIDED model, variables measured to assess the scale up of injectable contraceptives in Gombe, Nigeria are outlined in Table 3. **Paper 1** (235) provides more details on the methods and analysis done. Also, Paper 1 (Appendix 36) describes the health system readiness to deliver community-based injectable contraceptives in Nigeria and how the system readiness may influence the process of scaling up. Thus, this paper adds to the limited understanding of how health system issues may promote or hamper effective scale up of this innovation outside the pilot location.

2.6 User preferences and innovation packaging

Paper 2 (Appendix 37) explores the fit between users' preference and the design and packaging of the community-based distribution of injectable contraceptives (CBDIC) innovation. The paper also assessed whether and how potential user groups and community members were engaged in the scale up process. Furthermore, Paper 2 details how modifications to the packaging of this innovation resulted from socio-cultural, religious and programmatic considerations. The paper

emphasizes the need for innovation packaging to be contextual and cost-effective. Also, there might be a need to combine strategies for synergy and to integrate community-based distribution with existing programs and infrastructures. Scale up approaches should include flexibility and allow for adaptation to fit local contexts within the areas that it is rolling out to.

2.7 Socio-cultural context and innovation scale up

The sociocultural issues that may support or resist uptake of the community-based distribution of injectable contraceptives are explored in **Paper 3** (Appendix 38). The paper submits that scale up is more than establishing health sector implementing structures, health workers training and getting innovation supplies, but also requires readiness which includes paying attention to multifaceted environmental factors that may affect scale up.

2.8 How social networks promote innovation diffusion

Paper 4 (236) describes how social networks influence the adoption of health innovations and indeed health behaviors (see Appendix 39). The paper explores the possibility for index users of community-delivered injectable contraceptives to influence the use of this innovation by women they relate with. The paper concludes that SNA is useful in spotting opinion leaders and champions among reproductive age group women. Also, it illustrates how the uptake of community-based injectable contraceptives may be influenced by social networks, and how dense and homophilic networks may have unplanned positive effects.

2.9 Ethical considerations

Ethical approval for this study (Appendices 33 and 34) was gotten from the University of the Witwatersrand's Human Research Ethics Committee (Medical) (Reference No.: M160737) as well as the Ethical Review Board of University of Ibadan/University College Hospital (Reference No.:

UI/EC/16/0022). Written informed consent was obtained before the interviews; study participants were provided with Information sheets about the research. Separate written consent to record the interview/discussion was obtained (see Appendix 5 for participant information sheet and informed consent forms). Participants' confidentiality was protected as much as possible by not reporting their names and positions. However, participants for the FGD were informed that confidentiality cannot be totally guaranteed. Only participant codes were used and only institutions and type of institutions were reported. Also, data obtained in this study were stored in a password-protected computer to which only the principal investigator and supervisors have access.

CHAPTER 3

SUMMARY OF KEY FINDINGS

In this chapter, the key findings from the four studies are summarized while details are presented in Appendix 34 – 39. Paper 1 presents factors in the health system context that may improve or hinder the uptake of injectable contraceptives; Paper 2 highlights features in innovation packaging that may influence the diffusion of innovation at the study site and Paper 3 presents data on how factors in the sociocultural context affect the adoption of health innovation. Finally, Paper 4 summarizes the feasibility of the use of social network analysis in stimulating innovation uptake among peer networks.

3.1 How health system readiness influences innovation uptake

The results highlighted some health system issues that facilitated or impeded spread of the innovation. Among the factors that enabled the scale up of the innovation were availability of enabling task-shifting policy, partnership between the government and implementing NGOs , continuous collaboration among stakeholders and quality assurance measures which readied the health system for the scale up.

However, health system factors that impeded scale up included inadequate human resource and personnel training challenges, partial implementation of task-shifting policy, professional health groups' opposition to the policy on task-shifting and task-sharing. Other factors that hindered scale up efforts included weak service delivery support systems like transportation and supply chain logistics and poor commodity security that led to contraceptives being pilfered from the system. Likewise, scale up was also negatively impacted by ineffective monitoring and evaluation of health workers' activities and output. Tables 4 and 5 summarizes the health system issues that influenced the scale up of this innovation. Further details are also available in Paper 1 (Appendix 36).

Table 4: Health system factors influencing scale up of community-based distribution of injectable contraceptives

Theme	Sub-theme	Quote
Factors facilitating scale up	Enabling task-shifting policy	“I think the major factor (in successful implementation) is the conducive environment that the policy on task-shifting created ...this brought an overwhelming support of the government of Nigeria toward the policy implementation” (KII1, male, NGO manager).
	Partnership between the government and collaborating NGOs	“...When we go to implement a project, we want to be sure that the state government has a kind of ownership of the process... Once the FMOH gave a clear nod to the project, there was limited resistance from the states, as the project had an official introductory note that facilitated the engagement of the actors at the local level. The state was able to address the pockets of resistance wherever they arose by referring to the national support for the program” (KII1, male, NGO manager).
	Continuous stakeholders partnership	“...At the outset, there was a stakeholder meeting that involved many of the professional bodies, so it was easy to always go back to them whenever you have a challenge” (KII1, male, NGO manager).
	Innovation scale up quality assurance measures	“... So, most of our trainings are focused on quality of service... So, we’ve paid lot of attention to looking at eligibility of women... Initiation is done at the facility level but refills or subsequent monthly injectables) is done by them [CHEWs]. We were able to allay a lot of anxieties...” (KII1, male, NGO manager).

Table 5: Health system factors impeding scale up of community-based distribution of injectable contraceptives (cont'd)

Theme	Sub-theme	Quote
Factors in the health system context that may impede scale up	Inadequate human resource and staff training challenges	“...The challenges we encountered was lack of adequately trained personnel ... so there was inadequate trained staff” (KII5, male, family planning coordinator).
	Limited task-shifting policy implementation	“...The federal government should include all the health workers and not limit (task-sharing of CBD of injectable contraceptives) to only midwife or nurse or even the CHEWs in the community. So, we need to carry along all health professionals so that we’ll have a wider coverage ...let’s carry them together, give them training, update their knowledge and build their capacities, they can do it” (IDI2, female, CHEW).
	Professional groups’ resistance to the task-shifting and task-sharing policy	“...there is a perennial struggle within (the health sector) about whose domain is injectable contraceptives. While the community health workers feel they should be in charge, nurses will always feel that they are the people giving it, and should continue to give it” (IDI, male, Doctor, SMOH).
	Commodity security	“Contraceptives disappear from the logistics chain into the private sector because they (contraceptives) are totally free in the public sector. How this happens is not clear” (KII3, female, NGO program manager).
	Weak logistics system	“The problem is nothing but transport ...if there is transport, enough transport, we can go out and you see like home visit, outreach, (but) if there is no transport, there’s problem.” (IDI14, female, CHEW)
		“...if there is break in the chain of the supply then there will be a problem, but if there is a continuous supply of these injectable then I don’t think there will be any problem” (IDI9, male, Deputy PHC coordinator)
	Ineffective monitoring and evaluation	“... There is need also even from the state, from the LGA to follow-up, see how things are being done, are they really doing the right thing? Are they really delivering the services not just bringing results on paper? When you go (to the field) the results may not be there vividly. There should be a level of follow-up...” (IDI2, female, CHO).

3.1.1 How implementers addressed health system weaknesses

Frontline health workers took a number of initiatives to address health system weaknesses which were slowing down scale up process. Some of these initiatives and agencies include spending personal funds on transportation rather than stop outreach services as a result of a lack of funding. In addition, outreach services to hard-to-reach areas are rescheduled to dry seasons where these areas, which do not have proper infrastructures like bridges, are more accessible. Although these initiatives increase access to the innovation, particularly in hard-to-reach areas, many women remain unprotected during periods of inaccessibility during which period they use substitutes like condoms and oral pills. Figure 6 below summarizes health worker agency with verbatim quotes.

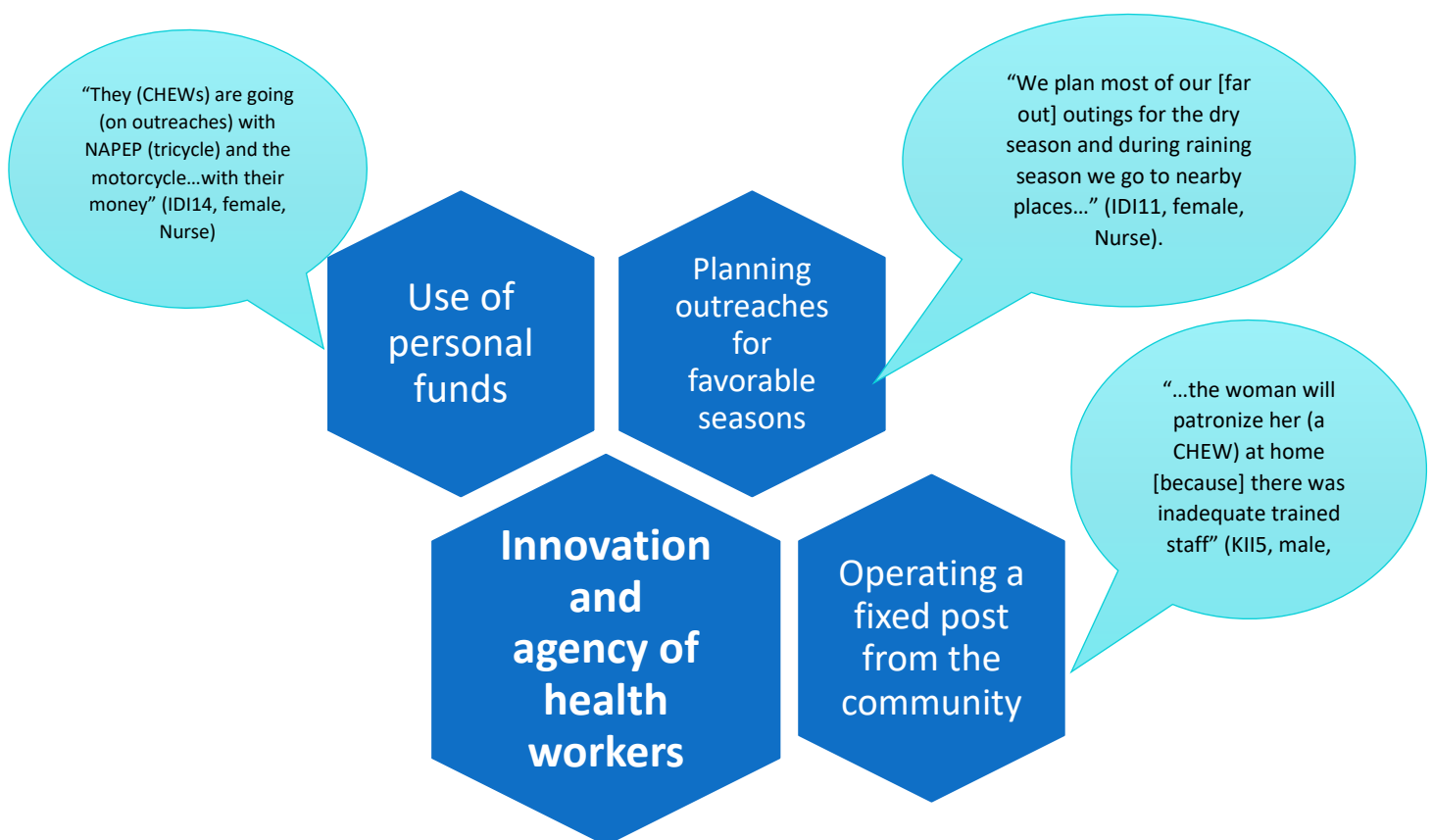


Figure 6: Health workers innovation and agency

3.2 How innovation packaging influence scale up

Due to the challenges of inadequate human resources and specific socio-cultural context issues, there are a number of modifications made to the packaging of the community-based distributed injectable contraceptives innovation. These modifications include the discrete use of markets as fixed or mobile posts to complement the community-based house-to-house approach, outreach to women's gatherings like naming ceremonies, weddings and women group meetings. In addition, other innovations include recruiting young women (community volunteers) to provide age-specific contraceptive messaging, partnering with patent medicine vendors to provide the contraceptive to women of reproductive age group and use of social marketing through mobile telephony to improve compliance with injection regimen. The role of patent medicine vendors in innovation scale up is explored further in Paper 2 (Appendix 37). Figure 7 below summarizes the modifications made to the packaging of the CBDIC innovation.

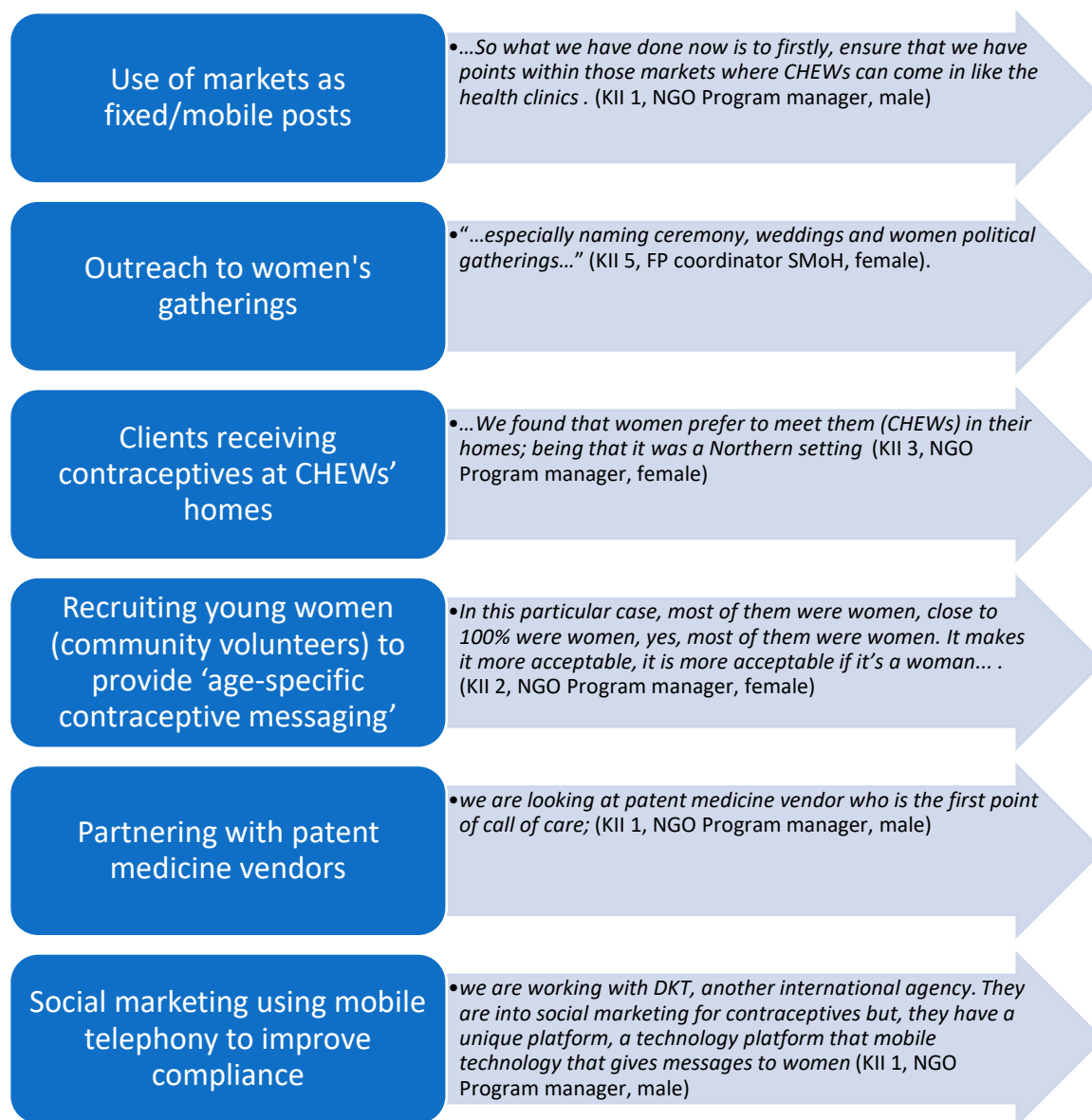


Figure 7: Modifications to the packaging of the CBDIC innovation

3.3 Sociocultural context and scale up

3.3.1 Cultural and religious beliefs influencing scale up

Sociocultural factors influencing scale up included deep-rooted cultural beliefs about fertility where community members see children as ‘divine blessings’ therefore reluctant to adopt family planning. Closely related to this is the influence of religiosity, strong adherence to religious beliefs,

which was described by respondents as one of the major factors impeding the uptake of contraceptives in general.

Furthermore, male spouses of injectable contraceptives users generally prefer the CBD approach as they believe it promotes confidentiality and saves women time. However, a few respondents expressed their preference for the facility-based approach due to their concern for proper examination before adopting a method and their belief that the CBD approach invades their privacy.

3.3.2 Spousal and community support for scale up

Male involvement was described as very important in this male-dominated environment. In addition, participants submitted that improving male spouses' awareness and education about the benefits of injectable contraceptives will facilitate uptake of the innovation as it is easier to get their buy-in and cooperation in permitting their wives to get the injections.

Also, progress with scale up in many communities was ascribed to the involvement of community and traditional leaders in the scale up process. However, some participants were of the opinion that community support is still suboptimal. See Table 6.

Table 6: Sociocultural factors affecting scale up

Theme	Sub-theme	Quote
Cultural and religious beliefs influencing scale up	Cultural beliefs about fertility	“...there will always be resistance to this use of contraceptives, because here, we are people that believe that children are a blessing, so you give birth to as many as possible” (IDI, male, Doctor, SMoH).
	Perception about community-based distribution	“...During home visit, it’s between you and the woman (health worker) and she can explain it very well to you since she is not in a hurry...”
		“...Sometimes some husbands want all these things to be confidential, but when you now tell them to release their wives to the hospital, they will think you are exposing the family issues” (FGD, married men).
		‘prefer[ed] to go to the hospital, so I can be checked properly, check my BP” (FGD, female, current user).
	Religiosity and uptake of innovation	“To the south eastern man, most of them are Catholics, they frown at family planning, so also here (northern Nigeria) people frown at family planning in general” (KII, male, Senior official, SMoH).
Spousal and community support for scale up	Spousal support and innovation uptake	“Some men will not accept it (contraceptive) because they want plenty children...she (the wife) should continue begging him until he agrees if she wants it” (FGD, women not using contraceptives).
		Honestly we need to do more in carrying them [men] along, male involvement is very important because you know they are our superiors... so it is very important for us to consider male involvement, it will help a lot (IDI, female, Nurse).
	Traditional leaders involvement	“There are so many traditional rulers that were involved in this program; that is the reason why it has been accepted 100%, especially in Gombe State now” (IDI, male, Traditional leader, Gombe).
	Religious leaders and innovation scale up	“...My involvement is...passive involvement. Of course, we preachers, you can push people, encourage them in your own little way... We preach it, we tell people about it... (IDI, male, Christian religious leader)

3.4 Social networks and innovation uptake

Sociodemographic characteristics of the 20 egos³ and their 200 alters⁴ are presented in Table 1 of Paper 4 (see Appendix 39). More than two-thirds of the actors⁵ were at least 30 years old while about 80% were of Hausa ethnicity and more than half (55%) had at least primary school education. The 20 ego networks were labeled A to T (see Appendix 41). In both sites, the ego was slightly older than her alters, in most of the networks (see Table 2 of Paper 4).

More than 90% of the alters used one form of family planning method whereas slightly greater than 80% adopted community-based injectable contraceptives at the time of the study.

3.4.1 Degree centrality and betweenness centrality among egos and alters

Figures 7 to 26 show connections among egos and their alters as well as alter-alter ties whereas Table 9 explains the legends in the sociograms. Most egos (18 out of 20) were prominent with very high degree centrality⁶ (7 or higher). Nine out of 10 egos in Yemaltu-Deba LGA had the maximum degree centrality of 10. The ego in SNA-C (Figure 9), had a degree centrality of 10 whereas the ego in SNA-Q (Figure 23) is an example of a peripheral ego with low degree centrality. Compared with the average degree centrality of alters in the networks, the egos had lower degree centrality with less connections in six of the 20 networks (see Figures 10, 12, 13, 14, 15, 23; and Table 6 of Paper 4). Most of the network members with high degree centrality also had high betweenness centrality⁷. Similarly, a larger percentage of actors with high betweenness centrality (43 out of 60) were adopters of CBD injectable contraceptives. Though, in some of the networks, a few of the actors with the highest betweenness did not use injectable contraceptives (See Figures

³ Index users/respondents

⁴ Actors that ego has ties with

⁵ Distinct individuals

⁶ Prominence

⁷ Number of times actor pairs (who otherwise might not communicate) were connected

8, 9, 11, 13, 14, 15, 21). Slightly more than half of the egos (11 out of 20) had high betweenness centrality. Likewise, alters with high betweenness centrality were mostly egos' neighbors, relatives and close friends (See Figures 9, 21, 23). Commonly, most actors in these networks were injectable contraceptive users.

3.4.2 Density and centralization among ego networks

Generally, the ego networks in this study had high density⁸ ranging from 0.46 to 1 (see sociograms in Figures 7 to 26; Table 6 presents key to node coding on the sociograms). Ninety percent of networks in Gombe (site A) and all networks in Yemaltu-Deba (Site B) had densities greater than 0.5 while 3 networks (Figures 18, 19 and 24) had 100% density; this means that all the network members communicate about injectable contraceptives use. Likewise, most networks had low centralization⁹ ranging from 0 to 73.4%. This implies that as ties among network members increases, the predisposition for power or prominence to be concentrated in a small number of actors decreases.

Furthermore, adoption of injectable contraceptive was either high or low in networks with 100% density. In four out of the 20 networks – SNA-D, H, I and Q (See Appendix 41, Figures 10, 14, 15, 23), the egos were not as prominent as the alters in the social network.

3.4.3 Communication about community-based distributed injectable contraceptives among social networks

In both Gombe and Yemaltu-Deba sites, alters communicate about family planning matters frequently (95% and 97% respectively), according to egos' reports. Actors who were Hausas mostly (in 15 of 20 networks) communicated about the innovation with their kinswomen rather

⁸ Cohesiveness/number of connections as percentage of potential connections

⁹ The extent to which network density revolves around certain actors

than with women of other ethnic groups (see Table 6 of Paper 4 for more details). Besides, the networks showed homophily regarding age – actors who were 30 years or older were more inclined to communicate with others about their age. Moreover, a propensity to communicate among groups with similar sociodemographic characteristics was also seen among actors who had at least secondary school education. While marriage type is a factor of homophily, actors in polygamous relationships were more homophilic in Gombe whereas in Yemaltu-Deba it was actors in monogamous marriages who had homophilic communication interactions.

Majority of the actors in the networks showed homophily according to ethnicity (88.6%), injectable contraceptive use (81.4%) and age (80.0%). This suggests that actors in this study interact more based on their ethnic affiliations as well as their use of injectable contraceptives and age. Actors demonstrated the least homophily according to marriage type (49.5%). Table 7 of Paper 4 shows details of homophily among women in the study (See Appendix 39).

In some of the networks, there were peripheral actors who had very few ties with other actors in the network (See Appendix 41, Figures 9, 17, 20, 21, 26). In addition to having low degree centrality, these actors also had low betweenness centrality. Table 9 (Appendix 40) describes the legends for the sociograms. The essential findings from the sociograms are summarized in Table 7 below.

Table 7: Summary of the key findings from the sociograms (A – T)

Findings	Networks (see Appendix 41)
Networks where ego had high degree centrality	All sociograms except networks F and Q
In some networks, non-users of injectable contraceptives had the highest betweenness centrality	B, C, E, G, H, I and O
Alters with high betweenness centrality were mostly egos' neighbours, relatives and close friends	C, O and M
Networks with 100% density has similar patterns of injectable contraceptive use	L, M and R
Egos in a few networks were less prominent than the alters in the networks	D, H, I and Q
Some networks had peripheral actors	C, K, N, O, Q

CHAPTER 4 DISCUSSION AND CONCLUSION

In this chapter, issues that may enhance or hamper scale up, according to the AIDED framework, are discussed and emergent themes are synthesized across the four papers. See Table 8.

Table 8: Major themes across the four papers

Papers	Paper 1 Health system readiness for innovation scale-up: the experience of community-based distribution of injectable contraceptives in Nigeria	Paper 2 Community-based delivery of injectable contraceptives in Nigeria: does the packaging of the innovation fit user preferences?	Paper 3 “Our culture prohibits some things”: Qualitative inquiry into how sociocultural context influences the scale up of community-based injectable contraceptives in Nigeria	Paper 4 Innovation diffusion: How homogenous networks influence the uptake of community-based injectable contraceptives
Component of AIDED model	Assess, Develop	Assess, Innovate	Assess, Develop & Engage	Devolve
Themes	Health system weakness and lack of readiness may undermine scale up	Most modifications to innovation packaging resulted from socio-cultural, religious and programmatic considerations	Health systems should engage with and learn from community stakeholders	SNA is a feasible strategy to identify champions and opinion leaders for innovation diffusion
Implication of findings for health program management and community participation	Successful scale up must consider both health system capacity and contextual factors. Agency and discretion of frontline health workers facilitated scale up, although sustainability questionable.	Innovation packaging should be context-specific and cost-effective for adequate community uptake. Scale up approaches should be flexible and adaptable to local contexts	There must be active collaboration between the community and health system. Passive resistance among potential users should be considered during scale up. Scale up preparedness will require	Encouraging potential users to talk about CBDIC in their social networks, may improve uptake and scale up. Ego social network analysis could be a feasible method for identifying champions among women of reproductive age groups. Interventions to promote scale up of CBDIC could

			moving beyond superficial engagement	consider building homophilic networks around particular characteristics like ethnicity, education and age.
Implication of findings for health system strengthening	Benefits of health innovation observed during pilot may not be realized without addressing health system weakness	Health system should be robust enough to combine both community-based and health facility-based strategies	Health system should be responsive to the local sociocultural context	Health systems must be strong enough to collaborate with the community to identify and promote health innovation diffusion through social networks

1.1 Implications of health system weakness on innovation scale up

Scale up is not likely to be successful if health system challenges are not resolved. From this study, health system challenges hampering scale up included inadequate human resource, weakness in the service delivery support systems and logistics, incomplete implementation of the task shifting policy as well as ineffective monitoring of health workers.

4.1.1 Role of human resource for health in innovation uptake

While Nigeria has an active task-shifting policy, its implementation is still inadequate, probably due to the opposition of doctors and nurses' groups to the process, at least at the inception. Thus, inadequate human resources was one of the key challenges to the scale up of the community-based injectable contraceptives. Researchers have described scale up as a labor-intensive process and that there cannot be effective scale up without a corresponding increase in the human resources for health (69, 87, 237). Therefore, insufficient human resources may put substantial pressure on available health personnel, who are critical to the effectiveness and efficiency of the health system (238-240).

Furthermore, promoting innovation diffusion in a context of human resource deficiency may starve other units of the health sector of the much-needed manpower (241), thereby compromising access and the quality of health services rendered to clients (242-244). Also, researchers have established that the major rate-limiting factors to innovation scale up towards achievement of sustainable development goal 3 of universal healthcare were health workforce-related issues (motivation, distribution, task-sharing, and workforce forecasting), availability of medical products and infrastructures as well as adequate financing (49, 92, 245, 246). More research is required to plan the human resource requirement for the diffusion of community-based injectable contraceptives in Nigeria and perhaps to evaluate how to better motivate the existing health personnel from the current scale up (69, 237, 241).

4.1.2 Frontline health workers discretion during implementation scale up

The role of community health workers in improving quality and access to health services, reducing the cost of care, as well as contributing to community development in poor and disadvantaged areas have been established in the literature (247-249). Although health workers in this study used their initiatives to ensure that family planning commodities got to women, the sustainability of such resourcefulness in the face of perennial lack of funding is doubtful (245, 247). On the long run, the scale up process may be jeopardized. Although frontline health workers are important in the provision of universal health coverage and attainment of the SDGs because they exercise substantial discretion (250-253). Health workers have been known to “bend the rules, work overtime, and collaborate in order to help clients” (254). However, how much initiative they should be allowed during implementation is still debatable (255). Evidence shows that discretion shown by frontline health workers to a great extent depend on availability and appropriate implementation of policies and guidelines (256). Availability of clear policies will ensure unambiguous,

transparent, timely and effective implementation of health innovation by frontline health workers (256, 257) as this discretionary exercise of power is not always used positively (257, 258). In addition, frontline health workers agency may be affected by heavy workloads, lack of resources and demands from stakeholders (259).

4.1.3 Role of effective logistics system, funding, and advocacy in the diffusion of health innovation

Furthermore, other issues which may slow down health innovation spread like the CBD of injectable contraceptives include poor logistics, particularly inadequate transportation for health workers, and inefficient commodity distribution. Therefore, more attention seems to be on the innovation itself rather than how it is delivered. There is abundant research evidence that an efficient supply chain system is essential to the success of scale up project. Thus, it is important for health program managers to plan for this *ab initio* (260). Currently, women have to buy injectable contraceptives when they go out-of-stock at the public health facilities or other channels of distribution. This out-of-pocket expenditure, albeit occasional, may not improve contraceptive prevalence as desired by health managers and it may aggravate the financial burden of a people already strained by enormous out-of-pocket spending on health (261-264). Advocacy for increased political commitment for consistent funding for scale up is therefore necessary particularly through the private sector, which has been relatively untapped particularly in LMICs (36, 95, 96, 265).

4.2 Implications of innovation packaging on scale up

In addition to the community-based delivery approach, this study reported a number of amendments to the innovation in order to align delivery of the innovation to users' preferences. This study demonstrated that community engagement is essential for innovation packaging and hence effective scale up. Similarly, there is ample research evidence that innovation packaging

and scale up will not be effective without adequate community engagement (266-268). Furthermore, community participation is important for optimal uptake and sustainability of health programs (266, 268, 269). However, in order to understand community preferences, gain acceptance for health innovations and to achieve the objective of innovation packaging, program managers should collaborate with religious and community leaders particularly in LMICs (266, 270-273).

Although, researchers have reported that CBD of injectable contraceptives is valuable in LMICs, particularly in difficult terrains (29, 58, 274), this study, however, highlights some modification to the innovation. These include the use of mobile and fixed posts for contraceptive distribution, age-appropriate health education, in addition to individual and group education meetings, just like some studies have reported (274-276). In this study, the modification to CBD seen arose essentially as a result of and in response to environmental factors – mainly cultural and religious reasons, as Nigeria is largely a religious and patriarchal society (277, 278). Common reasons from literature for amending the traditional CBD include the need to guarantee a more efficient service delivery, especially when the program's capacity cannot meet the community's needs (275, 279, 280). Furthermore, an amendment to the packaging of CBD of injectable contraceptives might be needed when the community preference was not understood or accommodated in the program from the planning stages and when there is lack of community participation, governance and lack of conducive political environment (274, 281, 282). The inadequate governance and political will may manifest as insufficient funding or deficient infrastructures for health workers to do their jobs effectively (283, 284).

Also, results from this study showed that CBD does not exist in isolation of the health system but can only work within the community's health infrastructures particularly with the need to initiate

contraceptive use and manage adverse effects of contraceptives from the health facility. However, studies (277, 279, 280) show that integration of CBD programs with existing health infrastructures might become challenging as the community contraceptive uptake increases thereby necessitating bringing in more voluntary health workers who are totally focused on CBD.

4.3 Implications of sociocultural contexts on innovation scale up

Socio-cultural factors that affected scale up of community-based injectable contraceptives in this study include traditional and religious norms and beliefs, patriarchy, perceptions, and myths about contraceptives and family planning. Researchers have reported that the scale up process cannot be separated from the context and the culture in the environment (242, 285-288) and that culture and health beliefs were significant predictors of health innovation adoption (288, 289).

4.3.1 Context and scale up: role of significant others

This study shows the importance of involving men and significant others for scale up of the CBD of injectable contraceptives to succeed in environments like Nigeria that are still largely male-controlled (16, 128, 242). In many African societies, patriarchy is preserved by the society particularly the family and especially by women themselves (290-292). Other studies, similar to the findings of this study, have reported that male partner participation and backing of women's significant others, mainly the mothers-in-law, are central to innovation scale up in Nigeria as these significant others wield a lot of influence over women of reproductive age group (242, 293, 294). Similarly, increased male engagement has been shown to improve men's knowledge and hence reduce their antagonism thereby improving uptake and sustained use of contraceptives both among women and men (295-298).

Meanwhile, the passive resistance reported in this study is mainly influenced by entrenched issues of patriarchy, religious and traditional beliefs and norms, it is therefore important for program managers to involve men – who are guardians, in most cases, of both religious and cultural values (292, 299-301). Male participation can be beneficial for all community stakeholders (299, 301), as well as bring about social change (302, 303). Therefore, with proper management involvement of men may ultimately give the scale up of this health innovation a greater chance of success.

4.3.2 Context and scale up: influence of religious and cultural beliefs

Moreover, uptake of the community-based injectable contraceptives and family planning, in general, were found to be influenced by religious beliefs in our study site in Northern Nigeria which is largely dominated by Islam. Individual and household choices, lifestyle and even traditional values including contraceptive use (304-306) have been reported to be influenced by religion, particularly by Islam in Northern Nigeria and Catholicism in the South (307). For instance, studies done in Islamic countries (308, 309) emphasised the need to understand Islamic religion in order to do effective social marketing, and recommends that approval be obtained from religious leadership before certain sensitive products like contraceptives are marketed. Similarly, understanding religious differences in local contexts is important in multi-faith countries such as Nigeria – for example, what ‘works’ in the largely-Islamic North (310) may need adaptation for Christian populations elsewhere. Also, policymakers and program implementers should pay attention to the market and religion intersect while seeking to improve uptake of sensitive health innovation in religiously and culturally conservative countries like Nigeria (311, 312).

4.3.3 Context and scale up: role of community support

The importance of strong community support and partnership with community gate-keepers in the scale up process cannot be over-emphasized as demonstrated by this study. Community participation is the lifeline the CBD approach, without which it cannot succeed (95, 313). It is therefore imperative for program implementers to learn from the community what works (or may work) in the setting, or what their preferences are since there is no quick fix to scaling up - it is basically a unique learning process which is contextual (95). Hence, scale up may not achieve its purpose without sufficient local knowledge and readiness to learn through the process of community participation and stakeholder collaboration (95, 313, 314).

Therefore, scale up is influenced by several socio-cultural factors; thus, paying attention to complex contextual issues is essential for innovation uptake. Also, health systems should learn from the community in the process of scale up through constant engagement with significant others as well as other stakeholders in the community.

4.4 Implications of social networks on innovation diffusion

4.4.1 Network density and innovation diffusion

A greater proportion of ego networks in this study had high densities. Therefore spread of information on use of injectable contraceptives would be easier within these networks since dense networks allow easier messaging and organization of actions among actors (147, 315-317). The higher degree of cohesion among actors in the network may not be a surprise, given that more than half of the alters were close friends or family (315). However, some actors may be unwilling to share their opinions in a dense network, possibly because they know the information might spread through the network very fast (318).

