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Sociodemographic Factors, Socioeconomic Factors, and Teenage Pregnancy Outcomes in Guyana

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February 2021

Abstract

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MPH, Saint George's University Grenada, West Indies, 2005

MBBS, University of Guyana, 1997

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Doctoral Study Submitted in Partial Fulfillment of

the Requirements for the Degree of

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Abstract

Teenage pregnancy, a global phenomenon is associated with adverse pregnancy outcomes, owing to the mother's individual factors, location, education attainment, and service accessibility. Globally, 16 million babies are born to teenage mothers annually. In Guyana, there is a paucity of information on factors associated with teenage pregnancy rate which stands at 74 per 1,000, and its outcomes. Archived data from the 2014 UNICEF Multiple Indicator Cluster Survey 5 (MICS5) was used to identify and examine relationships between the sociodemographic, socio-economic factors, and teenage pregnancy outcomes in Guyana. This quantitative cross-sectional review approach guided by the Bronfenbrenner theoretical framework analyzed data on 6000 households with a pregnant mother between the ages of 15 to 19. Binary and multiple regression analyses were conducted to assess the relationship between the sociodemographic and socioeconomic factors and teenage pregnancy outcomes. The study revealed no significant association between neonatal mortality and antenatal care received, ethnicity, location, mother education, and postnatal care provided by skilled personnel ($\chi 2$ (11) = 9.60, p = 0.567). Furthermore, there was no significant association between low birth weight and mother ethnicity, education, location, and wealth index (F (11,191) = 0.91, p = .534, R2 = 0.05). Consequently, this research's findings may impact positive social change by stimulating further studies in the prevention and quality improvement in the management of teenage pregnancy. Moreover, the results could encourage public health professionals to design and implement effective teenage pregnancy prevention programs among Guyana teenagers at an individual, interpersonal, and organizational levels.

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Dedication

I dedicate this doctoral study to my parents the late Samuel and Elise Francis who were a police officer and teacher respectively and who laid the foundation and work tirelessly for me to obtain academic achievement in earlier years and were unable to see my progress and accomplishment made over the years.

Acknowledgments

I acknowledge the guidance, assistance, and encouragement provided to me during the preparation of this doctoral study leading up to my Doctor of Public Health. I thank specifically the Chair Dr. Sanggon Nam, the 2nd Member, Dr. Debo I. Awosika-Olumo, the University Research Reviewer, Dr. Richard Palmer, and Program Director, Dr. Margaritis. I express gratitude to my daughter Kareema Cummings. Special thanks to my siblings Kean Francis- Mitchell, Samuel Francis, and Medita Francis-Adams who mean so much to me. I am also grateful for my friends who have supported, prayed with me, and helped me to attain such academic heights in my career. I thank God Almighty for giving me the strength, endurance, and resources to complete this dissertation.

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Section 1: Foundation of the Study and Literature Review

Introduction

The World Health Organization (WHO, 2018) reported that 16 million girls, ages between 15 and 19 years give birth annually, accounting for 11% of the births worldwide. Ninety-five percent of all the adolescent births occur in low-middle income countries among poor, less educated, unemployed, and rural populations. The same report noted that teenage pregnancies occur three times more often in indigenous communities than in the urban populations; and that the neonates of these teen mothers have a greater risk of having low birth weight (LBW), being preterm, and experiencing severe neonatal complications. Ganchimeg et al. (2014) reported that there is a notable correlation between higher risks of low birth weight, preterm deliveries, and rural residence. The public health importance of such risks increases as age decreases among these vulnerable women. According to Ganchimeg et al. (2014), the teenager's biological immaturity as a result of their short cervix and small uterine volume as well as their susceptibility to infections and increase prostaglandins account for their preterm delivery. Alithabe et al. (2015) noted that the evidence is still controversial; as there is even now uncertainty as to the level to which this biological immaturity caused the observed associations or if there are confounded by the poor socioeconomic factors and lack of health care. Hence this notion continues to be a matter for debate. Kim et al. (2016) reported that adverse pregnancy outcomes as observed in low-income women have been attributable to low socioeconomic status and poor social factors or to economic barriers which are specific to the utilization of medical services where the teenager visits for antenatal and postnatal care.

Low socioeconomic status, limited educational attainment, and an extended family structure have been shown to be common risk factors for teenage pregnancies in Bangladesh (Papri et al., 2016). However, Ghouse and Zaid (2016) noted that pregnancy risks are also compounded when there is competition between mother and fetus for required nutrients. Nguyen, Shiu, and Farber (2016) noted that changes in social norms increase sexual freedom among teenagers, especially when there is a lack of parental control. According to Nguyen, Shiu, and Farber (2016), early menarche and the inability of teenagers to access contraceptives can be responsible for a concomitant surge in early sexual activity among teenagers, leading to pregnancy.

The persistence of this public health issue amidst the negative discourse about teenagers, compelled me to identify sociodemographic and socioeconomic factors that might diminish the effects of the risk of preterm delivery, low birth weight and neonatal mortality among this vulnerable and naïve group. Public health specialists have agreed that teenagers are at increased risk of adverse outcomes. The corollary has been true as teaching sex education in schools develop teenagers' self-confidence and help these teens delay their first sexual encounter (Vincent & Alemu, 2016). A better physician-to-patient relationship is another effective rights-based intervention that has been proffered to benefit teenagers (Papri et al., 2016).

This Section 1 is comprised of 11 subsections: (a) the research problems and issues addressed in this study; (b) the purpose of the study; (c) the four research questions (RQs) and associated hypotheses, (d) the theoretical foundation, (e) the literature strategy and review, (f) the nature of the study, including the rationale for the study's design, (g) the

terms used in the study, (h) the assumptions and limitations for the study, (i) the scope and delimitations addressing validity, (j) the study's significance, and (k) the potential contributions of the advancement of the study and implications for positive social change.

Problem Statement

Teenage pregnancy has become a serious problem in Latin America and the Caribbean, with adolescent pregnancy rates estimated at 46 births per 1,000 girls ages between 15 and 19, the second highest in the world (WHO, 2018). The adolescent birth rate in Guyana stands at 74 per 1,000 (Situation Analysis of Children and Women in Guyana, 2016). In Guyana, the percentage of adolescent pregnancies has been fluctuating from 20-22% below the age of 19 years during the period 2011 and 2012 but has remained constant at 1% under 15 years for the last 2 years (Ministry of Health, Statistical Department, and Primary Health Care Data, 2013). According to Situation Analysis of Children and Women in Guyana (2016), one in every five Amerindian girls from the Indigenous communities between the ages of 15 and 19 was a mother at the time of the survey, and one in every four girls from this indigenous communities lived in poor homes and had started to bear children already when compared to 1 in 10 Amerindian girls from richer homes. The report identified the teenagers' location and place of residency (Figure 1), poverty status (Figure 2), and ethnicity, which had a bearing on the early sex encounter (Figure 3; Situation Analysis of Children and Women in Guyana, (2016).

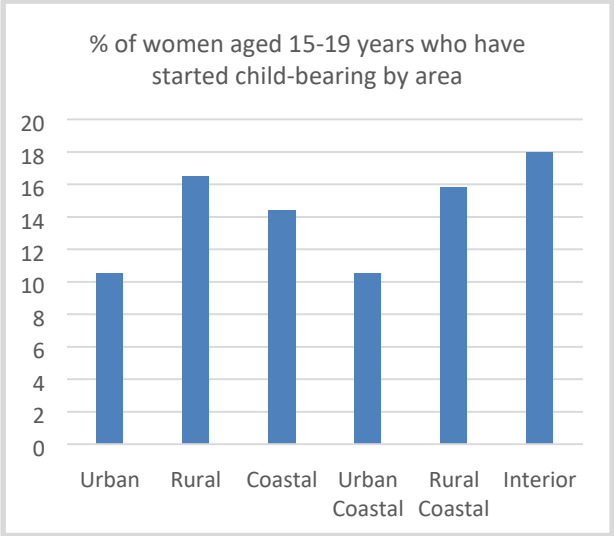


Figure 1. Pregnant Teenagers (15-19 Years) in the Rural and Coastal Areas in Guyana. Source: Guyana MICS 2014

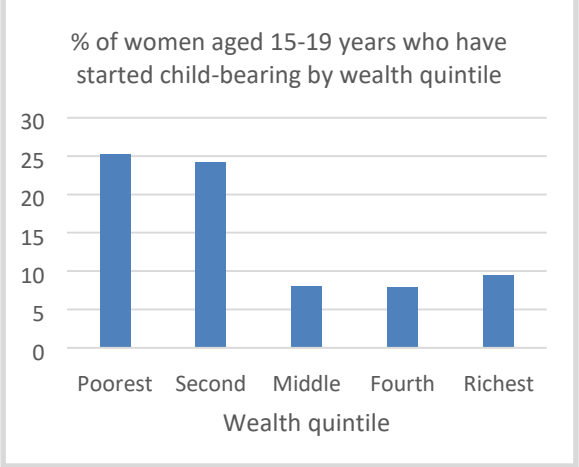
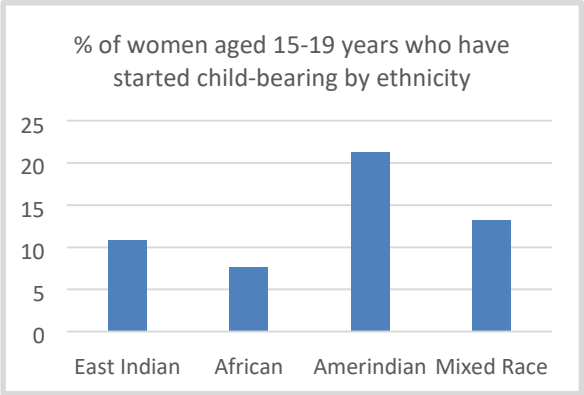


Figure 2. Pregnant Teenagers (15-19 Years) Wealth Quintile in Guyana. Source: Guyana MICS 2014



Source: Guyana MICS 2014

Figure 3. Pregnant Teenagers (15-19 Years) Among the Different Ethnicities in Guyana

The WHO and United Nations Children's Fund (UNICEF) have painted a dismal picture of teenagers who had preterm births, a major cause of neonatal and perinatal mortality. WHO (2007) had noted that adolescents are at increased risk for preterm labour and delivery, compared to older women, and further noted that the youngest age groups had run the highest risk. Infants born to adolescent mothers were more likely to be of low birth weight (LBW), and were therefore also more likely to suffer from the sequelae of low birth weight (LBW). According to Shahnawaz et al. (2015), LBW is related to poor socioeconomic conditions and is an important predictor of infant mortality, and especially in the first 1000 days of life. LBW was therefore, a sine qua non for influencing neonatal and infant mortality among teenage mothers (Shahnawaz et al., 2015).

