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Sociodemographic influence on pregnancy among adolescent girls in Nigeria

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Abstract

Sociodemographic Influence on Pregnancy Among Adolescent Girls in Nigeria

by

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MPH, Walden University, 2014

AA, Montgomery College, 2006

BS, Bowie State University, 1996

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Adolescent pregnancy is a phenomenon that affects the entire world. The effect can be apparent at the individual, family, and societal levels. In 2013, the rate of adolescent pregnancy in Nigeria was 149 per 1,000 aged 10 to 19 years. In this cross-sectional quantitative study, the association between adolescent pregnancies, type of place of residence, household head age, and household head gender was examined for Nigerian adolescent girls aged 15 to 19 years who participated in the 2013 Nigeria Demographic and Health Survey. The framework for this study was the Socioecological Model (SEM). Three research questions were analyzed using univariate, bivariate, and binary logistic regression. A logistic regression model was used to test for associations. The results indicated that type of place of residence and household head age predicted adolescent pregnancy, although household head gender did not (*OR* 1.032; 95% CI [0.997, 1.069]). Living in a rural community is associated with an increase in the odds (1.174) of getting pregnant as an adolescent, 95% *CI* [1.140, 1.209], in Nigeria. Household head age reliably predicted adolescent pregnancy in Nigeria, *OR* (0.90) with 95% CI [0.890, 0.910], $p < 0.05$ (0.001). The covariates controlled for this research were ethnicity, income, religion, and educational level. Findings from this study should promote positive social change by helping policy makers to better understand why adolescent pregnancy persists in Nigeria and thereby create laws that help public health practitioners design SEM-based sex education for primary and secondary school girls in Nigeria.

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Dedication

This study is dedicated to my late father, Ugbome Okolie Mbulu, whose wisdom and dedication to herbal medicine and public service still guides me to date. To my mother, Ngbolie Agwaife-Mbulu, for her early investment in my educational journey. This educational journey is also dedicated to my uncles Elder Nkwor Christian Agwaife and Chief Emmanuel Mbulu.

This education milestone wouldn't have started or got completed without the unwavering support and independence of my family. I am highly grateful to my wife, Dr (Prof.) Patience Jegbefu Agbi-Mbulu, and to my two wonderful children, Ifeoma Christine and Chukwuemeke Christopher.

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Section 1: Foundation of the Study and Literature Review

Introduction

Adolescent pregnancy is the topic of interest for this study. Adolescent pregnancy is a public health problem that has attracted the attention of many concerned institutions around the world due to the health and social impact on individuals, families, neighborhoods, and societies (Alabi & Oni, 2017; Akpor & Thupayagale-Tsheneagael, 2019; United Nations, 2019). The 2013 data reported by Nigeria Demographic and Health Survey (NDHS) showed that about 23% of girls aged 15 to 19 years have started having children, 17% already have their first child, and 5% were pregnant at the time of the survey.

In addition, the survey reported that 32% of adolescents in rural areas of Nigeria have started having children compared to 10% in the urban areas of the country (NDHS, 2013). Nigeria also has regional disparities in adolescent pregnancy. For example, the Northwestern part of the country experiences 36% of the phenomenon compared to 32% in the Northwest region (NDHS, 2013). The difference between Northern and Southern Nigeria relative to adolescent pregnancy is that early marriage is higher in the North compared to the South. For example, Adedokun, Adeyemi, and Dauda (2016) reported that 48% of girls in the North are married by 15 years, and 78% are married by the time they are 18 years old. On the other hand, child-marriage in the South has declined considerably; even non-existence in some regions (Adedokun, Adeyemi, & Dauda, 2016).

. The above information shows that adolescent pregnancy disparity between urban and rural adolescent Nigerians exists due to proximal and distal variables such as area of residence (location) or type of place of residence.

The disparity still exists despite government and organizational efforts to manage the situation; meaning there is a need for more targeted studies (Akpor & Thupayagale-Tsheneagael, 2019). Results from the current study could lead to better understanding of how specific individual and household factors support or decrease the problem of adolescent pregnancy in Nigeria. It could also lead to improved targeted prevention programs with the capacity to empower, as well as improve knowledge and skills needed to decrease the incidence of adolescent pregnancy in Nigeria. This research did not locate any recent literature that specifically or directly reported on how a type of place of residence, age, and gender of household heads and in combination influenced adolescent pregnancy in Nigeria. Therefore, with this research I tried to fill this gap.

The potential for positive social change because of this study is the empowerment of household heads, communities, and adolescent girls. Results from this study should help policymakers, practitioners, and related institutions to plan, implement and evaluate tailored social-ecological level-based intervention programs to decrease adolescent pregnancies. Such intervention programs should aim directly at empowering all socio-ecological levels where adolescents grow and mature. For instance, household heads (interpersonal level) in Nigeria are currently empowered to force child marriage due to pregnancy (Envuladu et al, 2014).

In the following sections of this chapter I discuss the study background, problem statement, the purpose of the study, research questions and hypotheses, theoretical framework, nature of study, literature review strategy, and literature review related to key variables and concepts. Also, I discuss definitions, assumptions, scope and delimitations, and study significance and provide a summary and conclusion.

Background of Study

Pregnancy-related deaths among adolescents aged 15 to 19 years as of 2017 were twice as high compared to those aged 20 years and above; resulting to about 70,000 deaths each year among this group in developing countries, including Nigeria (Alabi & Oni, 2017). In addition, Young adolescent mothers and their babies are at higher risk for contracting HIV (World Health Organization [WHO], 2018). Abortion, both legal and illegal, has shown to be very common among adolescent girls in Nigeria (Alabi & Oni, 2017). Furthermore, recent research by Birhanu et al. (2019) found that adolescent pregnancy in Nigeria was responsible for the high number of stillbirths and nother associated physical, emotional, and psychological complications.

WHO (2018) reported that in 2013 alone, complications from pregnancy and childbirth were the second leading cause of death for 15 to19-year-old adolescents, following suicide. Also, Sámano et al. (2017) found that deaths from pregnancy among the adolescent group continue to surpass those from motor vehicle accidents. Researchers such as Mombo-Ngoma et al. (2016) noted that adolescents aged 15 to 19 share 16% to 50% of the global low birth weight, preterm birth, stillbirths, and neonatal death. In addition, Sámano et al. (2017) warned that pregnant adolescents aged 15 to 19 years are

at higher risk than other groups for obstetric complications such as fistula, anemia, eclampsia, postpartum hemorrhage, and puerperal endometritis.

Many factors have been identified that increase risk of pregnancy among adolescent girls. Early-life exposure to economic hardship coupled with lack of educational opportunities increases an adolescent's vulnerability to early sexual debut (Indongo, 2020). World Health Organization [WHO] (2018) reported that early sexual debut is about 15 years of age among adolescent girls in Nigeria. The group further report that early sexual debut when combined with early girl marriage (also common in Nigeria) are highly associated with adolescent fertility (World Bank Group, 2016). However, many adolescents worldwide become sexually active before age 15 years, resulting in about 79.6% of them experiencing pregnancy during their adolescent stage (Birhanu et al., 2019). More importantly, researchers noted that adolescents living in rural settings are more than two times at risk for pregnancy compared to those living in urban settings (Kassa et al., 2018).

Furthermore, the risk of pregnancy among the ever-married adolescents in 2018 was twenty-fold more when compared to the never-married group (Kassa et al., 2018). Child marriage and pregnancy have been linked to parents' or household heads' characteristics. For instance, while a father's lack of education increases the risk by 1.65times, a mother's lack of education increases adolescent pregnancy risk 2 times (Kassa et al., 2018). Also, parents and their daughters having poor education background increases the barrier to communication about sex at home, a situation that increases the risk of adolescent pregnancy by three folds (Kassa et al., 2018).

For Nigeria's situation, high population growth has been added to the list of factors contributing to the persistent phenomenon. 2018 survey data shows that 19% of adolescent women aged 15–19 have begun childbearing, 14% have given birth, and 4% were pregnant with their first child at the time the survey (National Population Commission [NPC] & Inner-City Fund [ICF], 2019). Statistics show that these adolescents are more likely to have a large family size (5.9 for rural adolescents versus 4.2 for urban adolescents) by the end of their fertility period, fueling the persistency of the problem (NPC & ICF, 2019).

This study yielded valuable information that should help stakeholders to be aware that household factors influence adolescent sexual behavior that ultimately lead to pregnancy. Such data can be used by program managers to design programs tailored for proximal factors such as household heads, especially younger and older household heads who may be too naïve to recognize an at-risk adolescent. Additionally, study results could motivate policymakers to pass laws at the distal level aimed to motivate intrapersonal and interpersonal level institutions such as local leaders, churches, and schools to create anti-adolescent-pregnancy initiatives and programs.

Problem Statement

Adolescent pregnancy in Nigeria has been considered a health problem since the early 1960s (Fagbamigbe et al., 2019). The decline in pregnancy among adolescents in Nigeria has not kept pace with the rest of the world despite prior research and interventions by government and private entities, particularly when compared to other African countries like Ghana, Ethiopia, Senegal, and South Sahara Africa (World Bank

Group, 2016). Nigeria still bears about a 14% burden of the world's maternal mortality, of which 30% of this burden falls on girls aged 15 to 19 years (World Bank Group, 2016).

Hounton et al. (2015) observed that adolescent pregnancy and the associated health issues are likely to continue to persist in Nigeria until enough research is done to explore proximal and distal factors surrounding Nigerian adolescent women. Proximal factors relative to child development and adolescent pregnancy refer to factors closest to the developing child (Kilanowski, 2017). Furthermore, factors in this category are said to have the strongest influence on the child, hence, they form the strongest interaction and relationship with the child (Kilanowski, 2017). These factors, according to Okoye (2016), include age, gender, level of education, and socioeconomic status of the child and parents. The distal factors, which also include household characteristics, ethnicity, and societal rules, account for environmental factors outside the immediate environment that influence a child's development (Okoye, 2016). Okoye (2016) described distal environment as what occurs in other ecological settings such as where the parents and policy makers perform their daily functions that barely interacts with the child (2016).

Although there are some specific factors within the proximal and distal environment that have been shown to influence adolescent pregnancy in Nigeria, much is still needed to be learned about the contributions that other factors may play. Of particular interest was the contribution that location (urban versus rural), household head gender, and household head age play. The reason for this is that findings on the relationship between these variables and adolescent pregnancy are still limited and are

inconsistent (Ayele, et al, 2018; Awizeye, et al, 2020; Baruwal, et al, 2020; Hounton, et al., 2015; Izugbara, 2015; Kimweri, 2012; Olurinola, 2016).

The Izugbara (2015) study was famous for the unusual finding compared to results from other countries. Izugbara found 73% of cases of adolescent pregnancy among rural adolescents compared to about 27% cases among urban adolescents. But more recent studies found otherwise. A study by Ayele et al. (2018) found no relationship between location (urban versus rural) and adolescent pregnancy. Another recent study in Rwanda by Awizeye et al. (2020) showed that it may not be true that rural adolescents experience higher pregnancy rates compared to urban adolescents. They analyzed the 2015 Rwanda data and found that urban adolescents experienced a higher pregnancy rate (8%) versus rural adolescents (7%). These inconsistent findings show that the argument about location (urban versus rural) as predictors of adolescent pregnancy in Africa, particularly in Nigeria, is yet to be settled; especially as most recent data is absent in Nigeria compared to some other African countries.

Similarly, the relationship between household head characteristics and adolescent pregnancy is also limited and unclear. A study conducted in Rwanda found that adolescent pregnancy was higher among households headed by males (64% cases) compared to female-headed households (36% cases; Awizeye, et al., 2020). Contrarily, Baruwa1 et al. (2020) reported higher teenage pregnancy among households headed by females living in rural areas of Malawi. Similarly, Kinweri (2012) reported that gender of household head has no significant influence on the risk of adolescent pregnancy. Another study in Tanzanian equally found no significant association between household head

gender and adolescent pregnancy (Baruwal et al., 2020). However, Nigerian data on whether household head gender influences adolescent pregnancy is not only scanty at best, but again lagging compared to some other African countries. This is important because some studies blame the deterioration of Nigeria household and community traditional culture as the reasons for higher adolescent pregnancy in Nigeria, yet research shows that resources are more directed to the urban areas (Hounton, et al., 2015).

In addition to the above two variables, information on age of household head and adolescent pregnancy is also very limited. Some research in other countries (Habitu et al., 2018) have studied the relationship between age of household head and adolescent pregnancy and found no relationship in a multivariate analysis (Habitu et al., 2018). Also, only limited information about this variable is available in Nigeria (Izugbara, 2015). Hence, more research is needed to fill this gap in knowledge data.

Information on the relationship between location (urban versus rural), gender of household head, age of household head, and adolescent pregnancy is not only limited but unclear as well. Therefore, the purpose of this study was to use the 2013 NDHS to document the role of these variables on the adolescent pregnancy problem in Nigeria as guided by the social ecological model (SEM). Such information could provide important insight on why the adolescent pregnancy problem in Nigeria remains persistent despite considerable intervention. Where relationships were found in this research, I recommend that resources be distributed according to needs to have meaningful impact.