Nevertheless, if the majority of actors in a network are non-users of injectable contraceptives, it might be hard for prospective users to adopt the innovation in a dense network since individual decisions are largely influenced by the common opinion in the network (147, 317-319). Actors in a dense network may adopt a wrong information, thereby limiting the chances of other actors in the network from getting the correct information and possibly their uptake of the health innovation (315). This claim is supported by the results of this study which revealed that networks with very high density had either a very high or very low percentage of injectable contraceptive users. This suggests that network members influence one another in the choice to adopt injectable contraceptive (147). Thus, it is important to get the correct message, the first time, about the innovation across to probable users in these communities, rather than do damage control later.

Furthermore, the use of injectable contraceptive in the study's ego networks is probably group-inspired rather than due to individual choices (147) since in dense networks, actors relate with one another in the network and no particular member is prominent (315). Similarly, in a very dense network, all the members are potential leaders which may champion the diffusion of the innovation within the network (133, 147, 320). So, the network is strong and not at the mercy of a few crucial actors (315, 320).

On the other hand, in a dense network, false information about the innovation could emanate from any of the members, thus impeding the innovation's uptake in the network. Therefore, in a dense network, no member functions as "gatekeepers" for information which other actors may depend on to get linked to the network (147).

4.4.2 Role of prominent and peripheral actors in innovation diffusion

Peripheral actors in networks could be important in the uptake process by acting as channels through which other networks obtain pertinent information from the setting (321, 322). Although

peripheral actors might not be referred to as links to other networks with certainty since this study used ego networks, however, these outliers may have connections with other networks.

Moreover, this study suggests that members with high degree centrality also have high betweenness centrality. This proposes that actors with high degree centrality were comparatively more prominent in the ego network and thus able to control flow of information about the innovation (147, 148, 323).

Since most prominent actors in this study use injectable contraceptives, this may have a positive effect on the uptake of the innovation in these communities. The policy implication of this is that network members with high betweenness centrality might be great as peer educators since they are able to positively influence other network members (324). Also, these actors with high betweenness centrality in this study may act as opinion leaders and “champions” in their environment (133), since they generally regulate information flow within their networks (315).

Also, some players who have high betweenness centrality in some networks in this study did not use injectable contraceptives. This may affect the reliability of the information shared about the innovation among network members (147). Similarly, this may mean that prominent players who regulate information flow about the innovation do not use it themselves - a development which may negatively affect the uptake of injectable contraceptives in those networks.

4.4.3 Homophily and innovation diffusion

Most of this study’s networks were homophilic regarding ethnicity, education, age and marriage type. Homophily resulting from ethnicity in this study could be because Hausa is the principal ethnic group in the study setting. However, it has been reported that ethnicity is chief basis of homophily in social groupings followed by age, religion, education, occupation and gender (135). Similarly research has revealed that ethnicity is one of the most important determinants of social

group membership (135, 325). Also, homophily from ethnicity and race cuts across marriage, friendship, work, social circle, to those who influence individuals' decisions (135, 326). Although working through natural groupings may help promote spread of health innovation in Gombe and similar communities, however, this requires political sensitivity and care given the potential volatility in northern Nigeria.

Apart from ethnicity, actors in this study preferred to communicate about injectable contraceptives within their age groups and according to their level of education. Therefore, these characteristics – ethnicity, education and age – should be well-thought-out when recruiting peer educators in the scale up of health innovations like the community-based injectable contraceptives (135, 327, 328). Program managers may also consider these attributes, particularly age and ethnicity, when recruiting health workers to serve in communities. For instance, program managers might want to ensure that all major age groups of reproductive age women are represented among community health workers.

An important drawback of homophilic networks should however be noted: networks can easily be contaminated with false or unwholesome information about the innovation since network members share a common source of information (315). Also, information from ego social network analysis may be biased by the subjectivity of egos since data was exclusively obtained from the egos' points of view. However, despite this potential bias, ego social network analysis provides important information and a vital perspective about the influence of social networks on adoption and spread of health innovations.

4.5 Limitation

This study was largely conducted in Northern Nigeria (only one interview took place in Ibadan, southwest Nigeria). Since the country is very heterogeneous in terms of health systems, ethnicity, culture, and religion, it may be difficult to generalize findings. In addition, Gombe state has a sociocultural environment that is deeply influenced by religion, which is relatively different from other states in southern Nigeria. However, the findings of this study provide valuable information into how the AIDED model may be used in analyzing barriers and facilitators to scale up of health innovations in LMICs especially in a society like Nigeria. Therefore, methodological transferability rather than generalizability is the strength of this study. Thus, this PhD provides insight for doing this study in other settings with similar research problems.

In addition, in the social network analysis, a possible limitation is subjectivity of the information from egos about actors in their networks. Nonetheless, the subjectivity provides valuable data on the influence of social networks on innovation diffusion.

4.6 Conclusion

This research explored the interplay between barriers and facilitators of scale up of community-based injectable contraceptives guided by the AIDED model. Thus, this study shows that health system challenges may weaken the scale up of community-based injectable contraceptives. Besides, scale up is more than creating health sector implementing structures, training health workers and getting innovation supplies, but also requires preparedness which includes paying attention to multifaceted contextual matters. Although sustainability is uncertain, initiatives and actions taken by frontline health workers helped the scale up process. Diffusion of health innovation may not be successful if health system problems are not addressed despite benefits established during the pilot.

Moreover, most of the modifications to the packaging of this innovation resulted from socio-cultural, religious and programmatic considerations. Scale up approaches should include flexibility and allow for adaptation to fit local contexts within the areas that it is rolling out to. Also, there might be a need to combine strategies for synergy and to integrate community-based distribution with existing programs and infrastructures.

Furthermore, scale up requires preparedness which includes paying attention to multifaceted contextual matters not just creating health sector implementing structures, training health workers and getting innovation supplies. Although a new system usually requires more work to gain acceptability and achieve effectiveness, the findings of the study show that the health system and those who work in it need to move beyond a narrow health ‘comfort zone’ by actively engaging with, and learning from, those who are leading, caring for and living in the community.

Finally, this study demonstrates the application and possibility of using ego SNA to identify opinion leaders and champions among reproductive age women. It also demonstrates the influence of social networks on the spread of the innovation, and how dense and homophilic networks may have unexpected positive health impact. The findings of this study also illustrate that the decision by network members to adopt a health innovation is interdependent. Likewise, the study highlights the importance of paying attention to complex contextual issues during innovation uptake and how health systems and communities should interact in order to ensure successful innovation scale up in a developing country like Nigeria.

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Appendices

APPENDIX 1: Interview Guide: Key informant interview with senior MOH officials and NGO programme managers

1. Let's start by you describing your role in implementing this intervention – the community-based delivery of injectable contraceptives in the pilot sites in Gombe. What was your role and how long were you involved?
2. Did you encounter any challenges during the pilot study? Please explain.
Probes:
 - If not mentioned, ask: any resistance from the community members, from health workers, from other stakeholders, from potential users themselves?
 - How did you handle challenges / resistance?
3. We are interested in your experience with the process of taking the intervention from pilot study phase to wider implementation in Gombe itself. What was the process, from implementation to wider scale up of the intervention? Walk me through the process.
Probes:
 - The goal, approach to implementing, key components of the process, indicators of success
 - Landscape and stakeholder assessment done – before, during or after the pilot?
 - Your role in these processes?
4. In your opinion, what factors have supported the scale up of this intervention so far?
5. Have you experienced challenges during the process of scaling up? Please explain.
Probes:
 - What challenges? ... **may prompt with** “any others”
 - How did you handle challenges?
6. Was there a way of ensuring that the intervention aligns to the wants and preferences of the users you were targeting? Please tell me about it.
Probes:
 - Any user needs / wants assessment done? By whom? When?
 - Any modifications made in order to align packaging of the innovation to user wants – either during or after the pilot?
 - Any health service modification (e.g. change service models for delivering the intervention)?
7. Have communities been engaged in the scale up process? Please describe in what ways and by whom?
8. Looking back, is there anything that you think could have been done differently to facilitate the process from pilot study to wider implementation? Please explain.
9. Is there anything else we have not asked but you would like to tell us about your experience with the process of implementation and scale up of CBD?

Thank you for your time. This is the end of our discussion.

APPENDIX 2: In-depth Interview Guides

A. Interview guide: In-depth interview with health workers (Doctors and CHEWs)

1. Let's start by you describing your role in implementing this intervention – the community-based delivery of injectable contraceptives by community health extension workers.
 - a. What role did doctors / CHEWs play in designing the intervention?
 - b. What about their role in introducing the intervention at community level?
 - c. What was your own role?
Probes:
 - **Doctors:** Your own (or experience of other doctors like you) with: planning, training CHEWs, providing supportive supervision to CHEWs during and after the pilot?
 - **CHEWs:** Your own (or experience of other CHEWs like you) in planning, administering the injectable contraceptives to women?
 - d. Did you / other health workers experience challenges?
 - i. Please explain.
 - ii. How did you handle the challenges?
2. In your opinion, what factors affect wider implementation and uptake of the CBD of injectable contraceptives in the communities that you serve?
Probes:
 - Anything else?
3. In your opinion, how supportive of this innovation are:
 - a. **For doctors:** doctors in general, and your professional health group (e.g. Nigerian Medical Association) please explain.
 - b. **For CHEWs:** community health extension workers in general? Please explain.
4. As far as you are aware, what role, if any, have health workers like you played in making the CBD of injectable contraceptives more acceptable to the users in your community? Please explain.
5. In your opinion, how likely are those women who have already adopted the CBD of injectables to spread information about the innovation to other women who are not using it? Please explain.
6. Looking back, is there anything that you feel might have been done differently to facilitate the process of moving from pilot study to wider implementation?
7. Is there anything else we have not discussed that you would like to tell us about your experience with implementing the CBD of injectable contraceptives?

Thank you for your time. This is the end of our discussion.

B. Interview guide: In-depth interview with community leaders

1. You were selected to participate in this study because you are aware of the government program in which CHEWs provide injectable contraceptives to women in the community, outside the health clinic setting.
 - a. Please describe what you know about this program.
 - b. How did you hear about it?
2. How much support do you think there is for this program in your community? Please explain
3. Have you or other community leaders like you been involved in introducing this program on injectable contraceptives into your community?
 - a. **If yes:** Describe your / or other leaders' involvement (what role)? How did you / they get involved? Who initiated?
 - b. How do you feel about being involved / not being involved?
4. The government started with this program only in two places in Gombe but they are now trying to make this available to all other parts of Gombe.
 - a. What challenges do you think the government might encounter when trying to get wider uptake of this programme in the community?
 - b. Have you or other community leaders in this community been approached by government to assist with addressing these challenges?
5. In your opinion, what might prevent women in your community from taking up this intervention? What may encourage them to take it up?
6. In your opinion, how likely are those women who have already adopted the CBD of injectables to share information about it to other women who are not using it? Please explain?
7. Looking back, is there anything that you feel might have been done differently to make this way of providing contraceptives acceptable in your community?
8. Is there anything else we have not discussed that you would like to tell us about your experience with implementing the CBD of injectable contraceptives?

Thank you for your time. This is the end of our discussion.

APPENDIX 3: Focus Group Discussion Guides

A. Focus group discussion guide: FGDs with women who have already adopted the use of injectable contraceptives through the CBD approach

1. Let us start with talking about contraceptives / family planning methods in general. Please share with me what you understand about contraception / family planning. What kinds of contraceptive methods do you know?
2. What do you think people in this community think about contraceptives and family planning in general?
Probe:
 - Do they support the idea of contraception / family planning in general?
 - Specifically, how supportive of injectable contraceptives compared to others?
3. What about women in this community. How do you think they feel about contraceptives and family planning in general?
Probe:
 - Support the use of contraception / family planning in general?
 - Specifically, how popular are injectable contraceptives compared to others?
 - What makes women use injectable contraceptives? What makes them not use it?
4. I am interested to know what you think women want and prefer regarding contraceptives. Which types of contraceptives do women in your community prefer? How do you think women prefer to receive contraceptives (from clinic versus other places; from doctor or nurse versus others)?
5. The government introduced a new program where community health extension workers now administer injectable contraceptives to women away from the clinic, including at homes. I know that you already receive injectable contraceptives through this approach.
 - a. How did you hear about this program?
 - b. What made women like you to decide to receive injectables through CHEWs?
 - c. Would you encourage friends or family members to receive injectable contraceptives from CHEWs? Please explain.
 - d. What do you think might prevent other women in your community from using this new way of receiving injectable contraceptives through CHEWs?
6. What suggestions do you have for how the way injectable contraceptives are administered in your community can be improved to make sure many more women receive them?

Thank you for your time. This is the end of our discussion

B. Focus group discussion guide: FGD with a group of women in the reproductive age group who have not yet adopted the CBD of injectables (may include those who do not use injectables and those who do)

1. Let us start with talking about contraceptives / family planning methods in general. How many contraceptive types do you know? Can you describe them?
2. How do you think people in this community perceive contraceptives and family planning in general?

Probe:

- Popularity of contraceptives / the idea of family planning in general
- Specifically, popularity of injectable contraceptives

3. How do you think women in this community perceive contraceptives and family planning in general?

Probe:

- Popularity of contraceptives / family planning in general
- Specifically, popularity of injectable contraceptives

4. What do women want - which types of contraceptives, which mode of delivery do they prefer? (clinic vs. other places, doctor/nurse versus others)
5. Let us now talk about injectable contraceptives specifically. In your opinion, what factors will make women of reproductive age use or reject injectable contraceptives? What makes them not use it?
6. The government introduced a new program where community health extension workers now administer injectable contraceptives to women away from the clinic, including at homes. I know that you have not received injectable contraceptives through this approach.
 - a. How did you hear about this program?
 - b. What factors make women like you decide not to receive injectables through CHEWs?
 - c. What factors would encourage you to receive the injectable contraceptives through CHEWs?
 - d. Willingness to encourage friends and family members of reproductive age to receive injectable contraceptives from CHEWs?
 - e. What do you think might prevent other women in your community from using this new way of receiving injectable contraceptives through CHEWs?

Probes:

- Resistance to mode of distribution – facility vs. community based
- Socio-cultural resistance to injectable contraceptives
- Resistance to injectable contraceptives being administered by CHEWs rather than other health workers like nurses and doctors

7. What suggestions do you have for how the way injectable contraceptives are administered in your community can be improved to make sure many more women like you receive them?

Thank you for your time. This is the end of our discussion.

C. Focus group discussion guide: FGD with elderly women (older than reproductive age) in the community

1. Let us start with talking about contraceptives / family planning methods in general. How many contraceptive types do you know? Can you describe them?
 2. How do you think people in this community perceive contraceptives and family planning in general?
Probe:
 - Popularity of contraceptives / the idea of family planning in general
 - Specifically, popularity of injectable contraceptives
 3. What role do you play in advising your married daughters/daughters-in-law and family members of reproductive age about contraception/family planning?
 4. How do you think elderly women (grandmothers) in this community perceive contraceptives and family planning in general?
Probe:
 - Popularity of contraceptives / family planning in general among elderly women (awareness and knowledge, not use)
 - Specifically, popularity of injectable contraceptives
 5. What do elderly women prefer? Which types of contraceptives, mode of delivery (clinic vs. other places, doctor/nurse versus others) do they prefer for their married daughters/daughters-in-law
 6. Let us now talk about injectable contraceptives specifically. In your opinion, what factors will make women of reproductive age use or reject injectable contraceptives?
 7. Will you support your married daughters/daughters-in-law using injectable contraceptives? Please give reasons for your answer.
 8. The government introduced a new program where community health extension workers now administer injectable contraceptives to women away from the clinic, including at homes.
 - a. How did you hear about this program? In your opinion, what factors help women to decide to receive injectables through CHEWs?
 - b. Willingness to encourage married daughters/daughters-in-law and family members of reproductive age to receive injectable contraceptives from CHEWs?
 - c. What do you think might prevent women in your community from using injectable contraceptives through CHEWs?
 - d. What kinds of challenges do you know the government has faced with the distribution of injectable contraceptives through CHEWs in your community?
- Probes:
- Resistance to mode of distribution – facility vs. community based
 - Socio-cultural resistance to injectable contraceptives
 - Resistance to injectable contraceptives being administered by CHEWs rather than other health workers like nurses and doctors
8. What suggestions do you have for how the way injectable contraceptives are administered in your community can be improved to make sure many more women receive them?

Thank you for your time. This is the end of our discussion.

D. Focus group discussion guide: FGD with younger and older men (single and married) in the community

1. Let us start with talking about contraceptives / family planning methods in general. How many contraceptive types do you know? Can you describe them?
 2. How do you think people in this community perceive contraceptives and family planning in general?
Probe:
 - Popularity of contraceptives / the idea of family planning in general
 - Specifically, popularity of injectable contraceptives
 3. How do you think men in this community perceive contraceptives and family planning in general?
Probe:
 - Popularity of contraceptives / family planning in general among men
 - Specifically, popularity of injectable contraceptives
 4. What do men want - which types of contraceptives, mode of delivery (clinic vs. other places, doctor/nurse versus others) do they prefer for their wives
 5. Let us now talk about injectable contraceptives specifically. In your opinion, what factors will make women of reproductive age use or reject injectable contraceptives?
 6. Will you support your wife/partner/girlfriend using injectable contraceptives? Please give reasons for your answer.
 7. The government introduced a new program where community health extension workers now administer injectable contraceptives to women away from the clinic, including at homes.
 - a. How did you hear about this program? In your opinion, what factors help women to decide to receive injectables through CHEWs?
 - b. Willingness to encourage wife/partner/girlfriend and family members of reproductive age to receive injectable contraceptives from CHEWs?
 - c. What do you think might prevent women in your community from using injectable contraceptives through CHEWs?
 - d. What kinds of challenges do you know the government has faced with the distribution of injectable contraceptives through CHEWs in your community?
- Probes:
- Resistance to mode of distribution – facility vs. community based
 - Socio-cultural resistance to injectable contraceptives
 - Resistance to injectable contraceptives being administered by CHEWs rather than other health workers like nurses and doctors
9. What suggestions do you have for how the way injectable contraceptives are administered in your community can be improved to make sure many more women receive them?

Thank you for your time. This is the end of our discussion.

APPENDIX 4: SNA questionnaire: Interviews with women who have adopted injectable contraceptives delivered by CHEWs

Project Title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

Participant code

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Date of interview:

DD	MM	YYYY
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Place of residence

State

Local municipality

Town

Village / suburb

A. Participant (ego) attributes

1. Age at last birthday (in years) _____
2. Highest level of education completed
 1. No formal education
 2. Arabic school
 3. Primary school
 4. Secondary school
 5. Tertiary education (please specify type: _____)
3. Occupation _____
4. Marital status
 1. Single
 2. Cohabiting
 3. Married
 4. Separated
 5. Divorced
 6. Widowed
 7. Other (please specify) _____

5. Type of marriage
 1. Monogamy
 2. Polygamy
 3. Others (please specify)_____
6. Ethnicity
 1. Hausa
 2. Ibo
 3. Yoruba
 4. Others (please specify)_____
7. When did you start using injectable contraceptives provided by a CHEW?
 Year _____ month _____
8. Where / how do you receive the injectable contraceptives from a CHEW?
 1. At home
 2. At the market
 3. At the village square
 4. Other (please specify)_____

B. Name generation and ego-alter relationship

- a. Can you please tell me who are the women that you interact with regularly (e.g. those you talk to, share activities with)? Please mention only women who are of child-bearing age.
 - a. Please just tell me their first names or initials.
Insert responses on the data capture sheet
 - b. For each person you have mentioned, I would like to know what is your relationship with her :
 - i. Relative / family member
 - ii. Close friend
 - iii. Co-worker
 - iv. Neighbor
 - v. Someone you meet at church/mosque
 - vi. Someone you meet at the market / place of trade
 - vii. Other type of relationship (please specify) _____?

Insert coded responses on the data capture sheet

- b. Kindly give me some information about each of the persons you mentioned earlier.
Insert coded responses on the data capture sheet
 - a. How long have you known her (years and months) _____
 - b. Roughly how old is she? (Age in years) _____

- c. What is her highest level of education?
- i. No formal education
 - ii. Arabic school
 - iii. Primary school
 - iv. Secondary school
 - v. Tertiary education (please specify type: _____)
- d. What is her occupation? _____
- e. What is her marital status? Is she:
- i. Single
 - ii. Cohabiting
 - iii. Married
 - iv. Separated
 - v. Divorced
 - vi. Widowed
 - vii. Other (please specify)_____
- f. What Type of marriage does she have?
- i. Monogamy
 - ii. Polygamy
 - iii. Others (please specify)_____
- g. What is her Ethnicity? Is she:
- i. Hausa
 - ii. Ibo
 - iii. Yoruba
 - iv. Others (please specify)_____
- h. To the best of your knowledge, does xx use contraceptives / family plan?
- 1=yes
 - 2=no
 - 3. Don't know
- i. To the best of your knowledge, does xx use injectable contraceptives provided by a CHEW?
- 1=yes
 - 2=no
 - 3. Don't know

C. Ego-alter discussions on CBD of contraceptives

I. From time to time, people discuss important personal matters with other people. Looking back over the last six months:

- a. How frequently have you discussed any issues about family planning with xx?
 - i. *Never*
 - ii. *Very often;*
 - iii. *Occasionally*
 - iv. *Rarely*
- b. If “Never”: is there any reason why you do not discuss issues about family planning with xx?

Narrative (capture open-ended responses)

III. Let us now focus specifically on the women you said you have spoken to about family planning in the last 6 months. For each woman I would like you to answer the following questions

- a. Since the time that you yourself started using injectable contraceptives provided by a CHEW, have you ever shared with her your experience of receiving injectable contraceptives from a CHEW??
 - 1=*yes*
 - 2=*no*
- If “No”: Is there a reason why you have not talked with her about your experience of using injectable contraceptives from a CHEW?

Narrative (capture open-ended responses)

- b. Have you ever specifically recommended to xx to also start using CBD injectable contraceptives from a CHEW?
 - 1=*yes*
 - 2=*no*
- If “No”: How likely are you to recommend CBD injectable contraceptive to xx?
 - 1=*very likely;*
 - 2=*somewhat likely;*
 - 3=*very unlikely*

D. Alter-alter relationship

- I. To the best of your knowledge, what is the relationship between each of the women you listed above? Would you say xx and xx are:

0. Strangers (don't know each other)
1. Family/kinship
2. Close friends
3. Co-workers
4. Neighbours
5. Meet each other at church/mosque
6. Meet each other at the market / place of trade
7. Share other type of relationship (please specify) _____?

Code the response in the relevant cell in the SNA Matrix below (the clear cells only)

Persons	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										

II. In your opinion, what is the likelihood that the women you listed above will talk among themselves about or recommend to one another using the injectable contraceptive distributed in the community by CHEWs?

- 0. Never
- 1. Very likely
- 2. Somewhat likely
- 3. Unlikely

Persons	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										

THANK YOU FOR YOUR TIME

APPENDIX 5: Participant Information Sheet for MOH officials

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

Introduction:

Good day! I am Oluwaseun Akinyemi, a PhD candidate of the School of Public Health, University of the Witwatersrand, Johannesburg. I am doing research on the scale up of community-based injectable contraceptives in Gombe State, Nigeria. Research is just the process to learn the answer to a question. In this study we want to learn what the factors are that may influence the scale up of community-based distribution of injectable contraceptives in Nigeria, in order to understand possible facilitators and barriers.

Invitation to participate: I am therefore asking / inviting you to take part in this research study because you are a senior MOH official who was/is involved with this programme.

What is involved in the study – I am asking different people such as policy makers, program managers, health workers, community leaders, women who are the end-users of injectable contraceptives, and broader members of the community to participate in this study. About 100 people will participate in the study and all will be from Nigeria. If you agree to participate it means you will take part in a key informant interview. Each interview will last for about 60 minutes. In the interviews I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program. There are no right and wrong answers; I am interested in understanding your opinions. Please note that I intend to audio-tape this interview.

Risks and Benefits of being involved in the study – There are no invasive procedures involved in this study, thus no physical harm is envisaged. However, you don't have to answer any question you are not comfortable with.

There are no direct benefits for participating in this study.

The participant will be given pertinent information on the study while involved in the project and after the results are available.

Participation is voluntary: Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. Also, you may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

Reimbursements for transportation: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Confidentiality: Efforts will be made to keep personal information confidential. Absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law.

Organizations that may inspect and/or copy the research records for quality assurance and data analysis include groups such as the Research Ethics Committee. If results are published, may lead to individual / cohort identification.

Contact details of researcher – for further information / reporting of study related adverse events.

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APPENDIX 6: Participant Information Sheet for NGO programme managers

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

Introduction:

Good day! I am Oluwaseun Akinyemi, a PhD candidate of the School of Public Health, University of the Witwatersrand, Johannesburg. I am doing research on the scale up of community-based injectable contraceptives in Gombe State, Nigeria. Research is just the process to learn the answer to a question. In this study we want to learn what the factors are that may influence the scale up of community-based distribution of injectable contraceptives in Nigeria, in order to understand possible facilitators and barriers.

Invitation to participate: I am therefore asking / inviting you to take part in this research study because you are a programme manager for an NGO involved with this programme.

What is involved in the study – I am asking different people such as policy makers, program managers, health workers, community leaders, women who are the end-users of injectable contraceptives, and broader members of the community to participate in this study. About 100 people will participate in the study and all will be from Nigeria. If you agree to participate it means you will take part in a key informant interview. Each interview will last for about 60 minutes. In the interviews I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program. There are no right and wrong answers; I am interested in understanding your opinions. Please note that I intend to audio-tape this interview.

Risks and Benefits of being involved in the study – There are no invasive procedures involved in this study, thus no physical harm is envisaged. However, you don't have to answer any question you are not comfortable with.

There are no direct benefits for participating in this study.

The participant will be given pertinent information on the study while involved in the project and after the results are available.

Participation is voluntary: Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. Also, you may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

Reimbursements for transportation: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Confidentiality: Efforts will be made to keep personal information confidential. Absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law.

Organizations that may inspect and/or copy the research records for quality assurance and data analysis include groups such as the Research Ethics Committee. If results are published, may lead to individual / cohort identification.

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APPENDIX 7: Participant Information Sheet for health workers

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

Introduction:

Good day! I am Oluwaseun Akinyemi, a PhD candidate of the School of Public Health, University of the Witwatersrand, Johannesburg. I am doing research on the scale up of community-based injectable contraceptives in Gombe State, Nigeria. Research is just the process to learn the answer to a question. In this study we want to learn what the factors are that may influence the scale up of community-based distribution of injectable contraceptives in Nigeria, in order to understand possible facilitators and barriers.

Invitation to participate: I am therefore asking / inviting you to take part in this research study because you are a health worker who is involved with this programme.

What is involved in the study – I am asking different people such as policy makers, program managers, health workers, community leaders, women who are the end-users of injectable contraceptives, and broader members of the community to participate in this study. About 100 people will participate in the study and all will be from Nigeria. If you agree to participate it means you will take part in a key informant interview. Each interview will last for about 60 minutes. In the interviews I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program. There are no right and wrong answers; I am interested in understanding your opinions. Please note that I intend to audio-tape this interview.

Risks and Benefits of being involved in the study – There are no invasive procedures involved in this study, thus no physical harm is envisaged. However, you don't have to answer any question you are not comfortable with.

There are no direct benefits for participating in this study.

The participant will be given pertinent information on the study while involved in the project and after the results are available.

Participation is voluntary: Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. Also, you may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

Reimbursements for transportation: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Confidentiality: Efforts will be made to keep personal information confidential. Absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law.

Organizations that may inspect and/or copy the research records for quality assurance and data analysis include groups such as the Research Ethics Committee. If results are published, may lead to individual / cohort identification.

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APPENDIX 8: Participant Information Sheet for community leaders

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

Introduction:

Good day! I am Oluwaseun Akinyemi, a PhD candidate of the School of Public Health, University of the Witwatersrand, Johannesburg. I am doing research on the scale up of community-based injectable contraceptives in Gombe State, Nigeria. Research is just the process to learn the answer to a question. In this study we want to learn what the factors are that may influence the scale up of community-based distribution of injectable contraceptives in Nigeria, in order to understand possible facilitators and barriers.

Invitation to participate: I am therefore asking / inviting you to take part in this research study because you are a community leader.

What is involved in the study – I am asking different people such as policy makers, program managers, health workers, community leaders, women who are the end-users of injectable contraceptives, and broader members of the community to participate in this study. About 100 people will participate in the study and all will be from Nigeria. If you agree to participate it means you will take part in a key informant interview. Each interview will last for about 60 minutes. In the interviews I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program. There are no right and wrong answers; I am interested in understanding your opinions. Please note that I intend to audio-tape this interview.

Risks and Benefits of being involved in the study – There are no invasive procedures involved in this study, thus no physical harm is envisaged. However, you don't have to answer any question you are not comfortable with.

There are no direct benefits for participating in this study.

The participant will be given pertinent information on the study while involved in the project and after the results are available.

Participation is voluntary: Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. Also, you may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

Reimbursements for transportation: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Confidentiality: Efforts will be made to keep personal information confidential. Absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law.

Organizations that may inspect and/or copy the research records for quality assurance and data analysis include groups such as the Research Ethics Committee. If results are published, may lead to individual / cohort identification.

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APPENDIX 9: Participant Information Sheet for religious leaders

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

Introduction:

Good day! I am Oluwaseun Akinyemi, a PhD candidate of the School of Public Health, University of the Witwatersrand, Johannesburg. I am doing research on the scale up of community-based injectable contraceptives in Gombe State, Nigeria. Research is just the process to learn the answer to a question. In this study we want to learn what the factors are that may influence the scale up of community-based distribution of injectable contraceptives in Nigeria, in order to understand possible facilitators and barriers.

Invitation to participate: I am therefore asking / inviting you to take part in this research study because you are a religious leader in this community.

What is involved in the study – I am asking different people such as policy makers, program managers, health workers, community leaders, women who are the end-users of injectable contraceptives, and broader members of the community to participate in this study. About 100 people will participate in the study and all will be from Nigeria. If you agree to participate it means you will take part in a key informant interview. Each interview will last for about 60 minutes. In the interviews I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program. There are no right and wrong answers; I am interested in understanding your opinions. Please note that I intend to audio-tape this interview.

Risks and Benefits of being involved in the study – There are no invasive procedures involved in this study, thus no physical harm is envisaged. However, you don't have to answer any question you are not comfortable with.

There are no direct benefits for participating in this study.

The participant will be given pertinent information on the study while involved in the project and after the results are available.

Participation is voluntary: Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. Also, you may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

Reimbursements for transportation: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Confidentiality: Efforts will be made to keep personal information confidential. Absolute confidentiality cannot be guaranteed. Personal information may be disclosed if required by law.

Organizations that may inspect and/or copy the research records for quality assurance and data analysis include groups such as the Research Ethics Committee. If results are published, may lead to individual / cohort identification.

Contact details of researcher – for further information / reporting of study related adverse events.

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APPENDIX 10: Participant Information Sheet for women who are current users of injectable contraceptives

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

Introduction:

Good day! I am Oluwaseun Akinyemi, a PhD candidate of the School of Public Health, University of the Witwatersrand, Johannesburg. I am doing research on the scale up of community-based injectable contraceptives in Gombe State, Nigeria. Research is just the process to learn the answer to a question. In this study we want to learn what the factors are that may influence the scale up of community-based distribution of injectable contraceptives in Nigeria, in order to understand possible facilitators and barriers.

Invitation to participate: I am therefore asking / inviting you to take part in this research study because you use an injectable contraceptive.

What is involved in the study – I am asking different people such as policy makers, program managers, health workers, community leaders, women who are the end-users of injectable contraceptives, and broader members of the community to participate in this study. About 100 people will participate in the study and all will be from Nigeria. If you agree to participate it means you will take part in a key informant interview. Each interview will last for about 60 minutes. In the interviews I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program. There are no right and wrong answers; I am interested in understanding your opinions. Please note that I intend to audio-tape this interview.

Risks and Benefits of being involved in the study – There are no invasive procedures involved in this study, thus no physical harm is envisaged. However, you don't have to answer any question you are not comfortable with.

There are no direct benefits for participating in this study.

The participant will be given pertinent information on the study while involved in the project and after the results are available.

Participation is voluntary: Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. Also, you may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

Reimbursements for transportation: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Confidentiality: Efforts will be made to keep personal information confidential. However, confidentiality is not guaranteed in a focus group discussion. Personal information may be disclosed if required by law.

Organizations that may inspect and/or copy the research records for quality assurance and data analysis include groups such as the Research Ethics Committee. If results are published, may lead to individual / cohort identification.

Contact details of researcher – for further information / reporting of study related adverse events.

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APPENDIX 11: Participant Information Sheet for women who do not use injectable contraceptives

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

Introduction:

Good day! I am Oluwaseun Akinyemi, a PhD candidate of the School of Public Health, University of the Witwatersrand, Johannesburg. I am doing research on the scale up of community-based injectable contraceptives in Gombe State, Nigeria. Research is just the process to learn the answer to a question. In this study we want to learn what the factors are that may influence the scale up of community-based distribution of injectable contraceptives in Nigeria, in order to understand possible facilitators and barriers.

Invitation to participate: I am therefore asking / inviting you to take part in this research study because you do not use an injectable contraceptive.

What is involved in the study – I am asking different people such as policy makers, program managers, health workers, community leaders, women who are the end-users of injectable contraceptives, and broader members of the community to participate in this study. About 100 people will participate in the study and all will be from Nigeria. If you agree to participate it means you will take part in a key informant interview. Each interview will last for about 60 minutes. In the interviews I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program. There are no right and wrong answers; I am interested in understanding your opinions. Please note that I intend to audio-tape this interview.

Risks and Benefits of being involved in the study – There are no invasive procedures involved in this study, thus no physical harm is envisaged. However, you don't have to answer any question you are not comfortable with.

There are no direct benefits for participating in this study.

The participant will be given pertinent information on the study while involved in the project and after the results are available.

Participation is voluntary: Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. Also, you may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

Reimbursements for transportation: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Confidentiality: Efforts will be made to keep personal information confidential. However, confidentiality is not guaranteed in a focus group discussion. Personal information may be disclosed if required by law.

Organizations that may inspect and/or copy the research records for quality assurance and data analysis include groups such as the Research Ethics Committee. If results are published, may lead to individual / cohort identification.

Contact details of researcher – for further information / reporting of study related adverse events.

Dr Oluwaseun Akinyemi
Department of Health Policy and Management
College of Medicine
University of Ibadan
Ibadan, Nigeria
+234 803 502 0136
seunakinyemi@hotmail.com

Contact details of UI/UCH Ethics Committee chair (Nigeria) – for more information.