The consequence of teenage pregnancy has been of tremendous burden to the health system and could result in cervical cancer for the teen mother due to early sexual activity with multiple partners; postponement of the teen mother and family in seeking antenatal care; and an increase in perinatal morbidity and mortality (Ganchimeg et al., 2014). It was further reported that given less focus on primary health care, equality, equity, and effective,

and timely approaches towards determinants of health, teens are at an increased risk of adverse outcomes (Ganchimeg et al., 2014). It is expected that policy makers in Guyana unite efforts and move swiftly to address this public health concern. This study is expected to contribute to public health knowledge and provide more evidence on the impact of sociodemographic and socioeconomic factors on teenage pregnancy outcomes in Guyana. The study will provide significant, timely, and relevant data to the Maternal and Child Health Department of the Ministry of Public Health in Guyana. Data generated from this study can be used to implement programs to improve poor perinatal and infant outcomes in the coastland and hinterland regions of Guyana thus addressing the underlying and structural causes—the social determinants of health.

Identified Gap

There are different sociodemographic and socioeconomic factors that affect pregnancy outcomes among teenagers in Guyana. This study draws on teenage pregnancy outcomes from developing and developed countries that have strong health systems, and that use an integrated, continuous, high-quality approach to improve pregnancy outcome. According to Dulitha (2013), there has been an association between the risk factors such as low socioeconomic background, low educational attainment, disrupted family structure, and poor sexual practices and a decrease weight at birth of the infant (owing to lack of nutrients for the baby) among teenage mothers in South Asian countries, such as Bangladesh, India and Nepal. Few studies have identified education and low socioeconomic status as impacting teenage pregnancy outcomes in Guyana. Ghouse & Zaid (2016) found that place of residence was significant enough to decrease the baby's weight. However, Khan,

Nasrullah, & Jaleel (2016) found a strong correlation between inadequate antenatal care and LBW, and that the lack of checkups for complications among pregnant teens was associated with neonatal mortality. According to Vieira, Dos Santos, and Guimarares (2020), one of the roles of the primary health care professional is prenatal monitoring, helping the teenage mother during delivery, helping her with postpartum and newborn care. However, the late demand of the health care specialists to monitor the teenage mothers, along with their insecurities, allow the obstetricians nurses, and midwives not to individualize the teenage mothers so as to identify social risk factors that could impact pregnancy outcomes (Vieira, Dos Santos, & Guimarares, 2020).

According to Opondo et al. (2019), the Amerindians and the mixed-race group had a greater risk of adverse birth outcomes, which would have supported previous findings. Socioeconomic factors and the ecological pathway need to be explored as potential contributors to teenage pregnancy outcomes in Guyana. The sociodemographic factors and socioeconomic factors of teenage pregnancy outcomes in Guyana could enable better planning among policy makers; scarce human and financial resources could be better targeted to reduce the teenage pregnancy dilemma. Little research has been directed to evaluating the effects of socioeconomic markers on this vulnerable group in order to examine infant mortality and LBW in Guyana. This study is a fitting one as its aim is to look at the future leaders of Guyana, the teenagers, and to see how these sociodemographic and socioeconomic factors interact with the individual, the family, the healthcare professionals, the community and at the macro level through the lens of the ecological model to note any association with teenage pregnancy outcomes. In Guyana, the

association of the teenage mother's ethnicity, location, and educational status, her attendance at antenatal and postnatal clinic utilizing a skilled health worker and her infant's survival status and birth weight are largely unknown. Whether the sociodemographic and socioeconomic factors in Guyana have a direct effect on pregnancy outcomes among teenagers remains an open question, but efforts can be made to improve the quality of life for the teens who are pregnant.

Purpose of the Study

The purpose of this quantitative study was to analyze the secondary and archival data from the 2014 UNICEF Multiple Indicator Cluster Survey Round 5 (MICS5) to examine the effect of sociodemographic and socioeconomic factors on pregnancy outcomes among teenagers in Guyana, South America, including the coastland and the hinterland communities. I undertook this study to determine whether there is an association between the independent variables: a) sociodemographic factors, including: age (15–19 age group), (b) ethnicity (whether the teenagers were of East Indian, African, Amerindian or mixed race), and (c) skilled health personnel (medical doctor, nurse midwife, single - trained midwife, medex, traditional birth attendant, or a community health worker) attending to the pregnant natal clinics. The socioeconomic characteristics included (a) maternal level of education (none, primary, secondary or higher) of the teenage mothers attending the antenatal during delivery, and post-delivery, (b) residency (whether the mother in either an urban or rural setting or in the interior of the country), and (c) ethnicity. The dependent variables were (a) LBW (less than 2.5 kilograms) and (b) neonatal mortality death or death

within 28 days of birth (Situation Analysis of Children and Women in Guyana, 2016). According to Shahnawaz et al. (2018), numerous factors contributed to neonatal mortality and low birth weight among pregnant teenage mothers. To decrease the adverse outcomes of teenage pregnancy, I attempted to test the Bronfenbrenner' theory as it is associated with pregnant teenagers and their interrelated background factors that impacted their pregnancy outcomes. It is proffered that robust measures must be taken at the macro and policy levels to decrease the influence of an unfavorable teenage pregnancy outcomes The social change implications of the study include informing policy makers, government and non-governmental planners, and program managers at the level of the health and education ministries; with the objective of involving other technical and implementing agencies to address this important public health concern, prevent teenage pregnancies and provide appropriate, timely, and relevant responses to these adolescents ‘ needs.

I summarized the data in order to examine the relationship between the (a) sociodemographic and socioeconomic factors and (b) pregnancy outcomes among teenagers in Guyana. I used logistic regression to determine the relationship between four factors: ethnicity, location, the presence of skilled health personnel at the antenatal and postnatal clinics, and neonatal mortality. I used linear regression to determine the relationship between education and LBW. In addition, inferential statistics were used to analyze whether there is a fit among the independent and dependent variables. The information garnered from the analysis was used to support my hypotheses. The findings of this quantitative analysis are expected to be used by policy makers to lobby for human and financial resources to address the structural causes of teenage pregnancy in Guyana.

Research Questions and Hypotheses

RQ1: Among the teenagers in Guyana ages 15 to 19, is there a relationship between the ethnic origins of a teenage mother and neonatal mortality and low birth weight?

$H_0$1a: There is no statistically significant relationship between the ethnic origin of a teenage mother ages 15 to 19 in Guyana and neonatal mortality.

H_a1a: There is a statistically significant relationship between the ethnic origin of a teenage mother ages 15 to 19 in Guyana and neonatal mortality.

$H_0$1b: There is no statistically significant relationship between the ethnic origin of a teenage mother ages 15 to 19 in Guyana and low birth weight.

H_a1b: There is a statistically significant relationship between the ethnic origin of a teenage mother ages 15 to 19 in Guyana and low birth weight.

RQ2: What is the relationship between the locations of the pregnant teenager in Guyana and neonatal mortality and low birth weight?

$H_0$2a: There is no statistically significant relationship between the locations of the pregnant teenager in Guyana and neonatal mortality.

H_a2a: There is a statistically significant relationship between the locations of the pregnant teenager in Guyana neonatal mortality.

$H_0$2b: There is no statistically significant relationship between the locations of the pregnant teenager in Guyana and low birth weight.

H_a2b: There is statistically significant relationship between the locations of the pregnant teenager in Guyana and low birth weight.

RQ3: What is the relationship between the level of education of the pregnant teenage mother in Guyana, and neonatal mortality and also the birth weight of her infant?

$H_0$3a: There is no statistically significant relationship between the level of education of the pregnant teenage mother in Guyana and neonatal mortality.

H_a3a: There is a statistically significant relationship between the level of education of the pregnant teenage mother in Guyana and neonatal mortality.

$H_0$3b: There is no statistically significant relationship between the level of education of the pregnant teenage mother in Guyana and low birth weight.

H_a3b: There is statistically significant relationship between the level of education of the pregnant teenage mother in Guyana and low birth weight.

RQ4: What is the relationship between attendance at antenatal care by teenage mothers using skilled personnel, neonatal mortality, and low birth weight in Guyana?