Purpose of the Study

In this study, I looked at quantitative data about adolescent pregnancy in Nigeria to understand the relationship between independent variables type of place of residence (rural and urban), age of household heads, the gender of household heads, and adolescent pregnancy, aged 15 to 19, while controlling for ethnicity, wealth index, religion, and educational level that have been found to also influence adolescent pregnancy. Such information may be relevant to the enactment of new policies and programs that target both modifiable and nonmodifiable factors to reduce adolescent pregnancy and impact in Nigerian settings. New public health policies have been found to stimulate targeted programs. According to Thomson et al. (2018), specific public health policies on both primary prevention (fiscal, regulation, and education) and secondary prevention (preventative treatment and screening) interventions have been found to be effective in improving health inequalities. For example, tax incentive policy could be enacted to help girls stay in school and help discourage household heads from promoting child marriage.

Kassa et. al., (2018) called for further research that could advance targeted interventions to reduce adolescent pregnancy in rural areas of Africa. However, knowledge of rural and urban differences at the individual, household, and community levels regarding the problem of persistent adolescent pregnancy was limited; hence, in this research I explored this difference to know why adolescent Nigerian girls continue to get pregnant, which could help with the design and implementation of better evidence-based programs in these areas of Nigeria.

Research Questions and Hypotheses

Three research questions and their corresponding hypotheses were investigated**:**

RQ1: Is there an association between area of residence in Nigeria (urban versus rural) and adolescent pregnancy when controlling for ethnicity, wealth index, religion, and educational level?

$H_0$1: There is no significant association between area of residence in Nigeria (urban versus rural) and adolescent pregnancy when controlling for ethnicity, wealth index, religion, and educational level.

H_a1: There is significant association between and area of residence in Nigeria (urban versus rural) and adolescent pregnancy when controlling for ethnicity, wealth index, religion, and educational level.

RQ2: Is there an association between household head's gender within the area of residence in Nigeria (urban versus rural) and adolescent pregnancy when controlling for ethnicity, wealth index, religion, and educational level?

$H_0$2: There is no significant association between household head's gender within the area of residence in Nigeria (urban versus rural) and adolescent pregnancy when controlling for ethnicity, wealth index, religion, and educational level.

H_a2: There is significant association between household head's gender within the area of residence in Nigeria (urban versus rural) and adolescent pregnancy and when controlling for ethnicity, wealth index religion, and educational level.

RQ3: Is there an association between household head's age within the area of residence in Nigeria (urban versus rural) and adolescent pregnancy when controlling for ethnicity, wealth index, religion, and educational level?

$H_0$3: There is no significant association between household head's gender within the area of residence in Nigeria (urban versus rural) and adolescent pregnancy when controlling for ethnicity, wealth index, religion, and educational level?

H_a3: There is significant association between household head's age within the area of residence in Nigeria (urban versus rural) and adolescent pregnancy when controlling for ethnicity, wealth index, religion, and educational level?

Theoretical Framework

The SEM of Bronfenbrenner (1979) guided this research. Bronfenbrenner first introduced SEM in 1970, and he credited his ability to coin this model to Lewin, from whom he learned. Other authors also credited Lewin as one of the first social scientists to recognize the relationship between environment and human behavior. Lewin argued that proximal and distal ecological factors influence a child's development, something Lewin recognized while researching to understand what he called the whole situation (Bronfenbrenner, 1979). Similarly, Bronfenbrenner's SEM central hypothesis is that interaction between a person and their environment, including physical, social, and political components, influences health outcomes (Kilanowski, 2017).

SEM and cross-sectional approach are related. They share the view of operating within the natural environment without the ability to manipulate it. A cross-sectional study is a study designed to study a single moment in time within the natural environment

without controlling it (Sullivan, 2018). Similarly, SEM explains that the individual and their setting (environment) influence each other in time because the type, degree, and length of influence on each other changes as the developing human matures (Bronfenbrenner, 1979).

Apart from the method used for data collection, data analysis, and interpretation was from the perspective of Lewin's formula assumes child development as a process that takes place in a dynamic environment with multiple layers that resemble the type of nested structures found in Russian dolls (p. 3). Lewin's relationship formula B = f (P & E) best expresses this relationship, in which behavior (B) is a function (f) with at least two factors (traits and personality) represented by P, and the influence from the environment or situation denoted as E (p. 3).

The three research questions presented in the previous section relate to SEM's nested structure in the following ways (Figure 1):

Figure 1

Social Ecological Model

Policy/Enabling Environment (national, state, local laws)

Organizational (organizations and social institutions

Community (relationships between organizations)

Interpersonal (families, friends, social networks)

Individual (knowledge, attitudes, behaviors)

Note. From the Centers for Disease Control and Prevention.

http://www.cdc.gov/violenceprevention/overview/social-ecologicalmodel.html

The main characteristic of RQ1 was in the area of residence (rural; urban), which refers to the type of community where the home of the adolescent is located. The community belongs to the third layer of the socioecological model. This layer (exosystem) refers to one or more settings that usually do not directly interact with the developing child but indirectly influence the child through the beliefs, behavior or actions of others that directly influence settings (Bronfenbrenner, 1979. p. 25).

The second and third research questions were characterized by household head age and gender. These characteristics, according to Bronfenbrenner (1979), belong to the interpersonal level (mesosystem) of SEM. This level is described as a place where two or more settings interact, of which the developing child has direct contact or interaction, including relationships within the home/family, school, neighborhood peers, social life, daycare, and work. This level, according to Bronfenbrenner (1979), is an extension of the microsystem (individual level).

Nature of Study

NDHS was analyzed to answer the three research questions. The survey contains data on the age of adolescent girls (individual-level data), gender and age of the household heads (family/interpersonal level data), and type of place of residence (community or societal level data). Also, the survey collected data on men and women aged 15 to 49 years. The survey was designed for participants to respond to questions such as: Are you currently pregnant? (yes/no); what is your age at first child? (NDHS, 2013).

The research was a secondary data analysis that used cross-sectional data from the 2013 NDHS. This design was the best choice for the research topic and questions (Setia, 2016). Polit and Beck (2017) added that survey research, mainly cross-sectional design, is appropriate for describing relationships in a phenomenon at a fixed point in time (p. 169–170). Although Creswell (2014) reported that survey research collects data using a questionnaire or structured interviews to generalize the result to the population from where the sample was picked (p. 13), research results may sometimes not be

generalizable due to certain limitations. The design is trendy among adolescent reproductive researchers despite its weaknesses. For example, Izugbara (2015) used a cross-sectional design to examine the relationship between sociodemographic risk factors for unintended pregnancy among unmarried adolescent Nigerian girls; and found that female-headed households were less likely to experience adolescent pregnancy. Current research could not use the other types of observational studies (case-control and cohort) because neither of them fit well with the type of research questions for this study. For instance, case-control studies phrase research questions based on outcome status, and cohort studies formulate research questions based on exposure status (Setia, 2016).

Statistical analyses examine if there was any relationship between study variables. The independent variables for this research were type of residence (rural versus urban), age of household heads, and the gender of household heads; the dependent variable was adolescent pregnancy of girls aged 15 to 19 years. The confounders that were controlled were ethnicity, income, religion, and educational level; if confounders are not controlled, the study results could be deemed invalid and meaningless (Salazar et al., 2015). These relationships were examined using univariate, bivariate, and binary logistic regression models. Univariate logistic regression describes and analyzes the frequency distribution of each variable. The bivariate analysis explained pregnancy outcome for adolescent girls who were exposed to rural living versus those exposed to urban living. Binary logistic regression was more suitable because of the outcome variable's binomial nature (Sullivan, 2018). Also, binary logistic regression determined the effect of each independent variable and their combined predictive effect on the outcome variable. The

procedure used for variable selection was the statistical modeling method called "enter" that assessed the association between independent variables and dependent variables, including the effect of the confounders (Sullivan, 2018).

Literature Search Strategy

For the current research I drew pertinent information from peer-reviewed articles published between 2015 and 2020. Some older seminal literature published before 2015 were included due to their scientific importance. The accessed databases and search engines for the literature search were books, reports, MEDLINE, CINHL, SAGE, ProQuest, Academic Search Complete, Scopus, and Web of science. Also, I accessed Walden dissertation database, and Google Scholar.

The search items and phrases were *determinants of, factors, reasons for adolescent pregnancy, adolescent pregnancy in Nigeria, adolescent pregnancy in Africa, teenage pregnancy, adolescent sex education, household heads, community leaders, parenting styles, types of parenting, ecology, ecological model, socio-ecological model, socio-cognitive theory, socio-learning theory, health belief model, socio-cultural factors, rural, urban, global rate of adolescent pregnancy, history of adolescent pregnancy, global rate of adolescent pregnancy, sociocultural factors, adolescent pregnancy, planned, unplanned, Nigeria Demographic and Health Surveys, unintended pregnancies, developed countries, under-developed countries, developing countries, sub- Saharan Africa, West Africa, Southern, Northern and Western Nigeria, early marriage, family, community, peers, distal, proximal, siblings, single parent, societal, adolescent,*

outcomes, Nigeria, African, Delta State, Lagos State, methods, methodology, global, and *world.*

Social Ecological Model

I used the SEM developed by Bronfenbrenner between 1973 and 1979 (Phase 1 of the theory) for this research. Edinete and Tudge (2013) classified the history of SEM development into three phases; this study identified with Phase 1. Rosa and Tudge (2013) described Phase 1 as when Bronfenbrenner worked on his idea on human development in relationship with the environment. He developed the idea to include what was called the person-process model (Phase 2), with attention paid to the passage of time in human development (Rosa & Tudge, 2013). Bronfenbrenner developed the bioecological model (Phase 3), where he showed how individual traits (proximal processes) could be influenced when in contact with "spatial" and "temporal" influencers (Rosa & Tudge, 2013).

The main propositions of Phase 1 include that changes in the social environment can produce changes in the developing individuals (McLeroy et al., 1988). According to McLeroy et al. (1988), the model also assumes that the developing individual inflicts changes on the surrounding systems or layers. According to Kilanowaski (2017), this reciprocal relationship is dependent on adequate support from family, peers, communities, and society (Rosa & Tudge, 2013). Hence, SEM is a model that encourages stakeholders to consider the whole system. Furthermore, the model assumes an interaction between, within, and across all levels of a health problem, including people's interactions with their physical and sociocultural environment (National Cancer Institute

[NCI], 2005). However, as previously noted, many prior SEM practitioners did not incorporate all aspects of its structure. In the current research I examined the entire SEM structure for clues relative to the research questions, particularly on the four systems (microsystem; mesosystem; exosystem; macrosystem) as named in Phase 1 (Bronfenbrenner, 1979).

Only very few researchers have applied SEM to situations and variables similar to the current research. Nevertheless, early researchers like Caldwell and Ware (1977), and Winett et al., (1989) gave clues on how SEM was viewed during their time as human ecology students and researchers. They observed that global societies had somehow relied on the institutional factors and social norms as they tried to solve adolescent pregnancy problems. However, Okoye (2016) argued that early researchers and practitioners focused on victim-blaming ideology, where the pregnant adolescent girls were blamed for their situation, hence, absolving the environment from any responsibility about the situation. Before Okoye's observation in 2016, McLeroy et al. (1988) simplified the five SEM constructs as intrapersonal, interpersonal, organizational, community, and larger societal levels (public policy) of social ecology. The simplification made it clearer how factors other than individual-level factors are related to the situation. In addiiton, the simplification helped focus the literature search strategy for recent articles that have used SEM to study adolescent pregnancy (Garney et al., 2020, Rizvl et. al., 2020, Raneri & Wiemann, 2007). NCI (2005) further simplified the constructs by inserting the macrosystem (societal level) and chronosystem (timed experience) into the exosystem (community level), inferring that they are parts of developing child's total community

(environment); The NCI (2005) approach has also helped in locating appropriate literature that has applied SEM to situations like the current research.

Rizvl et al. (2020) used Bronfenbrenner's SEM to identify factors at personal, microenvironment, and macroenvironment levels potentially associated with risky sexual behavior; aged 10 to 24 years old Cambodian young women; using a systematic literature review method called the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) to guide the study. The study found that risky sexual behavior was associated with multiple factors such as early sexual debut, and not living with parents or orphan, and peer pressure. The results of this review prompted the authors to recommend multilevel targeted intervention. Also, Garney, et al. (2020) as recently as 2017, used SEM to examine evidence-based adolescent pregnancy prevention programs for effectiveness and found that many of the programs are aimed at the individual and interpersonal levels. Besides, these authors evaluated these programs using the individual as the unit of analysis, regardless of the targeted SEM level. They found that the programs lacked a system-based approach. Surprisingly, none of the programs targeted environmental and policy-levels (Garney, et al., 2020). Furthermore, Raneri and Wiemann (2007) employed social-ecological theory to examine individual, dyad, family, peer/community, and social system factors that predict repeat teenage pregnancy within 24 months.

In addition to prior application as a reason to adopt this model, literature shows that SEM-based reproductive research has helped identify factors that influence adolescent pregnancy; that SEM-based interventions can be beneficial because of the

multilayer or systemic focus (Green, Richard, & Potvin, 1996; McLeroy, et al.,1988; Stokols, 1996). The use of SEM offered me the opportunity to observe the combined effect of the independent variables on dependent variable. Such observation could be useful in designing intervention programs. Also, SEM use for this research added to the literature volume used in the 2013 NDHS dataset and cross-sectional design to study adolescent pregnancy in Nigeria, aged 15 to 19 years. Therefore, the choice to focus this research within scope using SEM was essential.