Prof. Catherine O. Falade
Chairperson, University of Ibadan/University College Hospital Ethics Committee
Institute for Advanced Medical Research and Training (IAMRAT)
College of Medicine, University of Ibadan
Ibadan, Nigeria
+234 803 326 4593
cfalade@comui.edu.ng

Contact details of REC administrator and chair (South Africa) – for more information.

Ms Zanele Ndlovu
Research Administrator
Human Research Ethics Committee (Medical)
University of the Witwatersrand
Johannesburg, South Africa
+27 11 717 1252
zanele.ndlovu@wits.ac.za

APPENDIX 12: Participant Information Sheet for married men

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

Introduction:

Good day! I am Oluwaseun Akinyemi, a PhD candidate of the School of Public Health, University of the Witwatersrand, Johannesburg. I am doing research on the scale up of community-based injectable contraceptives in Gombe State, Nigeria. Research is just the process to learn the answer to a question. In this study we want to learn what the factors are that may influence the scale up of community-based distribution of injectable contraceptives in Nigeria, in order to understand possible facilitators and barriers.

Invitation to participate: I am therefore asking / inviting you to take part in this research study because you are a married man.

What is involved in the study – I am asking different people such as policy makers, program managers, health workers, community leaders, women who are the end-users of injectable contraceptives, and broader members of the community to participate in this study. About 100 people will participate in the study and all will be from Nigeria. If you agree to participate it means you will take part in a key informant interview. Each interview will last for about 60 minutes. In the interviews I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program. There are no right and wrong answers; I am interested in understanding your opinions. Please note that I intend to audio-tape this interview.

Risks and Benefits of being involved in the study – There are no invasive procedures involved in this study, thus no physical harm is envisaged. However, you don't have to answer any question you are not comfortable with.

There are no direct benefits for participating in this study.

The participant will be given pertinent information on the study while involved in the project and after the results are available.

Participation is voluntary: Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. Also, you may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

Reimbursements for transportation: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Confidentiality: Efforts will be made to keep personal information confidential. However, confidentiality is not guaranteed in a focus group discussion. Personal information may be disclosed if required by law.

Organizations that may inspect and/or copy the research records for quality assurance and data analysis include groups such as the Research Ethics Committee. If results are published, may lead to individual / cohort identification.

Contact details of researcher – for further information / reporting of study related adverse events.

Dr Oluwaseun Akinyemi
Department of Health Policy and Management
College of Medicine
University of Ibadan
Ibadan, Nigeria
+234 803 502 0136
seunakinyemi@hotmail.com

Contact details of UI/UCH Ethics Committee chair (Nigeria) – for more information.

Prof. Catherine O. Falade
Chairperson, University of Ibadan/University College Hospital Ethics Committee
Institute for Advanced Medical Research and Training (IAMRAT)
College of Medicine, University of Ibadan
Ibadan, Nigeria
+234 803 326 4593
cfalade@comui.edu.ng

Contact details of REC administrator and chair (South Africa) – for more information.

Ms Zanele Ndlovu
Research Administrator
Human Research Ethics Committee (Medical)
University of the Witwatersrand
Johannesburg, South Africa
+27 11 717 1252
zanele.ndlovu@wits.ac.za

APPENDIX 13: Participant Information Sheet for unmarried/single men

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

Introduction:

Good day! I am Oluwaseun Akinyemi, a PhD candidate of the School of Public Health, University of the Witwatersrand, Johannesburg. I am doing research on the scale up of community-based injectable contraceptives in Gombe State, Nigeria. Research is just the process to learn the answer to a question. In this study we want to learn what the factors are that may influence the scale up of community-based distribution of injectable contraceptives in Nigeria, in order to understand possible facilitators and barriers.

Invitation to participate: I am therefore asking / inviting you to take part in this research study because you are an unmarried/ single man.

What is involved in the study – I am asking different people such as policy makers, program managers, health workers, community leaders, women who are the end-users of injectable contraceptives, and broader members of the community to participate in this study. About 100 people will participate in the study and all will be from Nigeria. If you agree to participate it means you will take part in a key informant interview. Each interview will last for about 60 minutes. In the interviews I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program. There are no right and wrong answers; I am interested in understanding your opinions. Please note that I intend to audio-tape this interview.

Risks and Benefits of being involved in the study – There are no invasive procedures involved in this study, thus no physical harm is envisaged. However, you don't have to answer any question you are not comfortable with.

There are no direct benefits for participating in this study.

The participant will be given pertinent information on the study while involved in the project and after the results are available.

Participation is voluntary: Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. Also, you may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

Reimbursements for transportation: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Confidentiality: Efforts will be made to keep personal information confidential. However, confidentiality is not guaranteed in a focus group discussion. Personal information may be disclosed if required by law.

Organizations that may inspect and/or copy the research records for quality assurance and data analysis include groups such as the Research Ethics Committee. If results are published, may lead to individual / cohort identification.

Contact details of researcher – for further information / reporting of study related adverse events.

Dr Oluwaseun Akinyemi
Department of Health Policy and Management
College of Medicine
University of Ibadan
Ibadan, Nigeria
+234 803 502 0136
seunakinyemi@hotmail.com

Contact details of UI/UCH Ethics Committee chair (Nigeria) – for more information.

Prof. Catherine O. Falade
Chairperson, University of Ibadan/University College Hospital Ethics Committee
Institute for Advanced Medical Research and Training (IAMRAT)
College of Medicine, University of Ibadan
Ibadan, Nigeria
+234 803 326 4593
cfalade@comui.edu.ng

Contact details of REC administrator and chair (South Africa) – for more information.

Ms Zanele Ndlovu
Research Administrator
Human Research Ethics Committee (Medical)
University of the Witwatersrand
Johannesburg, South Africa
+27 11 717 1252
zanele.ndlovu@wits.ac.za

APPENDIX 14: Informed Consent Agreement for Senior MoH officials

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives. This study will contribute to providing evidence towards aiding our understanding of the barriers and facilitators to the introduction, dissemination, diffusion and integration of the community-based distribution of injectable contraceptives intervention in Nigeria.

Procedures: You have been selected as one of this study's participants for a key informant interview. Each interview will last for about 60 minutes. In the interviews I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program.

Potential Risks: There are no health risks associated with the interviews and discussions.

Potential benefits: The findings of this study will help enhance the scale up of injectable contraceptives in Nigeria thereby helping to promote maternal and child health as well as healthier families.

Reimbursements for “out of pocket” expenses: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Withdrawal from participation: If you agree to take part you are free to end your participation in this study at any time you want without having to give reasons.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent record: Please read this statement carefully before you sign and if you agree on participating, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled “Scale up of community-based injectable contraceptives in Gombe State, Nigeria” which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences.

Participant's name: _____

Participant's signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member's statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study, the risks and benefits involved, and the obligations of the study team.

_____	_____	_____
Name	Signature	Date

APPENDIX 15: Informed Consent Agreement for program managers

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives. This study will contribute to providing evidence towards aiding our understanding of the barriers and facilitators to the introduction, dissemination, diffusion and integration of the community-based distribution of injectable contraceptives intervention in Nigeria.

Procedures: You have been selected as one of this study's participants for a key informant interview. Each interview will last for about 60 minutes. In the interviews I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program.

Potential Risks: There are no health risks associated with the interviews and discussions.

Potential benefits: The findings of this study will help enhance the scale up of injectable contraceptives in Nigeria thereby helping to promote maternal and child health as well as healthier families.

Reimbursements for “out of pocket” expenses: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Withdrawal from participation: If you agree to take part you are free to end your participation in this study at any time you want without having to give reasons.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent record: Please read this statement carefully before you sign and if you agree on participating, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled “Scale up of community-based injectable contraceptives in Gombe State, Nigeria” which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences.

Participant's name: _____

Participant's signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member's statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study, the risks and benefits involved, and the obligations of the study team.

_____	_____	_____
Name	Signature	Date

APPENDIX 16: Informed Consent Agreement for health workers

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives. This study will contribute to providing evidence towards aiding our understanding of the barriers and facilitators to the introduction, dissemination, diffusion and integration of the community-based distribution of injectable contraceptives intervention in Nigeria.

Procedures: You have been selected as one of this study's participants for an in-depth interview. Each interview will last for about 60 minutes. In the interviews and discussions I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program.

Potential Risks: There are no health risks associated with the interviews and discussions.

Potential benefits: The findings of this study will help enhance the scale up of injectable contraceptives in Nigeria thereby helping to promote maternal and child health as well as healthier families.

Reimbursements for “out of pocket” expenses: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Withdrawal from participation: If you agree to take part you are free to end your participation in this study at any time you want without having to give reasons.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent record: Please read this statement carefully before you sign and if you agree on participating, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled “Scale up of community-based injectable contraceptives in Gombe State, Nigeria” which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences.

Participant's name: _____

Participant's signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member's statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study, the risks and benefits involved, and the obligations of the study team.

_____	_____	_____
Name	Signature	Date

APPENDIX 17: Informed Consent Agreement for community leaders

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives. This study will contribute to providing evidence towards aiding our understanding of the barriers and facilitators to the introduction, dissemination, diffusion and integration of the community-based distribution of injectable contraceptives intervention in Nigeria.

Procedures: You have been selected as one of this study's participants for an in-depth interview. Each interview will last for about 60 minutes. In the interviews and discussions I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program.

Potential Risks: There are no health risks associated with the interviews and discussions.

Potential benefits: The findings of this study will help enhance the scale up of injectable contraceptives in Nigeria thereby helping to promote maternal and child health as well as healthier families.

Reimbursements for “out of pocket” expenses: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Withdrawal from participation: If you agree to take part you are free to end your participation in this study at any time you want without having to give reasons.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent record: Please read this statement carefully before you sign and if you agree on participating, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled “Scale up of community-based injectable contraceptives in Gombe State, Nigeria” which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences.

Participant's name: _____

Participant's signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member's statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study, the risks and benefits involved, and the obligations of the study team.

_____	_____	_____
Name	Signature	Date

APPENDIX 18: Informed Consent Agreement for religious leaders

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives. This study will contribute to providing evidence towards aiding our understanding of the barriers and facilitators to the introduction, dissemination, diffusion and integration of the community-based distribution of injectable contraceptives intervention in Nigeria.

Procedures: You have been selected as one of this study's participants for an in-depth interview. Each interview will last for about 60 minutes. In the interviews and discussions I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program.

Potential Risks: There are no health risks associated with the interviews and discussions.

Potential benefits: The findings of this study will help enhance the scale up of injectable contraceptives in Nigeria thereby helping to promote maternal and child health as well as healthier families.

Reimbursements for “out of pocket” expenses: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Withdrawal from participation: If you agree to take part you are free to end your participation in this study at any time you want without having to give reasons.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent record: Please read this statement carefully before you sign and if you agree on participating, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled “Scale up of community-based injectable contraceptives in Gombe State, Nigeria” which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences.

Participant's name: _____

Participant's signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member's statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study, the risks and benefits involved, and the obligations of the study team.

_____	_____	_____
Name	Signature	Date

APPENDIX 19: Informed Consent Agreement for women who are current users of injectable contraceptives

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives. This study will contribute to providing evidence towards aiding our understanding of the barriers and facilitators to the introduction, dissemination, diffusion and integration of the community-based distribution of injectable contraceptives intervention in Nigeria.

Procedures: You have been selected as one of this study's participants for a focus group discussion or a questionnaire interview. Each interview or focus group discussion will last for about 60 minutes. In the interviews and discussions I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program.

Potential Risks: There are no health risks associated with the interviews and discussions.

Potential benefits: The findings of this study will help enhance the scale up of injectable contraceptives in Nigeria thereby helping to promote maternal and child health as well as healthier families.

Reimbursements for “out of pocket” expenses: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Withdrawal from participation: If you agree to take part you are free to end your participation in this study at any time you want without having to give reasons.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent record: Please read this statement carefully before you sign and if you agree on participating, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled “Scale up of community-based injectable contraceptives in Gombe State, Nigeria” which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand

that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences.

Participant's name: _____

Participant's signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member's statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study, the risks and benefits involved, and the obligations of the study team.

Name	Signature	Date
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APPENDIX 20: Informed Consent Agreement for women who do not use injectable contraceptives

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives. This study will contribute to providing evidence towards aiding our understanding of the barriers and facilitators to the introduction, dissemination, diffusion and integration of the community-based distribution of injectable contraceptives intervention in Nigeria.

Procedures: You have been selected as one of this study's participants for a focus group discussion. Each focus group discussion will last for about 60 minutes. In the interviews and discussions I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program.

Potential Risks: There are no health risks associated with the interviews and discussions.

Potential benefits: The findings of this study will help enhance the scale up of injectable contraceptives in Nigeria thereby helping to promote maternal and child health as well as healthier families.

Reimbursements for “out of pocket” expenses: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Withdrawal from participation: If you agree to take part you are free to end your participation in this study at any time you want without having to give reasons.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent record: Please read this statement carefully before you sign and if you agree on participating, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled “Scale up of community-based injectable contraceptives in Gombe State, Nigeria” which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand

that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences.

Participant's name: _____

Participant's signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member's statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study, the risks and benefits involved, and the obligations of the study team.

Name	Signature	Date
------	-----------	------

APPENDIX 21: Informed Consent Agreement for married men

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives. This study will contribute to providing evidence towards aiding our understanding of the barriers and facilitators to the introduction, dissemination, diffusion and integration of the community-based distribution of injectable contraceptives intervention in Nigeria.

Procedures: You have been selected as one of this study's participants for a focus group discussion. Each focus group discussion will last for about 60 minutes. In the interviews and discussions I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program.

Potential Risks: There are no health risks associated with the interviews and discussions.

Potential benefits: The findings of this study will help enhance the scale up of injectable contraceptives in Nigeria thereby helping to promote maternal and child health as well as healthier families.

Reimbursements for “out of pocket” expenses: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Withdrawal from participation: If you agree to take part you are free to end your participation in this study at any time you want without having to give reasons.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent record: Please read this statement carefully before you sign and if you agree on participating, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled “Scale up of community-based injectable contraceptives in Gombe State, Nigeria” which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences.

Participant's name: _____

Participant's signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member's statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study, the risks and benefits involved, and the obligations of the study team.

_____	_____	_____
Name	Signature	Date

APPENDIX 22: Informed Consent Agreement for unmarried men

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives. This study will contribute to providing evidence towards aiding our understanding of the barriers and facilitators to the introduction, dissemination, diffusion and integration of the community-based distribution of injectable contraceptives intervention in Nigeria.

Procedures: You have been selected as one of this study's participants for a focus group discussion. Each focus group discussion will last for about 60 minutes. In the interviews and discussions I will ask questions about your knowledge and your role in the implementation or use of injectable contraceptives as well as what you think might be the challenges and things that work well in implementing this program.

Potential Risks: There are no health risks associated with the interviews and discussions.

Potential benefits: The findings of this study will help enhance the scale up of injectable contraceptives in Nigeria thereby helping to promote maternal and child health as well as healthier families.

Reimbursements for “out of pocket” expenses: Transportation costs incurred in order to participate in the study will be reimbursed at the rate of ₦100 per km.

Withdrawal from participation: If you agree to take part you are free to end your participation in this study at any time you want without having to give reasons.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent record: Please read this statement carefully before you sign and if you agree on participating, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled “Scale up of community-based injectable contraceptives in Gombe State, Nigeria” which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences.

Participant's name: _____

Participant's signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member's statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study, the risks and benefits involved, and the obligations of the study team.

_____	_____	_____
Name	Signature	Date

APPENDIX 23: Informed Consent Agreement to audio record interview senior MoH officials

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent to record: Please read this statement carefully before you sign and if you agree that the interview / discussion with you should be audio recorded, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled **“Scale up of community-based injectable contraceptives in Gombe State, Nigeria”** which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences. I agree that the interview / discussion with me should be audio recorded. I understand that the recording is for research purposes only.

Participant's name: _____

Participant's signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member's statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study (including audio recording of the interview), the risks and benefits involved, and the obligations of the study team.

Name	Signature	Date
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APPENDIX 24: Informed Consent Agreement to audio record interview with program managers

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent to record: Please read this statement carefully before you sign and if you agree that the interview / discussion with you should be audio recorded, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled **“Scale up of community-based injectable contraceptives in Gombe State, Nigeria”** which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences. I agree that the interview / discussion with me should be audio recorded. I understand that the recording is for research purposes only.

Participant's name: _____

Participant's signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member's statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study (including audio recording of the interview), the risks and benefits involved, and the obligations of the study team.

_____	_____	_____
Name	Signature	Date

APPENDIX 25: Informed Consent Agreement to audio record interview with health workers

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent to record: Please read this statement carefully before you sign and if you agree that the interview / discussion with you should be audio recorded, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled **“Scale up of community-based injectable contraceptives in Gombe State, Nigeria”** which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences. I agree that the interview / discussion with me should be audio recorded. I understand that the recording is for research purposes only.

Participant's name: _____

Participant's signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member's statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study (including audio recording of the interview), the risks and benefits involved, and the obligations of the study team.

Name	Signature	Date
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APPENDIX 26: Informed Consent Agreement to audio record interview with community leaders

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent to record: Please read this statement carefully before you sign and if you agree that the interview / discussion with you should be audio recorded, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled “**Scale up of community-based injectable contraceptives in Gombe State, Nigeria**” which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences. I agree that the interview / discussion with me should be audio recorded. I understand that the recording is for research purposes only.

Participant’s name: _____

Participant’s signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member’s statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study (including audio recording of the interview), the risks and benefits involved, and the obligations of the study team.

_____	_____	_____
Name	Signature	Date

APPENDIX 27: Informed Consent Agreement to audio record interview with religious leaders

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent to record: Please read this statement carefully before you sign and if you agree that the interview / discussion with you should be audio recorded, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled “**Scale up of community-based injectable contraceptives in Gombe State, Nigeria**” which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences. I agree that the interview / discussion with me should be audio recorded. I understand that the recording is for research purposes only.

Participant’s name: _____

Participant’s signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member’s statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study (including audio recording of the interview), the risks and benefits involved, and the obligations of the study team.

_____	_____	_____
Name	Signature	Date

APPENDIX 28: Informed Consent Agreement to audio record focus group discussion with women who currently use injectable contraceptive

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent to record: Please read this statement carefully before you sign and if you agree that the interview / discussion with you should be audio recorded, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled “**Scale up of community-based injectable contraceptives in Gombe State, Nigeria**” which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences. I agree that the interview / discussion with me should be audio recorded. I understand that the recording is for research purposes only.

Participant’s name: _____

Participant’s signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member’s statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study (including audio recording of the discussion), the risks and benefits involved, and the obligations of the study team.

Name	Signature	Date
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APPENDIX 29: Informed Consent Agreement to audio record focus group discussion with women who do not use injectable contraceptive

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent to record: Please read this statement carefully before you sign and if you agree that the interview / discussion with you should be audio recorded, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled **“Scale up of community-based injectable contraceptives in Gombe State, Nigeria”** which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences. I agree that the interview / discussion with me should be audio recorded. I understand that the recording is for research purposes only.

Participant's name: _____

Participant's signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member's statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study (including audio recording of the discussion), the risks and benefits involved, and the obligations of the study team.

Name	Signature	Date
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APPENDIX 30: Informed Consent Agreement to audio record focus group discussion with married men

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent to record: Please read this statement carefully before you sign and if you agree that the interview / discussion with you should be audio recorded, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled “**Scale up of community-based injectable contraceptives in Gombe State, Nigeria**” which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences. I agree that the interview / discussion with me should be audio recorded. I understand that the recording is for research purposes only.

Participant’s name: _____

Participant’s signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member’s statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study (including audio recording of the discussion), the risks and benefits involved, and the obligations of the study team.

Name	Signature	Date
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APPENDIX 31: Informed Consent Agreement to audio record focus group discussion with single/unmarried men

Study title: Scale up of community-based injectable contraceptives in Gombe State, Nigeria

SERIAL NUMBER _____

Background and purpose: One of the health innovations that have been piloted with significant success around the world, including Nigeria, is the community-based distribution of injectable contraceptives.

Additional Information: In case you have any question or concern about this study please feel free to contact Dr Oluwaseun Akinyemi, Department of Health Policy and Management, College of Medicine, University of Ibadan Ibadan, Nigeria (Tel. No.: +234 803 502 0136; Email: seunakinyemi@hotmail.com)

Informed consent to record: Please read this statement carefully before you sign and if you agree that the interview / discussion with you should be audio recorded, please fill free to sign this form below to affirm your consent.

I, _____ clearly understand the aims of the project titled “**Scale up of community-based injectable contraceptives in Gombe State, Nigeria**” which has been explained to me by the researcher. I have been given the chance to ask questions and I am satisfied with the answers to all of my questions and I agree to participate in the study. I understand that I may revoke my consent and leave the study at any stage, if I wish so, with no negative consequences. I agree that the interview / discussion with me should be audio recorded. I understand that the recording is for research purposes only.

Participant’s name: _____

Participant’s signature or thumbprint: _____ Date: _____

Witness Name (As appropriate): _____

Witness signature (As appropriate): _____ Date: _____

Study team member’s statement: I, the undersigned, have explained to the participant in a language that s/he understands; the procedures to be followed in the study (including audio recording of the discussion), the risks and benefits involved, and the obligations of the study team.

_____	_____	_____
Name	Signature	Date

APPENDIX 32: Distress Protocol

Distress Protocol 1: The protocol for managing distress in the context of a research focus group /interview

(Adapted from: Draucker C B, Martsolf D S and Poole C (2009) Developing Distress Protocols for research on Sensitive Topics. *Archives of Psychiatric Nursing* 23 (5) pp 343-350)

Distress

- A participant indicates they are experiencing a high level of stress or emotional distress

OR

- Exhibit behaviours suggestive that the discussion/interview is too stressful such as uncontrolled crying, shaking etc.

Stage 1 Response

- Stop the discussion/interview.
- The researcher (who is a health professional) will offer immediate support
- Assess mental status:
 - Tell me what thoughts you are having?
 - Tell me what you are feeling right now?
 - Do you feel you are able to go on about your day?
 - Do you feel safe?

Review

- If participant feels able to carry on; resume interview/discussion
- If participant is unable to carry on, Go to stage 2

Stage 2 Response

- Remove participant from discussion and accompany to quiet area or discontinue interview
- Encourage the participant to contact their GP or mental health provider

OR

- Offer, with participant consent, for a member of the research team to do so OR
- With participant consent contact a member of the health care team treating them for further advice/support

Follow up

- Follow participant up with courtesy call (if participant consents)

OR

- Encourage the participant to call either if he/she experiences increased distress in the hours/days following the focus group

Distress Protocol 2: The protocol for managing distress in the context of a research focus group /interview management

Adapted from: McCosker, H Barnard, A Gerber, R (2001). Undertaking Sensitive Research: Issues and Strategies for Meeting the Safety Needs of All. Forum: Qualitative Social Research, 2(1)

Pre-data collection

- The researcher would consider the potential physical and psychological impact on the researcher of the participants' description of life experiences.
- The researcher would consider how many interviews could be undertaken in a week.
- The researcher would be aware of the potential for emotional exhaustion.

Data collection stage

- For topics that are potentially sensitive/distressing data collection would be undertaken by two members of the research team.
- Regular scheduled debriefing sessions with the lead researcher.
- Research team would be encouraged to journal their thoughts and feelings which may then become part of fieldwork notes in some research approaches.

Analysis

- Research team would be alerted prior to transcription review of potentially "challenging" or "difficult" interviews
- The research team would have regular scheduled debriefing sessions with the lead researcher

Follow up

- Researcher will access a research mentor (supervisor) if he experiences increased distress in the hours/days following transcription.

Distress Protocol 3: The protocol for managing distress in the context of a research focus group /interview transcription

(Adapted from: Gregory, D Russell, C Phillips, L (1997). Beyond textual perfection: transcribers as vulnerable persons. Qualitative Health Research, 7(2), 294-300.)

Pre-data collection

- The transcriber would be considered in the research proposal, with a clear indication of how s/he will be provided with a "safe" working environment while also maintaining the "quality" of the research.

Ethical review stage

- The transcriber would be included in the ethical clearance process.
- The transcriber would be informed of the nature of the research and the type of data.

Pre-transcription

- The transcriber would be alerted prior to the transcription of potentially "challenging" or "difficult" interviews.
- The transcriber would have regular scheduled debriefing sessions with a named member of the research team.

During Transcription

- Transcriber would have prompt access to an appropriate person for crisis counselling.
- S/he would have a clearly documented termination from the transcription process that includes resolution of personal issues which arose as a consequence of the work.
- Transcriber would be encouraged to journal her/his thoughts and feelings which may then become part of fieldwork notes.

Follow up

- Follow transcriber up with courtesy call (if transcriber consents)

OR

- Encourage the transcriber to call if s/he experiences increased distress in the hours/days following transcription

APPENDIX 33: Ethics Approval – University of the Witwatersrand Human Research Committee (Medical)



R14/48 Dr Oluwaseun Oladapo Akinyemi

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M160737

NAME: Dr Oluwaseun Oladapo Akinyemi
(Principal Investigator)
DEPARTMENT: School of Public Health
Gombe State Ministry of Health, Funakaye and Yamaltu, Nigeria

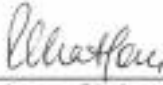
PROJECT TITLE: Assessing the Scale Up of Community-Based
Injectable Contraceptives in Nigeria

DATE CONSIDERED: 29/07/2016

DECISION: Approved unconditionally

CONDITIONS:

SUPERVISOR: Dr Mary Kawonga and Dr Aziza Mwisongo

APPROVED BY: 
Professor P Cleaton-Jones, Chairperson, HREC (Medical)

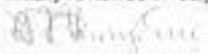
DATE OF APPROVAL: 19/09/2016

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 301, Third floor, Faculty of Health Sciences, Philip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. I agree to submit a yearly progress report. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in July and will therefore be due in the month of July each year.



03/10/2016

Principal Investigator Signature

Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX 34: Ethics Approval – University of Ibadan / University College Hospital Research Ethics Committee, Nigeria



INSTITUTE FOR ADVANCED MEDICAL RESEARCH AND TRAINING (IAMRAT)
College of Medicine, University of Ibadan, Ibadan, Nigeria.



Director: **Prof. Catherine O. Falade, MBBS (Ib), M.Sc. FMCP, FWACP**
Tel: 0803 326 4593, 0802 360 9151
e-mail: cfalade@comui.edu.ng lillyfunke@yahoo.com

UI/UCH EC Registration Number: NHREC/05/01/2008a

NOTICE OF FULL APPROVAL AFTER FULL COMMITTEE REVIEW

Re: Assessing the Scale Up of Community-Based Injectable Contraceptives in Gombe State, Nigeria

UI/UCH Ethics Committee assigned number: UI/EC/16/0022

Name of Principal Investigator: **Dr. O. O. Akinyemi**
Address of Principal Investigator: School of Public Health,
University of the Witwatersrand,
Johannesburg, South Africa

Date of receipt of valid application: 21/01/2016

Date of meeting when final determination on ethical approval was made: N/A

This is to inform you that the research described in the submitted protocol, consent form, and other participant information materials have been reviewed and *given full approval by the UI/UCH Ethics Committee.*

This approval dates from **24/02/2016 to 23/02/2017**. If there is delay in starting the research, please inform the UI/UCH Ethics Committee so that the dates of approval can be adjusted accordingly. Note that no participant accrual or activity related to this research may be conducted outside of these dates. *All informed consent forms used in this study must carry the UI/UCH EC assigned number and duration of UI/UCH EC approval of the study.* It is expected that you submit your annual report as well as an annual request for the project renewal to the UI/UCH EC early in order to obtain renewal of your approval to avoid disruption of your research.

The National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the Code including ensuring that all adverse events are reported promptly to the UI/UCH EC. No changes are permitted in the research without prior approval by the UI/UCH EC except in circumstances outlined in the Code. The UI/UCH EC reserves the right to conduct compliance visit to your research site without previous notification.



Professor Catherine O. Falade
Director, IAMRAT
Chairperson, UI/UCH Ethics Committee
E-mail: uiuchec@gmail.com

APPENDIX 35: Approval of Title



Private Bag 3 Wits, 2050
Fax: 027117172119
Tel: 02711 7172076

Reference: Mrs Sandra Benn
E-mail: sandra.benn@wits.ac.za

06 January 2017
Person No: 1006186
PAG

Dr OO Akinyemi
P.o. Box 22252
U.I. Post Office
200001
Nigeria

Dear Dr Akinyemi

Doctor of Philosophy: Approval of Title

We have pleasure in advising that your proposal entitled *Scale up of community-based injectable contraceptives in Gombe State, Nigeria* has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

A handwritten signature in black ink, appearing to read 'Sandra Benn'.

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences

APPENDIX 36: Paper 1

Health system readiness for innovation scale-up: the experience of community-based distribution of injectable contraceptives in Nigeria

RESEARCH ARTICLE

Open Access



Health system readiness for innovation scale-up: the experience of community-based distribution of injectable contraceptives in Nigeria

Oluwaseun Akinyemi^{1,2*} , Bronwyn Harris^{3,4} and Mary Kawonga²

Abstract

Background: Following the successful pilot of the community-based distribution of injectable contraceptives (CBDIC) by community health extension workers (CHEWs) in Gombe, northern Nigeria in 2010, there was a policy decision to scale-up the innovation to other parts of the country. However, there is limited understanding of health system factors that may facilitate or impede the successful scale-up of this innovation beyond the pilot site. Thus, this study assessed the health system readiness to deliver CBDIC in Nigeria and how this may influence the scale-up process.

Methods: This study was conducted in two Local Government Areas in Gombe State in September 2016. Seven key informant interviews were held with purposively sampled senior officials of the ministries of health at the federal and state levels as well as NGO program managers. Also, 10 in-depth interviews were carried out with health workers. All transcripts were analyzed using the thematic framework analysis approach.

Result: The availability of a policy framework that supports task-shifting and task-sharing, as well as application of evidence from the pilot programme and capacity building programmes for health workers provided a favourable environment for scale-up. Health system challenges for the scale-up process included insufficient community health workers, resistance to the task-shifting policy from professional health groups (who should support the CHEWs), limited funding and poor logistics management which affected commodity distribution and availability. However, there were also a number of health worker innovations which kept the scale-up going. Health workers sometimes used personal resources to make up for logistics failures and poor funding. They often modify the process in order to adapt to the realities on the ground.

Conclusion: This study shows health system weaknesses that may undermine scale-up of CBDIC. The study also highlights what happens when scale-up is narrowly focused on the intervention without considering system context, capacity and readiness. However, agency and discretionary decision-making among frontline health workers facilitated the process of scaling up, although the sustainability of this is questionable. Benefits observed during the pilot may not be realised on a larger scale if health system challenges are not addressed.

Keywords: Scale-up, Community-based distribution of injectable contraceptives, Health system readiness, Stakeholder collaboration

* Correspondence: seunakinyemi@hotmail.com

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²Department of Community Health, School of Public Health, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa
Full list of author information is available at the end of the article



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Background

In Nigeria, following the successful pilot of a community-based distribution (CBD) of injectable contraceptives programme in Gombe State (one of the country's 36 states), a decision was taken by the National Council on Health – Nigeria's highest decision-making body on health – to scale-up the intervention starting with expansion elsewhere in Gombe State and later extending to other parts of the country [1]. The CBD of injectable contraceptives, which was included in the national task-shifting policy, entails community-based provision of injectable contraceptives by community health extension workers (CHEWs). Scale-up was intended to ensure that benefits identified during the pilot (particularly higher contraceptive uptake) [1] were made available throughout the country.

This innovation was important in Nigeria, a country with very low contraceptive prevalence rates (CPR) – 14.6% for any method and 9.7% for modern methods (condoms, pills, intrauterine devices and implants) [2–4]. In addition, there is a wide dichotomy between contraceptive usage in the urban and rural areas – 24.1 and 10.1%, respectively [5–7]. The 2013 demographic and health survey showed only 3% of married women in Nigeria used an injectable contraceptive method, a total fertility rate of 6 per woman, and an annual population growth rate of 3.2% [7]. The low contraceptive prevalence is said to be an important contributor to the unacceptably high maternal mortality ratio of 576 per 100,000 live births with maternal deaths accounting for 32% of all deaths among women aged 15–49 years [7].

In 2014, scale-up of the CBD of injectable contraceptives, started in Nigeria with a national NGO leading the process. Scale-up started with the training of trainers (experienced nurse midwives) as well as Community Health Extension Workers (CHEWs) [8]. By end of 2017, large scale provision of injectable contraceptives at the community level had commenced in Gombe State (North East) and Kebbi State (North West). However, the understanding of health system factors that may facilitate or impede the successful scale-up of this innovation beyond the initial pilot site is limited.

Health system and innovation scale-up in low and middle-income countries

The importance of scaling up health interventions in order to maximise population-wide benefits has been well documented [9, 10]. Health innovation scale-up is imperative in order to achieve universal health coverage and global development goals [11–13]. Scaling up can be described in several ways but is generally agreed to mean improving the scope and magnitude of health interventions in order to reach more people in terms of number and geographical spread [9, 10, 14]. Scaling up requires

commitment in terms of political will, finances, human and material resources [10, 15]. However, in Low and Middle Income Countries (LMICs), there is a dearth of enabling policies to support scale-up of tested interventions [16]. As alluded to by Gilson and Schneider [13], political will and a conducive policy framework are essential to successful innovation scale-up. Furthermore, sometimes scale-up is embarked upon without a thorough appraisal of health system readiness to deliver the innovations [17], resulting in limited availability of interventions of known efficacy in many low-income countries [1, 18].

The strength and absorptive capabilities of the health system affect scale-up [10, 19]. Health system factors including weak leadership and governance, inadequate human resources for health [20, 21], limited financing [11], the lack of a clear legal framework, over-centralized health systems [22] and weak stakeholder advocacy [13, 23] limit the ability of the system to utilise increased aid inflow [10] and to implement interventions on a wide scale [21]. It has been demonstrated that assessing the health system's readiness and preparing the system to implement innovations on a large-scale is critical for successful realisation of the expected health benefits of the innovation [17]. According to Evans and Etienne [24], increasing resources will not necessarily lead to increase output in a milieu of health system fragility. This is particularly so in Nigeria, a country with a complex and weak health system [25]. According to the AIDED model of Bradley and colleagues [16], assessing the system context in which an innovation will be delivered is one of the key stages in the process of scaling up an intervention. The AIDED model conceptualises scale-up as a set of five interconnected and non-linear stages: assess, innovate, develop, engage and devolve. The Assess stage includes understanding the context (including socio-cultural and health system context) in which the innovation will be introduced [16]. An assessment of health system readiness to scale-up the community-based delivery (CBD) of injectable contraception has not been documented in Nigeria where a policy decision was taken to scale-up the CBD innovation [1].

This study is part of a broader research project applying the AIDED model [16] to explore possible barriers and facilitators of the scale-up of CBD of injectables in Nigeria.