$H_0$4a: There is no statistically significant relationship between attendance at antenatal care by teenage mothers using skilled personnel in Guyana and neonatal mortality.

H_a4a: There is a statistically significant relationship between attendance at antenatal care by teenage mothers using skilled personnel in Guyana and neonatal mortality

$H_0$4b: There is no statistically significant relationship between attendance at antenatal care by teenage mothers using skilled personnel in Guyana and low birth weight.

H_a4b: There is a statistically significant relationship between attendance at antenatal care by teenage mothers using skilled personnel in Guyana and LBW.

Theoretical Approach for the Study

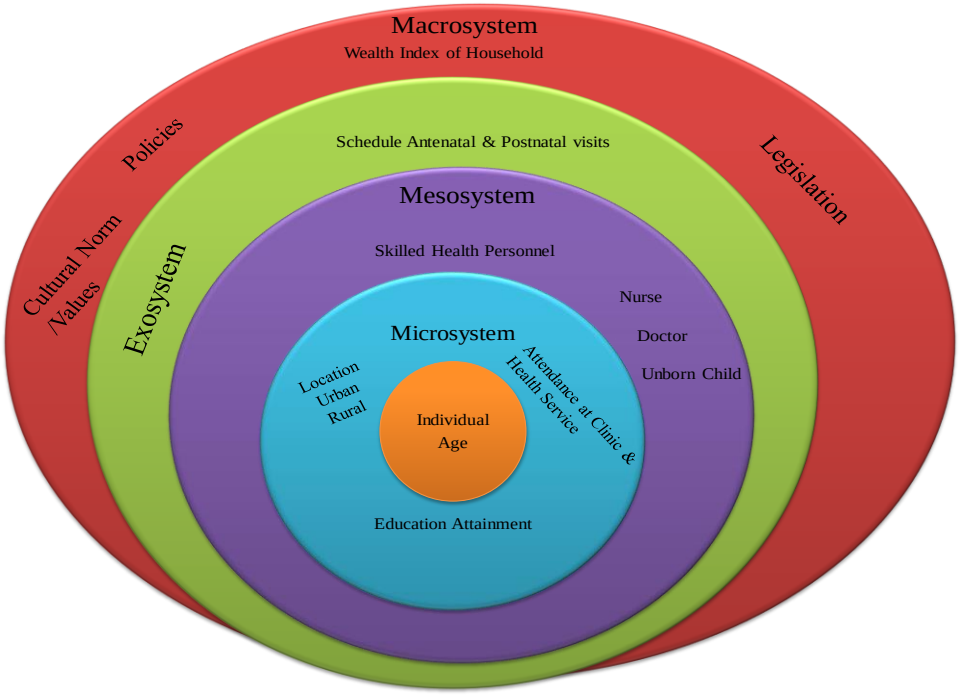


Figure 4. Diagram of the Bronfenbrenner theory and the factors associated with teenage pregnancy such as sociodemographic factors, family structure and stability, educational factors, norms and values, and service accessibility.

Bronfenbrenner's theory has provided a useful model in formulating a theoretical lens for studying the sociodemographic factors, the socioeconomic factors and teenage pregnancy outcomes in Guyana. According to Salazar et al. (2009), Bronfenbrenner's conception of behavior requires that there be an examination of the interconnected related factors which affect teenage pregnancy outcomes. Salazar et al. (2009) further reported that an individualistic approach to such public health issues would be inadequate and therefore an ecological approach should be considered when examining interrelationships between multiple levels of influence on health outcomes.

According to Bronfenbrenner (1979), there were multiple influences and interactions on the specific teenage health behaviors at the level of the individual, intrapersonal, and interpersonal levels; at the level of the peers, the family, the community, the society, and at the policy level. Bronfenbrenner (1979) noted that the ecological models should be behavior specific, identifying potential influences at each level, and that multiple –level interventions were most effective in changing behaviors.

Bronfenbrenner's ecological systems theory, as depicted in Figure 4, was the theoretical framework for this study because such a theory has various social and environmental factors that affect individuals' development and behavior (Bronfenbrenner, 1979). According to Bronfenbrenner (1979) the levels of influences include: 1) individual level, 2) micro system, 3) meso system, 4) exosystem and 5) macro system.

This ecological model, the individual level, termed the *micro system*, is comprised of the roles and characteristics of a developing individual. The *mesosystem* is referred to the interrelations or connections between the hypothesized micro systems factors, while the *exosystem* is referred to forces within the larger social system in which the individual is embedded. However, the individual has an active role within these larger systems. At the *macro system* level, cultural beliefs and values impact all the other systems, especially when poverty rates are demonstrated in the community (Bronfenbrenner, 1979).

Specifically, the mesosystem has included the interaction between pregnant teenagers, with their single-parent status, and health care providers; it is made up of the interactions between the skilled personnel and the state of the unborn infant. Importantly, their peers, familial factors, and community-level factors could exert a strong influence on

them. Whereas the exosystem is involved with the interactions between the pregnant teenager and her routine and scheduled antenatal and postnatal visits with skilled health care personnel. The macro system, the last tier of environmental influence has included the wealth index of the household, ethnicity, policies, and legislations available which affect teenage pregnancies; in addition, there are the cultural norms and values that could relate to teenage pregnancy.

According to Briggs, Brownwell, & Roos (2007), at the macro level, low socioeconomic status is related to teenage pregnancy and parenting. Teenage pregnancy could interrupt the mother's education, making it difficult for a high school dropout to return to school. This jeopardizes the trajectory to adulthood by both limiting her income earning potential and necessitating the use of welfare and low-level employment. Frequently, the young mother who is settled in poverty and would find it very difficult when trying to provide for herself and to offer the child a good start in life. In this study, the Bronfenbrenner's ecological framework has been the choice of consideration**,** and pregnant teenager's outcome has been examined under the sociodemographic and socioeconomic factors organized by the following five levels of interaction.

Nature of the Study

The nature of this quantitative study involved an analysis of secondary data from a cross-sectional study, UNICEF's multiple indicator cluster survey 2014 round 5 (MICS5). This method allowed me, the researcher, to determine relationships between variables, test hypotheses, and generalize results to the population. The selected research design for this doctoral study was cross-sectional. According to Howell (2013), the design was appropriate

because it was relatively quick, easy to conduct, and cost effective; it was adequate and appropriate for determining the relationships between the variables measured at a single point in time. The independent variables included the sociodemographic factors of place of residence, maternal age, antenatal care and postnatal care, and skilled professionals in obstetrics; the socioeconomic factors included the mother's education, wealth index, and ethnicity. The dependent variables included neonatal mortality and LBW.

Figure 5 is a simplified diagram of how the socioeconomic factors, coupled with the non-modifiable of the matcher and the process of care can influence perinatal outcomes.

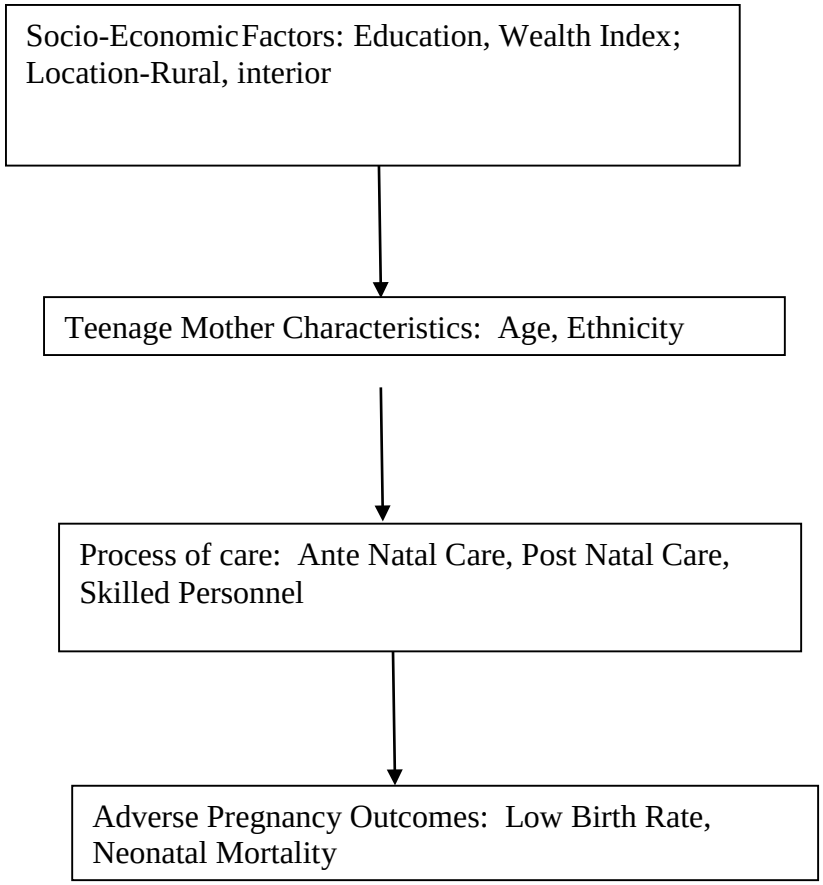


Figure 5. Diagram socioeconomic factors, teenage mother characteristics, process of care, and perinatal outcome.