SEM was used in a way that helped focus the research within its scope. As a result, this study did not include any other factor other than those identified in the research questions and hypothesis. For example, this research did not address the continuity, change, and quality of the relationship between pregnant adolescents and their household characteristics and other parts of their environment. Furthermore, the relationship between SEM and current research questions was observed through the constructs as shown in figure 1.

The first circle (level) is the intrapersonal (microsystem). This level is closest to the developing adolescent child amongst the other systems that surround the adolescent child. According to Kilanowski (2017), this system contains the strongest influences as well as the interactions and relationships of the immediate surroundings. The adolescent girl's biological traits, including age and gender (as a female), found in the three research questions, are located on this level.

The second level is the mesosystem (interpersonal/family level) that surrounds the developing adolescent child. It encompasses those variables that the individual has

immediate contact with (Kilanowski, 2017). Factors such as family, which are the characteristics of research questions 2 and 3, are found on this SEM level. The third circle is called the exosystem (organizational/community level). This level does not directly exert pressure on the individual but indirectly through the individual's community, family, and other social networks (Kilanowski, 2017). For this research, the type of residence found in question one belongs to this SEM level.

The community environment (macrosystem) is the fourth cycle. This system is an extension of mexo and exosytems. It is a more extensive system compared to the three systems above. It comprises the public policy system with political boundaries, hence, controls who receive resources, including dissemination of information, such as training on the prevention of adolescent Pregnancy (Okoye, 2016). Bronfenbrenner (1979) stated that the macrosystem, in most cases, controls how the context (for example, family) of the lower systems functions. For this reason, children across the globe are not much different in terms of their daily experiences. The interventional research examples below align with the notion that macrosystem-based studies should compare events of different levels of their social networks and patterns of changes (Bronfenbrenner, 1979). The layer contains the cultural values, customs, and laws (Berk, 2000). According to Berk (2000), if a community has a belief or culture that parents are solely responsible for raising their children without any type of support from the society, then such cultural environment will not provide any type of help for parents in need; such lack of support could influence the way parents (mesosystem context) function towards raising their children within the child's microsystem context.

The fifth and the last circle is the chronosystem, which encompasses the internal elements such as how the child manages or react to influences with age or maturity (Berk, 2000). This level also involves the external environment, such as how the child relates and manages the time of parent (s) death with the environment (Berk, 2000). This level relates to this research in that age 15 to 19 years is an inclusion criterion. This age group was selected because they are biologically more matured than their younger counterpart.

Therefore, the four primary SEM levels analyzed are the microsystem, mesosystem, exosystem, and macrosystem. But the analytical discussion involved five SEM levels. Table 1 shows a summary of the relationship between SEM and research questions.

Table 1

Summary of the Relationship Between the Social Ecological Model and Research

Questions

SEM levels	Other Names	Research variables
Microsystems	Intrapersonal	The pregnant adolescent (individual) at the center of the circle.
Mesosystem	Interpersonal	Family (Age and gender of household head, wealth index, religion, and educational level)
Exosystem	community	Area of Residence/Neighborhood (Rural; Urban)
Macrosystem	Policy; Society	Ethnicity
Chronosystem	Time; historical content	Maturity as in closer to adulthood (15 to 19 years only included)

Literature Review Related to Key Variables and Concepts

Literature showed numerous factors that influence adolescent pregnancy around the globe, including African countries like Nigeria: educational attainment, poverty, employment status, residence, peer pressure, unwanted sexual advances from adult males, coercive sexual relations, unequal gender power relations, poverty, religion, early marriage, lack of parental counseling and guidance, parental neglect, absence of affordable or free education, lack of comprehensive sexuality education, non-use of contraceptives, male's responsibility to buy condoms, early sexual debut and inappropriate forms of recreation, excessive use of alcohol, substance abuse, educational

status, low self-esteem, inability to resist sexual temptation, curiosity, cell phone usage, cost of contraceptives, inadequate and unskilled health workers, long waiting time and lack of privacy at clinics, lack of comprehensive sexuality education, misconceptions about contraceptives, and non-friendly adolescent reproductive services (Mobolaji, Fatusi, & Adedini, 2020). The variables were categorized into one or more of the SEM levels. Prior researchers encouraged that each of the ecological levels should continually be investigated to track how individual or combination of factors influence adolescent pregnancy (Chung, et al., 2018). The following paragraphs discussed prior studies relative to key variables and constructs of interest as displayed in table 1. Also, gaps in literature were appropriately discussed.

Microsystem (Individual) Level of Influence

The individual-level of influence of the SEM is regarded as the environment that encompasses the individual's characteristics at the center of the adolescent pregnancy. The individual factors for this research and in this level are adolescent age, adolescent gender (girl), and adolescent pregnancy. Age is a biological or trait variable within the context of SEM. A woman's age at the time of pregnancy or live birth determines her status as a pregnant adolescent or childhood mother (Indongo, 2020), which is why "age at first birth" used by NDHS to collect pregnancy data was accessed to reach pregnant adolescents aged 15–19 years.

Some research has reported age as a determinant of adolescent pregnancy. For example, Alabi and Oni (2017) used a descriptive method to identify fundamental factors that influence adolescent pregnancy and how they affect Nigeria as a society. They

reported that Nigerian girls are more sexually active as they get older; hence, adolescents aged 15 to 19 are at higher risk for pregnancy but with fewer complications than younger adolescents aged 13 to 15 years. On the other hand, adults aged 20 and above have fewer complications relative to pregnancy.

A cross-sectional hospital-based study undertaken by Udoh and Udonwa (2019), found that first pregnancy occurred among the respondents between 13 and 15 years of age. Like Alabi and Oni (2017), Udoh and Udonwa (2019) found pregnancy to be more common among adolescents aged 15 to 19. Udoh, et al. (2019) also reported that participants that got pregnant earlier than aged 15 experienced menarches by or before aged 13 years. Both studies recommended that sex education targeting SEM microsystem (individual level) be implemented in school, particularly for 13-year-old girls, with additional attention to modifiable risk factors (Udoh, et al., 2019).

In a qualitative study that targeted Mexico City metropolitan population, Martínez-Rojano, et al. (2017) interviewed and analyzed data from families living with girls with a focus on the personal context with the families. The study found 15.4 years as the average age of pregnant adolescents in their study, and the average age of their partner or spouse was aged 20 years; 4.6 average age disparities between the adolescents and their partners. The study recommended that understanding how communication works between parents and children is necessary to avoid adolescent pregnancy. Parents must give ultimate affection while limiting autocratic leadership to help the developing child stay motivated at the family level (Martínez-Rojano, et al., 2017).

In an Ethiopian study, Habitu, Yalew, and Bisetegn, (2018) employed a community-based cross-sectional study to investigate factors associated with adolescent pregnancy and found age, after adjusting for covariates, to be significantly associated with adolescent Pregnancy (AOR=2.10; 95% CI:1.55-2.88). The study recommended a stronger push for contraceptive use and increased awareness of the negative impact of divorce as it relates to adolescent pregnancy in the communities.

The covariates on this level are adolescent's religion, wealth index, educational level, and ethnicity. For instance, participants' educational level was controlled because evidence shows that exposure to adolescent pregnancy situations decreased with increased educational attainment (Habitu, et. al., 2018).

Mesosystem (Family) Level Influence

The household head is a family (interpersonal) level variable. Hence, the age of a household head and gender belong to this SEM level. Household heads (biological; non-biological) are generally part of the family environment for a developing child, a system that usually provides a structure for the daily function of the child (Alabi & Oni, 2017). This is a significant independent variable that this research assessed.

According to Alabi and Oni (2017), the home environment usually provides needed guidance and support to help adolescent children make better decisions about sexual activities. They recommended that adequate parental guidance is needed if incidents of adolescent pregnancy is to reduce in Nigeria. However, only very few studies have linked household head age or gender to Adolescent Pregnancy in Nigeria, and these studies are five years or older. For example, Izugbara (2015) used the 2008 NDHS to

investigate sociodemographic risk factors for unintended pregnancy among unmarried

adolescent Nigerian girls. According to him, households headed by older men or women

have less experience in adolescent pregnancy than households headed by younger men

and women (OR = 0.56, 95% CI = 0.3920–0.8073).

Also, Shakya, et al. (2020) used a cross-sectional approach to explore the

association between gender belief, social networks, and adolescent pregnancy at the

community level in Honduras; the sample was drawn from the reproductive health data of

Honduras that contains individual reproductive health and social network records. In this

research, the researchers found that girls who were less likely to get pregnant identified

their father as their main social contact compared to those that identified the mother as

their primary social contact (Shakya, et al., 2020). The authors recommend that

stakeholders stay alert to this context to ensure that any proximal level intervention is free

from any stigmatization element. The authors also reported that adolescent pregnancy

risk decreased if the child and social contact are closer in age (Shakya, et a., 2020). This

notion of age closeness appears to contradict Izugbara (2015) report that households

headed by younger men and women are more likely to experience adolescent pregnancy.

The covariates on this level are parents' religion, parents' education status, and

parents' income. Covariates are variables that are significantly associated with outcome

variables (Sullivan, 2018). Smith, Strohschein, and Crosnoe (2018), in a U.S.-Canada

study, used longitudinal data from the U.S. NLSY79 Young Adult Survey (n = 3,122)

and the Canadian NLSCY (n = 2,517). These surveys are regarded in both countries as

what connects child developmental history to teenage pregnancy. The researchers

hypothesized that a cross-national comparison could identify family-based pathways that connect the youth to the broader national contexts. They found that family-level risk for adolescent pregnancy was as of 2018 more common in the United States than in Canada due to poverty frequency at home (Smith, et al., 2018).

Also, parents' religion is an interpersonal Level of Influence. Alabi and Oni (2017) study suggested good moral values through religious bodies to reduce Nigeria's teenage pregnancy. Izugbara (2015) reported a significant higher risk of adolescent pregnancy (56.63%) with (OR=32) among adolescent Muslims in Nigeria.

At the same token, Habitu, Yalew, and Bisetegn, (2018) reported that parental religion was one of the core risk factors associated with adolescent pregnancy. Religion organization that are in close contact with household heads (Okoye, 2016). Akpor and Thupayagale-Tshweneagae (2019) reported that other studies, including their study, found illiteracy among parents as having a significant association with pregnancy outcome among Nigeria adolescents residing in Kwara and Edo states in Nigeria.

Exosystem (Community/Societal) Level of Influence

The type of place of residence belongs to this SEM level. NDHS defined residence type as the environment where the household is located, such as urban or rural settings (2013). This level mainly contains community-level factors such as social network and norms, or standards that exist as formal and informal among individuals, groups, and organizations within the community; supposedly, the child knows nothing about these community factors that indirectly influence her decisions (Bronfenbrenner, 1979). Okoye (2016) added that the community or societal level contains elements of

public policy factors trickled down from the local, state, and federal agencies that regulate healthy actions and practices for disease prevention.

Izugbara (2015) in his study (previously mentioned), found that the odds of adolescent pregnancy among unmarried adolescent girls in rural areas were 26-times more likely compared to their urban counterparts. Similarly, Alabi and Oni (2017) compared unmarried Nigerian adolescents living in rural areas with those living in urban areas and found that those living in rural areas are 26 times (odds) more likely to get pregnant before aged 20 years their urban counterpart. Azugbara (2015) computed the odds ratio with 95% confidence intervals to establish the association between residence and adolescent pregnancy, using a descriptive method to identify basic factors that influence adolescent Pregnancy in Nigeria.

Furthermore, a qualitative-exploratory study was carried out by Akpor and Thupayagale-Tshweneagae (2019) in Nigeria. The authors employed a template and content data analysis approach and found a lack of preventive initiative in the observed communities. The study also shows community's attitude towards adolescent pregnancy was skewed towards the fact that the community does not generally welcome adolescent Pregnancy, leading the authors to recommend that future individual and community level interventions be geared towards helping adolescents' build-up their social capital.

Macrosystem (Societal) Level of Influence

Adolescent pregnancy is seen as abnormal in some Nigeria societies, resulting to harsh stigmatism that includes being sent away from childhood home to live with other relatives or friends (Akpor & Thupayagale-Tshweneagae, 2019); an action that exposed

the pregnant adolescent to another type of parental situation in an unfamiliar environment that could lead to additional pregnancy related complications (Akpor & Thupayagale-Tshweneagae, 2019).

On the other hand, adolescent pregnancy is celebrated in other societies within same Nigeria (Akpor & Thupayagale-Tshweneagae, 2019). Alabi and Oni, 2017) found a similar situation in their study. This disparity, according to research, was due to Nigeria's national policy against abortion, low support for contraceptive use, and high support for child marriage; a child may be sent away from their primary home if she refused to marry the baby's father (Yaya, Amouzou, Uthman, Ekhluenetale, Bishwajit, Udenigwe, Hudani, & Shah, 2018). Such consequences could be because of laws created by politicians and other stakeholders at the macrosystem levels that ultimately influence how lower systems react to adolescent pregnancy incidence (Bronfenbrenner, 1979).