This paper specifically explores factors in the “assess” component of the AIDED model. The paper aims to identify factors within the health system context that may support or resist the scale-up of the community-based distribution of injectable contraceptives beyond Gombe State, and to explore whether the readiness and receptivity of the health system context was considered in the process of scaling up.

Methods

Study design and setting

This study, which was part of a larger study to explore the scale-up of community-based injectable contraceptives in Gombe Nigeria, was a cross-sectional qualitative study comprising key informant interviews (KIIs) and in-depth interviews (IDIs). The study took place principally in Gombe state (North eastern Nigeria) although some interviews took place in Ibadan in the South West (where the national NGO that spear-headed the pilot is headquartered) and Abuja in the Federal Capital Territory (where the Federal Ministry of Health and the international NGO are based). Administratively, Gombe is divided into 11 Local Government Areas (LGAs). Each LGA is further sub-divided into administrative wards. The state has a population of 2,353,879 people according to the 2006 population census of which women constitute about half (49.9%) and women of child bearing age about 22%. The maternal mortality rate is 1726/100,000, one of the highest in the country, and contraceptive prevalence rates (CPRs) are 3.5% for modern methods and 4.0% for any method [1, 3], compared to a national CPR of 15.1% (for any method) [26]. Prior to the adoption of the task-shifting policy which introduced the community-based distribution approach, administration of injectable contraceptives was facility-based and done by nurses and doctors at all levels of health care delivery [1]. Under the new policy thrust, the injectable contraceptives are administered at the community level by CHEWs who are linked to health facilities. Doctors and nurses based in the health facilities support and supervise the CHEWs and manage any adverse effects [1].

Sampling and participants

Two LGAs in Gombe State – Gombe LGA (urban) and Yamaltu/Deba LGA (rural) – were selected for this study. These study sites were purposively selected because Yamaltu/Deba LGA was one of the sites used for the pilot of the innovation and Gombe LGA because it is the capital of the State and the seat of policy makers at the state level. Study participants were selected primarily from these two LGAs, but also from the State and Federal (national) levels (Table 1). Seventeen participants were recruited through purposive sampling and included health managers in the state and federal Ministry of Health (MoH), as well as programme managers of Non-Governmental Organizations (NGOs) in Ibadan and Abuja who were involved in the pilot study or in making decisions about the scale-up. Other participants included health workers (doctors, nurses and CHEWs) in Gombe (see Table 1).

Table 1 Study sites, participants and data collection method

Location	Data collection method	n	Type of participants
IBADAN (state level)			
	KII	1	NGO program manager (doctor)
ABUJA (national level)			
	KII	3	NGO program managers, family planning coordinator of the Federal MoH ^a (all doctors).
GOMBE			
Gombe LGA	KII	3	State family planning coordinator, Director PHC ^b , Senior official of State MoH.
	IDI	5	Health workers (Nurses, CHEWs ^c)
Yamaltu/Deba LGA	IDI	5	Health workers (CHEWs ^c , Nurses)
Total		17	

^aMoH – Ministry of Health; ^bPHC – Primary Health Care; ^cCHEWs – Community Health Extension Workers

Data collection and analysis

A total of seven KIIs and 10 IDIs were conducted with the study participants over a two-week period in September 2016 to explore different roles and perspectives from across the health system hierarchy – both those responsible for managing the scale-up and those actually delivering the innovation. Interviews were conducted in English, audio recorded and transcribed. KIIs were conducted using a KII guide (see Additional file 1) to explore participants' roles in implementation of the CBDIC intervention during and after the pilot, their understanding of the task-shifting policy, as well as perspectives of challenges and factors supportive of the scale-up of CBDIC within the health system context. Also, IDIs were conducted with health workers using an interview guide (see Additional file 1) to assess their roles and experiences in the wider implementation of the CBDIC innovation, and their perspective of enablers and barriers.

A broad coding framework was developed based on the research questions, and applied to the transcripts to identify emerging and divergent themes. All transcripts were analyzed with NVIVO (version 10) software using the thematic framework analysis approach [27, 28]. As themes emerged, these were indexed and compared with themes from subsequent interviews until a sense of attainment of saturation was achieved [27].

Results

Factors in the health system context that may impede scale-up

Participants described a number of factors in the policy and health systems context which may impede the scale-up process. These factors include human resource and

operational challenges as well as resistance to task-shifting from health professional bodies.

Human resource and personnel training challenges

The scale-up plan was to extend the service to reach all administrative wards in all LGAs in Gombe State. Shortages of human resources to cover all Gombe's administrative wards was a major drawback for the community-based delivery of injectable contraceptives. This led to many clients being unable to use contraceptives consistently.

"...the challenges we encountered was lack of adequately trained personnel because it was limited at least one person per ward, one CHEW will go into the ward and then, the woman will patronize her (the CHEW) ... so there was inadequate trained staff" (KII5, male, family planning coordinator).

Furthermore, participants were of the opinion that the task shifting policy adopted by the federal government about six years earlier was not adequate to address the human resource to deliver the service. They were of the opinion that allowing other cadres of health workers (like pharmacy assistants, radiology assistants, environmental assistants and community pharmacists) apart from nurses and CHEWs to administer the community-based injectable contraceptives would accelerate scale-up since the commodities would be more readily available in the community.

"...the federal government should include all the health workers and not limit (task-sharing of CBD of injectable contraceptives) to only midwife or nurse or even the CHEWs in the community. These are the ones nearer to their communities in terms of training, in terms of updating their (community's) knowledge. So, we need to carry along all health professionals so that we'll have a wider coverage ...let's carry them together, give them training, update their knowledge and build their capacities, they can do it" (IDI2, female, CHEW).

A health manager at the local government level described having to do a lot of administrative duties within a very limited time, thus working under a lot of pressure in order to conform to the NGO requirement. Thus, managers were also under a lot of pressure and not able to adequately play oversight of the programme nor achieve their targets and goals. According to a manager, *"...they (coordinating NGO) will send about one-year report for us to write in just two days we will have to crash the program, crash the work to send them message..."* (IDI9, male, Deputy PHC Coordinator).

In addition, in terms of training, early implementers of the scale-up (the national and international NGOs coordinating scale-up) reported challenges with developing

tools to match the capacity level / training needs of lay health workers like CHEWs. This slowed down the scale-up process, as implementers could not get as much done within time planned.

"...Our challenges had to do with providing simple competency-based tools – you know traditionally, the training manuals tends to be very voluminous, then too wordy – you just need practical skills immediately, how do you provide an injection?" (KII3, female, NGO program manager).

Weaknesses in service delivery support systems

Other challenges which were thought to have hampered the scale-up process included lack of transportation for health workers to get to specific communities and poor logistics management. This affected commodity distribution and availability and hence limited the number of women they could reach with the intervention.

"The problem is nothing but transport ...if there is transport, enough transport, we can go out and you see like home visit, outreach, (but) if there is no transport, there's problem. But if there is transport, we can go out at least twice in a week, we can find the women at home nursing there and they can accept it (the injectable contraceptive)." (IDI14, female, CHEW).

"...if there is break in the chain of the supply then there will be a problem, but if there is a continuous supply of these injectable then I don't think there will be any problem" (IDI9, male, Deputy PHC coordinator).

Also, the centralised supply chain system was a barrier to effective distribution of the commodity to the community level as availability of transportation was a rate-limiting step in the scale-up process. Contraceptives are usually imported into the country by donors and kept in the country's central store in Lagos. Donors also fund the distribution of the commodity from Lagos to the states. However, the bottleneck is getting the commodity from the state capitals to health facilities, the so-called "last mile delivery" due to poor funding of logistics by the states. According to a key informant, this has adversely affected contraceptive security in many states in Nigeria.

"Another challenge was commodity security so at that point in time CLMS, that's community logistics management system, had issues in terms of moving commodities from the federal level to the state level and down to the facility level..." (KII3, female, NGO program manager).

Commodity security

In addition, participants reported that poor logistics management made the product vulnerable to theft. One key informant explained that there were pilferages along the logistic chain such that injectable contraceptives were diverted into private patent medicine stores and sold unlike in the public sector where they are freely available. According to the key informant, *“Contraceptives disappear from the logistics chain into the private sector because they (contraceptives) are totally free in the public sector. How this happens is not clear”* (KII3, female, NGO program manager).

Resistance to the task-shifting and task-sharing policy from health professional groups

An important reported health system challenge to the scale-up was persistent conflict among health worker groups about which cadre of health worker should administer injectable contraceptives.

“...there is a perennial struggle within (the health sector) about whose domain is injectable contraceptives. While the community health workers feel they should be in charge, nurses will always feel that they are the people giving it, and should continue to give it” (IDI, male, Doctor, SMoH).

Furthermore, one of the program implementers narrated that health workers and professional health groups at the onset of both the pilot and the scale-up were not supportive of CHEWs delivering injectables. Some professional bodies were particularly concerned about poor safety and quality if CHEWs were allowed to administer injectable contraceptives. For example, according to the Medical and Dental Council of Nigeria, *“...their (CHEWs’) basic training was not enough (for them to administer injectable contraceptives)”* (KII3, female, NGO program manager). This sentiment was reportedly shared by other professional associations particularly the Nursing Council as shown by the quotes below:

“...many of the medical associations and professional bodies were a bit reluctant, the Nursing Council particularly of note, was quite uncomfortable with training that cadre of staff (CHEWs).” (KII1, male, NGO program manager).

“...there was serious resistance from them (Nursing Council). Also, a few other professional bodies raised some concerns as to the quality of services especially when it relates to needle or injection safety” (KII4, male, FMOH official).

Lack of ownership of the scale-up process at the state and local government levels

The states and the local government health authorities were reportedly unwilling to drive the initiative to scale-up CBDIC. Participants perceived that this apathy was largely caused by the states’ poor funding support to implement the CBDIC. Many of the state MOHs had line items in their annual budget to fund the introduction of injectables, but had no financial support from the federal level to accomplish such plans. Furthermore, there was usually limited ownership from the State and Local Government tiers of governance when the NGOs are perceived to be the drivers of the initiative.

Most of the states are almost completely dependent on NGO partners for sustenance and funding in many areas that are not funded by government leadership including CBDIC. The Federal Ministry of Health usually supervises the State MoHs, which in turn oversee the Local Government health authorities in their respective states.

“...So they (the federal government) are fully involved from the outset... they lead as far as the implementation is concerned, so what we (the partners) do is get in the back seat and try to give technical support for the state to be able to implement such activity... The government can easily talk to them (the community) than what a partner will do when such a challenge comes.” (KII1, male, NGO manager).

Ineffective monitoring and evaluation

Participants reported the lack of effective monitoring and evaluation of health workers’ activities during the scale-up process as an important factor affecting smooth scale-up. An interviewee alluded to the fact that there might be a discordance between the report submitted by some implementers and the realities on the field:

“... there is need also even from the state, from the LGA to follow-up, see how things are being done, are they really doing the right thing? Are they really delivering the services not just bringing results on paper? When you go (to the field) the results may not be there vividly. There should be a level of follow-up, monitor them to see how they are going on. Even (members of) the community, interview them- how are the services, are you satisfied with what is happening?” (IDI2, female, CHO).

Factors in the health system context that may facilitate scale-up

Enabling task-shifting policy

Some key informants were of the opinion that availability of a policy framework which supported task-shifting of injectable contraceptives to CHEWs was fundamental

to the government support for the innovation scale-up. Also, the task-shifting policy was vital for the political will from the top (the federal government) through to the Local Government Areas. In the view of a respondent:

"I think the major factor (in successful implementation) is the conducive environment that the policy on task-shifting created ...this brought an overwhelming support of the government of Nigeria toward the policy implementation" (KII1, male, NGO manager).

However, the lack of funding transfers from federal government for the new programme reflected that the other element of political will – resource allocation – was limited.

Collaboration between implementing NGOs and the government

From the outset of the implementation process, the coordinating NGOs yielded the leadership of the programme to the Federal Ministry of Health in order to overcome resistance and to guarantee cooperation from the States and the local governments. When states saw that the federal government was in the lead, resistance fell away.

"...When we go to implement a project, we want to be sure that the state government has a kind of ownership of the process... Once the FMOH gave a clear nod to the project, there was limited resistance from the states, as the project had an official introductory note that facilitated the engagement of the actors at the local level. The state was able to address the pockets of resistance wherever they arose by referring to the national support for the program." (KII1, male, NGO manager).

Continuous stakeholder collaboration

Key informants also narrated that resistance was constantly dealt with through continuous dialogue and stakeholder participation during the pilot and the scale-up process.

"...At the outset, there was a stakeholder meeting that involved many of the professional bodies, so it was easy to always go back to them whenever you have a challenge" (KII1, male, NGO manager).

Another participant added: *"I think through dialogue with the various bodies it (injectable contraceptive by CHEWs) was finally allowed"* (KII3, female, NGO manager).

Quality assurance measures to prepare for innovation scale-up

Training and capacity building programmes for health workers aided the scale-up process. In the opinion of a participant, *"...with the training and capacity building (given to health workers), I think it showed a lot of result in both pilot and scale-up - over 11,000 providers were trained by both UNFPA and DKT Nigeria (a social marketing company) between 2015 to 2017..."* (KII1, male, NGO manager).

In addition, quality control measures were put in place before scale-up. These included provision of adequate training for CHEWs and initiation of the injectable contraceptives at the health facility (so that health professionals could screen users for possible contraindications) before allowing CHEWs to continue with subsequent monthly provision in the community. At the community level, contraindications or side effects that develop during use were reported to the community-based distributors who were usually in close proximity to the users. The community-based distributors were given a pictorial adaptation of the medical eligibility criteria chart which was used for counselling and screening at the community level.

"... So, most of our trainings are focused on quality of service and by this I mean, the community-based groups are more positioned to do harm when they are not properly trained and that will kill the whole process from the start. So, we've paid lot of attention to looking at eligibility of women. Both the community-based groups (pharmacy technicians, community pharmacist, community volunteers as well as retired CHEWs and midwives) and the CHEWs were taken through intensive training on medical eligibility for hormonal contraceptives using the WHO Medical Eligibility Criteria (MEC)...The MEC has been adapted in pictorial form for ease of use by CHEWs at the community level, so they are able to detect contraindications, counsel and refer appropriately" (KII1, male, NGO manager).

"Initiation is done at the facility level but refills or subsequent monthly injectables just like DMPA-SC (subcutaneous Depot Medroxyprogesterone Acetate) is done by them [CHEWs]. We were able to allay a lot of anxieties that 'women, who are hypertensive, how do they check their BP?' And all of those things" (KII1, male, NGO manager).

CHEWs also had a one-week training in contraceptives technology and counselling. This included clinical practicum sessions, didactic lectures, value clarification and rights-based decision making.

Furthermore, contraceptive products and consumables were kept in bags called outreach kits, designed to keep products at a stable temperature. The community-based distributors were also advised to keep products in an airy space out of the reach of children. Likewise, another quality control measure was to develop an effective referral system and linkages with hospitals that could take care of possible side effects. These measures helped to allay the fears of concerned groups, particularly the professional bodies, about the safety of the innovation.

“As part of our quality control measures we have a one-week intensive training for CHEWs in contraceptive technology and counselling which encompassed practical training sessions in hospitals, role plays and didactic lectures, rights-based decision making and value clarification in order to ensure that the woman knows her rights and is not railroaded into adopting a contraceptive method” (KII1, male, NGO manager).

“The other thing we have done is to do a complete community-to-hospital continuum of service/linkage that will ensure effective referrals. At the start-up of the project, the first few months, we insisted that women who were seen, who wanted the method can be counselled, given advice and must be referred to the facility to have a proper assessment done” (KII1, male, NGO manager).

“At the PHC facility, contraceptives are stored like other medicines but we designed a special bag called outreach kit for community-based distributors in order to keep contraceptives and other consumables within a stable temperature. Community-based distributors are also trained to store products properly out of the reach of children and to dispose waste safely” (KII1, male, NGO manager).

Action taken by implementers to address system weaknesses

Innovation and agency of health workers

Despite the transport and supply chain management barriers, the innovation and agency of health workers enabled service provision to continue. For example, health workers (CHEWs) sometimes spent personal funds on transportation in order to provide services to people in their communities. Also, in order to get to the hard-to-reach areas, health workers took the initiative to reschedule most outreach activities to the dry seasons when it is much easier to access those terrains. Usually, the nurses plan the outreaches, supervise the CHEWs and they usually stay at the facilities to provide services

whereas the CHEWs do the community delivery of the injectable contraceptives.

The limitation of this initiative however is that the women in these hard-to-reach areas may not be able to access injectable contraceptives during the rainy season and are then unprotected during this period or they may use other substitutes like oral pills or condoms. However, family planning managers are working on making longer-acting contraceptives (for example Sayana Press given once in three months) more available and to empower women to self-administer these.

“They (CHEWs) are going (on outreaches) with NAPEP (tricycle) and the motorcycle...with their money” (IDI14, female, Nurse).

“We plan most of our [far out] outings for the dry season and during raining season we go to nearby places...” (IDI11, female, Nurse).

“The truth is that during the rainy season the woman in the hard-to-reach area may get pregnant as she might not be able to get the injectable contraceptives. This is one of the challenges of community-based distribution in Nigeria – poor access to care during rainy season. We plan to deal with this challenge by popularising longer acting contraceptives, specifically Sayana Press, and training providers who will train women to self-inject these longer acting contraceptives.” (KII1, male, NGO manager).

Additionally, health workers, particularly CHEWs dealt with the challenge of human resource shortages by operating from home instead of going door-to-door and having the women in the community come to the CHEW's house to access injectable contraceptives services. This approach helped CHEWs to reach many more women despite the challenges with transportation. According to a key informant, *“...the woman will patronize her (a CHEW) at home [because] there was inadequate trained staff” (KII5, male, family planning coordinator).*

Discussion

In this study, we collected qualitative data on health system factors that may influence the scale-up of community-based injectable contraceptives in Gombe State, Nigeria. We also examined how health system challenges were dealt with within the context of the research setting. Our discussion addresses the health system concerns and implications for further scale-up of the innovation.

Principal among factors facilitating the scale-up process was political commitment by the federal government of Nigeria. Also, the availability of a policy

framework supporting task shifting of administration of injectable contraceptives from the doctors and nurses to allied health professionals like the CHEWs is another important aspect of the political commitment. However, although shifting of roles to CHEWs was necessary for a successful scale-up, it was not sufficient as the task shifting policy was rather generic and does not cover other pertinent issues like commodity supply, logistics and funding. Therefore, the lack of policy and policy implementation guidelines on how to implement the innovation in Nigeria's health system context may explain the seeming inadequate preparedness with regards to funding, workforce planning and logistics management in the process of scale-up. According to Berlan and colleagues [29], policy formulation and proper implementation is imperative in the process of innovation diffusion. The constraints to scale-up identified in this study include shortages in human resource, poor logistics management as well as theft of commodities, resistance to the task-shifting policy from health professional groups and lack of ownership of the process by the state and local government.

The availability of a policy framework is closely associated with the political leadership. In the work of Mangham and Hanson [10] and others [13], political will and availability of a conducive policy framework were shown to be essential to successful innovation scale-up. Strong political leadership is said to be critical to the realisation of the global developmental goals [13]. Evidence abounds that a pilot project is essential in documenting best practices, creating an enabling environment for a health innovation, enhancing the quality and improving the capacity of health workers to deliver the innovation [1]. And this was borne out in this scale-up.

Findings from this study show that despite an enabling task-shifting policy, there are still a number of barriers relating to funding, which may impede scale-up. Issues impeding the process particularly relate to inadequate transport for CHEWs, and logistical problems with commodity distribution. Thus, there seems to be a focus on the innovation but inattention to the delivery system. In a study done in Swaziland, on scale-up of voluntary medical male circumcision, Edgil and colleagues demonstrated that sound supply chain management is pivotal to the success of wide scale implementation of a health innovation and that it is imperative for program managers to plan and budget for this from the beginning of the process [30]. Although, the street level bureaucrats in our study demonstrated resilience and ingenuity in the face of failure of logistics to further implementation of the policy provisions, nevertheless the sustainability of their stopgap measures is questionable. Studies have shown that frontline health workers can exercise considerable discretionary powers thus making them important

determinants in the implementation of policies [31, 32]. However, how much discretion these street level bureaucrats should be allowed during implementation is still a subject of debate [33]. Furthermore, in the Nigerian context where people are already stretched by high out-of-pocket expenditure on health [34], requiring that they buy injectable contraceptives, when these are not available through public facilities and channels of distribution, undermines the aim of increasing contraceptive prevalence. Political leadership (particularly as expressed through financial commitment and allocation) is needed in this context, but it is not inherently spontaneous, and rather comes through continuous advocacy and government engagements by stakeholders [13, 23]. Advocacy for improved health funding should however not leave out the private sector. The role of the private sector has been described as "large and important" in global health funding [35]. Furthermore, there is increased need for advocacy to translate the current political will into greater financial commitment and increased funding of the scale-up process. According to Gilson and Schneider, an advocacy drive should be focused and targeted at both the political leadership as well the public through lobbying in order to frame public opinion and set the agenda for policy makers [13].

Findings from the study show that insufficient human resources for the scale-up contributed to overwork for the few health workers available, despite the implementation of the task-shifting policy of the federal government. Although the task-shifting policy is officially being implemented in the country, its implementation is still sub-optimal, possibly due to the passive resistance of higher cadre health workers to the process, at least at the inception. In a Malawian study to assess the human resource requirement for the scale-up of highly active antiretroviral therapy, the researchers concluded that the process is labour-intensive and that there cannot be successful scale-up without a commensurate increase in the human resources for health [36]. Thus, inadequate human resource may put significant stress on health workers who are the most important resource of the health system [37]. Scaling up health innovations in a milieu of human resource inadequacy may result in neglect of some other critical health services [38], as well as poor health service provision to citizens [39]. Similarly, in a systematic review of health systems bottlenecks to essential maternal and newborn healthcare, Dickson and colleagues [21] submitted that the principal health system blockage to scale-up of health innovations were human resource for health issues (workforce forecasting, task sharing, motivation for health workers in rural areas), limited funding, challenges in the accessibility of healthcare and unavailability of essential medical products and technologies. Further research is needed to

estimate the human resource need for the scale-up of injectable contraceptives in Nigeria and possibly to assess the stress on the available health workers from the current scale-up [36, 38].

Studies have established the contributions of community health workers to increasing access to healthcare and health innovations, reducing cost of care, improving the quality of care as well as contributing to community growth and empowerment in poor and underserved areas [40–42]. Although health workers in this study exercised agency to make sure the commodity gets to women, but their motivation may wane in the face of lack of ‘secure funding’ which may make the scale-up program unsustainable [40].

Furthermore, program managers and policy makers should make improved budgetary provision for supply chain management [30] in the scale-up of the community-based provision of injectable contraceptives and the budget should be monitored for compliance. Likewise, practical procurement and logistics management systems should be instituted in order to ensure constant availability of contraceptive products and delays in the system should be investigated and sanctioned appropriately [21].

Also, there may be deliberate policies to attract, deploy and retain CHEWs and other health workers in the rural areas as well as to stem the tide of in- and out-migration [37]. Increasing the retirement age of health workers may also be considered [21]. Besides, participants in our study described conflicts among professional health groups around role and task-shifting which slowed down the scale-up process. However, this type of inter-professional conflict, where professions seek to guard their perceived jurisdictions, is not peculiar to Nigeria [43]. Hall [44] believes that more education for health workers about other professional groups’ ideals, philosophies, customs and conducts may help improve cooperative practice among health professional groups. Organizing interdisciplinary discourse and continuing education for professional groups aimed at enlightening health workers about the roles, values, history and cultures of lay health workers may help to limit conflicts among health worker groups [43–46]. This sort of team-building intervention should be proactively done before innovation implementation and scale-up rather than being reactive when resistance might be more difficult to deal with as seen in this study.

The findings of this study revealed some challenges in the first phase (the ‘assess’ phase) of the scaling up process of community-based distribution of injectable contraceptives in Nigeria [18]. Since the stages of the AIDED scale-up model are interconnected and non-linear, there may be adverse implications for other stages of the scale-up process if the context in which the

innovation will be introduced is not properly assessed and prepared. Thus, this study points to some of the issues that could be considered in Nigeria before scaling up the community-based injectable contraceptives to more states.

Study limitation

Certain limitations of this study should be highlighted: findings may not be generalizable to other local contexts in Nigeria as the country is very diverse. Nonetheless, the findings of this study provide useful insights into understanding how health systems readiness affect the scale-up of health innovations in a developing country like Nigeria.

Conclusion

This study highlights that although a task-shifting policy exists to facilitate the scale-up of community-based distribution of injectable contraceptives by CHEWs, health system challenges may impede scaling up of this innovation. In our study setting, the health system needs more readying, which includes encouraging interdisciplinary discourse in order to help reduce or prevent health worker resistance to the task-shifting policy and to promote industrial harmony among health worker groups. Also, support systems for innovation scale-up require more attention – human resource, supply of commodities and resource allocation. A key implication for weak health system contexts like Nigeria is that inattention to readying the health system may undermine the scale-up of innovations of proven effectiveness.

Additional file

Additional file 1. Interview Guide 1: Key informant interview with senior MOH officials and NGO programme managers. Interview guide 2: In-depth interview with health workers (Doctors and CHEWs).

Abbreviations

AIDED: Assess Innovate Develop Engage Devolve; CBD: Community-based delivery; CBDIC: Community-based distribution of injectable contraceptives; CHEW: Community health extension worker; CHO: Community health officer; CPR: Contraceptive prevalence rates; IDI: In-depth interview; KII: Key informant interview; LGA: Local Government Authority; NGO: Non-governmental organization; PHC: Primary Health Care

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Authors’ contributions

OA conceived the study while OA and MK designed it. The data were collected by OA. OA, MK and BH analyzed the data, drafted and commented on the draft of the manuscript. OA, MK and BH read and approved the final version of the manuscript.

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Availability of data and materials

The data (transcripts) used and/or analysed in this study are available from Dr. Oluwaseun Akinyemi on request.

Ethics approval and consent to participate

Ethical approval for this study was obtained from the Human Research Ethics Committee (Medical) of the University of Witwatersrand (Reference No.: M160737) as well as the University of Ibadan/University College Hospital Ethical Review Board (Reference No.: UI/EC/16/0022). Participants in this study were provided with information sheets and then asked to provide written informed consent before the interviews. Names and other identifiers of participants are not reported in order to ensure anonymity.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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APPENDIX 37: Paper 2

Community-based delivery of injectable contraceptives in Nigeria: does the packaging of the innovation fit user preferences?

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Community-based delivery of injectable contraceptives in Nigeria: does the packaging of the innovation fit users' preferences?

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Running Head: INNOVATION PACKAGING AND USER PREFERENCES

Community-based delivery of injectable contraceptives in Nigeria: does the packaging of the innovation fit users' preferences?

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Abstract

Objectives To explore the fit between the design and packaging of a community-based distribution of injectable contraceptives (CBDIC) innovation and users’ preferences.

Design This qualitative study, based on a grounded theory approach and part of a larger study, was cross-sectional in design.

Setting This study was largely conducted in in Gombe State, Northeastern Nigeria. Some aspects of the study also took place in Abuja and Ibadan – Federal capital territory and South West Nigeria, respectively.

Participants Fifteen in-depth interviews (IDIs), seven key informant interviews (KIIs) and 10 focus groups discussions (FGDs) were conducted between September and November 2016.

Methods This study was conducted to obtain data from health workers, religious and traditional leaders and community members including users of injectable contraceptives. Using a thematic analysis, the transcripts were analysed for key themes pertaining to innovation packaging design and stakeholders’ preferences.

Results Although the innovation was designed to be community-based, little fit between the design of the innovation and stakeholders’ preferences was found. However, by continuously engaging with stakeholders, even after the onset of implementation, the packaging of the innovation was modified to take into account cultural, religious and programmatic factors, thereby improving the ‘fit’. Modifications included use of markets as mobile posts to distribute the injectables and to provide healthcare for women, dissemination outreach at women’s gatherings and distribution of contraceptives from community health extension workers’ (CHEWs) homes. Other modifications involved recruiting young female community volunteers as peer educators, partnering with patent medicine vendors and social marketing using mobile phones in order to improve compliance.

Conclusion Innovation packaging should be context-relevant and cost-effective. Also, there might be need to combine strategies for synergy and to integrate community-based distribution with existing programs and infrastructures. Scale up approaches should include flexibility and allow for adaptation to fit local contexts.

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Strengths and limitations of this study

- The study showed that stigma and sociocultural issues associated with uptake of community-based distribution of injectable contraceptives may be addressed through use of fixed posts and community social gatherings for innovation diffusion.
- The findings of our study revealed that effective innovation distribution often requires a combination of innovation packaging designs.
- Our study emphasised that innovation packaging is contextual and critical to innovation uptake.
- Our results highlighted the importance of consulting early the stakeholders, including potential users, when designing health innovation packaging.
- Since health innovation packaging is environment-specific, it might be challenging to implement some of the packaging described in this study in other contexts.

Keywords: Innovation packaging; Scale-up; Community-based distribution of injectable contraceptives; Socio-cultural context; Social marketing; Nigeria

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Declarations of interest

The authors declare that they have no conflict of interests.

INNOVATION PACKAGING AND USER PREFERENCES

Introduction

Innovation refers to ways of doing something differently. It may involve the creation of new products, teams, roles or markets; or the rejigging or modification of processes, ideas or systems.¹⁻³ Innovations have the potential to influence not just immediate or present users but also the networks in which these users are embedded.^{1, 4} Integrating and involving all stakeholders including potential users in the innovation packaging galvanizes the process and improves the chances of successful diffusion and implementation.^{1, 5} Knowledge of potential users’ expectations, perceptions and attitudes towards the innovation is essential when planning innovation scale-up as these drive public perceptions and shape acceptability. However, these may not necessarily be in sync, or ‘fitted’, with expert opinions and submissions.⁵⁻⁷

Packaging denotes how a product or service is offered in order to make it interesting to stakeholders, potential clients or users.¹ According to Kühne and colleagues,¹ packaging does not change the core characteristics of an innovation but provides additional desired benefits, for example, in the case of community-based injectable contraceptives, flexibility and confidentiality. Thus, packaging is not a substitute for innovation quality and safety.¹ However, it is a key component of whether and how the innovation will be adopted on scale-up.

Scaling up, making health innovations available over a wider geographical coverage and to more people, is essential in order to achieve universal health coverage (UHC).^{8, 9} However, inability to adapt health innovation packaging to the preferences of stakeholders including potential users is one of the main reasons why scale-up of innovations fails.¹⁰ Innovation packaging has been shown to influence the preferences of potential users of such innovation. For example, a study done among young people in New Zealand showed that plain packaging and warning labels significantly reduced users’ preferences for sugar-sweetened beverages,¹¹ while tobacco companies have also used packaging and innovation with product development to improve uptake of their products by young adults.¹²

Background

There is abundant research evidence that community-allied health professionals, including community health workers and outreach workers, can safely administer the injectable contraceptive Depo-Provera in the community with negligible risk to the users.¹³⁻¹⁵ This

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innovation has been shown to be safe and effective in demonstrated projects in many African countries including Ethiopia, Malawi, Kenya, Rwanda and Uganda.^{16, 17} It has also been shown to increase contraceptive prevalence rates in countries where it has been adopted.¹⁸ There is a long history of community-based distribution programs (going back at least six decades) for improving access to health services and commodities in rural and under-served areas, particularly in developing countries.¹⁸

Community-based distribution of injectable contraceptives (CBDIC) was officially adopted as a new innovation in Nigeria after its successful pilot in two Local Government Areas of Gombe State in 2010^{19, 20}. CBDIC was introduced as a response to the generally low contraceptive prevalence rate in the country (16.0% for any method and 11.1% for modern methods).²¹ In addition, Nigeria has a high fertility rate (5.5 births per woman) with a high maternal mortality ratio – 576/100,000 live births.^{21, 22} The CBDIC innovation entails community health workers providing injectable contraceptives to women at home or other settings outside the health facility. After the initial pilot, the scale-up of this innovation started in 2014, led by a national non-governmental organization (NGO) and supported by international donor agencies.¹⁹ The lessons learned from the pilot were used in the modification of the innovation packaging.

The AIDED model¹⁰ – the conceptual framework adopted for this study – provides a useful lens for understanding the scale-up process. AIDED is an acronym for the model's five non-linear and interrelated components of scale-up: Assess, Innovate, Develop, Engage and Devolve. 'Innovate' entails aligning the innovation packaging to user preference in order to optimise receptivity, while 'Develop' involves building support for the innovation and addressing concerns or resistance within the social context in which it will be delivered. According to Bradley *et al*, a good understanding of potential users' preferences is essential for successful innovation diffusion. This understanding will assist health managers to package the CBDIC innovation in ways that are context-specific and responsive.¹⁰

However, data on the extent to which the CBDIC innovation packaging was aligned to user expectations and preferences during and after the pilot is not available. This study, therefore, explored the fit between the design and packaging of the CBDIC innovation and stakeholders' preferences; and assessed whether and how potential user groups and community members were engaged during the design and packaging.

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Methods

Study design and setting

This qualitative study was part of a larger cross-sectional study on the scale-up of community-based distribution of injectable contraceptives in Gombe, Northeast Nigeria.²³⁻²⁵ Gombe State is divided into 11 administrative units (Local Government Areas) and has a population of about 2.4 million people.²⁶ Some of the interviews were also held in Abuja (Nigeria’s Federal Capital Territory) and Ibadan, a major city in the southwest region of the country.

Fifteen in-depth interviews (IDIs), seven key informant interviews (KIIs) and 10 focus groups discussions (FGDs) of eight people each, were conducted to obtain data from purposively selected health workers, religious and traditional leaders and community members (see Table 1). Participants were selected based on ability to provide relevant information necessary to answer the research questions for this study. Overall, a total of 102 people participated in the study.

[Table 1]

Data collection and analysis

The interviews and discussions were conducted with the aid of a guide. The interview guide covered issues about innovation preferences, factors affecting accessibility and uptake as well as issues that make the innovation interesting to stakeholders including community members. Most interviews and FGDs were conducted in English while a few interviews were conducted in Hausa language and later translated to English. Interviews and FGDs were conducted by the first author, who is a male public health physician assisted by three research assistants, two of whom were female. The number of interviews and FGDs done was based on the principle of saturation,²⁷ where no fresh information was obtained from subsequent interviews. All interviews and discussions were audio-recorded and transcribed.

Using the thematic analysis approach, the transcripts were analysed using the NVIVO-10 software.^{28, 29} Techniques used to enhance trustworthiness and credibility of data analysis in this study have been described elsewhere.²⁵ In preparing this manuscript, the Standards for Reporting

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Qualitative Research guidelines³⁰ for qualitative studies were used.

Ethical approval

Ethical approval for this study was obtained from University of Ibadan/University College Hospital Ethical Review Board (Ref. No.: UI/EC/16/0022) and the Human Research Ethics Committee (Medical) of the University of Witwatersrand (Ref. No.: M160737). Written informed consent was also obtained from all participants in this study.