Literature Search Strategy

To locate relevant, English-language research, I used Google Scholar, Science Digest, EBSCOHost, Medline, CINAHL, PubMED, and the Thoreau multidatabase. They were searched for the period 2013 to 2020. The following search terms were used: *teenage pregnancy, geographic location, education level, antenatal care, antenatal classes, teenage pregnancy outcomes, mothers, socioeconomic factors, sociodemographic factors, ethnicity, neonatal mortality, and low birth weight*.

Literature Review

The scope of literature review was limited to the period 2013 to 2020, but older peer review literature materials were also considered if they included information that could support the study. I examined evidence on (a) the validity of socioeconomic and sociodemographic factors and (b) casual factors for infant mortality and LBW, and supporting evidence on sociodemographic factors, socioeconomic factors, neonatal mortality and low birth weight were considered. In some cases, where there was a paucity of information, I considered current research, a few doctoral studies, newsletters, and print or online newspaper articles.

Robust efforts must be made to determine whether sociodemographic factors are related to healthcare accessibility and healthcare service utilization can positively influence teenage pregnancy (Taffa & Obare, 2017). Health inequity, a social determinant of health, has been linked to ill health among teenage groups (Tunçalp et al., 2014). Low education level, low wealth status, ethnicity, and the location of pregnant teenage mothers have all

been seen as forerunners to delays in using antenatal services and have ultimately increased the risk of serious health outcomes (Tarekegn, Lieberman, & Giedraitis, 2014).

Ethnicity, Neonatal Mortality, and Low Birth Weight

Socioeconomic circumstances contribute to the differences in birth outcomes across ethnic groups (Opondo et al., 2019). According to Opondo et al. (2019), the difference in risks of adverse birth outcomes were across ethnic groups and socioeconomic factors, and the evidence of mediation by these conditions of the effect of ethnicity on birth outcomes in England and Wales were explored. According to Opondo et al. (2019), neonatal mortality, infant mortality and preterm birth risks were 2.1 per 1000, 3.2 per 1000 and 5.6%, respectively. Minority ethnic babies had 48-138% greater White and Hispanic mothers. However, Wallace et al. (2017) noted that regardless of race, the preterm infants were at similar risk for neonatal death. While Morisaki et al. (2017) reported that differences in socioeconomic characteristics and ethnicity have not contributed to differences in LBW when 14 races and ethnicities were studied (non-Hispanic White, non-Hispanic Black, American Indian, Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Hawaiian, Guamanian, Mexican, Puerto Rican and Cuban).

Location, Neonatal Mortality, and Low Birth Weight

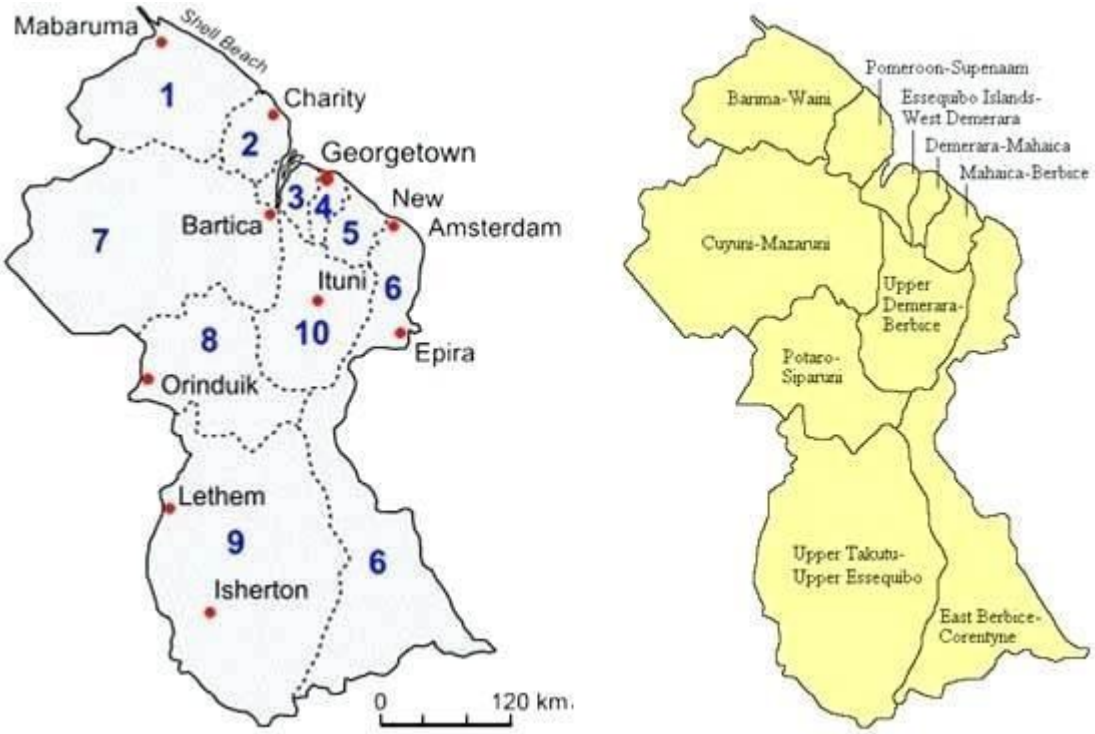


Figure 6. Maps showing the 10 Administrative Regions of Guyana, South America.

Situation Analysis of Children and Women in Guyana (2016) noted that of the 15% of the girls in the 15 to 19 age group bear children, 21% of girls are among the Indigenous and Amerindian populace and live in rural areas and the interior regions of Guyana (Regions 1, 7, 8 and 9). In an effort to examine the rural-urban differences in infant mortality rates and the common risk factors associated with the neonatal rates in Nigeria, Adewuyi and Lamichhane (2017) report that infants in rural residence have higher rates of mortality than their urban counterparts and that disparities in risk factors exist owing to inequalities and the social determinants of health. According to Oyekale and Maselwa (2018) infants born in urban areas seem to have higher likelihood of surviving. In addition

the Authors report that residence in urban area can as well influence infant survival through the notion of relatively higher income and educational attainments of urban people. Siahanidou et al. (2019) noted that disparities of infant and neonatal mortality are seen among Grecian women and there is a strong correlation (0.10 quartile) between these deaths and place of residence. Ghouse and Zaid (2016) note that the place of mother's residence is insignificant and that the mother's location can result in a decrease in birth weight of the infant owing to the lack of important nutrient deprived from the mother's diet for the infant. According to Ghouse & Zaid (2016), this decrease occurs by 2.5 decagrams on using an OLS regression.

Education, Neonatal Mortality, and Low Birth Weight

A strong correlation exists between the education of teenage mothers and mortality rates, as well as an association between lower education levels of young mothers and adverse infant health status (Tunçalp et al., 2014). Karlsen et al. (2011) suggested that this strong relationship between education and mortality rates poses a serious threat to adverse maternal and infant health status and survival with irreversible consequences (Loaiza & Liang, 2013). The majority of the adolescent teen mothers have dropped out of school (Gyan, 2013). Arceo-Gómez and Campos-Vázquez (2014) reported that the single most important effect of teenage childbearing was a lower educational attainment of the teenage mother, both in the short and long run as seen in Mexico. Arceo-Gómez and Campos-Vázquez (2014) reported on a study using longitudinal and cross-section data which had matched females who were pregnant with those who were not based on a propensity score. According to Arceo-Gómez and Campos-Vázquez (2014), in the near term, teenage

pregnancy has caused a decrease of 0.6-0.8 years of schooling, lower school attendance, fewer hours of work, and a higher marriage rate. However, in the long term, a 1-1.2-year loss in years of education was incurred, which implied a permanent effect on education and lower household income per capita (Arceo-Gómez & Campos-Vázquez, 2014).

Durban, Shefer, Bhana, and Morrel (2013) reported a qualitative research with a group of teachers and principals at 11 schools (over 80 interviewees) and 26 learners who had become parents at school in Cape Town. The pregnant teenage mothers were judged as infringing upon proscriptions of sexual modesty which was linked to larger social constraints on young female sexuality supporting a negative response to learning (Durban et la., 2013). Durban et al. (2013) noted also that the schools which were constructed act as a space where pregnancy and parenting made no sense as the policy makers are concerned with their public image and the presence of pregnant teenagers reflecting poorly on the schools. Oyekale and Maselwa (2018) noted that one of the major and critical determinant education, has been a positive correlation with infant survival and shows a statistical significance $p < 0.05$) in infant models in countries like Bangladesh, Uganda, Zimbabwe, Malawi, and Ethiopia. On using data on a school reform in Norway, the effect of mothers' education on birth weight was estimated. An exogenous variation in the education variable was created and analyses had shown that when controlling for municipality fixed effects, municipality-specific time-trends and mothers' and infants' year of birth (Grytten, Skau, & Sørensen, 2014); there was a fairly large effect of mothers' education on birth weight. In other words, increasing mothers' education had reduced the likelihood of low birth weight, even in a publically financed health care system (Grytten, Skau, & Sørensen, 2014).