The covariate associated with this level as well as with this research is ethnicity and religion. A national cross-section study by Mobolaji, Fatusi, and Adedini (2020) investigated the influence of ethnicity and religion on child marriage as it leads to adolescent Pregnancy in Nigeria. The authors employed statistical methods of cox proportional hazard regression models to adjust for residence, education, and wealth quintile. They found Child marriage to be higher among Northern ethnic groups (Muslims) (54.8%) with an adjusted hazard ratio (AHR) of 2.50; 95% C.I. = 1.59–3.95) compared to (5.9%) for Southern minority ethnic group (Christians) with AHR of 2.10; 95% C.I. = 1.54–2.86. The authors recommended that current and future interventions

should be made to be culturally sensitive and tailored to the variation in ethnic and religious social norms and belief systems (Mobolaji, et. al., 2020).

Definitions

Adolescent age (target population): Adolescent age, according to WHO (2018), is the age between 10 and 19 years. For this research, adolescent age is aged 15 to 19 years.

Adolescent pregnancy (dependent variable): The term refers to women who have not reached legal adulthood to become pregnant. Adolescent pregnancy, according to Kassa et al. (2018), is the occurrence of pregnancy in girls aged 10 to 19 years. For this research, adolescent pregnancy is when it occurs between aged 15 and 19 years. Pregnant adolescent among this group includes those who have had births (alive, or not), pregnant with their first child or have begun childbearing at the time of the survey, married, not-married (NPC & ICF, 2014). This variable was coded: Not pregnant = 0; pregnant = 1 (NPC & ICF, 2014),

Age: Age (adolescent age; household head age) was measured in years (NPC & ICF, 2014), All age in DHS is coded in five-year group, hence, the selected group for this research was coded 1 for the group 15 – 19 years old (NPC & ICF, 2014). The term in everyday speech usually refers to women who have not reached legal adulthood to become pregnant (Shakya, et al. 2020). In this research, age was treated as a categorical variable (Powers & Xie, 1999, p. 2).

Adolescent: Adolescent period for this research is the age between 15 and 19 (or before the twentieth birthday) (Shakya, et al., 2020).

Adolescent pregnancy: Adolescent pregnancy, according to Kassa et al. (2018), is the occurrence of pregnancy in a girl between the age of 10 and 19. However, this research only included Nigerian girls aged 15 to 19. Pregnant adolescent among this group includes those who have had live birth before age 19, or pregnant with their first child at the time of the survey (NPC & ICF, 2014).

Independent variables: Independent variables for this research were type of place of residence, gender of household heads, and age of household head. Polit and Beck (2017, p. 49) defined independent variables as the variables that influence the dependent variable.

Dependent variable: The dependent variable according to Polit and Beck (2017, p. 49) is the outcome that researchers want to understand, explain, or predict. Adolescent pregnancy was the dependent variable for this research.

Household head age: Household head age for this research refers to the age of father, mother, boyfriend, husband, baby's father, or partner; coded in five-year group (NPC & CF, 2014).

Household head gender: Household head gender refers to whether the household head is a man or woman; coded as 1 = man; 2 = woman (NPC& ICF, 2014),

Type of place of residence: Type of place of residence is either rural or urban where the household resides (NPC & ICF, 2014).

Covariate: Covariates are variables that could also influence study outcomes in addition to the effect of the variables under study (Polit & Beck, 2017). The covariates controlled for this research were ethnicity, income, religion, and educational level.

Assumption

NDHS is a cross-sectional survey that captures national data on many health-related issues in Nigeria, including adolescent Pregnancy (NPC & ICF, 2014). Some assumptions were acknowledged in the context of such a data collection environment because violation has effect on research conclusion, including interpretation of results, ability to draw an inference, and trust for the results (Kleinbaum, Kupper, & Nizam, 2014. p. 43). This study assumed (believed) that survey responders voluntarily participated and gave their consent; appropriate level of gift or incentive were given to encourage or motivate participation without coercion; data collectors were fluent in the native language in addition to English; survey questionnaire was tested, and retested (verified), and found to be reliable and valid; residence of both rural and urban geographic locations participated.

A study conducted by Berde and Yalcin (2016) used cross-sectional data from 2013 NDHS to explore if early initiation of breastfeeding (within an hour of birth) reduced infant morbidity and mortality. Besides, they wanted to know if the use of nationally representative survey data helped identify individual, household, and community-level factors associated with health issues, therefore helping the country update or improve previous knowledge regarding specific health conditions in Nigeria (Berde & Yalcin, 2016). The 2013 NDHS provided the authors the cross-sectional data needed for this study. They employed chi-square tests and binary logistic regression to test for association between their independent and dependent variables operating at the individual, household, and community-level factors (Berde & Yalcin, 2016). The study

found that some mothers initiate breastfeeding within one hour of birth (34.7 %; 95 %

Confidence Interval of 33.9–35.6).

As outlined above, although unverifiable, Demographic Health Survey (DHS)

information is believed to be true for the sake of validity and reliability of current

research. Also, del Burgo and Amaral (2016) reported that DHS health questionnaires

have improved over the years by adding specific socioeconomic variables. My

confidence to rely on this survey improved after learning more about its value to the

world.

Scope/Delimitation

The current research addressed household heads' role in adolescent pregnancy,

using DHS Nigeria national data. However, results may not be generalized to all settings

within Nigeria. I selected to focus on household heads because some researchers have

attributed the prevalence of adolescent pregnancy to the incidence of abandonment of

babies, starved babies, sick babies, homeless adolescents in some areas of Nigeria (Alabi

& Oni, 2017). Such areas, when identified, will be targeted with the recommendations

from this research. The household heads in such areas should be held more accountable

after providing the necessary training and information. This study was limited to

adolescents aged 15 to 19 years who responded to the survey. I included this group and

excluded the 10 to 14 adolescent age group. The research found that girls are more

sexually active as they mature towards adulthood per the chronological aspect SEM;

hence, adolescent pregnancy and the rate of associated consequences are common among

the 15 to 19 years of Nigeria's age group (Alabi & Oni, 2017).

Limitation

This study was limited to using the 2013 NDHS for a cross-sectional analysis of the secondary dataset; focused only on selected sociodemographic variables and adolescent age group 15 to 19 years. Therefore, unselected variables were not measured in this research. A recent NDHS may also be available by the time this dissertation is published, thus the need for continued re-examination of the relationship between selected variables.

The use of cross-sectional design limited this research to show only an association between the independent and dependent variables, without the ability to demonstrate cause and effect because in this design it is difficult to be certain which variable is actually the predictor (Polit & Beck, 2017). Also, the approach provides no opportunity for researchers to manipulate the environment or independent variables (Polit & Beck, 2017). Furthermore, the independent variables may not have accurately measure the dependent variable's exact nature (Xiao, et al., 2020). SEM also has its weaknesses, which according to Glanz, Rimer and Wiswanath (2015) are lack of specificity about which level of influence is most crucial, lack of information or clarity on how the levels of influence operate, and lack of information or clarity on how the constructs interact across levels. Also, this study was limited to using phase 1 version of SEM with focus on the three main levels of influence connected to the only three variables under study. Furthermore, very few studies have used SEM's multifaceted nature to study the factors that promotes persistent adolescent pregnancy in Nigeria in such a way that elements of level four and five imbedded in level three are carefully examined (Araújo, et al., 2011).

Additionally, survey data can be prone to human and instrumentation errors due to potential self-reporting and survey administrators' biases (Inner-City Fund [ICF], 2012). Such type of bias could affect the study outcome. For example, participants may not have correctly remembered pregnancy dates, especially those that have been exposed to repeat pregnancies. As a result of such potential bias, DHS has specific staff dedicated solely to the functions of survey instrument testing and pretesting. They made sure that errors are cut early in the field and fixed immediately (NPC & ICF, 2014).

Furthermore, psychometric properties for NDHS have not been statistically assessed. This was a huge weakness for such instrument that collects large amount of country level data. Psychometric properties, according to Asunta, et al. (2019), refers to the validity and reliability of the measurement tool – statistically. Asunta, et al. (2019) alluded to psychometric assessment as being more commonly done with scale instruments compared to other measures. Current study used the non-scaled aspects of NDHS. However, ICF-International mitigated this limitation by standardizing all DHS country surveys but allows each country to make country specific modification (NPC & ICF, 2014), hence, able to promote usability and feasibility as well as enhance consistency (Asunta, et al., 2019). In addition to standardization, NDHS is implemented about every five years with in-built plan to compare current outcome to the previous outcomes, which allows the survey to act like a standard test with data obtained at about the same time period (Asunta, et al., 2019). Therefore, data collected with NDHS was the best that can be recommended for this dissertation despite all the enumerated flaws.

Besides, NDHS is a large survey with a large sample size, which according to Xiao, et al. (2020), allows researchers to explore the relationship between various variables that would be otherwise difficult. However, current study was limited to the sample size of adolescents aged 15 to 19 years who responded to the survey.

Significant of Study

This study explored the relationship between the type of place of residence, age, and gender of household heads and adolescent pregnancy. The current research was born due to prior researchers' calls for continued research on the quest to identify factors that facilitate adolescent pregnancy towards finding appropriate solution to adolescent pregnancy. According to Mohr et al. (2019) and Odimegwu and Mkwananzi (2016), adolescent pregnancy is still a global public health priority that needs urgent and proper solutions. Furthermore, these authors reported that pregnancy, particularly in adolescents, is known to result in child marriage, clandestine abortion, school dropout, persistent poverty, unemployment, sexually transmitted diseases, depression, isolation, ridicule, shame, suicide, diminished opportunities, homelessness, and deaths of mothers and infants. The outcomes mentioned above affect the individual girl and her family, communities, and societies.

Therefore, the use of the socio-ecological model for this research was appropriate. Study results should help close the inconsistency and inconclusive gaps found in literature about the role selected sociodemographic factors play in promoting or diminishing adolescent pregnancy. Furthermore, this research could increase knowledge and understanding of how the environment and human behavior affect each other. From a

positive social change perspective, such an increase in knowledge and awareness should help plan and executive a good sex education program across all SEM systems and levels, and promote adolescent growth across SEM system and levels, which promotes countrywide development.

Summary and Conclusion

There are significant themes in the literature as to why adolescent pregnancy is persistent in Nigeria. Prior researchers found lack of sex education, poverty, child marriage, illiteracy, geographical area, lack of relationship with parents, societal norms, and family history of adolescent pregnancy contribute to a high adolescent pregnancy rate. A common theme in the literature about the negative consequences of adolescent pregnancy are forced marriage, school dropout, maternal and infant mortality, stillbirth, abortion, unplanned pregnancy, generational illiteracy, poverty, single motherhood, unemployment, repeat pregnancy, exposure to STDs, and over-reliance of social welfare. Adolescents in Nigeria, aged 15 to 19, are at increased risk for adolescent pregnancy due to childhood marriage, street hawking, low lifestyle, student hustlers, western lifestyle, and breakdown of traditional norms. It remains unclear whether the type of residence, age, and gender of household heads contribute to the high level of adolescent pregnancy in Nigeria.

This research examined the effect of sociodemographic variables, especially age and gender of household heads and residence type on adolescent pregnancy, using Bronfenbrenner's socio-ecological model. As an original contribution, this study determined the contribution of residence type (rural and urban) and household

characteristics to why adolescent pregnancy remained persistent in Nigeria. The

significant relationship found between place of residence (rural and urban), household

heads (sex; age), and teenage pregnancy is an additional original contribution from this

study. It provides policymakers and practitioners the information needed to undertake

additional intervention effort like sex education at the individual, family, and community

level for the most affected or vulnerable group. Such intervention could power

interventions at each SEM levels as early as possible to prevent adolescent pregnancy.

The following section 2, I discussed research design and rationale, methodology,

instrumentation and operationalization of constructs, and ethical procedures.

Section 2: Research Design and Data Collection

Introduction

In this research I examined the relationship between household head gender, household head age, type of place of residence, and adolescent pregnancy among girls in Nigeria aged 15 to 19. In this section I explaine the research design and why the design was appropriate for this study. I also describe the research methodology, including population, sampling and sampling procedures, instrumentation, operationalization, data analysis plan, the threat to validity, and ethical procedures.

Research Design and Rationale

For this study, I performed a secondary data analysis using data that was collected with a cross sectional survey design. A cross-sectional design is characterized by the collection of specified data at a specified point in time (Kesmodel, 2017). The point-in-time for this research was the 2013 NDHS administration period that has been described previously.

In this study, data from a group of adolescents surveyed as part of the NDHS was used to identify factors that may have influenced adolescent pregnancy among survey participants. The dependent variable for this research was adolescent pregnancy, and the independent variables were type of place of residence, household head gender, and household head age. In addition, confounders controlled in this research were ethnicity, income, religion, and educational level, which are known to influence adolescent pregnancy in Nigeria (Yaya, et al., 2018). Control of these confounders was part of in-built strategy for protection against associated bias (see Price, et al., 2019).