Patient and public involvement

During the pre-test, participants in the study were involved in modification of the study instruments, in order to make the questions clearer. Some respondents also helped with recruitment of other participants. Other types of involvement of the public in the larger study have been described elsewhere.²⁵

Results

The findings of this qualitative inquiry into the fit between the packaging of the innovation and stakeholders' preference as well as the community members' engagement in the design and packaging process are presented below. A number of innovation modifications were described by respondents following the initial pilot, including modification to the service delivery models and alignment of innovation packaging to stakeholders' preferences and needs.

Addressing sociocultural issues and stigma through fixed posts and community gatherings for innovation delivery

In the initial design of the CBDIC, community health workers were meant to go from house to house to administer injectable contraceptives to women of reproductive age group. However, due to a number of factors including lack of support from spouses and significant others (particularly mothers and mothers-in-law), the health workers had to modify delivery channels in order to preserve the confidentiality of women. One respondent declared: "...*Since we're in the North, our men will not allow their wives to go out...*" (KII 5, FP coordinator SMoH, female)

Also, because of cultural and religious factors, particularly in northern Nigeria, some young

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unmarried women, because of their unmarried status, find it difficult to request contraceptives from health workers in facilities. Some of the modifications designed in response to this practical challenge include using the markets as fixed posts for the distribution of non-prescriptive contraceptives (including injectable contraceptives) so that no woman feels stigmatised. Sometimes, the health workers also designed outreach activities for social gatherings where contraceptive services are extended to women “...especially naming ceremony, weddings and women political gatherings...” (KII 5, FP coordinator SMOH, female). Another respondent sums it up this way:

In Northern Nigeria, because of the peculiar culture and norms, majority of young women are still left behind (so to say) because older interventions are very focused on middle-age elderly women who are like more vocal in the community, but what happens with time is that younger women who want access to this method sort of shy away, because of the peculiarity of their culture and the fact that they don't want to be labelled... a lot of unwanted pregnancies will have happened because they (young women) cannot come out to say 'I want some help'. (KII 1, NGO Program manager, male)

Furthermore, because women were being lost to follow up when they were referred to health facilities either for proper assessment prior to initiation of contraceptive or as a result of a health complaint, a modification was made to the process to have women assessed by health workers (CHEWs) in mobile posts located in the markets. Thereby, they were offered health advice and care without needing to leave their businesses or risk stigmatisation if health workers were seen to visit their homes.

Sending people to the facility for referrals was quite a challenge because, a lot of women who are referred are lost in the process. We are still having a lot of lost to follow-up ...So what we have done now is to firstly, ensure that we have points within those markets where CHEWs can come in like the health clinics or a formal post within the market or a local shop that the CHEW comes in to pay a regular visit so that she can have a one on one conversation that the woman who does not want to come to the facility can come to on market days to see them. (KII 1, NGO Program manager, male)

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Maintaining confidentiality and promoting convenience

Furthermore, women would occasionally go to meet CHEWs in their homes, sometimes at night in order to preserve confidentiality since the communities are closely knit.

As long as she (CHEW) is in the community, and lives in that community the woman will patronize her since it's two-way service, she either goes to them or they come to her...
(KII 5, FP coordinator SMoH, female).

This was corroborated by a reproductive age-group woman when she narrated her experience:

...in the maternity, they gave me a paper and said if I have any health worker close to me (in the community), she can give me the (contraceptive) injection without me coming to the maternity all the time. So, this my friend does help out and if there is any challenge, I go back to her for

One additional modification was to keep the innovation discrete and almost 'hidden' or secret for users:

...We found that women find it convenient because of the balance of the power within homes and families particularly in the North, women usually have difficulty with uptake of interventions like this that are good for their own health, but with the injectables is something you can take without necessarily anybody knowing that you are taking it, the issue of taking permission from spouses to be able to take it will not be an issue for this woman...so they don't need to leave their houses to go to the facility to access the service, so that it was quite acceptable. After a while that became a practice that the women knew where the community health extension worker lived and so because they (CHEWs) were with them, they could actually go to their homes and get the service. (KII 2, NGO Program manager, female)

...We found that women prefer to meet them (CHEWs) in their homes; being that it was a Northern setting – if you go to see a CHEW, you can go to see her for any reason and going at night usually there was no problem with that but going to the facility where people can know you got an injection or not we so find that women prefer to see them in their homes... So, they don't want the CHEWs to come to their house so that people

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around will not know what is even happening. (KII 3, NGO Program manager, female)

Engagement of community volunteers and patent medicine vendors

Likewise, young women were recruited as community volunteers and trained by the coordinating NGO to enable a form of ‘peer to peer influence’, thereby earning the confidence of the young women through ‘age-specific contraceptive messaging’. In addition to the original design of community-based distribution, patent medicine vendors, popular low cadre dispensers of over-the-counter medicines within the community, were also recruited and trained for the distribution of the injectable contraceptives:

We are looking at three to four interventions: in the market which is anybody’s friend; we are looking at patent medicine vendor who is the first point of call of care; looking at community volunteers who can go into people’s homes. We were initially thinking of training more matured women who can talk to them, but at that point of intervention, it became apparent that we need to look at some younger people to take them into our training because peer to peer influence; I mean age-specific contraceptive messaging will be able to help younger people to be able to accept methods. Some, of course, of our trainings we had to expand the age range or people that will need to be trained. (KII 1, NGO Program manager, male)

Also, due to the cultural and religious sensitivity in Northern Nigeria where the CBDIC was piloted, almost all health workers recruited into the community-based distribution were women in order to facilitate the acceptance of the innovation.

...Because of the religious and cultural sensitivity, having women CHEWs that will go to homes was very important...In this particular case, most of them were women, close to 100% were women, yes, most of them were women. It makes it more acceptable; it is more acceptable if it’s a woman. In the North, it is difficult for a man to be visiting homes and meeting with women, it will not be acceptable. So, it’s easier when you roll this out with women. (KII 2, NGO Program manager, female)

Some of these modifications do not only fit well into stakeholders’ preferences but also into the human resource for health realities, especially in northern Nigeria. For instance, in “...most parts

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of the North, CHEWs man most of our primary health centres and as such they may not have enough time to work in the community...” (KII 4, FP coordinator FMoH, male).

Use of mobile telephony in social marketing

Moreover, mobile telephone technology was also employed through social marketing partnership with an international agency to set up a reminder system in order to ensure that women were compliant with their contraceptive injections. Reminders are sent to women a week ahead and the day before. Whether the woman gets the injection at the facility or through the community-based approach, she gets a congratulatory message.

Then also the fact that we are working with DKT, another international agency. They are into social marketing for contraceptives but, they have a unique platform, a technology platform that mobile technology that gives messages to women so that the first time they are enrolled, they send a code, the provider sends a code using the woman's number, she gets a text message that she has taken that method that day. So that subsequently when she's due for the three months injection, she gets a text message a week to that time, she gets it a day before- a reminder and if she gets the injection either in the facility or in the community, then she gets a congratulatory message on the day she takes her injection. That way you are sure there's a constant reminder... (KII 1, NGO Program manager, male)

Box 1 below summarises the modifications made to the packaging of the CBDIC innovation.

[Box 1]***Stakeholders' participation in the design and packaging process***

During the process of design and packaging of the innovation, qualitative research methods were adopted to assess stakeholders' preferences in the distribution of the community based injectable contraceptives. In addition, a baseline assessment was carried out by stakeholders in the scale-up

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process. This helped the program managers to factor in the preferences of the users as well as contextual realities into the innovation packaging and implementation. In addition, community gatekeepers were consulted in order to find out what community members prefer with respect to CBDIC.

... Baseline assessment was conducted by the NGO, the other staff at the state level partnered together (KII 5, FP coordinator SMoH, female)

...During the development of the scale-up plan through FGDs, key informant interviews, we found out some of the preferences of the women and mostly we found that ... younger girls knew much less about family planning and those older women had wrong misconceptions about family planning so we built that into the scale-up plan to address the issues. (KII 3, NGO Program manager, female)

...we went through the gatekeepers (community and religious leaders) who let us realize that community distribution will really be a thing that they desire. (KII 4, FP coordinator FMoH, male)

Discussion

According to Prata and colleagues,¹⁸ community-based distribution of contraceptives (CBD) is useful in developing countries, particularly in hard-to-reach areas. Our study revealed a number of modifications to the original design of the community-based distribution of injectable contraceptives approach in order to align the innovation delivery to users’ preferences. Similar to other studies,¹⁸ our findings highlight the use of various mobile and fixed posts for contraceptive provision in a discrete manner, age-specific messaging, as well as one-on-one and group education meetings, as part of a responsive CBD model. In our study, the model of CBD evolved as a result of, and in response to, contextual factors – mainly cultural and religious reasons, as Nigeria is generally a patriarchal and religious society.³¹ Other studies show that common reasons for modifications to classical CBD include the need to ensure efficiency in service delivery, particularly when community needs surpass a program’s capacity to deliver.³² ³³ In addition, modification to the packaging of CBD of injectable contraceptives might be imperative when the family planning market is saturated, when the preference of the community was not initially understood or when there is lack of support from local organizations and

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political leadership.^{18, 34} This lack of support may manifest as inadequate funding or insufficient infrastructures for health workers to carry out their functions adequately.³⁵

Our study highlights that CBD does not exist in isolation but can only work in local context - within the community's health infrastructures particularly when initiating contraceptive use and treating adverse effects of contraceptive. However, studies³¹⁻³³ caution that integration of CBD programmes with existing health infrastructures might become impractical as the needs of the community for contraceptives increase. This may necessitate bringing in more voluntary health workers who are totally focused on CBD.

Community volunteers were a major part of the health workforce for the diffusion of the innovation in this study. There is, however, divergent opinion in literature about the desirability of volunteer health workers versus paid health workers in a program like CBDIC,^{18, 36} with some suggesting that it might be more difficult to hold volunteer health workers accountable for their action.¹⁸ However, Alam and colleagues³⁷ believe that community volunteers remain a great asset particularly in the context of inadequate human resource for health in many developing countries. Our study similarly shows that volunteers are essential for shoring up the human resource for health deficiency in northern Nigeria.

In addition, the volunteers in this study acted as peer influencers through their interactions with potential users of the innovation. Peer influence may encourage behaviour change and can contribute to improved health status³⁸⁻⁴³ for a number of health conditions including breast cancer,^{44, 45} cardiovascular diseases,⁴⁶ diabetes,⁴⁷ HIV⁴⁷, and reproductive health issues.⁴⁸ Peer influence is a potentially advantageous measure to influence behavioural change in developing countries,⁴⁹ although some research have shown ambivalent results about the effect of peer influence on health behavioural change,^{44, 50} engaging young women to interact with their peers as seen in this study has the potential to improve uptake of the community based injectable contraceptives.

Furthermore, findings from this study show value in establishing partnership with proprietary patent medicine vendors (PPMVs) for the distribution of injectable contraceptives. PPMVs, individuals who sell orthodox medicines on retail without formal pharmaceutical training,^{51, 52} are found everywhere in Nigeria^{51, 53} and they are generally perceived to be more accessible and to provide quicker, more confidential and cheaper services.⁵³ PPMVs in Nigeria and other

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developing countries have been reported to be engaged in the distribution of health commodities like emergency contraceptives,⁵³ oral contraceptive pills,⁵² condoms, and intrauterine devices,⁵⁴ insecticide-treated nets,⁵⁵ the treatment of sexually transmitted infections⁵⁶ and provision of health education.⁵⁶ Although PPMVs can play a pivotal role in the distribution of reproductive health products,⁵⁶ a study in Southwest Nigeria revealed that their knowledge about reproductive health issues and products as well as drug dosing and treatment may be low.⁵³ PPMVs have also been reported to comply poorly with the Federal Ministry of Health’s guidelines on contraceptives dispensing.⁵⁴ Additionally, Ujuju and colleagues⁵² reported, in a study done in four Nigerian states, that the quality of advice given by PPMVs fell short of the standards for safety. These findings were also validated by a systematic review by Beyeler and colleagues.⁵¹ It has therefore been suggested that PPMVs be formally integrated into the sexual and reproductive management system in Nigeria,⁵⁶ and their training updated regularly,⁵² with continual supervision and monitoring, in order to improve safe access to reproductive health products like injectable contraceptives..

In this study, mobile technology (phones) was used as a social marketing tool to ensure compliance. Social marketing has been shown to be a high impact and effective tool to maintain contraceptive knowledge and usage in sub-Saharan Africa.^{57, 58} Liu and colleagues⁵⁹ while detailing the role of the private sector in introducing injectable contraceptive in southwest Nigeria via social marketing described how a combination of supply and demand-side measures were used to promote the innovation. Some of these measures include the availability of quality products, behaviour change campaigns, partnering with health worker associations, health worker trainings and use of both traditional and online media.⁵⁹

Furthermore, our findings highlight that innovation packaging may not be successful without adequate community engagement.⁶⁰ The importance of community participation for uptake and sustainability of health programs has been demonstrated in the literature.^{60, 61} The role of community and religious leaders in understanding the community preferences and gaining acceptance for health innovation, particularly in developing countries, cannot be over-emphasised.^{60, 62} Without this understanding, the objective of innovation packaging, particularly improved health access, might not be achieved.⁶³

Limitations of the study

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Some limitations of this study should be stated. Since packaging of health innovations is contextual and the country is very diverse, innovation packaging that worked in northern Nigeria, where this study was largely carried out, may not be effective or necessary in other regions of the country. Efforts to scale-up health innovations should be tailored according to contextual realities at a local level. Nevertheless, this study provides valuable insights into the concept of innovation packaging and its possible influence on the diffusion and uptake of health innovations such as the community-based distribution of injectable contraceptives.

Conclusion

We demonstrate a number of modifications to the packaging of the community-based distribution of injectable contraceptives innovation. Most of the modifications resulted from socio-cultural, religious and programmatic considerations. These include use of fixed posts to offer injectable contraceptives to potential users, recruitment of young women as community volunteers to provide peer-to-peer contraceptive messaging, partnership with patent medicine vendors and social marketing. Innovation packaging should be contextual and cost-effective. Also, there might be need to combine strategies for synergy and to integrate community-based distribution with existing programs and infrastructures. All these should be done with full community participation in order to achieve maximal success.

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Authors' contributions

The study was conceived by OA while OA and MK designed it. Data collection was done by OA. OA, MK and BH analyzed the data, drafted and commented on the draft of the manuscript. OA, MK and BH read and endorsed the final version of the manuscript.

Provenance and peer review

Not commissioned; externally peer reviewed

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Data Availability Statement

Dataset for this study is available at <https://doi.org/10.5061/dryad.8kpr4xj4>.

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Table**Table 1: Study sites, data collection methods, and participants' description**

Study sites	Data collection method	No. of interviews/discussions	Participants' description
Gombe	IDI	15	Health workers (CHEWs ^a , Nurses,)
	KII	3	Senior official of State MoH ^b , State Family Planning (FP) coordinator, Director PHC ^b
	FGD	10	Current contraceptive users, married and single men, younger women non-users (in reproductive age group), older women non-users,
Abuja	KII	3	NGO ^c program manager (physicians), FP coordinators at the Federal MoH
Ibadan	KII	1	NGO program manager (physician)

^a Community Health Extension Workers; ^bMinistry of Health; ^cNon-Governmental Organisation

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Box

- Use of markets as fixed/mobile posts
- Outreach to women's gatherings
- Clients receiving contraceptives at CHEWs' homes
- Recruiting young women (community volunteers) to provide 'age-specific contraceptive messaging'
- Partnering with patent medicine vendors
- Social marketing using mobile telephony to improve compliance

Box 1: Modifications to the packaging of the CBDIC innovation

Reporting checklist for qualitative study.

Based on the SRQR guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the SRQR reporting guidelines, and cite them as:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. Acad Med. 2014;89(9):1245-1251.

		Page
	Reporting Item	Number
Title		
#1	Concise description of the nature and topic of the study identifying the study as qualitative or indicating the approach (e.g. ethnography, grounded theory) or data collection methods (e.g. interview, focus group) is recommended	1

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Abstract

#2

Summary of the key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results and conclusions

2

Introduction

Problem formulation

#3

Description and significance of the problem / phenomenon studied: review of relevant theory and empirical work; problem statement

4-5

Purpose or research question

#4

Purpose of the study and specific objectives or questions

5

Methods

Qualitative approach and research paradigm

#5

Qualitative approach (e.g. ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g. postpositivist, constructivist / interpretivist) is also recommended; rationale. The rationale should briefly discuss the justification for choosing that theory, approach, method or technique rather than other options available; the assumptions and limitations implicit in those choices and how those choices influence study conclusions and transferability.

6

As appropriate the rationale for several items might be discussed together.

Researcher characteristics and reflexivity	#6	Researchers' characteristics that may influence the research, including personal attributes, qualifications / experience, relationship with participants, assumptions and / or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results and / or transferability	6
Context	#7	Setting / site and salient contextual factors; rationale	6
Sampling strategy	#8	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g. sampling saturation); rationale	6
Ethical issues pertaining to human subjects	#9	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	7
Data collection methods	#10	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources / methods, and modification of procedures in response to evolving study findings; rationale	6

1	Data collection	#11	Description of instruments (e.g. interview guides,	6
2				
3	instruments and		questionnaires) and devices (e.g. audio recorders)	
4				
5	technologies		used for data collection; if / how the instruments(s)	
6				
7			changed over the course of the study	
8				
9				
10				
11	Units of study	#12	Number and relevant characteristics of participants,	6
12				
13			documents, or events included in the study; level of	
14				
15			participation (could be reported in results)	
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17				
18	Data processing	#13	Methods for processing data prior to and during	6
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20			analysis, including transcription, data entry, data	
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22			management and security, verification of data integrity,	
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24			data coding, and anonymisation / deidentification of	
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31	Data analysis	#14	Process by which inferences, themes, etc. were	6
32				
33			identified and developed, including the researchers	
34				
35			involved in data analysis; usually references a specific	
36				
37			paradigm or approach; rationale	
38				
39				
40				
41	Techniques to enhance	#15	Techniques to enhance trustworthiness and credibility	6
42				
43	trustworthiness		of data analysis (e.g. member checking, audit trail,	
44				
45			triangulation); rationale	
46				
47				
48	Results/findings			
49				
50				
51	Syntheses and	#16	Main findings (e.g. interpretations, inferences, and	7-12
52				
53	interpretation		themes); might include development of a theory or	
54				
55			model, or integration with prior research or theory	
56				
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Links to empirical data	#17	Evidence (e.g. quotes, field notes, text excerpts, photographs) to substantiate analytic findings	7-12
Discussion			
Intergration with prior work, implications, transferability and contribution(s) to the field	#18	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application / generalizability; identification of unique contributions(s) to scholarship in a discipline or field	12-14
Limitations	#19	Trustworthiness and limitations of findings	15
Other			
Conflicts of interest	#20	Potential sources of influence of perceived influence on study conduct and conclusions; how these were managed	3
Funding	#21	Sources of funding and other support; role of funders in data collection, interpretation and reporting	3

None The SRQR checklist is distributed with permission of Wolters Kluwer © 2014 by the Association of American Medical Colleges. This checklist can be completed online using <https://www.goodreports.org/>, a tool made by the [EQUATOR Network](#) in collaboration with [Penelope.ai](#)

APPENDIX 38: Paper 3

“Our culture prohibits some things”: qualitative inquiry into how sociocultural context influences the scale-up of community-based injectable contraceptives in Nigeria

BMJ Open 'Our culture prohibits some things': qualitative inquiry into how sociocultural context influences the scale-up of community-based injectable contraceptives in Nigeria

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ABSTRACT

Objectives To explore how sociocultural factors may support or impede the adoption of community-based distribution of injectable contraceptives in Nigeria.

Design A qualitative study based on inductive thematic analysis was conducted through in-depth interviews and focus group discussions.

Setting Most participants lived in Gombe State, North-East Nigeria. Other participants were from Ibadan (South-West) and Abuja (Federal Capital Territory).

Participants Through seven key informant interviews, 15 in-depth interviews and 10 focus group discussions, 102 participants were involved in the study.

Methods This study conducted in 2016 was part of a larger study on scale-up of community-based distribution of injectable contraceptives. Qualitative data were collected from traditional and religious leaders, health workers and community members. The data were audio recorded, transcribed and analysed using a thematic framework method.

Results Sociocultural challenges to scale-up included patriarchy and men's fear of losing control over their spouses, traditional and religious beliefs about fertility, and myths about contraceptives and family planning. As a result of deep-rooted beliefs that children are 'divine blessings' and that procreation should not be regulated, participants described a subtle resistance to uptake of injectable contraceptives. Since Gombe is largely a patriarchal society, male involvement emerged as important to the success of meaningful innovation uptake. Community leaders largely described their participation in the scale-up process as active, although they also identified the scope for further involvement and recognition.

Conclusion Scale-up is more than setting up health sector implementing structures, training health workers and getting innovation supplies, but also requires preparedness which includes paying attention to complex contextual issues. Policy implementers should also see scale-up as a learning process and be willing to move at the speed of the community.

INTRODUCTION

Scale-up of effective health innovations, through their increased availability to a larger population over a wider geographic area,

Strengths and limitations of this study

- The study participants represented a range of stakeholders — users of injectable contraceptives, community members, providers and health system managers.
- The study provided stakeholders who participated a distinct experience and some observations to reflect upon since the study was based on a current programme, rather than speaking merely about theoretical responses they or their community members may have to a health intervention.
- Our results highlighted that scale-up is influenced by several sociocultural factors; thus, showing the importance of paying attention to complex contextual issues during innovation uptake.
- The findings of our study emphasised how health systems and communities should interact in order to ensure successful scale-up of health innovations.
- Social desirability bias is a possibility as some of the participants in this study were involved in the community-based distribution intervention.

is essential for achieving universal health coverage, particularly in low and middle-income countries (LMIC).^{1 2} Scale-up is influenced by various factors related to the innovation, the users and the social context in which the innovation is introduced.³ The nature of the innovation itself, preferences and characteristics of the intended users (including their willingness to adopt the innovation) and ways that the innovation is adapted to the local context are also some of the factors affecting innovation scale-up.⁴

The sociocultural context, which includes religious and cultural beliefs, gender and societal norms and attitudes, is an important predictor of adoption of a health innovation in a population.^{2 5} The sociocultural context may promote health or be a barrier to health-care utilisation.⁶ For example, cultural beliefs

and practices have been shown to influence the uptake of a range of health innovations including male circumcision,⁷ breast cancer screening^{6 8} and contraceptives.^{9 10} Without due consideration of the sociocultural context, health innovation development, delivery and scale-up are likely to be limited, and this may lead to waste of scarce health resources including time.¹¹ According to Bradley *et al*,³ assessing the receptivity and willingness of community members to adopt a health innovation within their environmental and sociocultural settings is one of the key first steps in the scale-up process. In their conception, poor understanding by implementers of potential users' sociocultural context will limit scale-up efforts, while good understanding will help programme managers to recognise contextual factors that may enhance or inhibit the uptake of an innovation.³

Evidence highlights the influence of sociocultural context on the adoption of contraceptive innovations. For example, in a study in rural Poland, Collieran and Mace¹² reported that religious and sociocultural factors, particularly social networks, influence the uptake of contraceptive use more than individual characteristics. Dalaba and colleagues¹³ in their study in northern Ghana reported that inadequate male participation led to resistance towards female reproductive freedom. Interventions at societal level, such as adequate male mobilisation coupled with appropriate community-based distribution (CBD) strategies, were shown to be effective in improving contraceptive uptake.¹³ In Nigeria, where society is largely patriarchal, with consequences for access to and use of contraceptives, a study found that about two-thirds of rural women who had spousal approval were reported to use contraceptives while all those who were forbidden by their husbands did not use any family planning method.¹⁴ According to the last Demographic and Health Survey in Nigeria, contraceptive prevalence rate (CPR) was 14.3% while only 2.4% of women of reproductive age group use injectable contraceptives. Understanding whether and how the sociocultural context influences scale-up of contraceptive innovation is thus important.

Evidence suggests that CBD of contraceptives is still needed in LMICs particularly rural or isolated communities in order to increase CPR.^{15–17} The full potential of CBD to improve CPR has not been fully realised in sub-Saharan Africa.¹⁸ Nigeria started its family planning policy review in 2007 and successfully piloted the CBD

of injectable contraceptives through community health extension workers (CHEW) as a new innovation in the health system in 2010 in Gombe State, north-eastern region.^{19 20} Afterwards, the scale-up of this innovation started in 2014, led by a national non-governmental organisation and supported by international donor agencies.²¹

However, the understanding of how sociocultural contextual factors may facilitate or impede the successful scale-up of the contraceptive innovation beyond the initial pilot site in Nigeria is limited. This study took place after scale-up started, thus it adopted both a retrospective slant to assess factors that affected scale-up and forward-looking approach to what may affect future scale-up effort (see study timeline in figure 1). The objective of this study is therefore to explore how sociocultural factors may influence the scale-up of the CBD of injectable contraceptives in Nigeria.

METHODS

Study design and setting

This cross-sectional study conducted from September to November 2016 was part of a larger research project^{22 23} which explored the interplay between barriers and facilitators of scale-up of the CBD of injectable contraceptives guided by the AIDED model³ (with components: Assess, Innovate, Develop, Engage, and Devolve) in order to inform wider scale-up of this innovation in Nigeria. The project took place in Gombe (north-eastern Nigeria), one of 36 states in Nigeria and a predominantly Muslim community. Gombe State, with a population of 2 353 879 people according to the 2006 population census,²⁴ has one of the lowest CPRs in the country (3.5% for modern methods and 4.0% for any method) and one of the highest maternal mortality rates (1726/100 000).^{19 25 26} Gombe was purposively selected because it was the setting for the national pilot test for CBD of injectable contraceptives in 2010. Gombe is divided administratively into 11 local government areas (LGA). The study was conducted in two LGAs—Gombe (A) and Yamaltu/Deba (B). Although participants were primarily based in Gombe State, one interview took place in another state (Ibadan in the South-West) and three interviews in Abuja at national level (Federal Capital Territory).



*Family planning

Figure 1 Situating data collection within the timeline for pilot study and scale-up.

Table 1 Participants' sociodemographic characteristics and data collection methods across study sites

Location	Type	Interviews/ FGDs (n)	Participants (n)	Gender		Participant type
				M n (%)	F n (%)	
Federal and state level						
	KII	4	4	2 (50.0)	2 (50.0)	NGO programme manager, senior official at the Federal MoH, NGO programme managers
Gombe State						
LGA A	KII	3	3	2 (66.7)	1 (33.3)	Senior officials of State MoH.
	IDI	7	7	3 (42.9)	4 (57.1)	Health workers (nurses, CHEWs), traditional and religious leaders
	FGD	5	40	16 (40.0)	24 (60.0)	Current contraceptive users, older women non-users, younger women non-users (in reproductive age group), married and single men
LGA B	IDI	8	8	4 (50.0)	4 (50.0)	Health workers (nurses, CHEWs), traditional and religious leaders
	FGD	5	40	16 (40.0)	24 (60.0)	Current contraceptive users, older women non-users, younger women non-users (in reproductive age group), married and single men
Total		32	102	43 (42.2)	59 (57.8)	

CHEW, community health extension worker; FGD, focus group discussion; IDI, in-depth interview; KII, key informant interview; LGA, local government area; MoH, Ministry of Health; NGO, non-governmental organisation.

Participants and sample

In total, 102 people participated in this study (see [table 1](#)). The participants were selected through a purposive sampling method, where study respondents were recruited based on characteristics of interest, availability and ability to provide relevant information^{27 28} about the research question: how may sociocultural context influence the process of introducing, translating and integrating health innovation? Participants included a range of stakeholders, including traditional and religious leaders, health workers as well as community members. One focus group discussion (FGD) each was conducted with different types of participants who were involved and could give an account based on their experiences of the programme with the aim of exploring qualitatively the views, concerns from this range of key role players, not aiming to quantify, compare or rank frequency of views. Each of the FGDs had eight participants. The selected participants were therefore deemed appropriate role players to share their own experience and views as well as reflect on and summarise the views of others about the implementation of the CBD of injectable contraceptives within their sociocultural context. The number of interviews and FGDs was determined by the principles of saturation, a point where no new information is emerging,^{29 30}

and availability of resources as well as study time.³¹ The interviews and FGDs were conducted by the first author assisted by three trained research assistants.

This study adopted the inductive thematic analysis. This approach was guided by available literature as well as insights from the participants—codes were generated from key themes identified from transcripts.^{29 32–34}

Data collection

Data were collected through 7 key informant interviews (KII), 15 in-depth interviews (IDI) and 10 FGDs. KIIs, IDIs and FGDs were conducted with senior stakeholders, healthcare workers and community members, respectively. Guides were used to conduct the interviews and FGDs (see online supplementary file 1). All guides were translated to the predominant local language—Hausa. Interviews with key stakeholders covered issues of programme planning and design, community entry and resolution of challenges with implementation. However, FGDs dealt with issues of programme implementation, community members' preferences with innovation delivery and packaging. Nonetheless, some issues covered in the interviews and discussions (FGDs) were similar. Interviews and discussions were tape recorded and later transcribed in full and translated where necessary. Transcription was

done using a protocol which emphasises verbatim transcription of recordings. Both transcription and translation were done by the same research associate who is vast in both Hausa and English languages. Back translation was subsequently done by another associate vast in the two languages; the back translations were afterwards compared with the original transcripts in order to ensure that the original meaning is retained.³⁵

Data analysis

Transcripts were analysed iteratively with the aid of the NVivo (V.10) software using the inductive thematic approach.^{29 30 33 34} Coding was done by the first and last authors independently at first before analysis started; these codes were then compared and harmonised. Emerging codes from the transcripts were added to predefined themes: community members' perceptions regarding CBD of injectable contraceptives, community members' acceptance (or rejection) of contraceptives and community engagement in the scale-up process. Emerging themes were indexed and compared with themes from subsequent interviews until saturation was attained. A codebook was developed after all the data were collected; this was then applied to the transcripts. Although numbers of interviews and FGDs were set at the outset based on empirical guidance, however during analysis, it was confirmed that saturation,²⁹ where no new information was obtained, was actually reached before the cap was reached in both interviews and FGDs. Analysis progressed alongside data collection. The Standards for Reporting Qualitative Research reporting guidelines for qualitative studies³⁶ were used in preparing this manuscript.

Patient and public involvement

The study participants were involved in shaping the study particularly during the pretest which led to the modification of some ambiguous questions in the guides. Also, some participants helped with the recruitment of other respondents through a snowball sampling³⁷ procedure. Furthermore, findings from this study and the larger research project have been presented in conferences with useful feedback; a policy brief has been developed to be disseminated to policymakers.

RESULTS

Of the 102 study participants, 59 (57.8%) were female (table 1) with a mean age of 42.8±14.2years. Similarly, mean ages of FGD and interview participants were 42.7±14.6 and 46.7±6.0years, respectively. Six of the 10 FGDs were made up of female participants, each FGD comprising eight respondents. Participants described a number of sociocultural factors that challenged the scale-up process right from the pilot stage; these include traditional and religious norms about fertility, perception about family planning including adverse effects as

well as patriarchy and men's fear of losing control of their spouses (figure 2).

Deep-rooted cultural and religious beliefs about fertility

Interview participants spoke about a deep-rooted belief among community members that children are 'divine blessings' and that procreation should not be regulated. Related to this world view, participants described a subtle resistance to the uptake of injectable contraceptives, more passive than overt in its expression by individuals and families who would feign acceptance but refuse the intervention when given.

...there will always be resistance to this use of contraceptives, because here, we are people that believe that children are a blessing, so you give birth to as many as possible. ...The resistance may not be as a group, but when you come to individual levels... as a government, they might not show you the resistance, but when it comes to the actual usage, that's where you start having problems. (IDI, male, doctor, SMoH)

Also, there were issues about religious beliefs influencing perception about family planning/contraceptive use at the community level. Religiosity, that is, strong adherence to religious beliefs, was said to be one of the major factors impeding the uptake of contraceptives in general.

...when you look at northern Nigeria, majority are Muslims and when you look at the south eastern states, you know we have issue of religion, issue of uptake of all contraceptives, not even injectables alone. To the south eastern man, most of them are Catholics, they frown at family planning, so also here (northern Nigeria) people frown at family planning in general. (KII, male, senior official, SMoH)

Awareness and perceptions regarding family planning

Most interview respondents agreed that there was a need to continue to educate community members about the overall benefits of contraceptives and family planning as well as emphasise possible side effects of contraceptive use among women. Also, informants were of the opinion that lack of knowledge about benefits of contraception contributes to reluctance to adopt the innovation. In the words of a respondent:

...the community and people at the grassroots have little information (on contraceptives). (KII, female, senior official, SMoH)

These challenges were further compounded by reports of adverse effects of the contraception from some women especially 'severe bleeding during menstruation' (IDI, female, CHEW). Healthcare providers felt that to effectively deal with these challenges, it was important to listen sympathetically to the women and treat reported side effects, in line with the training received for the innovation scale-up. Education was also given when clients had questions

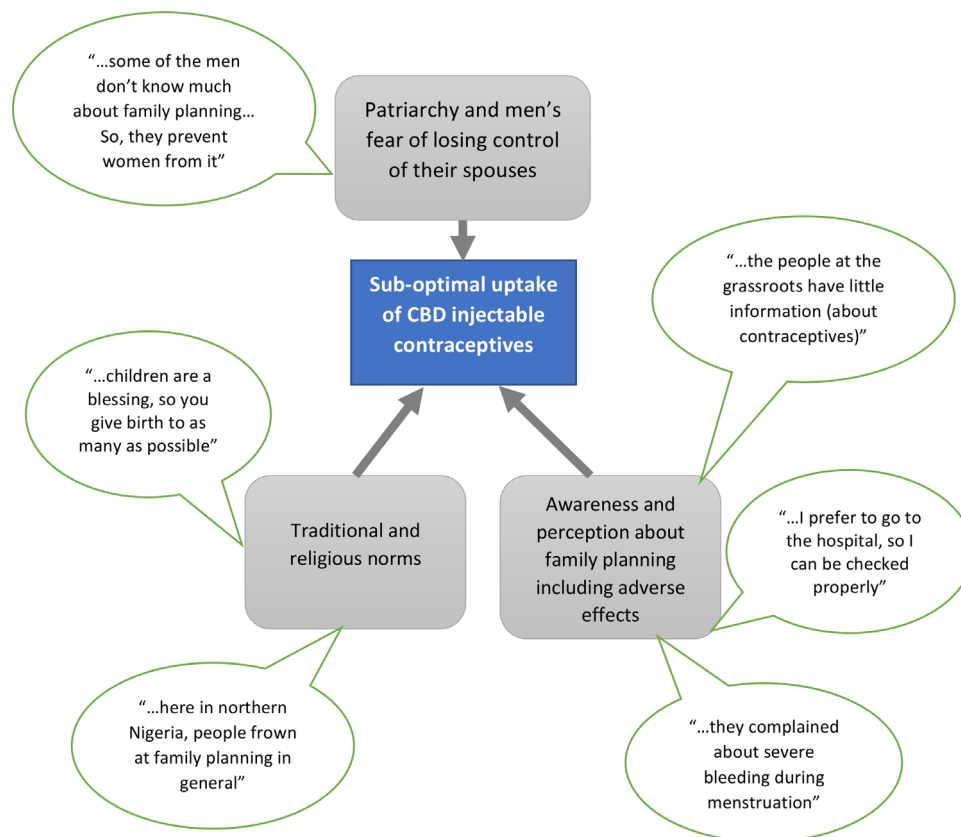


Figure 2 Sociocultural factors influencing uptake of community-based distribution (CBD) of injectable contraceptives in Gombe State.

in order to resolve doubts about the innovation. For example, a respondent said:

We listen to them, and we explain to them that since it (contraceptive) is a new thing in the body, they must experience such things... (IDI, female, nurse)

Focus group discussants highlighted many reasons why women in their reproductive age group used injectable contraceptives, including desire to stay attractive in order to prevent husbands from ‘straying’, space the children and enjoy life with fewer financial and parenting constraints. One of the discussants who currently uses injectable contraceptives described her motivation thus:

...If we space our children well, we will enjoy our lives because our husbands will always desire us since we are always looking attractive. He will not stay out late because he will be thinking of you at home. (FGD, female, current user)

Also, a participant stated that the impetus for contraceptive use was the fact that spacing her children afforded her the ability to take care of herself and the home thereby promoting hygiene and healthy living in the home. She said:

...You will be able to take care of yourself as well as your house, your husband will also desire you as you will look good as well as your children. Flies will not follow you around and anyone that comes to your

house will be able to eat and drink because everywhere is clean and attractive. (FGD, female, current user)

Perceptions regarding the CBD approach

During the FGDs, women who were current users of injectable contraceptives stated their preference for the community-based approach over the facility-based system of distributing the contraceptives. Some of their reasons for this position included convenience, affordability (saves cost as transport fare is not needed), improved privacy and focused attention from the health worker.