Antenatal Care, Neonatal Mortality and Low Birth Weight

Wong Shee et al. (2018) noted that attendance at a pregnancy care clinic was associated with improved outcomes. Wong Shee et al. (2018) further reported that the young teenage mothers who attended clinics re motivated and want to see the wellbeing of their babies. Flexibility of appointments and there being a central location augur well for the mother and her pregnancy. According to Arunda, Emmelin, & Asamoah (2017) in a survey, looking at the effectiveness of antenatal care services in reducing neonatal mortality in Kenya, 67% of all the expectant mothers attend antenatal clinic visit in the second trimester and more than half of all the women had attended four or more antenatal clinic (ANC) visits during pregnancy. On comparing mothers who were attended to by unskilled professionals versus skilled, it was found that neonatal mortality rate (NMR) was about 3.5 times higher among neonates whose mothers were attended by unskilled health care workers in attendance at the ANC service relative to those whose mothers were attended by skilled workers during their ANC attendance. Similarly, mothers who had no pregnancy complication check-up are 2.5 times higher neonatal mortality compared to those who received a checkup. According to Arunda, Emmelin, & Asamoah (2017), there were twice higher neonatal mortality among the mothers who were not given the tetanus toxoid shots than among the mothers who were given at least one tetanus toxoid injection. Although the neonatal mortality were comparatively higher among neonates whose mothers had none or fewer than 90 iron and folate tablets, no blood pressure (bp) checks and no blood tests or urine analysis, there was no statistically significant associations ($p > 0.05$) detected between the lack of these antenatal clinics (ANC) interventions and neonatal mortality.

Wong Shee et al. (2018) further noted that the odds of neonatal death were four times higher among neonates whose mothers had no ANC visit relative to those whose mothers had four or more (OR 4.0, 95% CI 1.7–9.1). The neonates whose mothers had 1– 3 ANC visits had about twice higher odds of deaths when compared to those whose mothers had four or more ANC visits. Similarly, the odds of neonatal mortality were significantly higher among neonates whose mothers had no TT injection as compared to those whose mothers had only one TT injection (OR 2.5, 95% CI 1.0–6.0). There was no statistically significant difference in the odds of neonatal mortality between mothers who had received two or more TT injections and those who had received one TT injection (aOR 0.9, 95% CI 0.5–1.4). Neonates whose mothers had unskilled ANC attendance had three times higher odds of mortality relative to those whose mothers had skilled ANC attendance (aOR 3.0, 95% CI 1.4–6.1). Lack of check-up for complications during pregnancy was associated with neonatal mortality (OR 2.4, 95% CI 1.5–4.0). There was no statistically significant difference between neonatal survival rates on comparing skilled or unskilled birth attendance. Using a cross -sectional study conducted in the Department of Obstetrics and Gynaecology Layari General Hospital and Dow University of Health Sciences Karachi between January 2007 to July 2008 to find out the frequency of birth weight and frequency of associated risk factors (Khan, Nasrullah & Jaleel, 2016). However, there was a strong correlation between inadequate ANC and low – weight. According to Khan, Nasrullah and Jaleel (2016), there was a U trend effect on LBW when the number of antenatal visits were examined and the number of prenatal visits increased the risk of LBW decreased; while there was a relative risk of LBW as 1.47 in patients with inadequate antenatal visits. It was

also noted that in women who had adequate antenatal visits, there was a risk of 0. 56. The provision of antenatal care clinics therefore, was expected to reduce the risk of LBW. The timely visits by the teenage mothers to the clinics created health awareness and timely identification in women with complications.

Literature Review Summary

The literature review identified the sociodemographic and socioeconomic factors that affect pregnancy outcomes among pregnant teenagers. According to Opondo et al. (2019), there are direct and indirect effects of ethnicity on neonatal mortality and birth weight. It was found that neonates who reside in rural areas were more prone to have higher mortality rates and low birth weights than those who are located in urban areas, as a result of the inequalities, inequities, and the social determinants of health (Adewuyi & Lamichhane, 2017). Tunçalp et al. (2014) noted that education plays a pivotal role on birth weight and that there is a strong correlation between education and neonate survival at birth. In addition, Wong Shee et al. (2018) reported that a mother's regular attendance at a clinic with a skilled health care worker increases her chance of having better pregnancy outcomes including the survival of the neonate with appropriate birth weight.

Literature Review Summary of the Key Variables. According to Opondo et al. (2019), Amerindians and the "Mixed" race group had a greater risk of adverse birth outcomes and being consistent with previous findings. However, this was in stark contrast with Morisaki et al. (2017), who reported that differences in ethnicity did not contribute to differences in LBW and neonatal mortality when 14 races and ethnicities were studied. From this study it was found that the majority of pregnant teens, 14% had resided in rural

communities when compared to those teenage mothers, a mere 10 %, who had resided in the urban areas. This ethnic display has been in support of a Nigerian Study where authors Adewuyi and Lamicahhane (2017) reported that infants in rural residence have higher rates of mortality than their urban counterparts and that the disparities in risk factors exhibited by such reality has stemmed from inequalities and the social determinants of health. It was further noted that the place of residence was significant enough to decrease the baby's weight as a result of lack of nutrients (Ghouse & Zaid, 2016). However, a careful analysis revealed that there was no statistical significance between birth weight and antenatal attendance at the obstetric primary care clinic. Khan, Nasrullah, and Jaleel (2016) found a strong correlation between inadequate antenatal care and low birth weight, and that the lack of checkups for complications among pregnant teens was associated with neonatal mortality.

In this study the Bronfenbrenner's ecological systems theory (1979) helped us to explain the role of ethnicity, location, education, and antenatal care in pregnancy outcomes. Although there were no connections found between socioeconomic factors and low birth weight, the provision of good health services, the availability of transportation, and the presence of a social networks can lead to positive pregnancy outcomes for teens (Vincent & Alemu, 2016). There was a modest relationship between education and antenatal care. From literature review, it was found that importance should be placed in the enactment of appropriate policies, on the teaching of sex education in schools, and on lending support to communities from where the teenage mothers' originate. Such types of intervention could provide an increase awareness in the prevention of pregnancy among the teens in this

middle to late teenage group. It is expected that teens attending and remaining in school would help to delay the first sexual encounter, as frequently, teen mothers have been shown to be typically unprepared and lack coping skills in the company of peer pressure (Vincent & Alemu, 2016).

Definition of Terms

Age: This independent variable refers to the age of the teenage mother as reported in the birth data as given by the MICS (Situation Analysis of Children and Women in Guyana (2016).

Antenatal care: Antenatal care visits. The independent variable Antenatal care visits refers to the number of times during her pregnancy a mother sought health services which relate to her pregnancy and impending birth, reported in the birth data from the MICS (Situation Analysis of Children and Women in Guyana (2016).

Census enumeration areas (or enumeration districts in Guyana) is defined as primary sampling units (PSUs), and is selected from each of the sampling strata by using systematic PPS (probability proportional to size) sampling procedures, based on the number of households in each enumeration area from the 2012 Population and Housing

Census frame (Situation Analysis of Children and Women in Guyana (2016).

Location: Location includes teenagers who reside in the Coastal, Urban Coastal, Rural Coastal or Interior parts of Guyana in the 10 administrative and developmental regions

Low birth weight- LBW is defined as weight at birth less than 2500 grams (2.5 kg) or 5.5 pounds [lbs] (WHO, 2012). This is the first measurement of an infant's weight taken within the first few hours after delivery and is measured in either pounds or grams. For the purposes of this study, the dependent variable birth weight refers to the infant's weight in grams, as reported in the birth data.

Neonatal death: Babies die before the first 28 days of life (Situation Analysis of Children and Women in Guyana, 2016).

Postnatal care: The independent variable postnatal care visits refer to the number. Of times after delivery a mother sought health services as reported in the MICS (MICS, 2014).

Sociodemographic/Socioeconomic factors: Sociodemographic variables include teenage age of groups (15–19 years); ethnicity (East Indian, African, Amerindian and Mixed); educational level (none, primary, secondary, and higher) and Wealth Index (Poorest, Second, Middle, Fourth, and Richest).

Crude birth rate (CBR) is the number of live births per 1,000 populations during the specified period.

General fertility rate (GFR) is the number of live births occurring during the specified period per 1,000 women aged 10-19 years.

Assumptions

In this study, the following assumptions were made: (a) the sample was adequate and represented the population under review; (b) the data were of a high quality; (c) the self-reporting by the participants was acceptable.

Limitations

This study was subject to three limitations. : (a) The study was cross-sectional and the ability to establish a causal direction between independent variables and dependent variables was limited. (b) In this study, a teenager was considered to be 15-19 years old (in other studies, a teenager was 10 -15 years old or 14-19 years old (Nguyen, Shiu, & Farber, 2016) - this suggests a selection bias.(c) The wealth index used was not a numerical value but a proxy; hence, questions I asked of the household relied on recall of some of the things owned (Nguyen, Shiu, & Farber, 2016). This had given rise to a recall bias as well as some difficulty in determining teenagers' veracity.

Scope and Delimitations

The scope of this study was limited to factors in which the independent variables included and was limited to the teenager's (a) age, (b) education, (c) location, (d) ethnicity; (e) the wealth index of the household, (f) the presence of skilled personnel at the clinic, and (g) whether the teenager's baby received adequate antenatal and postnatal care. Efforts are made to determine whether the ethnicity of the household head, and the location of the teenage mothers had an effect on neonatal mortality; whether the education of the teenage mother had an impact on the birth weight of the baby; and whether the relationship between

the teenage mother attending the antenatal clinic—and those who were seen and managed by a skilled physician or health care worker—were correlated with neonatal mortality. Pregnant teenage mothers, who lived in rural communities with limited economic resources, had a high risk of early conception. The data garnered from this study is expected to realize serious interventions to improve the livelihoods and fortunes of these vulnerable teenagers.