Cross-sectional design was attractive for the current research for its strength with secondary survey data analysis. The design is powerful in making comparison between groups or variables (Polit & Beck, 2017). In this regard, the research questions for this study were created to examine and describe a relationship (correlation) between two variables. In addition, the secondary dataset (2013 NDHS) was already in numerical (quantitative) form that aligned with the design (see Sullivan, 2017; Wang & Cheng, 2020). Literature showed that cross-sectional design studies have been recognized as an easier and cheaper to conduct, which saves time and other valuable resources (Lau & Kuziemsky, 2017). It would have been nearly impossible to conduct this research without additional finance, time, and other resources for data collection and analysis if not for the alignment between cross-sectional and secondary data analysis. The use of secondary data eliminated these barriers and allowed me to access high quality data collected and assembled by reputable organization (Sautter, 2014). However, the cross-sectional approach has some constraints.

The use of this design limited this research to the time period during which data was collected, hence, the research does not recommend that results be applied to time beyond when data was collected (Sullivan, 2017). This research recognized that participants had already been exposed to the risk factors; consequently, the health outcome had already occurred (see Sullivan, 2017); otherwise, the use of cross-sectional design wouldn't have been feasible. Furthermore, I recognized that the use of the cross-sectional approach further restricted the ability to establish a cause and effect relationship

between the variables at the particular time or period selected for the research (Kesmodel,

2017).

Methodology

Population

As of 2006, Nigeria remained the most populous country in Africa, seventh in the

world at the time (World Bank, 2019). The World Bank (2019) recently recorded

Nigerian population at 195.9 million in 2018. The data for the current study was gathered

from Nigerian men and women aged 15 to 49 years old who participated in the 2013

NDHS (NCS & ICF, 2014. The population of women versus men at the time was 51%

and 49% respectively, of which adolescent girls aged 10 to 19 years made up 22.8% of

the women. The total population of girls aged 15 to 19 was 10.4% as of 2017.

Sampling and Sampling Procedure

NDHS in general adopted the multistage cluster sampling technique. Salazar et al.

(2015) stated that multistage cluster sampling uses pre-existing units (clusters) in place of

the sampling frame when the right sampling frame does not exist. According to Crosby et

al. (2015), this technique helped researchers from reverting to the nonprobability

sampling process. Crosby et al. (2015) observed that the first stage of the process is to

randomly select a sample of clusters from the list of all available clusters, and the second

phase is the random selection of a sample from the selected clusters.

NDHS, at the first stage, randomly selected at least one enumerated area (EA)

from each cluster, but because clusters increase bias, they selected two EAs from larger

clusters, an approach that improves the reliability of research findings by minimizing

sampling bias and increasing sampling precision or design effect (Crosby et al., (2015; NPC & ICF, 2014). This first phase of sampling yielded 904 EAs (372 rural; 532 urban).

In the second stage, the interviewers visited all 904 EAs to ensure each household existed, including household members' listing and official identification of household heads. Also, they ensured that each EA contained at least 80 households per cluster. Again, to reduce sampling bias, neighborhoods from selected localities were joined to make up the 80 households when a cluster was short. The resultant list of households served as the sampling frame.

In stage three, the households that participated in the survey were randomly picked from the sampling frame, resulting in selecting forty-five households from every urban and rural cluster, yielding a sample size of 1,585. Included in this research were Nigeria girls (pregnant, not pregnant, married, not married) aged 15–19 years who resided in the household or visited overnight and slept in that house. Excluded are all girls below 15 years of age. Access to the NDHS dataset is public; it required no further ethical clearance to use the data. However, the requirement was to email the ICF International Maryland location to request access. They granted me permission on June 11, 2018 (see appendix A). The G*Power software version 3.1 calculated the logistic regression sample size in a z-test and priori environment with input parameters of two-tailed t test, alpha level of 0.05 (95 confidence level), 80% power, odd ratio H1 and H0 are 0.55 and 0.45 respectively (0.10 or 10% effect size), R^2 set to 0, and binomial distribution. A 0.10 effect size was chosen due to the large sample size of the NDHS survey and the reduced ability to detect large differences when the sample is large (Polit

& Beck, 2017). This calculation yielded (output parameters) a minimum sample size of 786 (see Appendix B) required to achieve the actual power of 0.8002454 with odd ratio (*OR*) of 1.493, and critical z of 1.9599640.

Instrumentation

The implementation of the NDHS was carried out by the NPC while ICF) International provided technical support and funds through the USAID MEASURE DHS program. The program assists countries like Nigeria collect valid and reliable health data. The ICF United States head office is in Rockville, Maryland. The first NDHS was carried out in 1990 and has been done every 5 years (NPC & ICF, 2014). Nigeria is one of the world's countries that lacks reliable registration systems (NPC & ICF, 2014). Hence, NDHS is critical to Nigeria. For example, NDHS comprises valid questionnaires for Nigerian women aged 15–49, making it a useful data source for cross-sectional research (del Burgo & Amaral, 2016). The NDHS dataset contains information regarding household heads and residence type relative to adolescent pregnancy for Nigerian girls aged 15 to 19, making it appropriate for this study.

Although the NDHS survey has been used in multiple rounds of data collection, the reliability and validity of the survey have not been statistically established. However, because NDHS is a standard survey conducted roughly every 5 years, comparison between years can be made (NPC & ICF, 2014). Furthermore, NPC and ICF (2014) established that all aspects of the NDHS data collection procedure were pretested and repeat pretested before all fieldwork. In addition, NPC and ICF (2014) explained that the survey's train-the-trainers program underwent the same pretest and repeat pretest scrutiny

because it was considered data collection and processing approach. In addition, del Burgo and Amaral (2016) noted that the standardization of the NDHS entire process makes NDHS replicable or usable under similar circumstances, including data collection, training of interviewers, transcribing, and recording of data to a useable form.

Del Burgo and Amaral, (2016) observed that many researchers have come to depend on the DHS dataset for different research designs. DHS data are used in health analysis and other disciplines like economics, sociology, marketing, and trade. For example, Amugsi et al. (2020) used Ghana Demographic and Health Survey (GDHS) and the United Nation International Children's Emergency Fund (UNICEF) framework to examine the relationship between childcare practice with infants and young children's growth (height, age, and z-score, or HAZ). They found that childcare practice was a significant predictor of HAZ after controlling for covariates at the child, maternal, and household levels. On the other hand, the reliability assessment (a replication analysis) using Kenya Demographic and Health Survey reported findings with odd ratio and confidential interval (Matanda et al, 2014).

Matanda, et al. (2014) did not discuss statistically establishing reliability and validity in using GDHS. This is despite their use of variables obtained via GDHS scales. For example, Matanda, et al. (2014) use anthropometry (weight and height) data obtained using electronic Seca scales. In addition, Matanda, et al. (2014) reported using GDHS height data measured using children's measuring board, and height data measured using standing height instrument. Yet, no psychometric data information was given. However, Matanda, et al. (2014) somewhat reported this absence of psychometric values as an issue

by stating that his research did not aim to understand instrumental reliability to gain greater understanding of their study situation. But, encouraged future researchers to undertake such study now that their own study has established significant association between study variables.

Operationalization

Rudestam and Newton (2015) observed that a construct can be transformed to take on the name variable by scoring it to assume different numerical values. Also, the operationalization of variables clarifies how they are measured (Rudestam & Newton, 2015). NDHS assessed the dependent variable (adolescent pregnancy) by asking participants of their current and past pregnancy events. The questions asked were, "Are you pregnant now; have you ever had a pregnancy that miscarried, was aborted, or ended in stillbirth; age at first birth" (NPC & ICF, 2014). Three response choices (yes = 1, no = 2, and unsure = 3) were given for the formal question, and two response choices (yes = 1; no = 2) were given for the latter two questions. In responding to the last question, participants wrote their age at first birth or pregnancy. Age at first birth, as stated earlier, was accessed to reach the research sample.

The three independent variables for this research were operationalized as follows:

- Type of place of residence. This variable was assessed as part of the respondent's identification. The two choices provided was urban or rural (NDHS, 2013). The variable is therefore dichotomous grouped as urban = 1; rural = 2 (NDHS, 2013).

- Household head gender. The survey further collected information on
  household head gender by asking if the person named as the household head
  was a male or female (NDHS, 2013). Hence, this variable was dichotomized
  as male =1; female = 2.

- Household head age. The survey collected data on this variable by prompting
  responders to enter in the box provided the age of the household head (NDHS,
  2013). But first, the responder was asked to specifically provide "name of
  household head" (NDHS, 2013). This variable was grouped and ordered as
  15-19, 20 -24; 25-29; 30–34; 35-39; 40-44; 45 – 49 (NDHS, 2013).

- Ethnicity. This variable served as a covariate for this research. Data was
  collected by asking respondents to respond, "what is your ethnic group"
  (NDHS, 2013).

- Religion. Data on religion was collected by asking this question, "what is your
  religion?" (NDHS, 2013). This variable served as a covariate for this research.

- Educational level. This information was collected with two questions. The
  first asked, "Have you ever attended school?" with two responses, 1 – yes, and
  2 = no. The second question asked, "what is the highest level of school you
  attended?" with three responses, 1 = primary, 2 = secondary, and 3 = higher
  (NDHS, 2013). This variable served as a covariate for this research.

- Income. Income in DHS surveys is a composite measure of a household's
  cumulative living standard; calculated using collected data on a household's
  ownership of selected assets, such as televisions and bicycles; materials used

for housing construction; and types of water access and sanitation facilities

(NDHS, 2013). Income was categorized as Poorest, poorer, middle, richer,

and richest, and it served as a covariate for this research.

The table 1 below shows the operational definitions of the dependent and

independent variables.

Table 2

Operational Definition of Dependent and Independent Variables

Variable names	Types of variables	Level of measurement	Categorization and operational definition
Household head age	Independent	Ratio/Interval	All respondent provided the age of their household head; NDHS grouped age as 15-19, 20 -24; 25-29; 30–34; 35-39; 40-44; 45 – 49
Household head gender	Independent	Nominal	Male; Female
Type of place of residence	Independent	Nominal	Rural; Urban
Age at first birth/child	Dependent	Nominal	Age was provided (12-49 years old)
Education	Covariate	Ordinal	Primary, secondary, higher
Income	Covariate	Ordinal	Poorest, poorer, middle, richer, and richest
Religion	Covariate	Nominal	Orthodox, Catholic, Protestant, Muslim, Traditional, and others
Ethnicity	Covariate	Nominal	Housa, Ibo (Igbo). Yoruba, Others

Data Analysis Plan

Statistical analysis for the current study was done using the software package for

social science version 25 (SPSS-25). Fortunately, the NDHS dataset was ready and

compatible with SPSS; the data set did not require further cleaning. NPC and ICF (2014)

cleaned the NDHS data by recoding the variables into a standardized file for cross-

country analysis. The recoded file, according to NPC and ICF (2014), was placed in a

rectangular file. However, SPSS users should always check for duplicate variables names

since SPSS only allows eight characters for variable names, and will chop the last

characters, thereby making variables with similar characters appear to be duplicated

(source of error).

Initial assessment of data was done using frequency distribution of the

independent variables with descriptive univariate analyses. Also, bivariate analysis

(crosstabulation/ contingency table) was used to examine the relationships between

independent variables and adolescent pregnancy outcome; chi-square test, $p < 0.05$, was

used to test whether the categorical variables are different (independence) or similar

(related). The chi-square test checked if the difference between rural and urban

pregnancy outcomes was due to chance. This difference is essential because only the

independent variables found to have a statistically significant association with adolescent

pregnancy in the bivariate analysis was included in the binary logistic regression models.

However, current research addressed the issue of missing values common in large

surveys as follows.

Missing value is an information the respondent could not provide due to one reason or the other. For example, a responder might have refused to answer a survey question because of interviewer or question error (Demographic Health Survey [DHS], 2013). Besides, Newton and Rudestam (1999, p. 19) stated that it is better for every case in the dataset to have a numeric code, else, sample size could be reduced, which then affect the statistical power. The missing data in the 2013 NDHS dataset was coded "9" (DHS, 2013), an approach compatible with SPSS (Diane, et al., 2010).

The following analysis was carried out for each research question:

RQ1: Is there an association between area of residence in Nigeria (urban versus rural) and adolescent pregnancy while controlling for ethnicity, income, religion, and educational level?

A binary logistic regression model was used to assess if relationship exists between a categorical independent variable (type of place of residence) and dependent variable adolescent pregnancy age 15-19 years (accessed via Age at first birth). The model reported an odds ratio (OR) and 95% confidence interval, while controlling for ethnicity, income, religion, and educational level?

RQ2: Is there an association between household head's gender within the area of residence in Nigeria (urban versus rural) and adolescent pregnancy in Nigeria while controlling for ethnicity, income, religion, and educational level?

A binary logistic regression model was used to assess if relationship exists between a categorical independent variable (household head gender) and dependent variable adolescent pregnancy age 15-19 years (accessed via Age at first birth). The

model reported an odds ratio (OR) and 95% confidence interval, while controlling for ethnicity, wealth index, religion, and educational level?

RQ3: Is there an association between household head's age within the area of residence in Nigeria (urban versus rural) and adolescent pregnancy in Nigeria while controlling for ethnicity, income, religion, and educational level?