...During home visit, it's between you and the woman (health worker) and she can explain it very well to you since she is not in a hurry; although in the hospital they can also explain but the home visit is better since the health worker will explain until you understand. (FGD, female, current user)

Likewise, some male discussants preferred the community-based approach because they believed it was more confidential and gave women more time to deal with domestic issues. The CBD approach was also believed to align with men's desire to be in control of ‘family issues’.

...Maybe the time the wife wants to go (to the health facility) the husband needed her for something else... Sometimes some husbands want all these things to be

confidential, but when you now tell them to release their wives to the hospital, they will think you are exposing the family issues. (FGD, married men)

However, one of the discussants who favoured the facility-based approach *'prefer[ed] to go to the hospital, so I can be checked properly, including to check my BP'* (FGD, female, current user). Similarly, some married men also preferred the facility-based approach as they believed that the community-based method is intrusive of their privacy and undermines their authority:

...My advice is that the woman should come to hospital ...because some husbands will query you that who gave you the permission to see their wives (at home) and advise them about child spacing. Some disagree with the community-based method. (FGD, married men)

Spousal involvement in family planning

In addition, male involvement was highlighted as important if uptake of innovation will be meaningful since Gombe is largely a society where the women need the men's permission for doing many things including obtaining injectable contraceptives.

Some men will not accept it (contraceptive) because they want plenty children...she (the wife) should continue begging the husband until he agrees if she wants to use contraceptives. (FGD, women not using contraceptives)

Furthermore, cultural beliefs and sociocultural context were reported as fuelling poor awareness and knowledge about contraceptive use. Also, male involvement was described as important in dealing with the problem of ignorance and poor perception about family planning in the community. According to the participants in this study, once the men are well informed, it is easier to get their buy-in and cooperation in permitting their wives to get the injections.

...some of the men don't know much about family planning commodities and some (people) are telling them some of the side effects. So, they prevent the women from using them...that's why we need more sensitization to the men and the youths. (IDI, female, nurse)

The perception of men (about contraceptives) is lower than that of women. The women know the implications better than the men. The men in the rural areas don't mind having any number of children... (FGD, married men)

Also, a female health worker emphasised the importance of male involvement particularly in communities where the literacy rate is low:

Honestly, we need to do more in carrying them [men] along. Male involvement is very important because you know they are our superiors. We in the North,

it is only the educated that may be sometimes at loggerhead (with their husbands) ... but these illiterates and native people, it is always the man that is superior. So, it is very important for us to consider male involvement, it will help a lot. (IDI, female, nurse)

Community support for scale-up

The issue of community support for scale-up was solely explored with community and religious leaders. The traditional leaders interviewed believed that community support for the innovation is very high.

In fact, the support our community gives to this programme, without exaggeration, I will say maybe 80%–90%. They (the community) have been very supportive of the programme. (IDI, male, traditional ruler, Yamaltu/Deba)

Definitely, you have 70% support from the communities. From the religious leaders, traditional rulers and even of ward heads in the community we get 100% support. (IDI, male, traditional leader, Gombe)

However, some cautioned that the community support is not as high as expected due to what they call low knowledge and awareness about contraceptive choices in Northern Nigeria.

...Really, people have supported the program but I know some people do not have the knowledge (about injectable contraceptives) but those that have the knowledge are really in support of the program... [you know] the Northern culture prohibits some things, that's why I said the support for it (injectable contraceptives scale up) is not as much as we expect. (IDI, male, Christian religious leader)

One community leader described his role as active in the scale-up process because he helps in disseminating information to all the wards under his domain. He shared his experience:

Whenever the need arises, we normally call the kingmakers, district head kingmakers, they are about seven, and we have at least 54 ward heads, we use to call them from time to time and enlighten them on the programme. In fact, almost all the community leaders are fully aware of the programme. (IDI, male, traditional leader)

Many of the leaders ascribed the progress with the scale-up in their communities to the involvement of the traditional leaders in the programme. However, some leaders complained of not being officially involved in the programme, although they still offer their support.

There are so many traditional rulers that were involved in this program; that is the reason why it has been accepted 100%, especially in Gombe State now. (IDI, male, traditional leader, Gombe)

...My involvement is...passive involvement. Of course,

we preachers, you can push people, encourage them in your own little way... We preach it, we tell people about it... (IDI, male, Christian religious leader)

DISCUSSION

In our study, there were a number of sociocultural issues alluded to as factors that may affect scale-up of a contraceptive innovation in Nigeria, including patriarchy, traditional and religious norms, beliefs and myths about contraceptives and family planning. Agunbiade and Ogunleye³⁸ reported in their study assessing the sociocultural barriers to the scale-up of exclusive breast feeding in Nigeria, the scale-up process cannot be separated from the context and the culture in the environment. Further, in a study among African-American women, culture and health beliefs were found to be significant predictors of health innovation uptake.³⁹

Our study indicates it is vital to secure the understanding and support of the men and significant others for scale-up of the CBD of injectable contraceptives to succeed in environments like our study site that are still largely patriarchal.³⁸ Similar to the findings of our study, male involvement and support of women's significant others, particularly the mothers-in-law, have been reported to be crucial to innovation scale-up in Nigeria as these significant others have strong influence on choices made by women.³⁸ In other settings, increased male participation through increasing men's knowledge and reducing their opposition has been shown to improve uptake and continued use of contraceptives^{40–42} and enhancement of prevention of mother to child transmission of HIV scale-up processes.⁴³ In this study, one of the reasons why women reportedly use contraceptives was to look attractive and satisfy their husbands in order to prevent them from engaging in extramarital relationships. Thus, contraception is both liberating for women on one hand but also perhaps serving the very patriarchy they are trapped in on the other. Studies have shown that in many African societies, patriarchy is perpetuated by the socialisation process which starts from the family and is often preserved by women themselves.^{44 45}

Also, findings from our study show passive resistance to contraceptive uptake, particularly at the individual levels, by both women and their spouses. Research has shown that passive resistance is one of the major reasons for the high failure rate of innovation scale-up.^{46 47} Passive resistance often results from individuals' resistance to change and contentment with or lack of power to change the status quo.⁴⁷ Further, consumers will not adopt an innovation if they are not sure of its value or benefits.⁴⁸ According to Heidenreich and Kraemer, passive innovation resistance should be addressed before the introduction of new innovations into the society.⁴⁶ Strategies for reducing passive resistance to uptake of health innovations in the community include actively involving men in their uptake,¹³ as well as giving adequate and correct information about the advantages of contraceptive use

to all stakeholders—health workers, community and religious leaders, trained volunteers and programme managers.⁴⁸

Since the passive resistance reported in this study is largely underpinned by deep-seated issues of patriarchy, religious beliefs and traditional norms/values, it is imperative for policymakers and programme managers to engage men—who are custodians, in most cases, of both religious and cultural values.^{49 50} Male involvement can bring benefits for all community stakeholders,⁴⁹ as well as social change.⁵¹ With careful management and ongoing monitoring, the involvement of men may ultimately give the scale-up of this health innovation a greater chance of success.

Furthermore, religious beliefs were also found to influence the scale-up of the community-based injectable contraceptives and family planning in general in our study sites in Northern Nigeria. Religion has been shown to significantly influence decisions on contraceptive use,⁵² as well as individual/household choices, lifestyle and even traditional values.⁵³ Thus, religion has great implications for the social marketing of commodities particularly contraceptives, as uptake of health products has been shown to differ significantly among adherents of major religions.⁵³ For example, research done in Islamic countries^{54 55} highlights the need to understand Islamic religion in order to do effective social marketing, and recommends that approval be obtained from religious leadership before certain sensitive products like contraceptives are marketed. Understanding religious nuances in local contexts is important in multi-faith countries such as Nigeria—for example, what 'works' in the largely Islamic North⁵⁶ may need adaptation for Christian populations elsewhere.

Our study demonstrated the importance of strong community support and partnership with community gatekeepers in the scale-up process. Research has shown that the CBD approach cannot succeed without community participation.⁵⁷ Therefore, programme implementers need to learn from the community what works (or may work) in the setting, what distribution method the community prefers or what modification to the existing methods they favour. Research has shown that there is no quick fix to scaling up.⁵⁷ It is essentially a learning process which is unique in different contexts. Therefore, scale-up may not be effective without adequate contextual knowledge and willingness to learn through the process of community participation and stakeholder collaboration.^{57 58}

While the focus of this paper has been on challenges as identified in the wider context of religion and patriarchy, many of the suggested solutions rely on the health systems and those working in it, to navigate these challenges and overcome them. However, this cannot be a static or reactive approach but rather needs to recognise that health systems and those working in them are also part of the sociocultural context and therefore it is important to find ways to support healthcare workers in mediating, translating and promoting the innovation in this context.

Limitations of the study

Some limitations of this study should be emphasised. As with any qualitative study, the findings are not statistically generalisable but the theories and ideas can be applied to other contexts. Also, some of the participants in this study were involved in the CBD intervention, therefore they may provide more socially desirable answers. However, a strength of this study is that it provided stakeholders who participated a distinct experience and some observations to reflect on since the study was based on a current programme, rather than speaking merely about theoretical responses they or their community members may have to a health intervention. Thus, the findings of this research provide valuable information into how socio-cultural context and user support affect the scale-up of health innovations in LMICs, particularly in a patriarchal society like Nigeria.

CONCLUSION

Our study suggests the need for continuous community education and engagement with the significant others and community leadership structures—both traditional and religious. Thus, providing an innovation does not necessarily translate to uptake. Therefore, programme implementers should also consider sociocultural and health system contexts when packaging a health innovation. Hence, supporting those in the health system to mediate the innovation in ways that are sensitive to the context but which, by working with communities and others, promotes transformation is imperative. In addition, incorporating the CBD approach with other outreach programmes, developing a more effective supervision of the approach may help make CBD more productive. Interventions to improve male participation will likewise go a long way to improve the scale-up process. Policy implementers should also see scale-up as a learning process and be willing to move at the speed of the community.

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Contributors OOA conceived the study. OOA and MK designed the study. The data were collected by OOA. OOA, MK and BH drafted and commented on the draft of the manuscript. OOA, MK and BH read and approved the final version of the manuscript.

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Competing interests None declared.

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APPENDIX 39: Paper 4

Innovation diffusion: how homogenous networks influence the uptake of community-based injectable contraceptives

RESEARCH ARTICLE

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Innovation diffusion: how homogenous networks influence the uptake of community-based injectable contraceptives



Oluwaseun Akinyemi^{1,2*} , Bronwyn Harris^{3,4} and Mary Kawonga²

Abstract

Background: Studies have shown that social networks influence health behaviors, including the adoption of health innovations. This study explored the potential for early adopters of community health worker-delivered injectable contraceptives (CHWDIC) to influence the uptake of this innovation by women in their social networks.

Methods: This Social Network Analysis (SNA) study was conducted in Gombe, Nigeria. Twenty women who were early adopters of the CHWDIC were recruited. Each participant (ego) listed ten women of reproductive age (alters) with whom they related. An interviewer-administered questionnaire was used to collect from each ego, data about the nature of her relationship with each alter (ego-alter relationship), whether she talked about CHWDIC with each alter, and whether her listed alters talked to each other about CHWDIC (alter-alter relationship). Data were also collected on age, marital status and education level for each ego and alter. Data were analyzed with UCINET social network analysis software. Variables of interest include homophilia (similarity), density (number of ties as a proportion of possible ties), degree (popularity) and betweenness (frequency of connecting actor pairs who otherwise might not communicate).

Results: There were 20 egos and 200 alters. Between two thirds (alters) and three quarters (egos) of the women were 30 years or older. All of the egos and 196 (98%) of alters were married. Most of the networks had similar (homophilic) actors according to certain sociodemographic characteristics - ethnicity, age, education and type of marriage. More than 90% of the networks had density greater than 50%, suggesting high cohesion in most networks. The majority of actors in these networks used injectable contraceptives. In some of the networks, few actors with the highest prominence (betweenness centrality) were not users of injectable contraceptives.

Conclusion: The study illustrates the application and feasibility of ego SNA in identifying champions and opinion leaders among women of reproductive age group. It also shows the influence of social networks on the diffusion of community-based injectable contraceptives, and how homophilic and dense networks may have positive health externality. The interrelatedness of network members' decision to adopt a health innovation was also demonstrated by the findings of this study.

Keywords: Ego social network analysis, Personal networks, Egocentric networks, Community-based distribution of injectable contraceptives, Homophily, Density, Innovation diffusion, Policy analysis, Contraceptive policy, Nigeria

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Introduction

Studies have shown, particularly in developing countries, that for health innovations to achieve their aims, there is a need for scale up [1, 2]. Scale up entails making the innovation available to a larger population and/or to new locations through better financing, and provision of material and human resources, as well as an improved public health delivery system [1, 2]. Studies show that social networks can facilitate both positive and negative behaviors [3, 4] – either through word of mouth or virtual networks via social media [5]. Also, social networks can support uptake of health innovation, and thus facilitate scale up [3, 6].

Although researchers [4, 6, 7] have demonstrated that social networks can support the uptake of health innovation, there is limited understanding or guidance on the role of social networks in the scale up of community-based injectable contraceptives – an innovation adopted in Nigeria. Uptake of this intervention is particularly important in Nigeria, a country with low contraceptive prevalence rates (CPR) and unmet need for contraception [8]. CPR is 14.6% for any method (rhythm, withdrawal, traditional methods) and 9.7% for modern methods (pills, condoms, implants, intra-uterine devices, injectable contraceptives) [9, 10], with a significantly lower rate in rural settings [11, 12]. Furthermore, only 3% of married women in Nigeria use an injectable contraceptive method [13]. However, the main thrust of Nigeria's National Policy on Population was to reduce the country's high rate of fertility (currently 5.5 births per woman) by encouraging voluntary adoption of family planning, in particular, modern contraceptive methods including injectable contraceptive methods [13]. Injectable contraceptive is the most popular method among women of reproductive age group in Nigeria [14]. Evidence from other African countries showed that injectable contraceptive was more effective in preventing pregnancies compared to other contraceptives because its effect is long-term and puts the woman in control [13, 14]. In 2010, a pilot study in Gombe State (one of the 36 states in Nigeria), tested the feasibility of community health extension workers (CHEWs) distributing injectable contraceptives to users at households and other settings outside the health facility with the aim to increase contraceptive prevalence rate [14]. Following the success of the pilot, the intervention was scaled-up in other parts of Gombe and later extended to another state, with plans to ultimately make the benefits available throughout the country [14]. Research exploring the potential of social networks in innovation uptake is sparse, especially in low- and middle-income countries (LMICs) like Nigeria [6, 15].

Background

The community-based distribution of injectable contraceptives by community health extension workers has

been implemented in pilot projects around the world, with significant improvement in contraceptive prevalence rate [16–18]. Research has shown that community-based distribution of family planning commodities improves access to and uptake of family planning methods [19]. This innovation involves the provision of injectable contraceptives to women of reproductive age group by community health extension workers in the community. It has been shown to be safe and effective in meeting couples' unmet need for contraception in demonstration projects in Kenya, Rwanda, Ethiopia, Malawi and Uganda [20, 21].

Many health innovations have been shown to improve health [22]. These include interventions to combat AIDS, malaria, tuberculosis as well as to improve reproductive health [22–24]. Although some health innovations are effective in demonstration projects [16, 23], they might not be made available to a large part of the population, or, where available, may be inequitably distributed [14, 16]. Also, there is limited information about how to successfully disseminate, diffuse and scale up such innovations on a wider scale [16].

Social networks and scale up of innovations

A social network consists of actors joined together through one or more ties or relations [25]. Through these ties, actors exchange information and also transmit expertise, knowledge, experience, and behaviors [3]. Social network analysis studies are used to assess various features of social networks, some of which are relevant for this study. For example, density – which is the number of ties forged within a network as a proportion of total possible ties – is a measure of cohesion amongst network actors. Degree centrality describes the position that each actor occupies in a network. In a network, some actors are central or prominent (those with the greatest number of ties to others), while others may be peripheral (those with few ties or direct connections to others). Another network feature is homophily, which is a measure of sameness or how much an actor relates with other actors with similar characteristics [26]. Furthermore, betweenness centrality measures the number of times an actor connects individuals who may otherwise not be connected in the network [27, 28]. In particular, this study seeks to find answers to the following questions: Do early adopters share information about the innovation with other women in their social circles? How tightly knit are these social networks and are there prominent actors in them? Who are the women they share with? Do women share this kind of information with those of similar characteristics? What characteristics commonly bind actors in these women's social networks together? In which social settings do they regularly interact (opportunities for sharing)?

In order to answer the questions above, we utilized social network analysis (SNA) to explore the potential for early adopters of community-distributed injectable contraceptives to influence the uptake of the innovation by new users in their social networks. The early adopters were women of the reproductive age group who had adopted the community-based injectable contraceptives at the time of the pilot study in Gombe state. To the best of our knowledge, no study has explored the role of social networks in the diffusion of injectable contraceptives in Nigeria, especially from users' perspectives. Thus, this study describes features (density and homophily) of the social networks of early adopters of community-distributed injectable contraceptives and explores the extent to which early adopters talked to / shared information about the innovation with women in their social networks.

In the AIDED model, Bradley and colleagues [29] conceptualized scale up as a process that entails various interrelated stages. These stages include assessing the landscape, innovating to fit potential users' interests, developing community support, engaging with users of innovation and devolving in order to enhance innovation spread. According to Bradley et al., [16] spread of health innovations from early adopters (index users) in low-income countries often occur via their social networks. However, there is a dearth of information on the Devolve component of the AIDED model and how social networks facilitate the scale up of injectable contraceptives among user groups [30]. The Devolve component entails diffusion of innovation through the peer networks of the initial users [30]. In addition, Valente, in his review of research evidence, submitted that social networks influence how people adopt new ideas and it may enhance behavioral change, organizational efficiency as well as the diffusion and spread of innovations [3, 31]. The decision to adopt or reject a new idea is mostly based on subjective evaluations from peers and hardly on research evidence [32]. Therefore, interpersonal communication channels have been found to be more effective than mass media in the formation and sustenance of attitudes towards an innovation since the diffusion of innovations is essentially a social process entailing the exchange of ideas among people [32]. Hence the use of social networks in understanding the spread of community-based injectable contraceptives in this study. This SNA study draws from the "Devolve" component of the AIDED model. SNA is a method that enables us to study social networks and how these influence behaviors and spread of innovation [3].

Methods

Study setting

Nigeria is a federal state with 36 federating units/states and a federal capital territory – Abuja. Health is governed at the

federal, state and local government levels. This study was conducted in Gombe State (North East). It is largely rural, with about 80% of the population engaged in Agriculture. Gombe is divided administratively into 11 Local Government Areas (LGAs) and has a population of about 2.4 million people [33]. Gombe State is multi-ethnic with the Hausa/Fulani being the dominant ethnic group, while Hausa language is widely spoken in the State [34]. The state is a patriarchal, culturally conservative setting with a predominantly Muslim population [33]. It borders Borno, the epicenter of the *Boko Haram* insurgency, to the west. Gombe State has suffered sporadic attacks by insurgents in the past few years [35, 36]. About 46% of married women in the state live in polygamous unions compared with a national average of 33% [37]. Polygamy is inversely proportional to educational level and wealth quintiles. Among women aged 25–49 years, the median age of first marriage is 15.8 years in Gombe State compared to a regional median of 17.5 years, while the median age of sexual debut is 15.9 years compared to the national median age of 17.6 years [35]. According to the 2013 Nigerian Demographic and Health Survey, 82.1% of women in Gombe make independent decisions about their earnings versus 70% national average, although the majority of the women in the state (81.0%) earn less than the men [37].

The State has a total fertility rate of 7.4 and one of the lowest contraceptive prevalence rates in the country (3.5% for modern methods and 4.0% for any method) [10, 14, 33]. The condition of public sector health facilities in North East region seems much better compared to the private sector facilities using the percent distribution of live births in these sectors as a proxy (18.4% vs. 1.2% for public and private health sectors respectively) [13].

Between 2008 and 2010, the community-based access to injectable contraceptive pilot project was implemented in two LGAs of Gombe State (Funakaye and Yamaltu/Deba) by the Nigerian Ministry of Health, with support from the Association for Reproductive and Family Health (a national NGO) and FHI 360 (an international NGO) [14]. This study, which is part of broader research to explore the scale up of injectable contraceptives, was conducted in Gombe and Yemaltu/Deba LGAs. In 2014, the Association for Reproductive and Family Health led the scale up process, starting with the training of trainers and community health extension workers [38]. By 2016, large scale provision of injectable contraceptives at the community level commenced in Gombe State and Kebbi State (North West), with a plan to activate the scale up in Ebonyi State (South East Nigeria).

Study design and sampling

This study was part of a larger research to assess the scale up of community health worker-delivered injectable contraceptives in Gombe State Nigeria. We used an

ego social network analysis and study design. Ego social network, also known as personal network, comprises of a focal actor (ego) as well as other actors (alters) connected to the ego through one or more relations [27]. In ego network design, data on the ties between ego and alters as well as between alters (alter-alter relationship) are documented entirely from the ego's perspective [27]. In this study, the egos were the early adopters of the community-based injectable contraceptives.

Twenty women of reproductive age group (egos), 10 each from Gombe and Yemaltu-Deba LGAs (Site A and Site B respectively) who had earlier participated in focus group discussions as part of the bigger study exploring the scale up of community-based distribution of injectable contraceptives in Gombe, were sampled purposively and recruited to participate in the social network analysis study. Each ego was requested to list ten women in the reproductive age group (15–49) (alters), with whom she had a social relationship (regardless of whether they used injectable contraceptives or not).

Data collection

During the survey, each ego was asked to list the initials of 10 alters (women in their social and peer networks). We presented each ego with this list and asked her to specify the nature of the social relationship with each alter. Then we collected data on the relation of interest - communication about the community-based distributed injectable contraceptives. Each ego (early adopter) was asked to specify whether they shared the relation of interest with each alter (ego-alter communication relation) and to state the frequency of communication about community-based distributed injectable contraceptives. An interviewer-administered questionnaire (see Additional file 1) was administered to the egos to collect their sociodemographic and data on network variables, as well as those of alters. In addition, information on ego-alter relationship and discussions on community-based distribution of injectable contraceptives, including alter-alter relationship were collected in this questionnaire. Also, the egos were asked whether they think that alters share information about injectable contraceptives among themselves (alter-alter communication relation) and the likelihood that alters will recommend community-based injectable contraceptives to one another. Frequencies and proportions, as well as specific SNA variables were generated. The interviews, each taking about 1 h, were conducted by the lead author assisted by two female research assistants in September 2016.

Data analysis

Data from the SNA questionnaires were imported from Microsoft Excel into UCINET social network software, (<http://www.analytictech.com/>) from where variables were generated. Twenty-one-mode matrices were developed

(one per ego network). Likewise, 20 sociograms (one per ego network) were generated. Each ego network depicts ego-alter as well as alter-alter relations. Every node in the network maps represents an actor.

Results

Socio-demographic characteristics of egos and their alters

As shown in Table 1, about two-thirds (61.5%) and three-quarters (75.0%) of alters and egos were 30 years or older. Almost all the actors (98.0% of alters and all egos) were married, with more than half (53.7%) in monogamous relationships. Of the 220 actors, 81% were Hausas, slightly more than half (55.0%) had primary or secondary school education and 58% were housewives or informally employed.

The networks were labeled A to T. In most of the networks – in both sites, the ego was slightly older than her alters (Table 2).

Based on egos' reported accounts, 184 (92.0%) of alters used family planning and 165 (82.5%) were using CBD injectables at the time of the study.

Social relationships between ego and alters

According to the egos, 54% of alters were relatives or close friends of ego, while 35% were neighbors or acquaintances of ego. Interaction through visiting with each other was the most common means of social contact between egos and their alters (58.5%), followed by communication at the market or workplace (25.5%) and at places of worship (16.0%). About 178 (89%) of the alters interacted with their ego once a month or more frequently. Ego-alter discussion on family planning was done often with almost all alters (96.0%). According to the egos, more than 90% of alters used contraceptives or a form of family planning method while more than 80% used CBD injectable contraceptives (Table 3).

Narrative of network composition

Network density and centralization

The networks in this study were generally dense, with density ranging from 0.46 to 1 (see Figs. 1 and 2; Key to node coding on the sociograms is presented in Table 4). Nine of 10 networks in site A and all networks in Site B had densities >0.5 while 3 networks have 100% density, meaning that all actors in the network talk to each other about injectable contraceptives. Also, there was low network centralization in most networks, ranging from 0 to 73.4%. However, density in most networks is greater than 0.5 (see Table 5). This suggests that as density (connection among actors) increases, the tendency for power or prominence to be concentrated in a few actors reduces.

In networks with 100% density, injectable contraceptive use was either very high or very low. In four out of

Table 1 Sociodemographic characteristics of actors in the networks (N = 220)

Variable	Egos (N = 20)		Alters (N = 200)		Total	
	n	%	n	%	n	%
Age group						
< 30	5	25.0	77	38.5	82	37.3
≥ 30	15	75.0	123	61.5	138	62.7
Marital status						
Single	0	0	4	2.0	4	1.8
Married	20	100	196	98.0	216	98.2
Highest level of education						
No formal education	3	15.0	53	26.5	56	25.5
Primary or secondary education	12	60.0	109	54.5	121	55.0
Tertiary education	5	25.0	38	19.0	43	19.5
Occupation						
Informal	9	45.0	119	59.9	128	58.2
Formal occupations	6	30.0	46	23.0	52	23.6
Self-employed/employer	5	25.0	35	17.5	40	18.2
Ethnicity						
Hausa	16	80	161	80.5	177	80.5
Others ^a	4	20.0	39	19.5	43	19.5
Marriage type			(N = 196)		(N = 216)	
Monogamy	11	55.0	105	53.6	116	53.7
Polygamy	9	45.0	91	46.4	100	46.3
Use of contraceptives/family planning						
Yes	20	100	184	92.0	203	92.3
No	0	0	16	8.0	16	7.3
Use of CBD injectable contraceptives						
Yes	20	100	165	82.5	185	84.1
No	0	0	35	17.5	35	15.9

^aOthers include Igbo, Tangale, Tera, Waja

the 20 networks (D, H, I, Q), the egos were less prominent than the alters in the network (Table 5).

Degree centrality and betweenness centrality among actors

In 18 of the networks, egos had very high degree centrality (7 or higher). In site B, almost all egos (9 out of 10) had degree centrality of 10 (maximum). In Fig. 2, the ego has a degree centrality of 10 while Fig. 3 shows an example of a sociogram where ego has low degree centrality (peripheral). In about one-third of the networks (6 out of 20), the egos had lower degree centrality with fewer ties compared with the average degree centrality of alters in the networks (see SNA-D, SNA-F, SNA-G, SNA-H, SNA-I and SNA-Q in Table 6). The majority of the actors with high degree centrality also had high betweenness centrality. Also, a greater proportion of actors with high betweenness centrality were users of CBD injectable contraceptives (43 out of 60). Although, in a

few of the networks, some of the actors with the highest betweenness were not users of injectable contraceptives (see Fig. 1 above). About half of the egos also have high betweenness centrality (11 out of 20). Similarly, most of the alters with high betweenness centrality were egos' neighbors, followed by their relatives and close friends (See Figs. 1, 3 and 4). Generally, the majority of actors in these networks used injectable contraceptives (Table 3).

Communication about community-based distributed injectable contraceptives

In both sites A and B, egos reported that alters discuss family planning issues often (95 and 97% respectively). Table 6 shows that in 15 of the 20 networks across the two sites, actors who were Hausas tended to talk about the community-based distributed injectable method more with fellow Hausas than with women of other ethnic affiliations. Furthermore, the networks showed homophily

Table 2 Age of egos and alters by network

Network	Age of ego (years)	Age of alters (years) – mean ($\pm$ SD)
SITE A (GOMBE)		
SNA-A	38.0	33.2 $\pm$ 3.7
SNA-B	40.0	34.9 $\pm$ 6.4
SNA-C	38.0	36.1 $\pm$ 6.2
SNA-D	35.0	32.4 $\pm$ 5.0
SNA-E	30.0	35.5 $\pm$ 4.8
SNA-F	37.0	36.6 $\pm$ 5.0
SNA-G	36.0	31.3 $\pm$ 2.3
SNA-H	36.0	33.0 $\pm$ 2.5
SNA-I	36.0	31.9 $\pm$ 1.9
SNA-J	34.0	32.5 $\pm$ 2.2
SITE B (YEMALTU-DEBA)		
SNA-K	35.0	30.5 $\pm$ 5.5
SNA-L	37.0	29.8 $\pm$ 5.5
SNA-M	40.0	32.0 $\pm$ 6.6
SNA-N	23.0	28.6 $\pm$ 5.5
SNA-O	25.0	24.8 $\pm$ 5.5
SNA-P	25.0	22.7 $\pm$ 2.1
SNA-Q	32.0	24.2 $\pm$ 5.8
SNA-R	30.0	26.9 $\pm$ 9.6
SNA-S	22.0	27.7 $\pm$ 9.9
SNA-T	20.0	22.9 $\pm$ 4.2

with respect to age – participants who were 30 years or older tended to talk more with women in their age group – although a look through the lens of location shows that the homophily was more pronounced in Gombe LGA (9 of 10 networks) than in Yemaltu-Deba LGA (3 of 10

Table 3 Alters' relationship with ego ($N = 200$)

Variable	SITE A		SITE B		Total	
	n	%	n	%	n	%
Relationship with ego						
Relatives and close friends	36	36.0	72	72.0	108	54.0
Co-workers	15	15.0	7	7.0	22	11.0
Neighbour and acquaintance	49	49.0	21	21.0	70	35.0
Place of interaction with ego						
Mosque/church	19	19.0	13	13.0	32	16.0
Market and workplace	37	37.0	14	14.0	51	25.5
Social visits	44	44.0	73	73.0	117	58.5
Frequency of social interaction with ego						
At least once weekly	22	22.0	54	54.0	76	38.0
At least once monthly	61	61.0	41	41.0	102	51.0
At least once yearly	17	17.0	5	5.0	22	11.0

networks). In addition, a tendency to communicate among groups with similar characteristics was also observed among actors who had at least secondary school education. Although marriage type is a factor of homophily, actors in polygamous relationships were more homophilic in Gombe whereas, in Yemaltu-Deba, it was actors in monogamous marriages who had homophilic communication interactions.

Majority of actors in the networks showed homophily according to ethnicity (88.6%), injectable contraceptive use (81.4%) and age (80.0%). This suggests that actors in this study interact more based on their ethnic affiliations as well as their use of injectable contraceptives and age. Actors demonstrated the least homophily according to marriage type (49.5%). Table 7 shows details of homophily among women in the study.

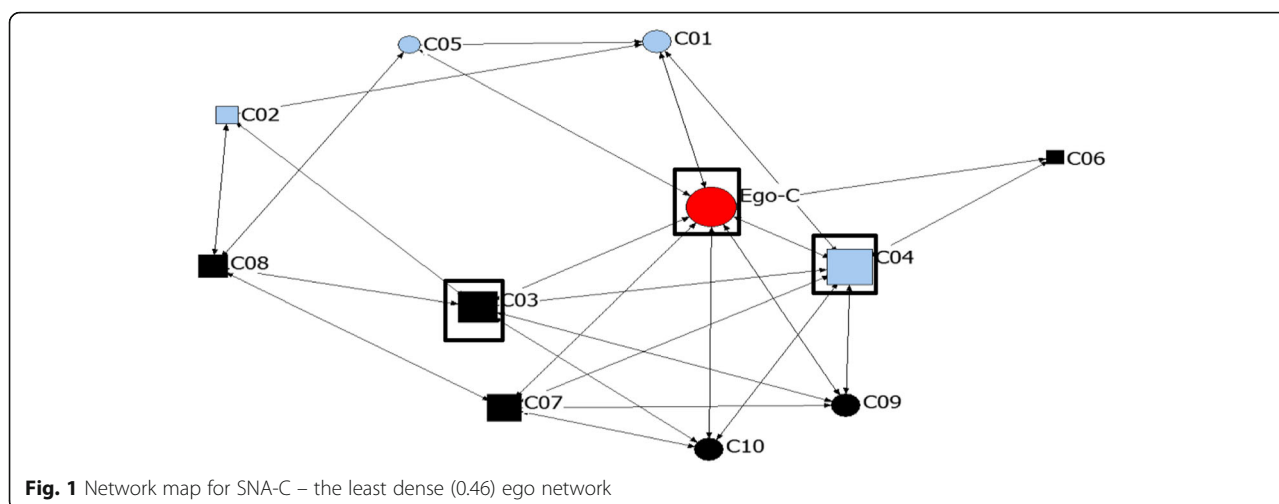
In some of the networks, there were peripheral actors who had very few ties with other actors in the network (see Fig. 4). In addition to having low degree centrality, these actors also had low betweenness centrality.

Discussion

This study revealed that most of the networks have high densities. Also, actors with high degree centrality showed prominence in their networks. In addition, common sources of homophily among actors in networks were ethnicity, age, education, and marriage type. The implications of these findings are discussed below.