Significance of Study

A study on the correlation between sociodemographic and socioeconomic factors and teenage pregnancy outcomes in Guyana is important for several reasons. According to Lassi et al. (2016), resource availability, including equitable access to skilled and motivated healthcare workers, plays a pivotal role in pregnancy outcomes among mothers in their teens. In addition, Bayati et al. (2016) noted that the identification and analysis of socioeconomic factors improve the quality care of teenage mothers and posited that location and communities with low socioeconomic status and with inadequate financial resources have a negative impact on infant health status and survival. Firstly, it is important to note and understand the dire consequences that pregnancies can have on teenagers especially when considering their sociodemographic and socioeconomic aspects in Guyana. Vital information on social accountability interventions for sustained improvements in the coverage, quality, and equity of antenatal services can be obtained. In addition, obtaining important evidence of sociodemographic factors and socioeconomic factors on the pregnancy outcomes of teenage pregnancy through the shared responsibility of policy makers, the community, and the teenage family can be revealing (Khan, Nasrullah, &Jaleel,

2016). According to Khan, Nasrullah, and Jaleel (2016) interventions—which involve the community, frontline health providers, and stakeholders—help overcome challenges and improve pregnancy outcomes. Secondly, this study provided (a) information for a policy document to encourage the pregnant teen to continue schooling before and after pregnancy; and (b) a robust health promotion strategy to help enlighten teenagers on sexual and reproductive health, contraception, and abstinence. Thirdly, the study allows for interventions and initiatives in sex education and reproductive health to be placed on the front burner. It is important that developing countries strive to achieve Sustainable Development Goals 1, 3, and 4 by reducing adverse pregnancy outcomes among teenagers. An ecological and macro-level perspective will allow for plausible inferences to be drawn. This study will allow for the sharing and dissemination of information garnered to policy makers and relevant stakeholders on possible ways to improve pregnancy outcomes among teenagers (Bayati et al., 2016).

Summary

Teenage pregnancy remains a public health issue and a significant socioeconomic problem globally and in developing countries such as Guyana, South America. According to Situation Analysis of Children and Women in Guyana (2016), the adolescent birth rate in Guyana stands at 74 per 1,000 and the percentage of teenage pregnancy among girls' ages between 15 and 19 especially among the women in the indigenous communities has been at 20 %. Teenage pregnancies compounded by sociodemographic factors, low socioeconomic status, and inadequate primary healthcare and skilled health personnel contribute to and have been associated with adverse pregnancy outcomes such as LBW and neonatal

mortality (Ghouse & Zaid, 2016; Opondo et al., 2019; Oyekale & Maselwa, 2018; Morisaki et al., 2017;Wong Shee et al., 2018). Therefore, emphasis must be placed on the inequities between the coastland and hinterland areas, the timely and appropriate health delivery and the social determinants of health (Situation Analysis of Children and Women in Guyana, 2016).

The study was a quantitative cross-sectional correlational design involving the analysis of secondary archival data from the 2014 UNICEF Multiple Indicator Cluster Survey round 5 (MICS5). Examination was done to see the effect of sociodemographic and socioeconomic factors on pregnancy outcomes. An association was sought between the independent variables ethnicity, location, level of education of the teenage mother and the utilization of skilled personnel at the antenatal and postnatal clinics to which the teen mothers attended and neonatal mortality and low birth weight, the dependent variables.

Section 2 looked at the research design and data collection—the procedures and methods of the study—and thus examines the questions and rationale of the research questions in the Study.

Section 3 included the results of the data analysis and the findings to the research questions

Section 4 provided information on the application of the study to professional practice, the implications of positive social change, recommendations for actions to the problem and public health concern of teenage pregnancy, the conclusion nd how the study will contribute to knowledge advancement.

Section 2: Research Design and Data Collection

Introduction

Understanding the relationships between sociodemographic and socioeconomic factors and pregnancy outcomes contributes to improved natal health outcomes. The purpose of this study was to examine the effect of sociodemographic and socioeconomic factors on pregnancy outcomes among teenagers in Guyana, South America, including the coastland and hinterland communities. In the process, the study used a review of quantitative national and international surveys, demographic and health surveys, a census survey, and income and expenditure surveys.

Section 2 contains descriptions of the study's methodological issues and procedures: the rationale for the selected research design; descriptions of the population, sample, and instrumentation; data analysis procedures, threats to validity, and ethical issues; a summary of the methodological procedures.

Research Design and Rationale

This study used a quantitative method and a cross-sectional, correlational design. The design was appropriate because it is relatively quick, easy to conduct, and cost effective (Howell, 2013); it was appropriate for determining the relationships between the variables measured at a single point in time (Howell, 2013). This quantitative method allowed me to determine relationships between variables, test hypotheses, and generalize the results to the population. The independent variables of the study were the sociodemographic factors of age, ethnicity, and location; the socioeconomic factors were education and wealth, along

with skilled, professional ante- and postnatal care. The dependent variables were neonatal mortality and LBW.

Secondary Data Analysis Methodology

Population

The population of interest in this study is operationally defined and includes all pregnant women residing in the 10 administrative regions of Guyana who are less than 20 years of age at the time they would have become pregnant and registered at the Ministry of Public Health Facility in the selected areas for antenatal care. It is noted that the adolescent population (15-19 years) estimation in Guyana is157, 858 or 21.1% of the total population. According to Bureau of Statistics, Ministry of Public Health and UNICEF (2015), the adolescent birth rate stands at 74 per 1,000 women. Twenty percent of the births in the country occur among adolescents (PAHO, 2012).

Prevalence of Teen Pregnancies in Guyana

Overall births in Guyana have seen an increase from 13,700 in 1991 to 19,300 in 1997 after which there was a decline through 2011. In Guyana, adolescents' pregnancies have varied from 19.7% to 23.7% of all pregnancies for the period 1991-2011 (PAHO/WHO, 2015) and have been between 20-22% for the period 2015-2016 (Ministry of Public Health, 2017). In 2014, the adolescent birth rate was 74 per 1,000 women, a little lower than the country's general fertility rate of 81 per 1,000 (MICS, 2014).

Sampling Procedures

The study sample consisted of secondary data obtained from the Multiple Indicator Cluster Survey round 5 (MICS5; Bureau of Statistics, Ministry of Public Health and UNICEF, 2014). Access to the data set was gained via: Telephone call, from conversation with the UNICEF Country Director in Guyana and through online request through UNICEF website.

The MICS5 household-based, cross-sectional survey used health facilities across Guyana. Information from the MICS5 which was supported by UNICEF and included individuals nationally, sub-nationally, and from the urban-rural representation of the population. The MICS5 was funded by the Government of Guyana, through the Bureau of Statistics and the Ministry of Health, as part of the global MICS program. It measured key indicators which were used to assess the situation of women and children in Guyana and captures demographic, health, and socioeconomic information.

The MICS 2014 was conducted among 5,077 households which were interviewed, and 19,321 household members (9,326 males and 9,995 females) who were listed to indicate a mean household size of 3.8. However, the sample size for the Guyana MICS 5 2014 was established as 6,000 households; the calculation of the sample size, and the key indicator used the underweight prevalence among children age 0-4 years to produce a sample size of 8,623 households. Hence the expected relative margin of error increased to 14 % According to Bureau of Statistics, Ministry of Public Health and UNICEF (2015), 72% of households were found to be from the rural areas whereas 12% came from the interior areas: 36% of the population was below 18 years old. The 2012 census frame was

used for the selection of clusters. A multistage, stratified cluster sampling approach was used for the selection of the original survey sample. The number of households selected per cluster for the Guyana MICS 5 was determined as 20 household based on but not limited to the design effect, time, and budget constraints. On dividing the total number of households by the number of sample households per cluster, a calculation was made that 300 sample clusters was needed for the allocation to the two domains (coastal and interior) by urban/rural across the 10 geographic regions of Guyana. The sample size for the Guyana MICS5 2014 was established as 8,623 as this was the number of households interviewed with a response rate of 92 %.

To be included in this study, households surveyed in the MICS5 was expected to have a pregnant mother between the ages of 15 to 19 who gave birth in a health facility in the interior or hinterland regions in Guyana with a stay of 12 hours or more and who was attended to by a skilled health professional. Households were excluded from this study if the teenager gave birth in a level 5 health facility or if the household had not a pregnant teenager.

To determine the minimum sample size needed for the proposed analyses, a power analysis was conducted using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007). The power analysis therefore used multiple linear regressions with four predictors, a medium effect, the size assumed, a power level of .80, and a significance level of .05. These parameters were deemed appropriate for social science research when there was no justification for a small or large effect size based on previous research (Cohen, 1988).

Based on these parameters, the results of the power analysis had shown that the minimum sample size required was 85.

Instrumentation and Operationalization of Constructs

The original data collection instrument had been the MICS5 model questionnaire (Bureau of Statistics, Ministry of Public Health and UNICEF, 2015). The customized and pretested questionnaires had included three locations: In both urban, rural areas, and a community in the interior areas.

Questionnaires used in the survey included: A household questionnaire, a questionnaire for individual women, and a questionnaire for children less than five years of age (Bureau of Statistics, Ministry of Public Health and UNICEF, 2015). The Household Questionnaire utilized, and collected basic demographic information on all household residents and the dwelling and includes: The list of household members, the education of the household members, and the household characteristics.

The questionnaire for individual women less than 20 years old living in household was administered and included: the women's background, the fertility of the women such as their birth history including the number of children birthed by the mother, the newborn's health, postnatal checks of both mother and neonate, and prevention guidance.

The questionnaire for the infant was administered to the mother or caretaker of the infant.