Binary logistic regression analyzed this relationship; odds ratio (OR) and a 95% confidence interval was used to interpret the results, however, OR for variable age (continuous) was interpreted as follows: supposing the OR for age as the predictor is 1.15. This was interpreted as though adolescent pregnancy increased by 15% with everything else in the model held constant (Polit & Beck, 2017. p. 417).

The rationale for including the above potential confounders was that they have been known to influence adolescent pregnancy in Nigeria (Indongo, 2020). Also, their effects have been statistically measured by prior researchers (Indongo, 2018; Izugbara, 2015). Hence, they were added to the binary logistic regressions model for the current research. Logistic regression was used to control these confounders because it allowed me to add or remove both the independent variables and confounders from or into the models without having to differentiate the variables (Polit & Beck, 2017), while at the same time able to monitor the effectiveness of all the variables as an individual and as a group. Furthermore, Salazar et al., (2015) reported that adding confounders to the regression model constrains them from influencing the relationship between selected independent variable and the outcome variables; in essence, I was able to see from the SPSS output table exactly how each variable influenced the targeted outcome variable.

Islam (2017) noted that holding the covariates constant during analysis helps determine independent variables' actual effect on the dependent variables.

Statistical Assumptions

This research avoided violation of any assumptions attached to the regression models. Every parametric analysis has some assumption regarding the data's characteristics (Stoltzfus, 2011). This research assumed that the selected variables are not required to be on the interval or ratio scale since the binary outcome has no affinity to measurement level (Stoltzfus, 2011). This research also assumed that the dependent and independent variables do not have to be in a linear relationship as tested via bivariate analysis. Thirdly, the error terms (residuals) do not need to be evenly spread (normal distribution) as seen from the univariate analysis results. Fourthly, random disturbances (noise) do not have to be the same between independent and dependent variables (Stoltzfus, 2011). However, some assumptions were managed by SPSS and G-power. For example, the linearity of independent variables with log-odds, multicollinearity (correlation) among the independent variables, and the assurance of large sample size as calculated by G-power. These assumptions are briefly defined below:

Multicollinearity: Multicollinearity was checked with correlation via bivariate analysis in SPSS, where the overlapping variability between the independent variables would have been detected (Newton & Rudestam, 1999, p. 264). There was no problem of overlapping, else, adjustment would have been made by analyzing each variable separately. This situation is defined as when the independent variables highly correlate (overlapping variability) with each other (Newton & Rudestam, 1999, p. 264). Not taking

steps to assess and adjust to such research situation makes interpreting the relationship

between independent and dependent variables difficult.

Linearity of independent variables with log-odds: Logistic regression requires the

independent variables to be linearly related to the log odds; does not require linearity

between independent and dependent variables (Stoltzfus, 2011). This assumption is not

an issue for categorical variables. However, the current research has age, which is a

continuous independent variable that assumes this type of linearity (Stoltzfus, 2011).

Normality: Normality was demonstrated with a graphical representation of each

variable. The univariate graphs showed that positively or negatively skewed variables.

According to Newton and Rudestam (1999, p 105), normality was not a concern for the

current study since the sample size is large enough to represent the population from

where the sample is drawn. In addition to the graphical technique, numerical techniques

based on the mean, median, and mode of each variable's distribution would have been

employed to test for normality on age. The mean, mode, and median values are usually

not the same as should be for normal distribution (Newton & Rudestam, 1999, p. 105);

again, this was not an issue for this research whether normality or not was achieved.

The rationale to include the confounders in the logistic model is because literature

has identified them to influence adolescent pregnancy (Indongo, 2020). Also, their effects

have been statistically measured by prior researchers. Polit and Beck (2017, p. 417)

observed that regression modeling is an excellent way to handle confounders because it

allows for adding or removing both the independent variables and confounders from or

into the models without having to differentiate the variables. Adding confounders to the

regression model, according to Salazar et al., (2015), constrains them from affecting the outcome variables. Polit and Beck (2017) observed that the independent variables' effect is truly observed after the covariates' effect is removed or controlled (p. 414–419). Islam (2017) noted that holding the covariates constant during analysis helps determine independent variables' actual effect on the dependent variables (Islam, 2017).

Threats to Validity

Factors that negatively affect validity may have compromised the rigor of this study. Research rigor can be undermined by internal threats such as faulty testing instruments or material and interference of unknown factors (confounders) (Salazar et al., 2015). On the other hand, external validity refers to the extent to which the results of the study can be extended beyond the sample used in the study (Crosby, 2013, p. 133). Frankfort-Nachmias (2015, p.17) observed that validity measures must clearly state what they intend to measure; threats to validity include a situation where the respondent provides socially desirable response to a survey question, or method error such as when question is unclear or poorly written (p.17).

Also, validity could have been compromised by faulty sampling and unnoticed interfering factors (Walliman, 2011). Examples of validity threats, according to Williams (2011) include bias from self-reported answers; surveys being administered in artificial settings; ways in which options are categorized or can constrain answers; and bias or errors in question formulation, data entry, and analysis. Furthermore, manner of operationalization (table 1) and the recoding of variables was also a concern. Under ideal conditions, a research study should have high internal and external validity.

Ethical Considerations

Human Subjects

In human subject protection in a research environment, the DHS ensures that anonymity and privacy are protected. A coding system is employed to track participants. DHS staff and researchers have no access to the code file (NPC & ICF, 2014). Interviewers are trained to read DHS consent statements before any interview can begin, including the "special" consent attached to the household and individual questionnaires (ICF, 2012). DHS's consent statements informed participants of the purpose and the involuntary nature of the survey, including the opportunity to withdraw at any time, or refuse to answer any question (ICF, 2012).

Ethical Issues

DHS interviewers are trained to explain to participants how the data collected will be used, stored, and protected (ICF, 2012). Besides, participants are informed that individual names will not be used for any purpose; all information will be grouped to produce a report (ICF, 2012). Moreover, DHS interviewers are not allowed to mention other participants' names or show a completed survey to a participant (ICF, 2010). DHS collaborated with the Nigerian Federal Ministry of Health ethics committee and the NPC of Nigeria (NPC & IFC, 2014). I obtained permission to use the 2013 NDHS dataset from the ICF Data Activist at 530 Gaither Road, Suite 500, Rockville, Maryland, 20850. The Institutional Review Board at Walden University reviewed and approved that this research can proceed (approval number 05-28-21-0325893).

Summary and Conclusions

In conclusion, this was quantitative descriptive cross-sectional research. The research explored if relationship existed between type of place of residence, household head gender, household head age, and adolescent pregnancy among Nigerian girls aged 15–19, using SEM as the framework. I analyzed data with descriptive and inferential statistical tools. The initial data analysis involved univariate and bivariate analysis. Therefore, only the independent variables that was found to have an association with dependent variable was be further analyzed with binary logistic regression to assess the strength of the association. The following section three of this research introduced data collection of a secondary data sets and study results.

Section 3: Presentation of the Results and Finding

Introduction

The purpose of this quantitative study using SEM was to explore if the persistent adolescent pregnancy issue in Nigeria was associated with type of place of residence (rural and urban), age of household heads, and gender of household heads amongst adolescent girls aged 15 to 19 years, while controlling for ethnicity, income, religion, and educational level, which have been found to also influence adolescent pregnancy. I investigated three research questions and their corresponding hypotheses to fulfill the research purpose:

RQ1: Is there an association of adolescent pregnancy and area of residence in Nigeria (urban versus rural) when controlling for ethnicity, income, religion, and educational level?

RQ2: Is there an association of adolescent pregnancy and household head's gender within the area of residence in Nigeria (urban versus rural) when controlling for ethnicity, income, religion, and educational level?

RQ3: Is there an association of adolescent pregnancy and household head's age within the area of residence in Nigeria (urban versus rural) when controlling for ethnicity, income, religion, and educational level?

The null hypothesis associated with the research questions was that there was no association between type of place of residence, household head age, household head gender, and adolescent pregnancy for girls aged 15 to 19 years in Nigeria. The alternative hypothesis, however, was that there was association between type of place of residence,

household head age, household head gender, and adolescent pregnancy in Nigeria, aged

15 to 19 years. In this section, I present access to the secondary dataset for secondary

analysis, results of the analysis, and summary of the answers to the research questions.

Also, this section contains a summary paragraph that includes transitional material to

Section 4.

Data Collection and Secondary Data Set

The NDHS data collection activities were conducted for a period of 5 months

(February 15, 2013, to June, 2013; NPC & ICF, 2014). The collection process required

that interviewers use instruments as provided. For example, each interviewer was

supplied with complete listing of households after a mapping exercise was carried out for

each cluster. Also, NPC staff interviewers were trained to use Global Positioning System

receivers to calculate the coordinates of the sample clusters. The total number of

households sampled were 40,680, of which 16,740 were from urban areas and 23,940

from rural areas. Data on the age and gender of household members were used to identify

women and men who were eligible for individual interviews, resulting in a response rate

of 96.7%.

Discrepancies

Some discrepancy exists at baseline from the use of secondary dataset. There was

a discrepancy between proposed and actual sample size in most of the variables in the

data set. Based on this discrepancy, I had to comb through the entire dataset to locate a

variable that contained at least 786 cases of adolescent pregnancy as calculated by

G*power. This action resulted to having a larger sample size of 64,701 (see aged 15–19

years in Table 5) for each research question. Also, I used the terminology wealth index instead of income in my proposal. I also interchangeably used multiple and logistic regression in my proposal, which was corrected by using only binary logistic regression in the entire document.

Demographic and Characteristics of the Sample

Univariate analysis for this research involved community/societal level variables (type of place of residence with rural and urban as the attributes), individual (intrapersonal) level variables (adolescent girl aged 15–19 years), and interpersonal level variables (age and gender of household heads). A total sample of 119,386 (men and women aged 15–49 years) reported having first child at the time of survey, including 64,701 adolescents aged 15–19 years. The sample population of respondents in terms of household head gender (Table 3) were mainly men (86.2%), with only 13.2% female household heads. Most of the household heads (19.6%) were within aged 45-49 years (Table 4); a small fraction (0.1%) of the household heads were 15-19 years old. Table 2 to Table 5 display the demographic characteristics of the research variables.

Table 3

Type of Place of Residence

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Urban	38786	32.5	32.5	32.5
	Rural	80600	67.5	67.5	100.0
	Total	119386	100.0	100.0	

Table 4

Gender of Household Head

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Male	103662	86.8	86.8	86.8
	Female	15724	13.2	13.2	100.0
	Total	119386	100.0	100.0	

Table 5

Age of Household Head

		Frequency	Percent	Valid percent	Cumulative percent
Valid	15-19	116	.1	.2	.2
	20-24	1248	1.0	1.7	1.8
	25-29	4720	4.0	6.3	8.1
	30-34	9957	8.3	13.2	21.3
	35-39	16099	13.5	21.4	42.8
	40-44	19695	16.5	26.2	68.9
	45-49	23345	19.6	31.1	100.0
	Total	75180	63.0	100.0	
Missing	System	44206	37.0		
Total		119386	100.0		

Table 6

Age of Birth Recode

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Others	54685	45.8	45.8	45.8
	15-19	64701	54.2	54.2	100.0
	Total	119386	100.0	100.0	

Bivariate Analysis

I conducted a bivariate analysis to examine whether the participants'

socioecological variables were associated with adolescent pregnancy in Nigeria.

Crosstabulation table with chi-square tests were conducted on type of place of residence,

household head gender, and household head age. These variables are nominal, except

household head age, which I transformed from interval/ratio to ordinal variables.

Crosstabulation for type of place of residence showed that 72.4% were rural residence

versus 27.6% urban residence. As for the household head gender, crosstabulation showed

87.8% males and 12.2% females.

Of the three independent variables, all were found to have significant association

with adolescent pregnancy for girls aged 15–19 years at 5% significant level ($p < 0.05$):

Type of place of residence (Table 6) (Pearson $\chi2 = 1556.670$, $p = 0.001$); household head

gender (Table 7; Pearson $\chi2 = 118.444$, $p = 0.001$); household head age (Table 8; Pearson

$\chi2 = 260.000$, $p = 0.001$). Tables 6 to 8 represent the chi square tables of the research

variables.

Table 7

Pearson Chi-Square Test for Types of Place of Residence

	Value	df	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	1556.670[a]	1	.000		
Continuity correction[b]	1556.181	1	.000		
Likelihood ratio	1554.537	1	.000		
Fisher's exact test				.000	.000
Linear-by-linear Association	1556.657	1	.000		
N of valid cases	119386				

Table 8

Pearson Chi-Square Test for Household Head Gender

	Value	df	Asymptotic significance (2-sided)	Exact sig. (2-sided)	Exact sig. (1-sided)
Pearson chi-square	118.444[a]	1	.000		
Continuity correction[b]	118.258	1	.000		
Likelihood ratio	118.103	1	.000		
Fisher's exact test				.000	.000
Linear-by-linear association	118.443	1	.000		
N of valid cases	119386				

Table 9

Pearson Chi-Square Test for Household Head Age

	Value	df	Asymptotic significance (2-sided)
Pearson chi-square	260.000[a]	6	.000
Likelihood ratio	262.272	6	.000
Linear-by-linear association	211.673	1	.000
N of valid cases	75180		

Binary Logistics Regression Analysis

Binary logistic regression analyses were performed using SEM microsystem (individual/intrapersonal), mesosystem (interpersonal), exosystem (community), and macrosystem (society) factors as indicated in the research questions. Statistical analyses of each predictor variable in the research questions are presented in this section. Age at first birth was the variable accessed to reach research sample (pregnant adolescents aged 15–19 years of the 2013 NDHS). Binary logistic regression was selected to determine whether the independent variables in the three research questions explained the dichotomous/binary nature of the dependent variable (adolescent pregnancy aged 15–19 years), a microsystem/individual level factor within SEM. The independent variables within SEM levels for this research are type of place of residence (exosystem/community), household head gender (mesosystem/family), and household head age (mesosystem/family); essentially analyzing the influence of exosystem and mesosystem on microsystem within the adolescent pregnancy problems in Nigeria.