According to Haythornthwaite, actors in dense networks communicate more amongst themselves than they do in loose networks [39]. Since dense networks make for easier communication and organization of activities among actors [27, 40], it would seem to be easier for the knowledge and use of injectable contraceptives to spread among these networks. This is probably due to a higher degree of trust and support among actors in the network, given that more than half of the alters were family or close friends [40].

However, if a number of actors in a network are non-users of injectable contraceptives, it might be difficult for these actors to adopt the innovation in a dense network since individual decisions are largely swayed by the common opinion in the network [27, 41]. According to Prell, [40] actors in a dense network may embrace incorrect information and could be less open to new information thus limiting other players in the network, and ultimately restricting the dissemination of accurate information about health innovations. This assertion is buttressed by the findings of this study which showed that networks with the highest densities may have either a very high or very low proportion of injectable contraceptive users, suggesting that actors inspire one another in the decision to use or not to use injectable contraceptive since “everyone knows everyone’s business” [27]. Thus, it is imperative to get the right message about



injectable contraceptives across to potential users of this innovation in these closely-knit communities.

In dense networks like in this study, each actor relates with every other actor in the network and no particular person is prominent [40]. Thus, the use of injectable contraceptives is more likely due to group influence than individual decisions by members of the network [27]. Also, in a very dense network, any of the actors in the network could easily become a leader championing the spread of the innovation within the network [3, 27]. Thus, the network is robust and resilient and not dependent on few key players [40]. Conversely, any one of the players could also be a source of false information about injectable contraceptives, thereby slowing down its adoption and use in the network. This means that in networks with high densities, there are no information “gatekeepers” that other actors can rely on to get connected to the network [27]. Likewise, about a quarter of the egos were not prominent in their networks. Consequently, the egos might not necessarily be the most

popular or most active in the spread of information about injectable contraceptive use since most of the networks are resilient and not centralized around a few actors [40]. Also, some of the alters might be early adopters themselves.

While it is not possible to refer with certainty to peripheral actors as links to other networks, because the study focused on ego networks, nevertheless, these outliers may have links to other networks. This so-called “strength of weak ties” [42], suggests that the peripheral actors could be formidable players in the diffusion process by serving as conduits through which networks associated with them get pertinent information from the environment.

Furthermore, our study revealed that actors with high degree centrality tend to also have high betweenness centrality. This suggests that actors with high degree centrality were relatively more prominent in the network and able to control the flow of information about injectable contraceptives [27, 28]. Since most actors in this study with high betweenness centrality were injectable

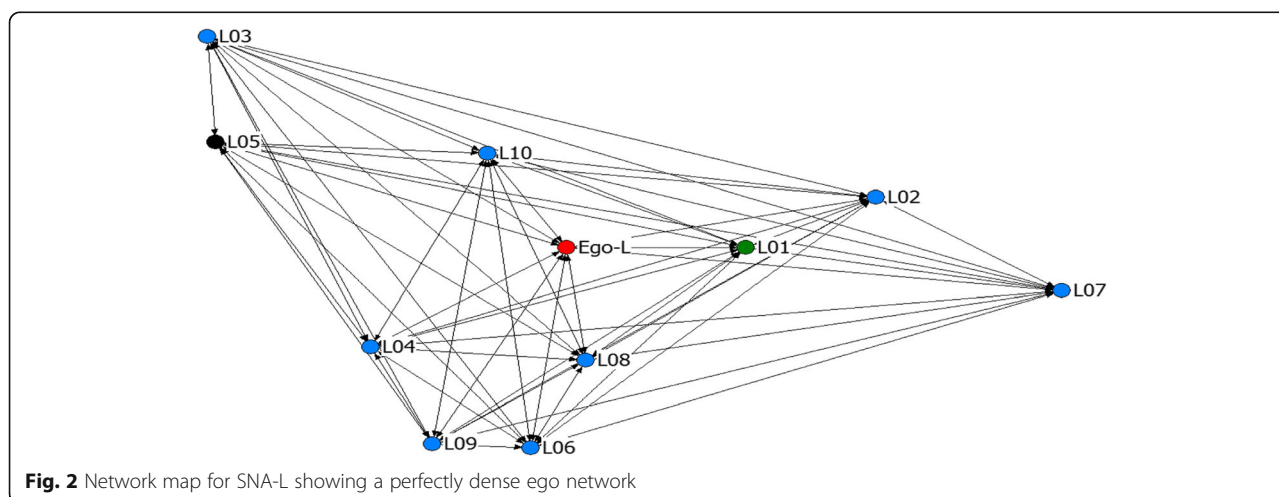


Table 4 Key to node coding on sociograms

Variable	Code	Label
Shape	Circle	Users of injectable contraceptives
	Square	Non-users of injectable contraceptives
Colour	Red	Ego
	Pink	Relatives and close friends
	Blue	Close friends
	Black	Co-worker
	Green	Neighbour
Size of node	Proportional to the degree centrality of actor	
Boxes around nodes ^a	Actors with the top three highest betweenness centrality values	

^aSociograms without boxes are those where all the actors have equal betweenness centrality values

contraceptive users, this may have a positive ripple effect on the spread of the innovation in these communities. Actors with high betweenness centrality might be useful as peer educators since they are able to act as ‘middle men’ between other actors in their networks and possibly link their network to other groups [43]. Since the majority of the actors with high betweenness centrality in

this study were users of community-based distributed injectable contraceptives, they may also act as “champions” and opinion leaders in their communities [3]. These actors might be able to play this role because they usually control the flow of information in the network due to their ties to several other actors; thus they are able to organize and spread information about injectable contraceptives to the whole network [40].

In addition, few actors who have high betweenness centrality in some networks in the study were not users of injectable contraceptives. This may have implications for the quality of information shared in these networks about injectable contraceptives [27]. It may also mean that actors who perhaps control information about injectable contraceptives were not necessarily users themselves. This may have a negative influence on the adoption and use of injectable contraceptives in such types of networks.

Moreover, most of the networks in this study were homophilic with respect to ethnicity, age, education, and marriage type. Although, the homophily due to ethnicity observed in this study could be because Hausa is the major ethnic group in the research area. Ethnicity has

Table 5 Network density and degree centrality

Network	No. of ties present ^a	Density	Ego's degree centrality	Average degree centrality	Ego nBetweenness	Network Average nBetweenness	CBD injectable contraceptive use
SITE A (GOMBE)							
SNA-A	84	0.76	9	7.64	4.37	2.45	8
SNA-B	96	0.87	10	8.73	2.14	1.34	10
SNA-C	50	0.46	8	4.55	23.07	4.80	4
SNA-D	94	0.86	7	8.55	1.56	1.62	7
SNA-E	108	0.98	10	9.82	0.25	0.20	10
SNA-F	88	0.98	5	8.00	4.58	1.99	7
SNA-G	86	0.78	7	7.82	2.56	2.41	5
SNA-H	92	0.84	8	8.37	1.60	2.29	8
SNA-I	92	0.84	8	8.36	1.15	1.67	9
SNA-J	74	0.67	7	6.73	3.11	2.80	8
SITE B (YEMALTU-DEBA)							
SNA-K	74	0.67	10	6.73	16.41	2.36	10
SNA-L	110	1.00	10	10.00	0	0	10
SNA-M	110	1.00	10	10.00	0	0	9
SNA-N	76	0.69	10	6.91	9.78	2.80	10
SNA-O	82	0.75	10	7.45	10.63	2.05	10
SNA-P	56	0.51	10	5.09	30.56	2.95	10
SNA-Q	56	0.51	2	5.09	0	2.89	3
SNA-R	110	1.00	10	10.00	0	0	3
SNA-S	96	0.87	10	8.73	2.64	1.30	10
SNA-T	80	0.73	10	7.27	8.52	2.48	9

^aNumber of possible ties = 110

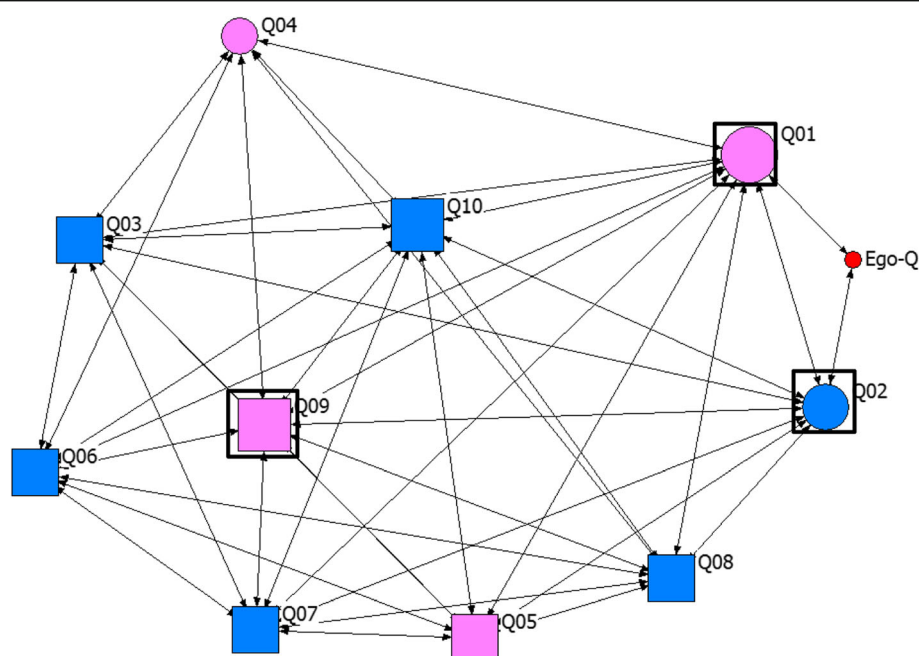
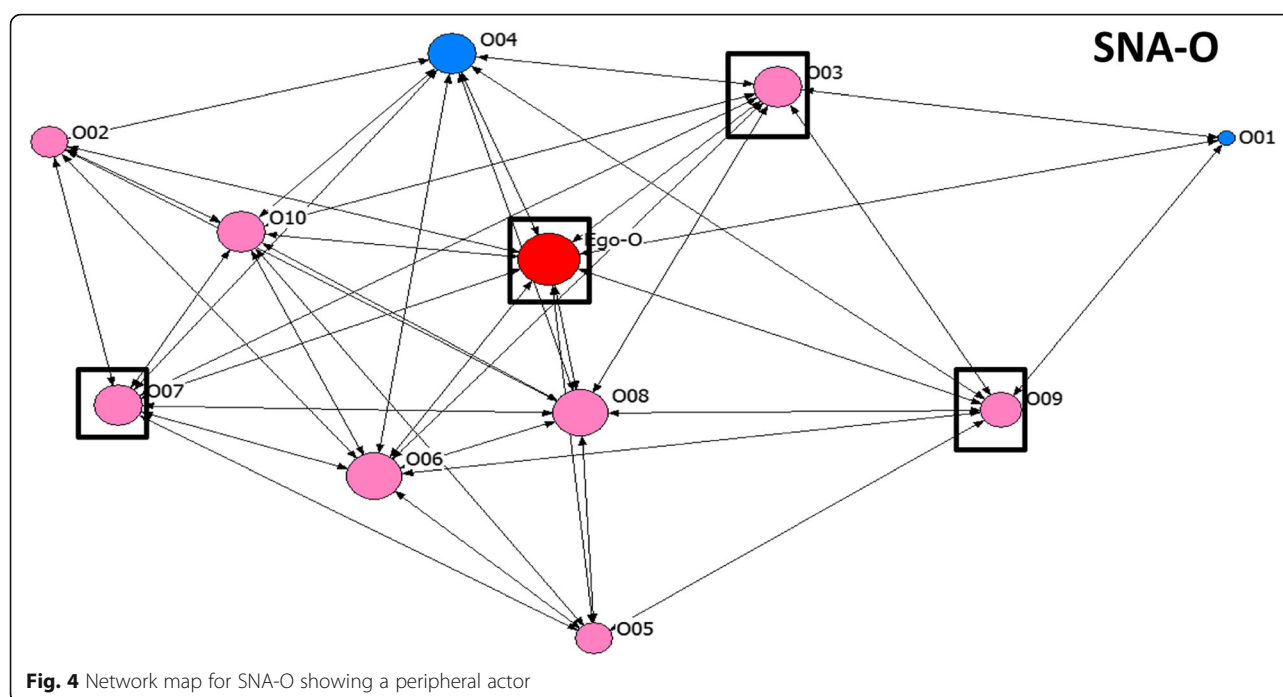


Fig. 3 Network map for SNA-Q – showing a peripheral ego with low degree centrality

Table 6 Group level E-I indices^a

Network	Ethnicity		Age of actors		Education		Marriage type	
	Hausa	Others	< 30	≥30	Less than secondary	At least secondary	Monogamous	Polygamous
SITE A (GOMBE)								
SNA-A	0.333	0.000	−0.106	0.135	0.179	0.022	−0.460	0.619
SNA-B	−1.000	–	0.750	−0.650	1.000	−0.793	0.256	0.019
SNA-C	−0.674	1.000	1.000	−0.826	0.111	−0.375	0.091	−0.143
SNA-D	−1.000	–	0.556	−0.373	0.500	−0.226	0.163	−0.020
SNA-E	−1.000	–	1.000	−0.796	−0.333	−0.370	−0.017	0.184
SNA-F	−1.000	–	1.000	−0.772	0.778	−0.543	0.273	−0.227
SNA-G	−0.795	1.000	0.778	−0.529	0.368	0.083	0.714	−0.667
SNA-H	−0.534	0.789	–	−1.000	–	−1.000	0.538	−0.394
SNA-I	−1.000	–	1.000	−0.810	–	−1.000	0.789	−0.534
SNA-J	0.429	−0.130	–	−1.000	1.000	−0.688	0.143	−0.304
SITE B (YEMALTU-DEBA)								
SNA-K	0.478	−0.333	0.714	−0.600	−1.000	–	−0.073	0.152
SNA-L	0.400	−0.200	0.400	−0.200	−0.600	0.800	−0.600	0.800
SNA-M	0.600	−0.400	0.400	−0.200	−0.600	0.800	0.600	−0.400
SNA-N	−1.000	–	−0.333	0.143	0.273	−0.023	−0.167	0.429
SNA-O	−1.000	–	−0.377	0.810	0.667	−0.310	0.077	−0.023
SNA-P	−1.000	–	−1.000	–	0.200	−0.333	−0.500	0.250
SNA-Q	−0.154	0.375	−0.722	0.667	0.314	−0.061	−0.722	0.667
SNA-R	−0.200	0.400	−0.600	0.800	0.400	−0.200	−0.600	0.800
SNA-S	−1.000	–	−0.429	0.538	0.163	−0.057	−0.057	0.163
SNA-T	−1.000	–	−0.400	0.800	−0.333	0.652	−0.746	1.000

^aE-I index is the number of ties external to the groups minus the number of ties that are internal to the group divided by the total number of ties. This value can range from 1 to −1



been described as the greatest source of homophily in social networks followed by age, religion, education, occupation and, gender [7]. Ethnicity has also been considered as an important determinant of social group membership [7, 44]. Homophily from race and ethnicity has been reported to permeate marriage, work, friendship, acquaintanceship, to those in whom individuals confide or discuss important matters with before making their decisions [7, 45]. Thus, working through natural groupings may help to facilitate the diffusion of information and better uptake in the process of scaling up of community-based injectable contraceptives in Gombe and similar communities. At the same time, given that conflict in Gombe State might also be sustained through networks that promote religious and sometimes ethnic homophily, the use of such networks to support the scale up of community-based distributed injectable contraceptives requires political sensitivity and care.

In this study, actors preferred to interact and share information about injectable contraceptives within their

age groups. Homophily resulting from age homogeneity has been reported to be long-lasting and usually very strong, probably because these ties often start from childhood [7, 46]. In addition, just as it was found in this study, education and occupation (which are principal determinants of social class in many contexts, including Gombe), have been shown to demonstrate strong homophily in social networks [7]. Education, in particular has been reported to influence the uptake of health innovations [47, 48]. Thus, these characteristics – age, education, and occupation – should be considered when engaging peer educators in the diffusion of innovations like the community-based injectable contraceptives. However, one drawback of homophilic networks is that it is easier for the network to be contaminated with inaccurate or false information or myths about injectable contraceptives, since the actors in the networks have related sources of knowledge [40].

Nevertheless, this study is limited by the subjectivity of egos as information obtained was solely from the egos' points of view. Still, it is this very subjectivity which also provides valuable data and enables a better understanding of the influence of network phenomenon – themselves subjective – on uptake and diffusion of health innovations. In addition, almost all alters and egos in this study were married thereby limiting the scope of the application of these findings.

Conclusion

This study shows the application and feasibility of ego social network analysis in identifying and disseminating

Table 7 Sources of homophily among actors according to specific characteristics (N = 220)

Variable	Egos (N = 20)		Alters (N = 200)		Total	
	n	%	n	%	n	%
Ethnicity	20	100.0	175	87.5	195	88.6
Injectable contraceptive use	17	85.0	162	81.0	179	81.4
Age	18	90.0	158	79.0	176	80.0
Education	13	65.0	133	66.5	146	66.4
Marriage type	11	55.0	98	49.0	109	49.5

health innovation through natural groupings in the community. It also illustrates how communication and social interactions among women of reproductive age might influence the uptake and diffusion of community-based injectable contraceptives by others. Additionally, this work shows how the exploitation of network phenomena in homophilic and dense networks may have positive health externality such as passive diffusion of health innovations past the point of introduction [49]. The inter-relatedness of network members' decision to adopt a health innovation was also illustrated by the findings of this study.

Thus, it is recommended that health messages about the community-based distribution of injectable contraceptives be carefully considered for accuracy and appropriateness, before being disseminated in these closely-knit communities. Also, highly connected or prominent individuals should be identified in the communities to serve as peer educators or "champions" in the scale up process. These champions should be identified within different groups for example marital, ethnic, age, educational, and employment groups, since community members tend to interact more according to these groupings.

Supplementary information

Supplementary information accompanies this paper at <https://doi.org/10.1186/s12889-019-7819-5>.

Additional file 1: Research tools.

Abbreviations

CBD: Community-based distribution; CHEWs: Community health extension workers; CHWDIC: Community health worker-delivered injectable contraceptives; CPR: Contraceptive prevalence rates; LGA: Local Government Area; LMICs: Low- and middle-income countries; NGO: Non-governmental organization; SNA: Social network analysis

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Authors' contributions

OA and MK conceived and designed the study. The data were collected by OA. OA, MK and BH drafted and commented on the draft of the manuscript. OA, MK and BH read and approved the final version of the manuscript.

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Availability of data and materials

The data used and/or analyzed in this study are available from Dr. Oluwaseun Akinyemi on request.

Ethics approval and consent to participate

Ethical approval for this study was gotten from the University of Ibadan/ University College Hospital Ethical Review Board (Reference No.: UI/EC/16/0022) as well as the Human Research Ethics Committee (Medical) of the University of the Witwatersrand (Reference No.: M160737). Information sheets were provided to study participants and written informed consent was obtained from participants before the interviews.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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APPENDIX 40 – Sociogram legends

Table 9: Sociogram legends

NODE	CHARACTERISTIC	CODE	LABEL
Size	Degree centrality	Size of node – larger nodes denote higher centrality	
Shape	Injectable	Yes	Round
	contraceptive use	No	Square
Colour	Relationship with Ego	Ego	Red
		Relative/family member	Pink
		Close friends	Blue
		Co-worker	Black
		Neighbour	Green

Actors with boxes around their nodes are those with the three highest betweenness centrality values. Sociograms without boxes are those where all the actors have equal betweenness centrality values.

APPENDIX 41 -Sociograms from social network analysis

Figure 8 shows a network comprising an early adopter of CBDIC (ego) and the ten women she identified as those she interacts with socially (alters). This is a dense network (76.4% of possible communication ties were forged) where all prominent actors are users of CBD injectable contraceptives (CBDIC).

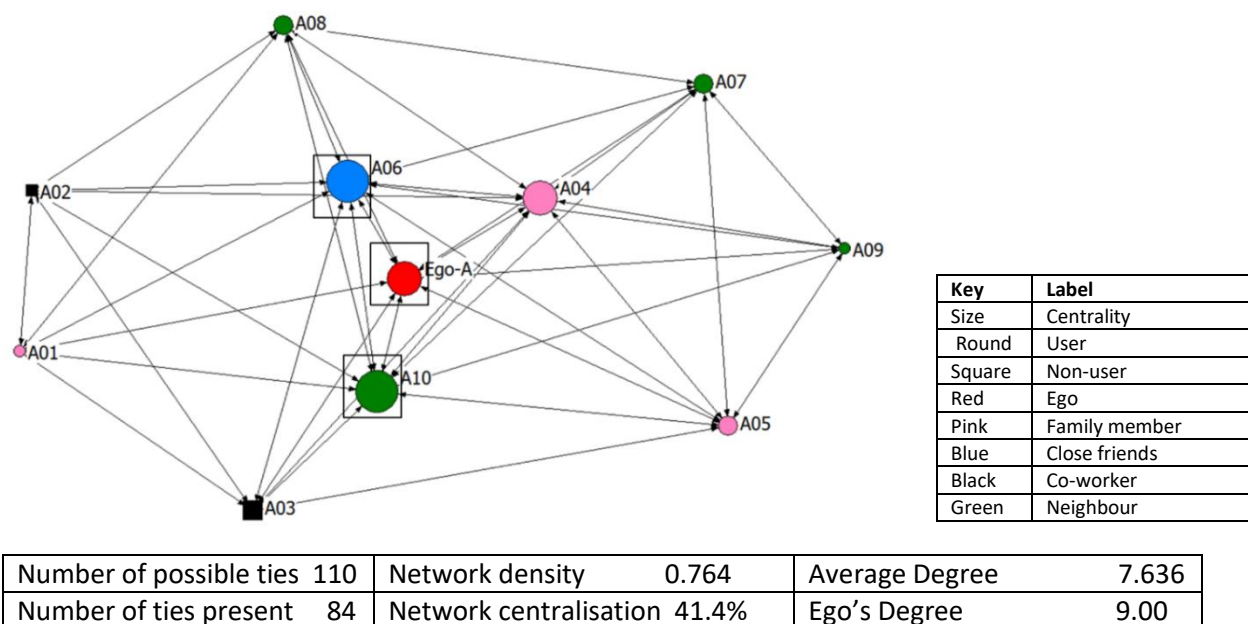


Figure 8: SNA-A sociogram showing a dense network

The sociogram in Figure 9 shows a high density and low centralization. All members of the network are users of CBDIC.

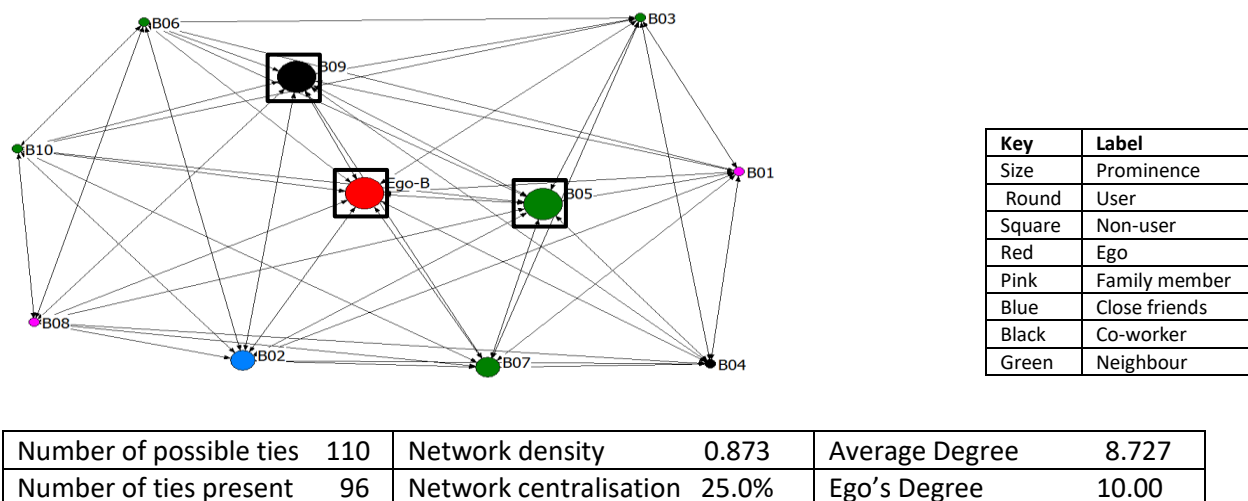
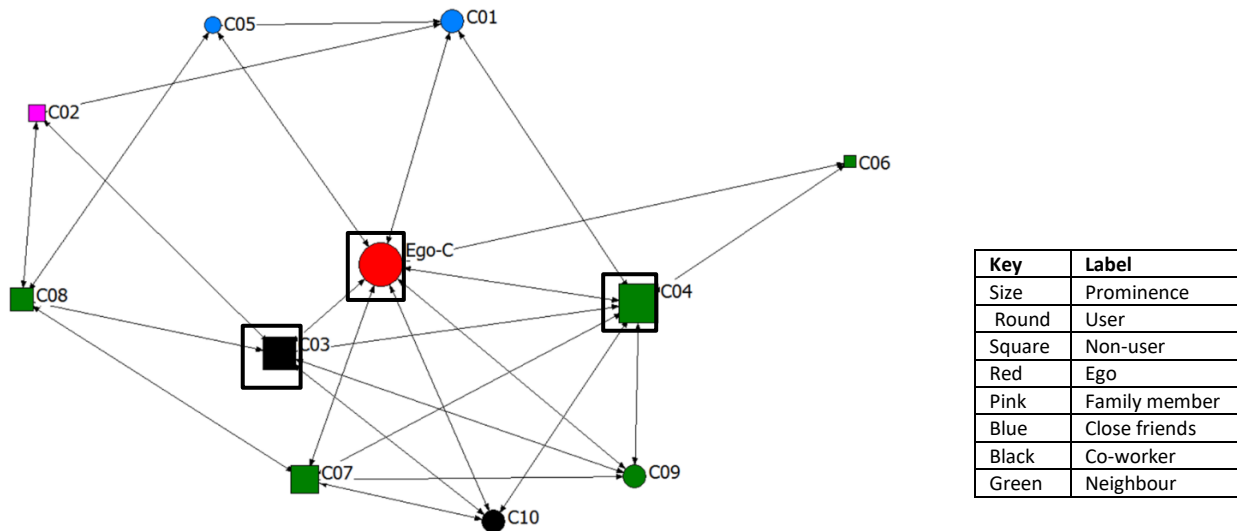


Figure 9: SNA-B sociogram

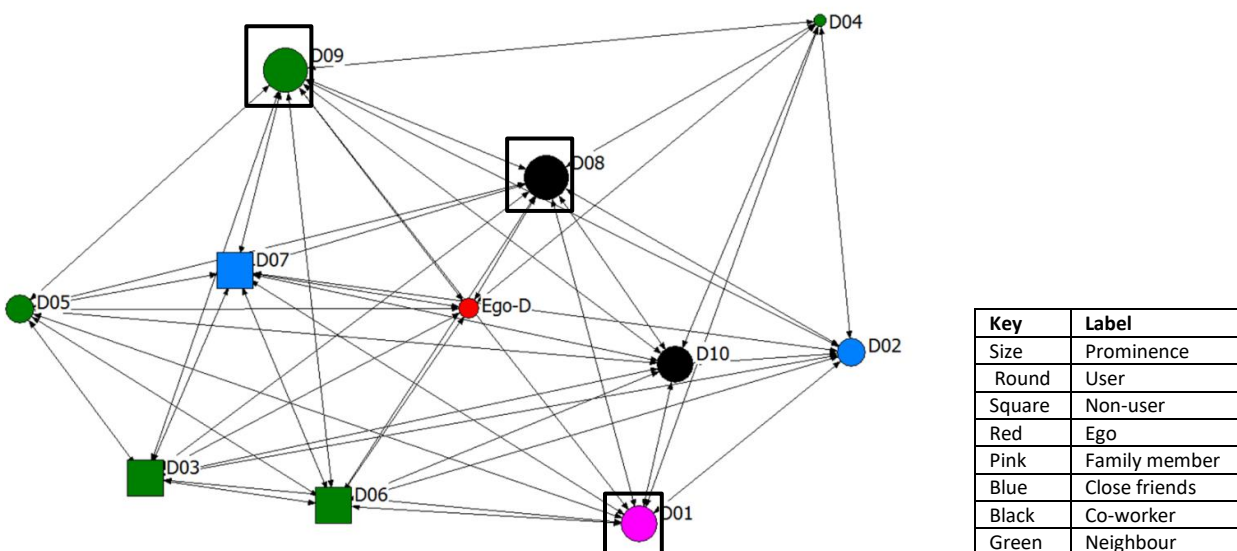
Figure 10 shows a network with low density and centralized around a few actors. There are also a few peripheral members and two of the most prominent members do not use CBDIC.



Number of possible ties	110	Network density	0.455	Average Degree	4.545
Number of ties present	50	Network centralisation	43.8%	Ego's Degree	8.00

Figure 10: SNA-C sociogram showing non-users with high betweenness and a peripheral alter

In Figure 11, the network is very dense, the ego is not prominent; although the most prominent actors are users of CBDIC, there are a few non-users in the network.



Number of possible ties	110	Network density	0.855	Average Degree	8.545
Number of ties present	94	Network centralisation	27.5%	Ego's Degree	7.00

Figure 11: SNA-D showing a non-prominent ego

The network in Figure 12 is one with a very high density, where most members are prominent and all are users of CBDIC. The network is not centralized around any individual.

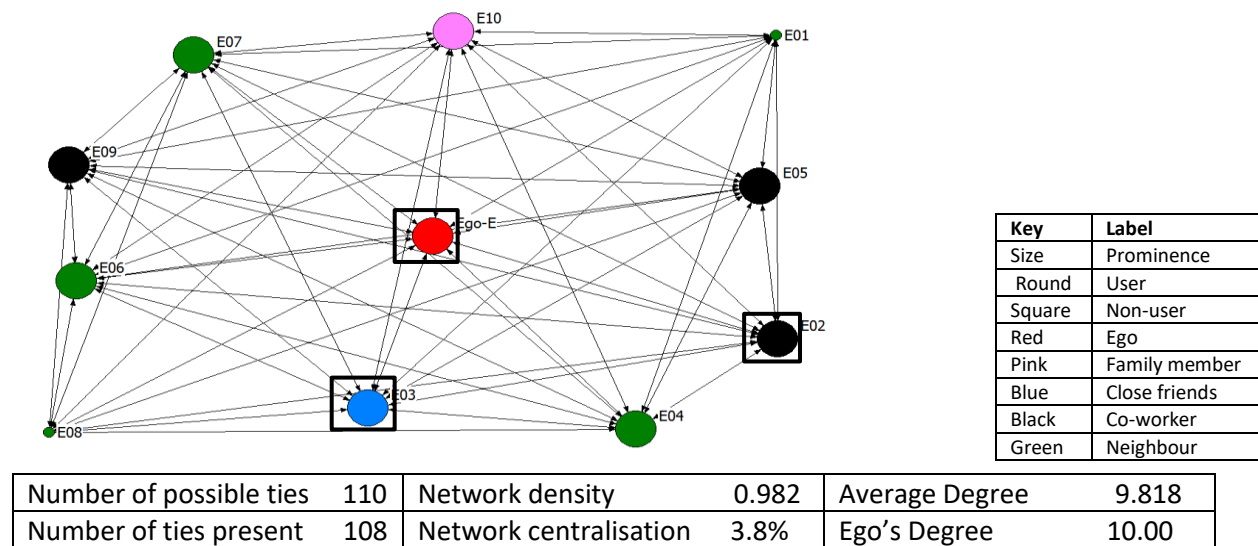


Figure 12: SNA-E sociogram showing ego and alters with high betweenness

In Figure 13, the network shows high density and somewhat centralized around few actors. Two of the most prominent actors do not use CBDIC and the ego is not very prominent.