Ethnicity was an independent variable in this study and was operationalized by the ethnicity of household head item of the survey. This independent variable was a nominal-level variable with five levels: indication was made whether the mother was of East Indian, African, Amerindian, Mixed race, and of other origin.

Age was an independent continuous variable in this study, and was operationalized by the "age of woman" variable from the dataset which recorded age in years.

Location was an independent variable in this study and was operationalized by the area item of the survey. This nominal-level variable had two levels: the mothers came from either an urban and rural residence.

Education was an independent variable in this study and was operationalized by the mother's education item of the survey. Education was a nominal-level variable with five levels: the pregnant mother indicated whether she had no education or would have attended schooling at the various levels-none, nursery, primary, secondary, and higher. Wealth index was an independent variable in this study and was operationalized by a combination of "yes" or "no". The reply to this question was a gauze as to the socioeconomic status of the family.

Skilled professional ante-natal care was an independent variable in this study and was operationalized by the "received ante-natal care" and "times received ante-natal care" items of the survey. Received ante-natal care was a nominal-level variable with two levels: yes and no. A statement was made as to ascertain whether a visit was made to the antenatal clinic.

Times received ante-natal care is a continuous variable. Skilled professional post-natal care was an independent variable in this study and was operationalized by: The "received post-natal care" and "Times received post-natal care" items of the survey.

Received post-natal care was a nominal-level variable with two levels: Yes and No.

Times received post-natal care was an interval level variable. The number of times visits were made by the teenage mother to the postnatal clinic were noted. Neonatal mortality was a dependent variable in this study and was operationalized by the whether or not the baby died within 28 days. Neonatal mortality was a nominal-level variable with two levels: Yes (died within 28 days) and No (did not die within 28 days).

LBW was a dependent variable in this study and was operationalized by reported birth weight in kilograms. LBW was a ratio-level variable.

Data Collection of Secondary Data Set

The Guyana Multiple Indicator Cluster Survey Round 5 (MICS5) tool was developed by UNICEF. The collection of data was carried out in 2014 by the Bureau of Statistics, as part of the global MICS programme under the aegis of the Ministry of Health in Guyana. This household survey collected a wide range of internationally comparable data with indicators on situation of children and women (Bureau of Statistics, Ministry of Public Health and UNICEF, 2015). Technical support was provided by the United Nations Children's Fund (UNICEF). UNICEF, the Inter-American Development Bank (IDB) and the Government of Guyana provided financial support. The tool consisted of information on adolescents birth rate, early childbearing, antenatal coverage, the content of antenatal coverage, the skilled attendants at delivery, institutional deliveries and caesarean sections (Bureau of Statistics, Ministry of Public Health and UNICEF, 2015). This information that was garnered helped to inform policy makers at the ministry of health in Guyana, to monitor progress and report on the Millennium Developmental Goals (MDGs), as well as served as a baseline for data post 2015.

Time Frame and Response Rate

The field work for the data collection occurred between April and July 2014. The households that were sampled was 5, 904; the households that were occupied had been 5,526; whereas the households that were interviewed were 5,077 (Bureau of Statistics, Ministry of Public Health and UNICEF, 2015). This was a multistage stratified cluster sampling. According to Bureau of Statistics, Ministry of Public Health and UNICEF (2015), the response rate was 91.9 %. When one considered the implementation of questionnaires, it was noted that children under the age of five accounted for 3, 482; whereas the mothers and caregivers who were interviewed accounted for 3,358 (Bureau of Statistics, Ministry of Public Health and UNICEF, 2015). In this case, there was a response rate of 96.4 %. Infants under one year of age and teenagers between the ages of 15 and 19 were included in the interviews and survey (Bureau of Statistics, Ministry of Public Health and UNICEF, 2015).

Discrepancies

It is important to note that some discrepancies were seen between the MICS 5 household data and the UN population report where the latter used population projections.

Missing data. Newgard and Lewis (2015) noted that variables that require complex, time-sensitive, resource-intensive collection methods can have missing data. The authors reported that if the method used for not handling the missing is not carefully studied, there can be biased results that can and also reduce the statistical power of the study and also affect the chance of the researcher drawing valid inferences. There were missing data in this study show that the minimum sample size required is 85 when utilizes multiple linear

regressions with the four predictors mentioned above was utilized. There were a large number of missing data for the independent variables ethnicity, location, and also where calculation is made of the number of times the baby was checked post natally be a skilled attendant or health personnel as seen in the frequency table (Table1) for the nominal and ordinal variables where *N* is equal to 2960.

Estimation of sampling errors. The secondary data obtained from the UNICEF MICS, made use of CSPro Version5.0, SPSS Version21 Complex Samples module and CMR Jack as the sample of selected respondents in the MICS5 was the only one of the samples that had used the same design and size (Bureau of Statistics, Ministry of Public Health and UNICEF, 2015). According to Bureau of Statistics, Ministry of Public Health and UNICEF (2015), each of the samples would have yielded results that would have been different from the actual sample which were selected. Therefore standard error, coefficient of variation, design effect, and confidence limits were sampling measures that were taken into account for the selected indicators for the MDGs (Bureau of Statistics,
Ministry of Public Health and UNICEF, 2015).

Data that were not applicable based on previous responses. The UNICEF tool contained principal questions that were not applicable to some participants. For instance I would have excluded participants who were over 20 years with children.

Operational definition of variables. Table 1 depicts a picture of the statistical analysis plan. Independent and dependent variables were listed with identification of the type of data, levels of measurement, definition, and data values.

Table 1

Operational Definitions of Variable

Variable	Data Type	Level of Measurement	Definition	Data Value Units
Independent				
Ethnicity	Categorical nominal	Nominal	Race	1. East Indian 2. African 3. Amerindian 4. Mixed Race 5. Other
Location	Categorical	Nominal	Area of residence	1. Urban 2. Rural
Education	Categorical	Ordinal	Reported highest of schooling	1. None 2. Nursery 3. Primary 4. Secondary 5. Higher
Received Antenatal care	Binary Categorical	Nominal	While the teenage mother attended the clinic	1. Yes 2. No
Times received care Antenatal care		Continuous (interval)	Number of times got antenatal care	
Received Postnatal care	Binary Categorical	Nominal	While the teenage mother attended the clinic	1. Yes 2. No
Times received care Postnatal care		Continuous (interval)	Number of times got antenatal care	
Dependent				
Neonatal Mortality	Binary Categorical	Nominal	Baby died within 28 days of birth	1. Yes 2. No

Low birth weight	Continuous (Ratio)	Actual weight was recorded in kilograms or grams

Data Analysis Plan

Cases that did not meet the study inclusion and exclusion criteria were removed and the data entered into Intellectus Statistics for data analysis. Missing data were handled by pair wise exclusion, meaning cases that were excluded from the analyses for which the required data were missing. Descriptive statistics were then computed and reported for the study variables. Frequencies and percentages were later computed for categorical variables, and means and standard deviations were computed for continuous variables.

Data preparation and cleaning. For this study, data was archived from the UNICEF database and with an agreement with the UNICEF country's representative and the Ministry of Health. The data from the UNICEF's data base were then inputted in Intellectus Statistics and the variables were coded based on the definitions in the methodology section of this study. The data included the independent variables (location, residence, education and antenatal and postnatal care by skilled attendants). The dependent variables were neonatal mortality and low birth weight. These data were inputted as categorical and was measured on a quantitative scale. The variable names included ethnicity (East Indian = 1, African =2, Amerindian = 3, Mixed = 4, and others = 5); location (Urban =1, Rural = 2); education (none = 1, nursery = 2, primary = 3, secondary =

4, and higher = 5); received antenatal care (1=yes and no= 2). The dependent variables were entered as neonatal mortality (yes =1 baby died within 28 days, and no = 2 baby did not die within 28 days of life). In the case of birth weight, the actual weight was recorded.

Research Questions and Hypotheses

The research questions and hypotheses to be addressed by the data analyses will be as follows:

RQ1: Among the teenagers in Guyana ages 15 to 19, is there a relationship between the ethnic origins of a teenage mother and neonatal mortality and low birth weight?

$H_0$1a: There is no statistically significant relationship between the ethnic origin of a teenage mother ages 15 to 19 in Guyana and neonatal mortality.

H_a1a: There is a statistically significant relationship between the ethnic origin of a teenage mother ages 15 to 19 in Guyana and neonatal mortality.

$H_0$1b: There is no statistically significant relationship between the ethnic origin of a teenage mother ages 15 to 19 in Guyana and low birth weight.

H_a1b: There is a statistically significant relationship between the ethnic origin of a teenage mother ages 15 to 19 in Guyana and low birth weight.

RQ2: What is the relationship between the location of the pregnant teenager in Guyana and neonatal mortality and low birth weight?

$H_0$2a: There is no statistically significant relationship between the location of the pregnant teenager in Guyana and neonatal mortality.

H_a2a: There is a statistically significant relationship between the locations of the pregnant teenager in Guyana neonatal mortality.

$H_0$2b: There is no statistically significant relationship between the location of the pregnant teenager in Guyana and low birth weight.

H_a2b: There is a statistically significant relationship between the location of the pregnant teenager in Guyana and low birth w eight.

RQ3: What is the relationship between the level of education of the pregnant teenage mother in Guyana, and neonatal mortality and also the birth weight of her infant?

$H_0$3a: There is no statistically significant relationship between the level of education of the pregnant teenage mother in Guyana and neonatal mortality.

H_a3a: There is a statistically significant relationship between the level of education of the pregnant teenage mother in Guyana and neonatal mortality.