Results

Binary logistic regression analyses were conducted to test the association between the independent variables in the research question and the dependent variable, pregnancy among adolescent girls aged 15–19 years in Nigeria. The components of the analysis correspond to the research questions.

Research Question 1

RQ1: Is there an association between area of residence in Nigeria (urban versus rural) and adolescent pregnancy when controlling for ethnicity, income, religion, and educational level?

$H_0$1: There is no significant association between area of residence within Nigeria (Urban versus Rural) and adolescent pregnancy when controlling for ethnicity, income, religion, and educational level?

H_a1: There is significant association between and area of residence within Nigeria (Urban versus Rural) and adolescent pregnancy when controlling for ethnicity, income, religion, and educational level?

A binary logistic regression was performed with dependent variable Age at first child (aged 15–19 years) and type of place of residence as the independent variable. A total of 64,701 cases were analyzed. The full regression model shows that type of place of residence was a significant predictor of adolescent pregnancy aged 15–19 years in Nigeria in the NDHS of 2013. Table 9 shows OR = 1.174, 95% CI = 1.140, 1.209. Also, the table reported a coefficient (0.161), Wald statistics (113.164), and probability values (0.001) that shows type of place of residence as a statistically significant predictor of adolescent pregnancy in Nigeria as of 2013 among the target groups. Therefore, alternative hypothesis can be accepted; null hypothesis rejected.

Table 10

Logistic Regression Model for Community/Society Variables With Confounders

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1ª	Type of place of residence	.161	.015	113.164	1	.000	1.174	1.140	1.209
	Highest educational level	-.314	.008	1423.424	1	.000	.730	.719	.742
	Religion	.008	.004	4.867	1	.027	1.008	1.001	1.015
	Ethnicity	-.001	.000	103.243	1	.000	.999	.999	1.000
	Wealth index	-.062	.006	96.800	1	.000	.940	.928	.951
	Constant	.405	.038	111.403	1	.000	1.499		

Research Question 2

Binary logistic regression analyses were conducted to test the association between the independent variables in the research question and the dependent variable, pregnancy among adolescent girls aged 15–19 years in Nigeria. The components of the analysis correspond to the research questions.

RQ2: Is there an association between household head's gender within the area of residence in Nigeria (urban versus rural) and adolescent pregnancy when controlling for ethnicity, income, religion, and educational level?

H_a2: There is significant association between household head's gender within the area of residence in Nigeria (urban versus rural) and adolescent pregnancy and when controlling for ethnicity, income, religion, and educational level?

$H_0$2: There is no significant association between household head's gender within the area of residence in Nigeria (urban versus rural) and adolescent pregnancy when controlling for ethnicity, income, religion, and educational level?

A binary logistic regression was performed with Age at first child (aged 15–19 years) as the dependent variable and type of place of residence as the independent variable. A total of 64,701 cases were analyzed. The full regression model shows that household head gender was not a significant predictor of adolescent pregnancy aged 15–19 years in Nigeria in the NDHS of 2013. Table 10 shows OR (1.032, 95% CI = 0.997, 1.069). Also, the table reported a coefficient (0.032), Wald statistics (3.197), and probability values (0.074) that shows household head gender as not a statistically significant predictor of adolescent pregnancy in Nigeria as of 2013 among the target group. Therefore, alternative hypothesis was rejected; null hypothesis was accepted.

Table 11

Logistic Regression Model for Interpersonal/Household Variable With Confounders

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1ᵃ Sex of household head	.032	.018	3.197	1	.074	1.032	.997	1.069
Highest educational level	-.315	.008	1418.680	1	.000	.730	.718	.742
Religion	.008	.004	4.770	1	.029	1.008	1.001	1.015
Ethnicity	-.001	.000	104.989	1	.000	.999	.999	1.000
Wealth index	-.093	.006	272.995	1	.000	.911	.901	.921
Constant	.725	.027	724.776	1	.000	2.066		

Research Question 3

Binary logistic regression analyses were conducted to test the association between the independent variables in the research question and the dependent variable, pregnancy among adolescent girls aged 15–19 years in Nigeria. The components of the analysis correspond to the research questions.

RQ3: Is there an association between household heads age within the area of residence in Nigeria (urban versus rural) and adolescent pregnancy when controlling for ethnicity, income, religion, and educational level?

H_a3: There is significant association between Household heads age within the area of residence in Nigeria (urban versus rural) and adolescent pregnancy when controlling for ethnicity, income, religion, and educational level?

H_03: There is no significant association between Household heads gender within the area of residence in Nigeria (urban versus rural) and adolescent pregnancy when controlling for ethnicity, income, religion, and educational level?

A binary logistic regression was performed with age at first child (aged 15–19 years) as the dependent variable and age of head household head as the independent variable. A total of 10,456 cases were analyzed. The full regression model shows that household head age was a significant predictor of adolescent pregnancy aged 15–19 years in Nigeria in the NDHS of 2013. Table 11 shows OR (0.90), 95% CI (0.890, 0.910). Also, the table reported a coefficient (-0.105), Wald statistics (326.4960), and P-value (0.001) that shows household head gender as a statistically significant predictor of

adolescent pregnancy in Nigeria as of 2013 among the target group. Therefore,

alternative hypothesis can be accepted; null hypothesis can be rejected.

Table 12

Logistic Regression Model for Interpersonal/Household Variable With Confounders

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	Age of household head	-.105	.006	326.496	1	.000	.900	.890	.910
	Highest educational level	-.375	.011	1241.676	1	.000	.688	.673	.702
	Religion	.001	.004	.091	1	.763	1.001	.993	1.009
	Ethnicity	-.001	.000	74.284	1	.000	.999	.999	1.000
	Wealth index	-.136	.007	347.803	1	.000	.873	.861	.886
	Constant	1.619	.041	1574.004	1	.000	5.047		

Effect size estimate explains how strong the relationship between each

independent and dependent variable is, which in essence inform how wrong or right the

null hypothesis of no relationship is (Polit & Beck, 2017, p. 394). A 10% (0.10) effect

size was chosen in calculating the sample size via power analysis. Confidential interval

(CI) indicates the expected size of the effect (Lee, 2016, p. 556). With large sample size

used for this research, the range of the 95% CI is considerably narrow (Lee, 2016, p.

556). For example, binary logistic regression for RQ1 expressed 95% CI = 1.140 and

1.209, a 0.06 (6%) estimated size of the effect. While RQ2 shows not statistically

significant (95% CI 0.997 and 1.069) with the inclusion of 1 indicating no difference

(null hypothesis) (Sullivan, 2018, p); RQ3 expressed 95% CI 0.890 and 0.910, a 0.020

(2%) estimated size of effect, provided normal distribution, and no bias (Lee, 2016, p. 556).

Summary

I presented the results of the 2013 NDHS relative to adolescent pregnancy aged 15–19 years and variable from three SEM levels. Bivariate analysis was performed that established relationships between these variables. Binary logistic regression analysis was carried out that established the extent of these relationships. The next section of this study contains the findings of this research.

Section 4: Research Findings and Interpretation

Introduction

Adolescent pregnancy remains consistently high in Nigeria. Surprisingly, SEM-based sex education with focus on elementary and high schools is sparse. To improve this situation, I examined the association between pregnancy among Nigerian girls aged 15–19 years (intrapersonal/individual factor), type of place of residence (community/societal factors), and household head's sex and age (interpersonal/family factors). There is strong evidence that mothers' median age at first birth in Nigeria was less than 19 (Ayotunde et al., 2009). In addition, children of adolescent mothers in Nigeria are more likely to die before the age of 5 (Ayotunde, et al., 2009).

This quantitative study was purposefully designed using 2013 NDHS data to capture SEM level evidence. I used SPSS version 25 for univariate, bivariate, and binary logistic analysis of the 2013 NDHS dataset.

Interpretation of Findings

Type of Place of Residence

Type of place of residence was significantly associated with adolescent pregnancy in Nigeria aged 15–19 years. Table 9 shows that being from a rural residence was associated with an increase in the odds of getting pregnant as an adolescent by a factor of 1.174 (95% CI [1.140, 1.209]) in Nigeria. This finding agrees with Kassa et al. (2018). They found that women living in areas of Nigeria that are more rural were more likely to experience adolescent pregnancy when compared to girls of the same age living in areas of the country that are more urban. Similarly, Alabi and Oni (2017) compared unmarried

Nigerian adolescents living in rural areas with those living in urban areas and found that those living in rural areas are 26 times (odds) more likely to get pregnant before aged 20 years than their urban counterparts. Similarly, Izugbara (2015) study found 73% of cases of adolescent pregnancy among rural adolescents compared to about 27% cases among urban adolescents.

Household Head Sex/Gender

Table 10 shows that household head gender was not significantly associated with adolescent pregnancy in Nigeria aged 15–19 years, *OR*: 1.032 (95% CI [0.997, 1.069]). This finding aligns with Iwizeye et al., 2020) who found no association between household head gender and adolescent pregnancy (*OR*: 0.91, 95% CI:0.56-1,49). Furthermore, the finding is not consistent with Izugbara (2015). Izugbara used the 2008 NDHS to investigate sociodemographic risk factors for unintended pregnancy among unmarried adolescent Nigerian girls and found household gender to be statistically associated with adolescent pregnancy, especially if the household head is a young adult aged 30-44 years (*OR*: 82 with 95% CI (060-1.139).

Household Head Age

Table 11 shows *OR* (0.90), 95% CI (0.890, 0.910). Also, the table reports a coefficient (-0.105), Wald statistics (326.4960), and *p*-value (0.001) that shows household head age as a statistically significant predictor of adolescent pregnancy in Nigeria as of 2013 among the target group. Therefore, the alternative hypothesis can be accepted, and the null hypothesis can be rejected. Izugbara (2015) used the 2008 NDHS to investigate sociodemographic risk factors for unintended pregnancy among unmarried

adolescent Nigerian girls. According to Izugbara, households headed by older men or women have less experience in adolescent pregnancy than households headed by younger men and women ($OR = 0.56$, 95% CI $= 0.3920$–0.8073).

Social Ecological Model

I obtained evidence by applying the socioecological model in this study. The individual factors (being adolescent aged 15–19 years), household factor (household head age) and community factors (type of place of residence) were significantly associated with adolescent pregnancy in Nigeria. Also, evidence showed that household head gender was not significant. The main social-ecological proposition that attracted me to this research was that all levels of social environment (individual/intrapersonal; family/interpersonal; community/society) interact together to influence humans in developing health outcomes (Bronfenbrenner, 1979). Hence, the model indicates that prevention efforts (planning, implementation, and evaluation) should target all these levels of human development (Bronfenbrenner, 1979). Such a holistic approach could potentially drive occurrence of adolescent pregnancy in Nigeria to a new low across rural and urban residence.

<div align="center">

Limitation of the Study

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I assessed the dataset from 2013 NDHS to reach the sample population for the current study. This is a secondary dataset appropriately fitted for this quantitative cross-sectional study. A secondary dataset when used for a cross-sectional study carries certain limitations, uncertainty, and/or bias that can lead to mistaken estimates of a variable's effect. The dataset used for this research was not specifically collected for this study. As

a result, some research variables were recoded, an action that has the potential to generate

inefficient and biased estimates (Fernandes et al., 2019).

Another limitation was that the dependent variable (adolescent pregnancy) was

not directly named as intended by current research. Hence, stratification steps were

employed that accessed another dependent variable (age at first birth) to reach the target

audience (pregnant adolescent girls aged 15–19 years) amongst the age at first child

group.

Furthermore, variables that could have added rigor to this research may have been

deleted to enforce confidentiality of participants; such deletion may have resulted in

residual confounding (distortion that remains after controlling for identified confounders;

Fernandes et al., 2019). In regard to residual effect, literature shows that diverse

variables or factors have influenced adolescent pregnancy (Yakubu, & Salusi, 2018);

hence, confounders controlled for this research may not have been complete.

Also, I was not privileged to know some of the data collection nuances that the

interviewers and interviewee experienced; such experience could have helped in data

analysis and interpretation (Cheng & Philips, 2014).

In addition, recall bias (relying on memory to report past events) among

uneducated rural and urban dwellers pertaining to age and date of past events, such as

year of childbirths has been documented as a major threat to internal validity of current

research (Hassan, 2005). Historically, nonexperimental research such as the current study

suffers from low level of internal validity (trustworthiness) because of poor control of

research environment. Therefore, recall bias might have increased the complexity in

accepting current study results as totally valid, especially by potential post hoc critiques. According to Hassan (2005), recall bias might have led to misclassification of variables and distortion of association in the current research (Hassan. 2005).