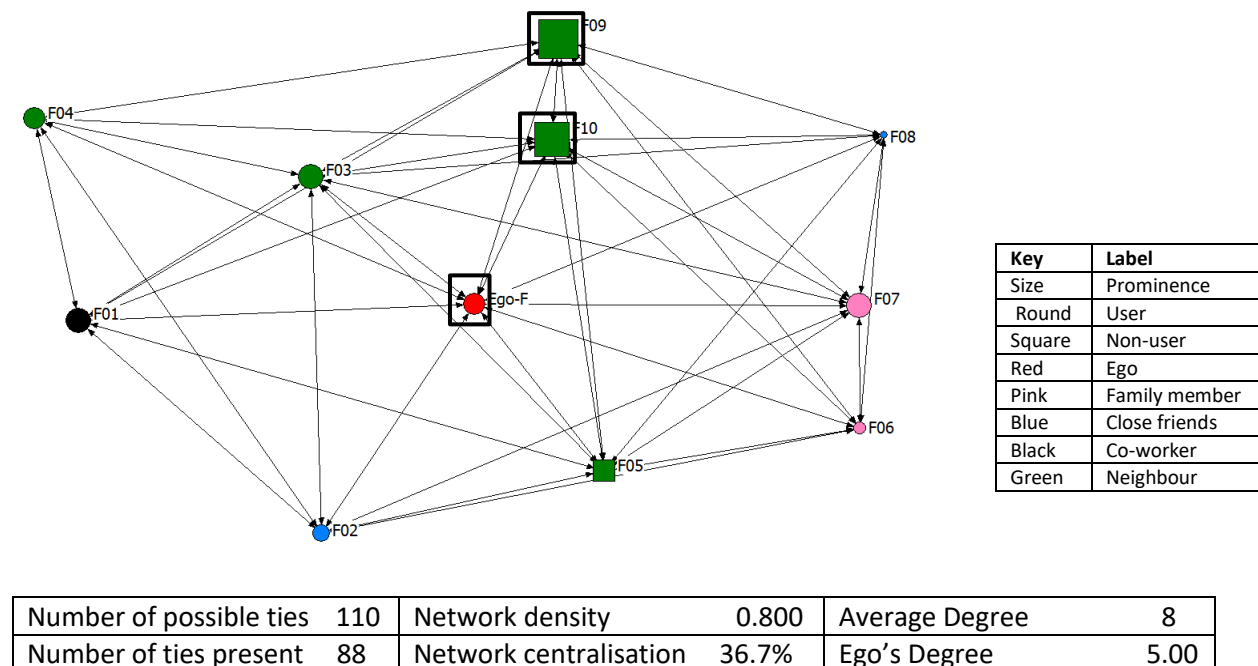
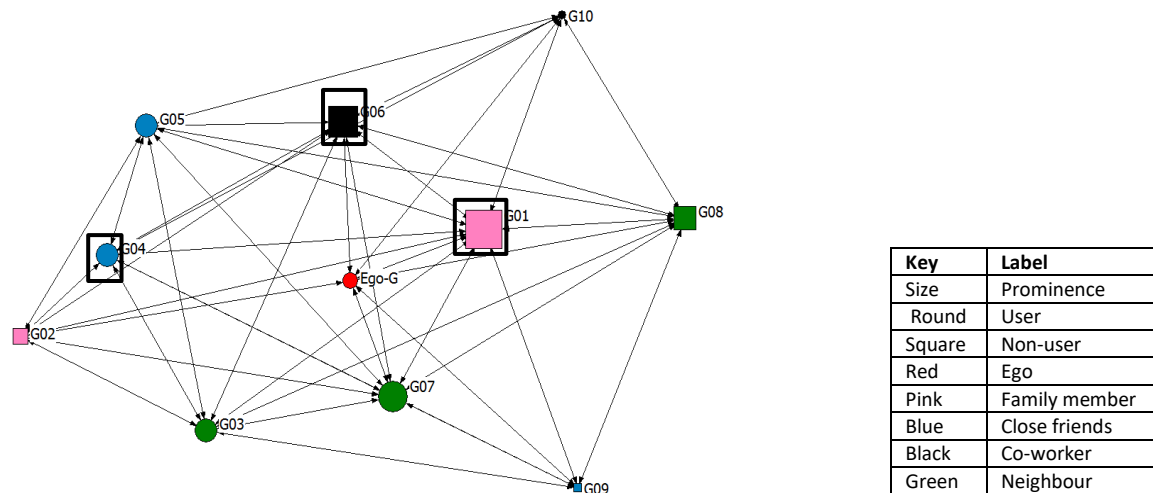


Figure 13: SNA-F sociogram showing non prominent ego and non-users with high betweenness

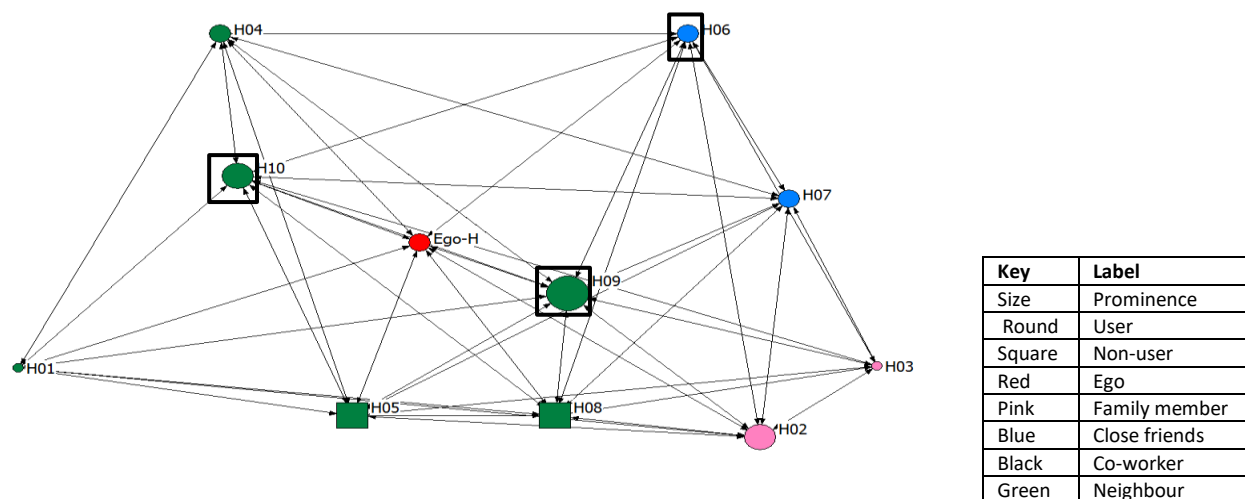
The sociogram below (Figure 14) shows a non-prominent ego. In the dense network, two of the most prominent players are non-users of CBDIC



Number of possible ties	110	Network density	0.782	Average Degree	7.818
Number of ties present	86	Network centralisation	39.7%	Ego's Degree	7.00

Figure 14: SNA-G sociogram showing a non-prominent ego and non-users with high betweenness

In Figure 15 below, the highly dense network has a non-prominent ego and shows some centralization around a few players in the network.



Number of possible ties	110	Network density	0.836	Average Degree	8.367
Number of ties present	92	Network centralisation	31.5%	Ego's Degree	8.00

Figure 15: SNA-H showing a non-prominent ego and alters with high betweenness

Figure 16 presents a network with high density, some centralization and a non-prominent ego. One of the most prominent members do not use CBDIC.

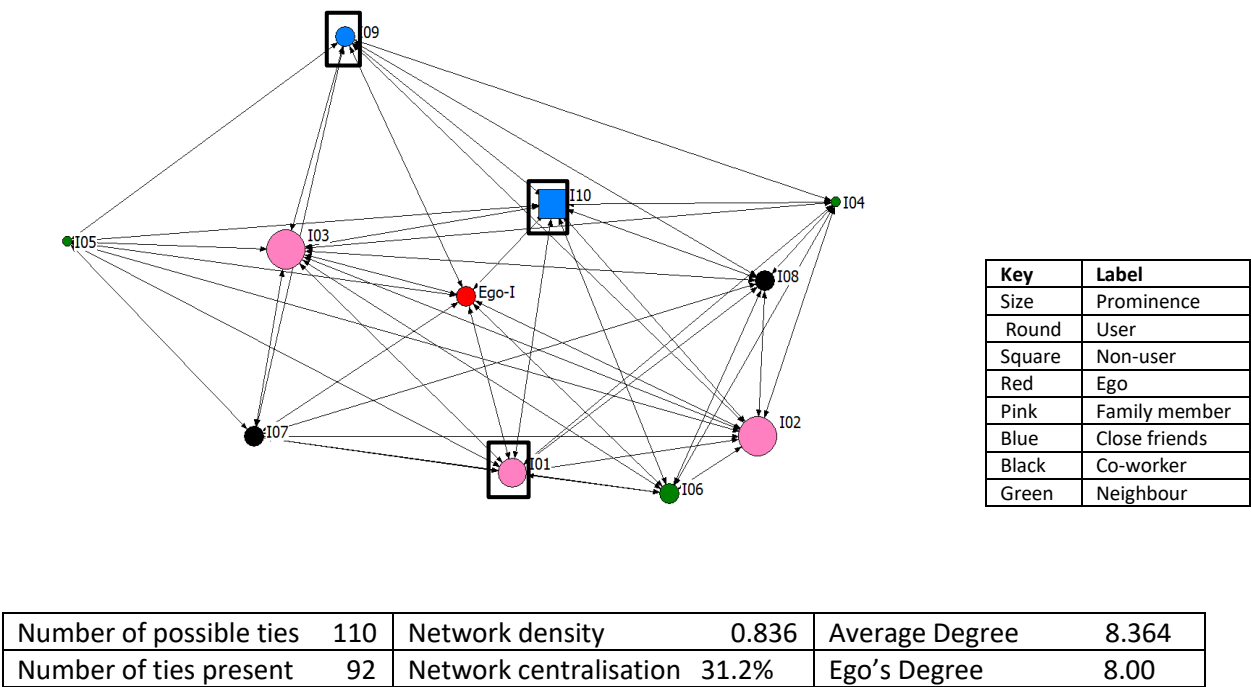


Figure 16: SNA-I sociogram showing a non-prominent ego and a non-user with high betweenness

Figure 17 also shows a network with a non-prominent ego and moderate density. There are a few peripheral actors and some centralization around a few members.

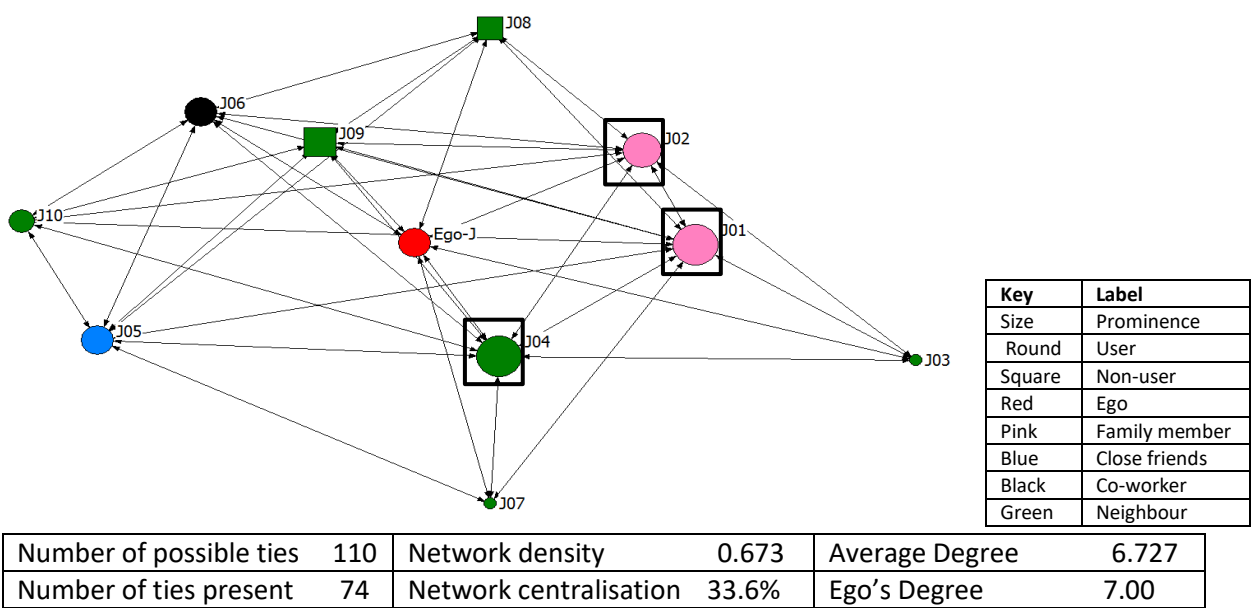
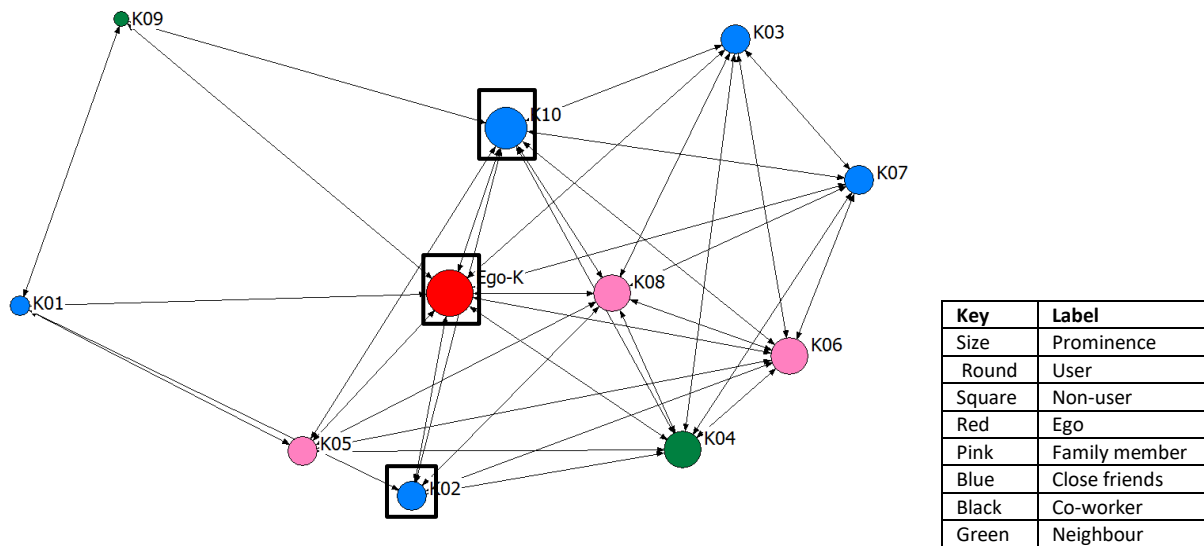


Figure 17: SNA-J sociogram showing a non-prominent ego and alters with high betweenness

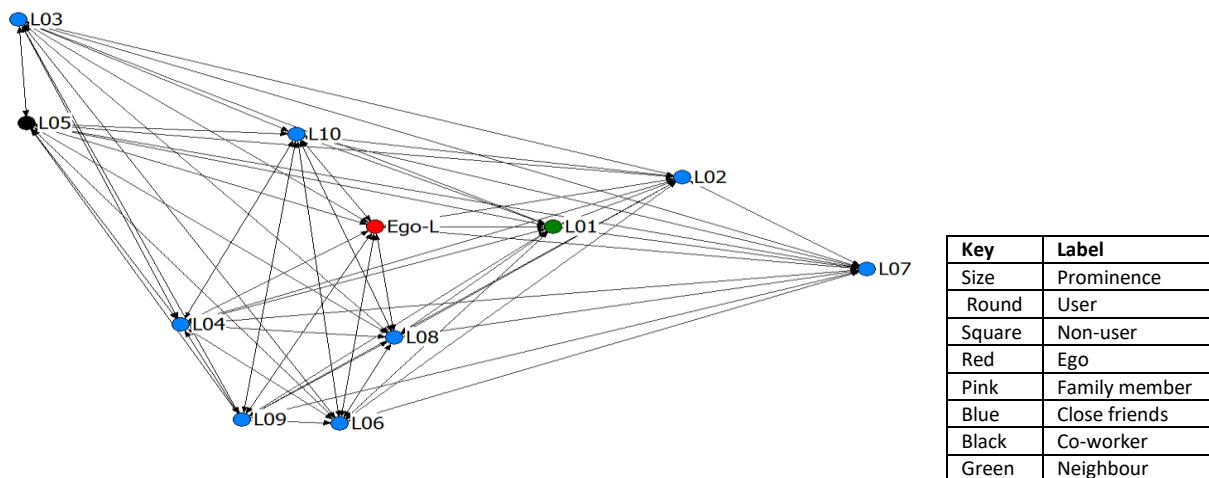
The network in Figure 18 shows a few peripheral members, a prominent ego and moderate centralization around a few prominent actors.



Number of possible ties	110	Network density	0.673	Average Degree	6.727
Number of ties present	74	Network centralisation	53.2%	Ego's Degree	10.00

Figure 18: SNA-K showing actors with high betweenness and peripheral alters

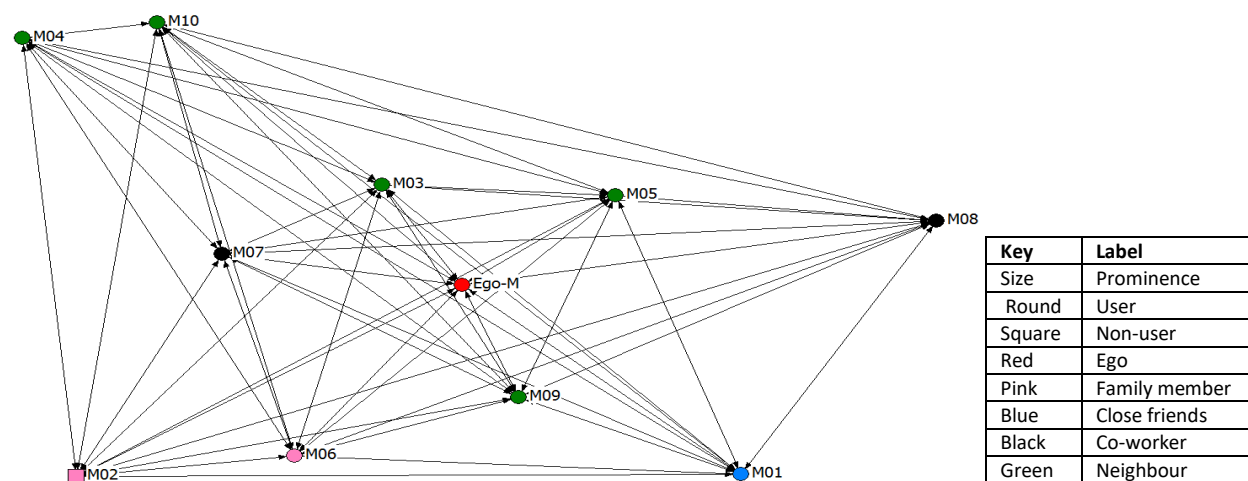
Figure 19 shows a network with perfect density, nil centralization and no prominent members. All actors in the network are users of CBDIC. Most alters are close friends of the ego.



Number of possible ties	110	Network density	1	Average Degree	10
Number of ties present	110	Network centralisation	0.0%	Ego's Degree	10.00

Figure 19: SNA-L sociogram showing a fully dense network with equally prominent actors

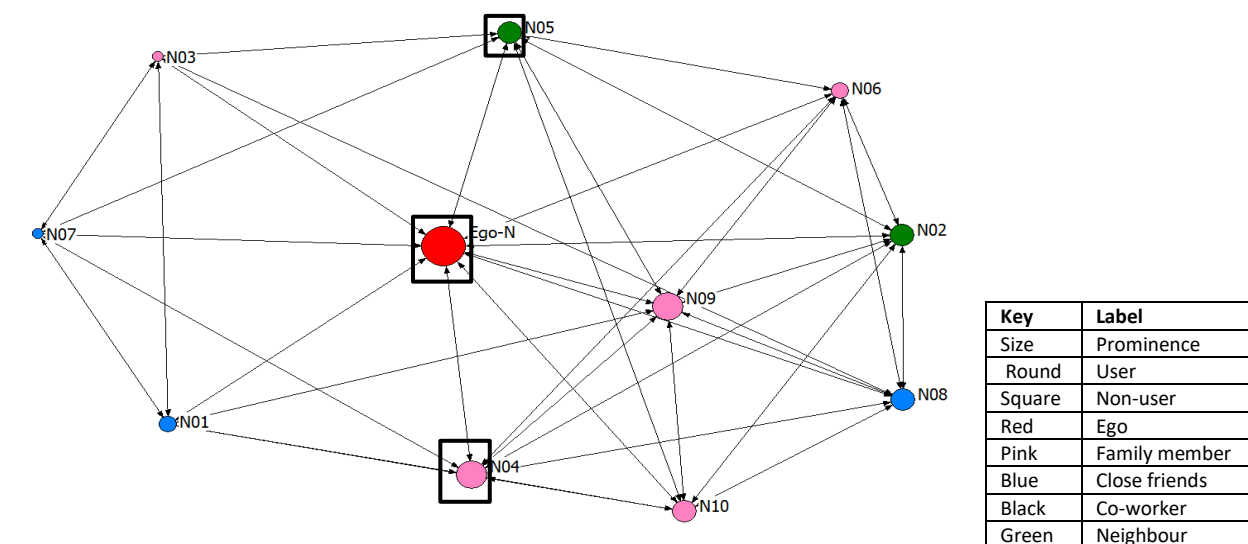
In Figure 20, the network also shows perfect density, no centralization and no prominent actors. Most of the alters are ego's neighbours.



Number of possible ties	110	Network density	1	Average Degree	10
Number of ties present	110	Network centralisation	0.0%	Ego's Degree	10.00

Figure 20: SNA-M showing sociogram showing a fully dense network with equally prominent actors

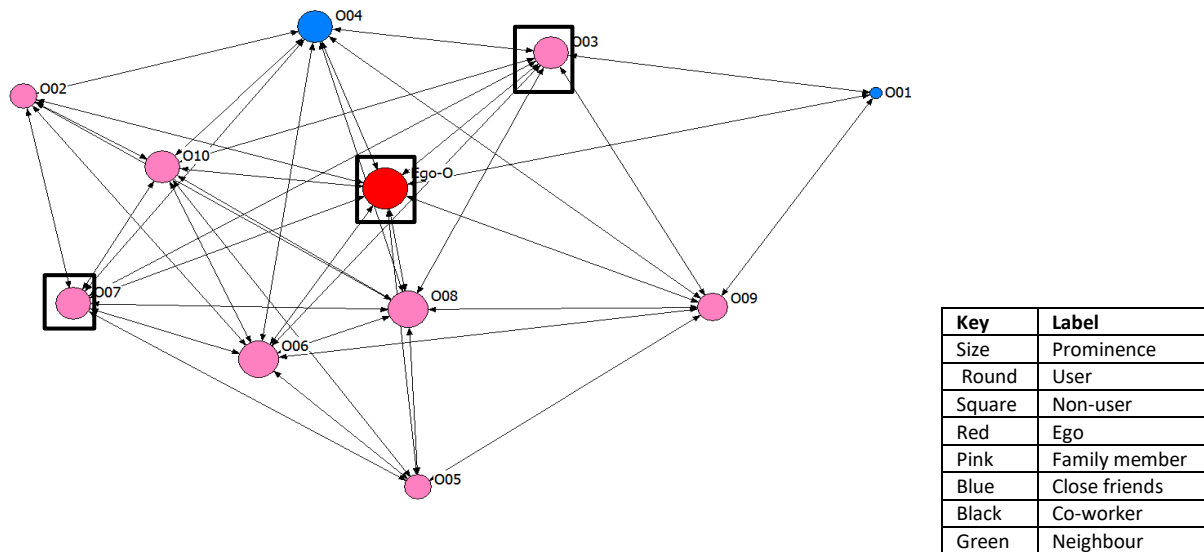
The network below (Figure 21) shows moderate density, modest centralization around a few members and some peripheral actors.



Number of possible ties	110	Network density	0.691	Average Degree	6.909
Number of ties present	76	Network centralisation	52.7%	Ego's Degree	10.00

Figure 21: SNA-N sociogram showing actors with high betweenness and peripheral alters

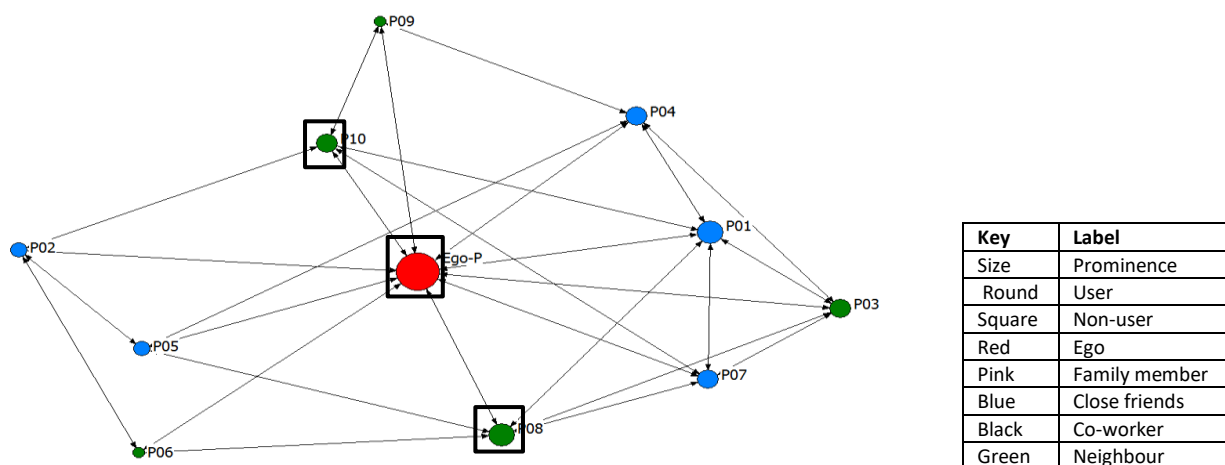
In Figure 22, the network has a prominent ego with some centralization, few peripheral actors and all members use CBDIC. Most of the alters are family members of ego.



Number of possible ties	110	Network density	0.745	Average Degree	7.455
Number of ties present	82	Network centralisation	43.5%	Ego's Degree	10.00

Figure 22: SNA-O sociogram showing actors with high betweenness and a peripheral alter

The network below (Figure 23) has very high centralization around a few prominent actors and moderate density. Members are largely ego's close friends and neighbours.



Number of possible ties	110	Network density	0.509	Average Degree	5.091
Number of ties present	56	Network centralisation	73.4%	Ego's Degree	10.00

Figure 23: SNA-P sociogram showing a prominent ego with many non-prominent alters

Figure 24 shows a network with a peripheral and non-prominent ego. The network is moderately dense with high centralization around a few actors. Most members do not use CBDIC.

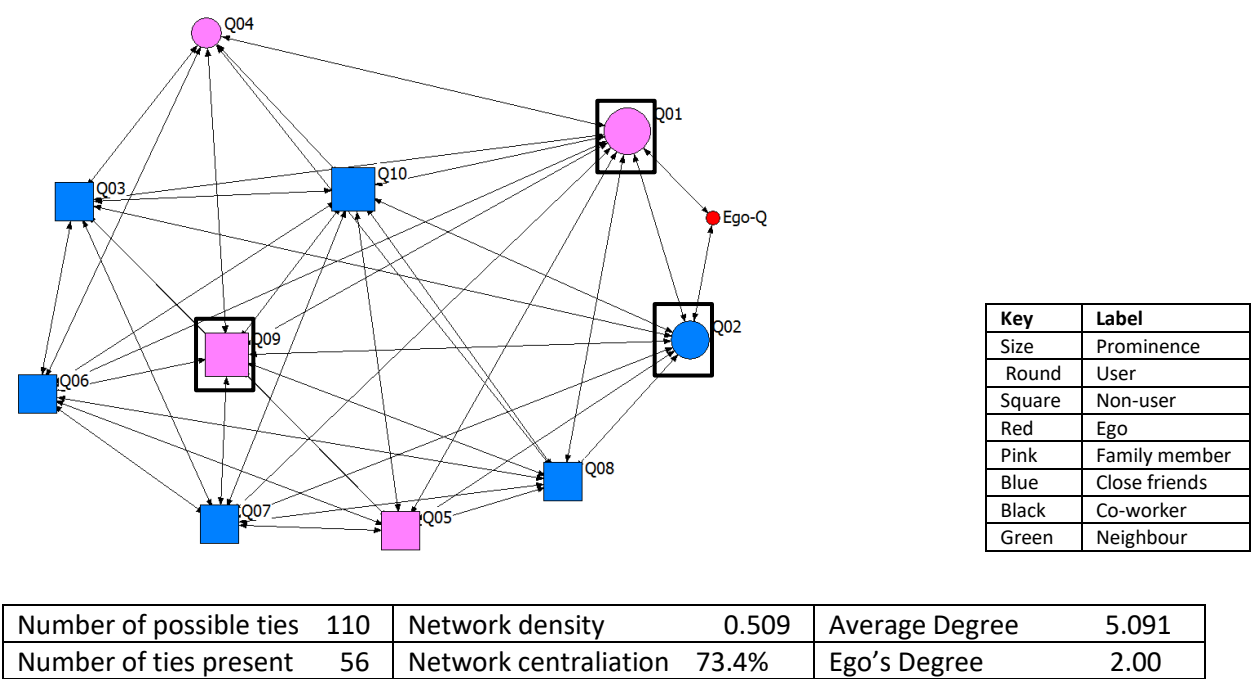


Figure 24: SNA-Q sociogram showing a peripheral, non-prominent ego and a non-user with high betweeness

The network in Figure 25 is perfectly dense with no prominent actor and no centralization. Many of the members do not use CBDIC and more than half are ego's neighbours.

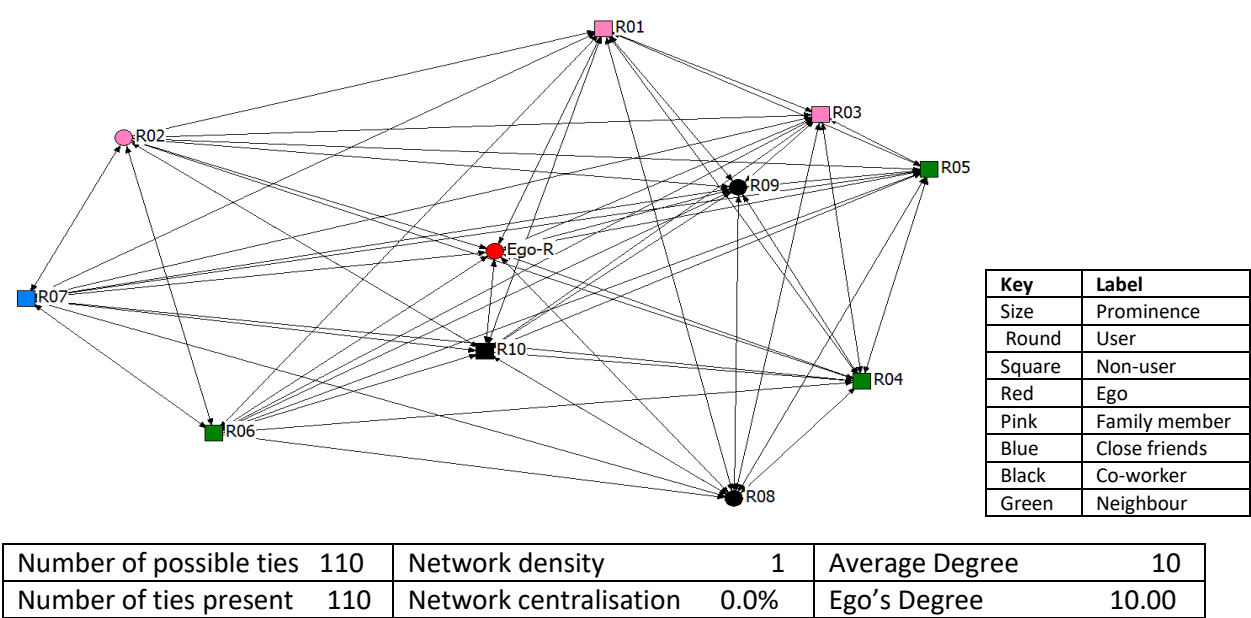


Figure 25: SNA-R sociogram showing a perfectly dense network with equally prominent actors

Figure 26 shows a network with high density and a prominent ego. All members use CBDIC and they are largely ego's family members, close friends and neighbours.

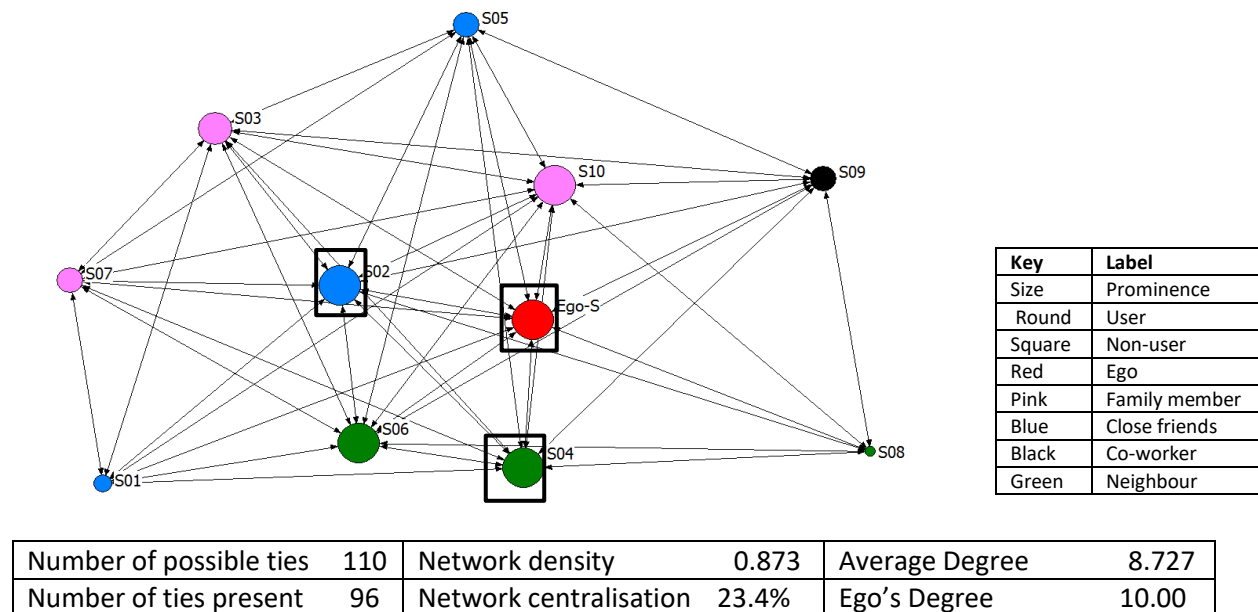


Figure 26: SNA-S sociogram showing actors with high betweenness

In Figure 27, the network is dense with a prominent ego, a few peripheral alters and some centralization around few prominent actors. All but one of the network members use CBDIC.

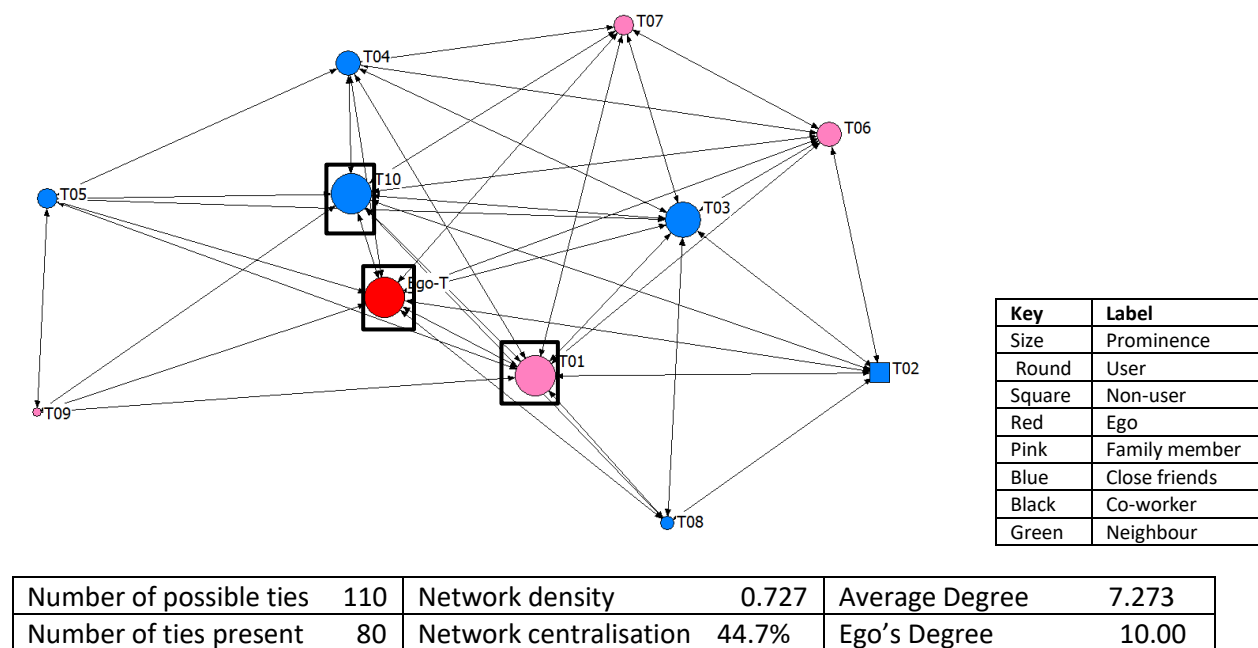


Figure 27: SNA-T sociogram showing actors with high betweenness and non-prominent peripheral alters

Scale up of community-based injectable contraceptives in Gombe State, Nigeria

by Oluwaseun Oladapo Akinyemi

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