In addition, DHS is standardized. The disadvantage of using this standardized survey was the limited opportunities to adapt the questionnaire to be locally (urban and rural) relevant. However, such limitation helped NDHS (a national survey) to maintain comparability, limit complexity of the survey, and keep the length of the questionnaire within country limits.

In addition, this research is limited regarding generalizability of research results. External validity that arose was that the dataset may not allow current parameters to be extended to younger adolescents aged 10–14 years. Also, even if such is the case, effect size (outcome) is likely to vary. This is regarded as a variation in group (persons) and outcome (Chadish et al., 2002, p. 83). Furthermore, NDHS reported that a higher percentage of households in the sample frame were rural (23,940) compared to urban (16,740); such disparity could have been due to errors in the estimation of households per cluster.

The above difference in household sample raised the issue of sampling and nonsampling errors (issue of survey reliability, internal validity). The sampling errors that could have contributed to this variation are errors from survey specification, sample frame, and selection. However, literature shows that large sample size (evidence in this current study) might have decreased sampling errors, because the study at least gets

closer to the actual population size, which might have increased reliability of the process or instrumentation (Chadish et al., 2002).

On the other hand, the non-sampling errors that arose were random errors, systematic errors, coverage errors, response errors, interviewer bias, respondent errors, survey process errors, questionnaire design errors, missing data (nonresponse) errors, coding errors, data capture errors, editing, and imputation errors (Chadish, et al., 2002).

Internal consistency reliability for this study is more about how consistent the NDHS as an instrument has been over time in measuring its constructs or characteristics (Revicki, 2014). The above statement demonstrates that reliability is also about the research instrument and not the data only (Olabode et al., 2019). The level of consistency of the instrument explains how accurate the population under study were represented using the instrument repeatedly (Olabode et al., 2019).

Literature shows that the use of the datasets from NDHS has had consistent results under similar methodology as current research, hence, the instrument was deemed reliable (del Burgo & Amaral, 2016). But this research employed stratification strategy that ensured the right subgroup or sample was accessed. Error in accessing the right subgroup of sample may have resulted to some level of abnormal group, which in turn may have skewed the results (Olabode et al., 2019). It is also assuring that NDHS data quality checks were conducted continuously both in and outside the field that improved trained personnel (concurrent data entry, and editors) and instruments and instrumentation, a process that also allowed a flow of feedback to interviewers during data collection and processing.

Recommendation

Adolescent pregnancy is a phenomenon surrounded by complex social network that affects individual, family, neighborhood, and society (Chung, Kim, & Lee, 2018). This current study analyzed the 2013 NDHS dataset. The dataset provided the opportunity for a cross sectional design that has the advantage of evaluating data at a specific point in time among groups. In addition, cross-sectional is cheaper, and easier to conduct, yet not able to claim causality due to limited control of the research environment and covariates (Chung, Kim, & Lee, 2018).

Future researchers should qualitatively and quantitatively look further and further into why adolescent pregnancy is not declining faster in Nigeria. As a result, researchers using NDHS dataset and methodologies are encouraged to take deeper stocks of individualized SEM-based risk factors. Such approach could give researchers the opportunity to be more considerate of individualized context in search of causes of adolescent pregnancy. In this regard, the discrepancies and arguments between researchers surrounding adolescent pregnancy could further reduce.

Furthermore, mixed-method approaches could further decrease existing discrepancies by improving the methodological weaknesses of the current methods, hence, increase reliability and validity. For example, qualitative methods could uncover that a pregnant adolescent was exposed to poverty, violence, and also uneducated; another pregnant adolescent within sample could have been exposed to different characteristics such as depression and low self-esteem due to her economic situation (Chung, Kim, & Lee, 2018).

In addition, cross-sectional design is the dominant approach adopted by adolescent pregnancy researchers. But cohort study design is another type of observation study that could further provide reliable and valid evidence that current independent variables within context of current research could cause rather than just correlate with adolescent pregnancy aged 15–19 years. Mann (2003) explained Cohort study as an approach used to study incidence and causes with the capacity to measure events that can distinguish between cause and effect (Mann, 2003).

Implications for Professional Practice

Evidence found from this study could be used to improve knowledge and awareness of stakeholders that are concerned with adolescent reproductive health. Such stakeholders include adolescent girls, researchers, practitioners, lay public health practitioners, community and household gatekeepers that provide protective and monitoring functions for adolescent girls. These practitioners and workers could employ findings from the current study to develop programs for at risk adolescent (individual), household (family), community level programs, and researchers.

In using findings from this research for interventional program planning, community level health workers who knows the area (place of residence) can be empowered to identify at risk girls and families as early as possible. Programs can then be developed by public health practitioners to target specific individual, family, and schools of such people. Such program should include assessment tools that captures individual and family strengths and weaknesses, including capacity and resource needs. Every effort should then be made to supply lacked resources and training grounded in

SEM level systems. Such approach should improve awareness as well as individualized information uptake, hence, strengthen overall protective factors against adolescent pregnancy.

For example, there is a growing body of evidence that shows the need to pay attention to individualized risk factors, including assessment of needs and capacity of individual adolescent and her family, and to examine how that information has been consumed or utilized by the individual and family in relationship to the community and society as the child developed through SEM system and levels (Mann, 2003).

In addition, Chungm, Kim, and Lee (2018) recommend that researchers and practitioners consider context as specific as possible to be able to gather pertinent and detail background information, else, results will continue to be varied, hence, poor intervention outcomes on adolescent pregnancy.

The methodology implication in describing recommendation for professional training and practice was well described by Sale (2016). For example, Sale (2016, p. 217), explained that professional doctorate methods are designed to develop researching professional; that PhD programs, on the other hand, are designed to develop professional researchers.

This current research supports Sale (2016) argument, and suggest that Doctor of Public Health candidates, and research practitioners bear the described scope in mind. The other distinction between the two arms of training and practice is that research practitioner's methods contribute to the development of the profession through scholarly

undertakings, while professional researchers devote themselves to academia with the hope of contributing to professional development at an arm's length (Sale (2016).

Furthermore, SEM implication in describing recommendation for professional practice focus on the three common areas (research, policy, and practice). For example, one of the benefits from decades of research in the areas of cognitive sciences is the revelation of how children develop reasoning, understanding, and use of structures around them as they mature, including how social context shapes the developing human (Pelligrino, Chudowsky, & Glaser, 2001, p. iv). This research, therefore, recommend the development of assessment tools that captures social network intricacies of the developing child's life. Pelligrino, Chudowsky, and Glaser, (2001) described this step as a gathering of information at a very fine level of details that could inform future research, policy, and practice.

Empirical studies design is an effective design that gathers observational and experiential data. The resultant empirical evidence is further analyzed using qualitative or quantitative methods to establish cause and effect. But current research used secondary dataset for secondary data analysis. Hence, not based on empirical methods.

As to the recommendation for professional practice, future practice-based researchers could use empirical methods to determine whether relationship exist between type of place of residence, household head gender, household head age, and adolescent pregnancy. The objective of such exploratory study could be to determine, categorize and to rank the existing adolescent pregnancy risk factors according to their significance for adolescent within SEM (Anjum, Anjum, Anjum, Ming, 2019).

Furthermore, exploratory factor analysis (EFA) could be employed to analyses the underlying SEM structures relative to the independent and dependent variables. Such experiential investigation aligns with Bronfenbrenner (1979) statement about SEM microsystem. He states that a microsystem for a developing child comprises of the child's past and current activities, including roles, and relations experienced by the child in each setting (Bronfenbrenner, 1979, p.22).

Social Change Implications

The social change implications of this study are based on the independent and dependent variables within the SEM model that grounded the study. Results of the study potentially support the argument that adolescent pregnancy is more common among rural versus urban adolescent girls in Nigeria. Furthermore, practitioners can focus on tailoring helpful preventive measures. Additionally, policy makers can create policy that finally direct more resources to the rural areas and not urban areas only.

The short- and long-term benefits of such investment at the individual, family, community, and societal levels can't be overemphasized. For example, long-term investment in women's reproductive health, especially adolescent girls, can have an economic benefit and reduce poverty for generations to come (Onarheim, Iversen, & Bloom, 2016). Another example, policy target on investment in contraceptive uptake, access to abortion, and high-quality SEM-based sex education could prevent the existence of adolescent pregnancy's predisposing factors across SEM level.

In addition, not being pregnant before aged 20 has health benefits, including life or death situations (Peyman & Oakley, 2009). For example, babies of Nigeria adolescent

mothers (less than 20 years old) are more likely to die before the age of 5 years compared to babies of older mothers (20 years and above) in Nigeria (Onarheim et al., 2016). Such situation can be socially reversed. Furthermore, not being pregnant as an adolescent has serious socioeconomic impact, including but not limited to positive effects on girl's education, empowerment, workforce participation, income equality, family stability, mental health in areas of depression or suicide (Onarheim et al., 2016).

Conclusion

Using data from the 2013 Nigerian Demographic Health Survey, this study examined the relationship between type of place of residence, household head gender, household head age, and adolescent pregnancy, aged 15–19 years in Nigeria. In the bivariate analysis, all three independent variables (type of place of residence, household head gender, and household head age) revealed a significant association with adolescent pregnancy, aged 15–19 years in Nigeria (table 6 -8). In the logistic regression analysis, family/household head factor such as household head age, and community/society factor such as type of place of residence combined reliably predicted adolescent pregnancy among women aged 15 to 19 years in Nigeria.

Adolescent pregnancy remains a major public health priority, and more research is needed to further enhance the knowledge gaps in the predictors of adolescent pregnancy in Nigeria. In addition, conflicting evidence found in literature showed there is a need for further research to decrease confusion, argument, and contradictions among researchers on the predictors of adolescent pregnancy.

Although there are many ways to prevent adolescent pregnancy, only few options exist in Nigeria. There is low use of contraceptive due many years of government being against it (Uwizeye et al., 2020). Yet, abortion is illegal (Uwizeye et al., 2020). Evidence discovered from this study could potentially be used to enhance sex education programs designed to target the individual, homes, and community at large, hence, contribute to positive social change by improving the lives of women, families, communities, and societies by increasing awareness on how being pregnant as an adolescent derail potential future plan (Uwizeye et al., 2020).

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Appendix A: Letter of Authorization to Use Nigerian Demographic and Health Survey

Dataset

Jun 11, 2018

Christian Mbulu,
Walden University, United States
Date: 06/09/2018

Dear christian mbulu:

This is to confirm that you are approved to use the following Survey Datasets for your registered research paper titled: "Health Outcome among Nigerian Non-Pregnant women":

Nigeria and Nigeria (Ondo State)
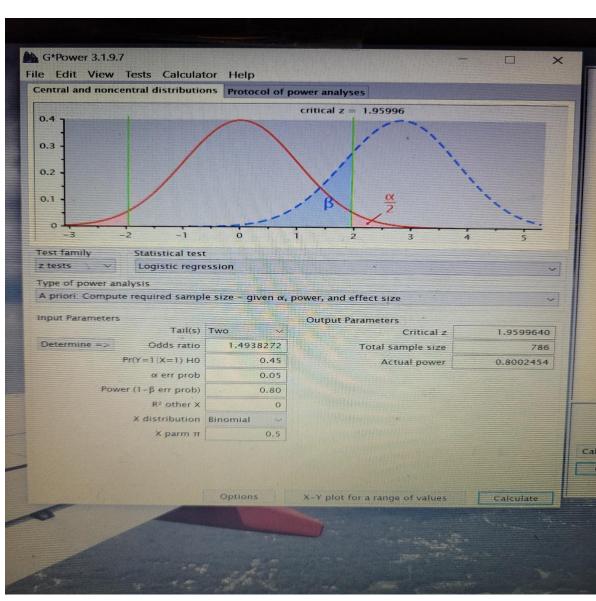
To access the datasets, please login at: https://www.dhsprogram.com/data/dataset_admin/login_main.cfm. The username is the registered email address, and the password is the one selected during registration.

The IRB-approved procedures for DHS public-use datasets do not in any way allow respondents, households, or sample communities to be identified. There are no names of individuals or household addresses in the data files. The geographic identifiers only go down to the regional level (where regions are typically very large geographical areas encompassing several states/provinces). Each enumeration area (Primary Sampling Unit) has a PSU number in the data file, but the PSU numbers do not have any labels to indicate their names or locations. In surveys that collect GIS coordinates in the field, the coordinates are only for the enumeration area (EA) as a whole, and not for individual households, and the measured coordinates are randomly displaced within a large geographic area so that specific enumeration areas cannot be identified.

The DHS Data may be used only for the purpose of statistical reporting and analysis, and only for your registered research. To use the data for another purpose, a new research project must be registered. All DHS data should be treated as confidential, and no effort should be made to identify any household or individual respondent interviewed in the survey. Please reference the complete terms of use at: https://dhsprogram.com/Data/terms-of-use.cfm.

The data must not be passed on to other researchers without the written consent of DHS. Users are required to submit an electronic copy (pdf) of any reports/publications resulting from using the DHS data files to: archive@dhsprogram.com.

Appendix B: The Main Window of G*Power Calculation