$H_0$3b: There is no statistically significant relationship between the level of education of the pregnant teenage mother in Guyana and low birth weight.

H_a3b: There is statistically significant relationship between the level of education of the pregnant teenage mother in Guyana and low birth weight.

RQ4: What is the relationship between attendance at antenatal care by teenage mothers attending antenatal clinic and neonatal mortality in Guyana?

$H_0$4a: There is no statistically significant relationship between attendance at antenatal care by teenage mothers Guyana and neonatal mortality.

H_a4a: There is a statistically significant relationship between attendance at antenatal care by teenage mothers in Guyana and neonatal mortality.

$H_0$4b: There is no statistically significant relationship between attendance at antenatal care by teenage mothers Guyana and low birth weight.

H_a4b: There is a statistically significant relationship between attendance at antenatal care by teenage mothers Guyana and low birth weight.

Table 2 shows the summary of the statistical procedures and analyses with the corresponding research question and hypothesis.

Table 2 *Summary of Statistical Procedures per Research Question and Hypothesis*

Research Question	Hypothesis	Variables	Statistical Analyses
RQ1: Among the teenagers in Guyana ages 15 to 19, is there a relationship between the ethnic origins of a teenage mother and neonatal mortality and low birth weight?	$H_0$1a: There is not statistically significant relationship between the ethnic origin of a teenage mother ages 15 to 19 in Guyana and neonatal mortality. $H_0$1b: There is not statistically significant relationship between the ethnic origin of a teenage mother ages 15 to 19 in Guyana and low birth weight.	Ethnicity	Descriptive statistics: Frequencies and percentages. Inferential Statistics: Logistic regression and linear regression

RQ2: What is the relationship between the location of the pregnant teenager in Guyana and neonatal mortality and low birth weight?	$H_0$2a: There is not statistically significant relationship between the location of the pregnant teenager in Guyana and neonatal mortality. $H_0$2b: There is not statistically significant relationship between the location of the pregnant teenager in Guyana and low birth weight.	Location	Descriptive statistics: Frequencies and percentages. Inferential Statistics: Logistic regression and linear regression
RQ3: What is the relationship between the level of education of the pregnant teenage mother in Guyana, and neonatal mortality and also the birth weight of her infant?	$H_0$3a: There is no statistically significant relationship between the level of education of the pregnant teenage mother in Guyana and neonatal mortality. $H_0$3b: There is no statistically significant relationship between the level of education of the pregnant teenage mother in Guyana and low birth weight.	Education	Descriptive statistics: Frequencies and percentages. Inferential Statistics: Logistic regression and linear regression

To address the research questions and hypotheses, a series of regressions were conducted. The dependent variables in these analyses were neonatal mortality and low birth weight. A separate regression was conducted for each dependent variable. Consideration was made of the independent variables sociodemographic factors (age, ethnicity and location), socioeconomic factors (education and wealth index), skilled professional ante-natal care, and skilled professional post-natal care. Nominal independent variables were dummy-coded with the largest category for each variable serving as the reference group.

A binary logistic regression was conducted to determine the relationships between neonatal mortality and ethnicity, location, skilled professional ante-natal care, and skilled professional post-natal care. The predictors in this regression were ethnicity, location, skilled professional ante-natal care, and skilled professional post-natal care. to address RQ1, RQ2, RQ3, and RQ4 the significance of the individual predictors were examined. Prior to interpreting the results of the binary logistic regression, the assumption of absence of multicollinearity was examined through variance inflation factors (VIFs). According to Stevens (2009), VIF values greater than 10 would indicate that multicollinearity was a problem.

To determine the relationships between LBW and education, a multiple linear regression was conducted. The predictors in this regression were education and wealth index. The significance of the individual predictors was examined to address RQ3. Prior to interpreting the results of the multiple linear regressions, the assumptions of normality, homoscedasticity, and absence of multicollinearity will be examined. Normality will be examined by visual inspection of a Q-Q scatter plot. Homoscedasticity will be examined by

visual inspection of a scatter plot of residuals and fitted values. Multicollinearity will be examined through VIFs, and for VIF values greater than 10 then multicollinearity will be a problem (Stevens, 2009).

Threats to Validity

According to Creswell (2013), there have been several threats to validity when considering a study and the researcher's conclusion to the outcome. Internal validity had referred to the degree that the results of the study attributable to the independent variables rather than confounding variables not controlled by the researcher.

Internal Validity

To address the potential threats to internal validity in this study, consideration has been made to identify confounding variables which are not measured in the original dataset and to account for any observed relationships between sociodemographic, socioeconomic factors, and pregnancy outcomes. Another type of threat to internal validity is maturation; the pregnant teen and mother may have matured or change while the data is being collected. Yet another type of internal validity is selection. A bright teenage mother is selected in preference to a mother who has a lower level of education; wherein individuals who volunteered to participate in the original data collection differ in important ways from those who did not volunteer or otherwise were not a part of the sample. The locations for this study include: a) Rural, b) Coastal and c) Hinterland or interior areas. Therefore the participants who are randomly selected are not equally distributed in terms of the characteristics identified in the study.

External Validity

External validity had referred to the degree that the results of the study had applied to the larger population. Potential threats to external validity in this study included: a) the interaction of setting and sampling, because of the characteristics of the setting of the participants in the questionnaire; and b) the researcher being able to generalize to individuals in all the regions of Guyana.

Ethical Procedures

This study employed good ethical practices: The rights of the teenagers were not violated as Guyana boasts several legislations, national laws and protection of adolescents; there has also been the presence of the Protection of Children Act which has been implemented in 2010 that do protect adolescents less than 18 years of age as well as teenagers over 18 years with special needs. Several government agencies have signed on to the enforcement of this act including the Ministry of Health and Education (Situation Analysis of Children and Women in Guyana (2016).

Informed verbal consent was obtained from the teenagers as well as the parents in the case of all respondents who are living with their parents, and where the teenagers are seen to live on their own, their consent is obtained from themselves. Permission and request for the Study are being sought from: The ethics review committee (IRB) of the Ministry of Public Health, UNICEF, and The Walden's Ethics Review Board.

Permission was granted for the study from UNICEF and the Ministry of Health in Guyana and from the Walden University. UNICEF and the Ministry of Health in Guyana

also provided ethical consent and agreement for the original data collection. To enhance the protection and storage of the data garnered from the study, a computer protected password has been installed.

Ethical Concerns

Teenage pregnancy continues to be a significant public health issue that requires researchers in this field to be cognizant of the ethical principles of respect for persons, beneficence, and justice (Matlala, 2017). According to Matlala (2017), the purpose for identifying such vulnerable population has been to allow for maximum participation within the requirements of ethical research; while simultaneously avoiding the unintentional support of stigma. Matlala (2017) further stated that informed voluntary consent had shown the researcher‘s ability to explain to the participants the plans of this research and the intended outcomes.

Treatment of Data

The private and confidential information shared by the semi structures interviews will be placed in a secure place to ensure that the teenager’s right to privacy will be maintained in a private setting (Matlala, 2017). A unique identifier will be made to assist in the security of private information and sensitive topics as falling pregnant while in school or dropping out of school (Matlala, 2017). The data obtained will not be given to any user without permission from the Bureau of Statistics in Guyana, the Ministry of Public Health and UNICEF Country Representative. The plan will be to keep the data indefinitely as the records of this study will remain relatively secure. A copy of this research will be

disseminated among relevant stakeholders including Ministry of Public Health, Ministry of Education, Ministry of Bureau and Statistics, Technical Partners

UNICEF.

Summary

In this section 2, the procedure for the quantitative secondary analysis of archival data from 2014 UNICEF's Multiple Indicator Cluster Survey Round 5 (MICS5) was outlined. The population of interest had included all pregnant women between the ages of 15 and 19 in the ten administrative regions of Guyana; and who had given birth in a health facility in the hinterland or coastland regions of Guyana with a stay of 12 hours or more and was attended to by a skilled health personnel at the antenatal and postnatal clinics. To examine the effect of sociodemographic and socioeconomic factors on pregnancy outcomes among teenagers in Guyana, this cross-sectional, correlational research study allowed the researcher to determine relationships between variables, test specific hypotheses and generate results to the population. The sample size based on a G* Power analysis for multiple regression was calculated using the predictors medium size effect, power of 0.8 and a significance level of 0.05.

Section 3 includes the results of the data analyses and the findings pertaining to each research question.

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this quantitative study was to analyze secondary data from the UNICEF MICS5 and to examine the impact of the sociodemographic and socioeconomic factors: the independent variables of ethnicity, location, education, and antenatal care; and the teenage pregnancy outcomes. These four risk factors have been shown to play a pivotal role and a potential challenge to both dependent variables, pregnancy outcomes neonatal mortality and low birth weight (Opondo et al., 2019; Ghouse & Zaid, 2016). The null hypothesis was stated as there is no significant relationship between the sociodemographic factors and socioeconomic factors and the pregnancy outcomes in Guyana; whereas the alternative hypothesis was stated as there was a significant relationship between the sociodemographic factors and the socioeconomic factors and teenage pregnancy outcomes in Guyana.

With the use of data from UNICEF MICS5, I was able to answer the research questions below. This chapter 3 offered information on detailed analysis of the study. There is the descriptive analysis, results of the binary logistic regression with assumptions, and the results of the linear regression with assumptions and summaries.

Research Questions and Hypotheses

The research questions and hypotheses to be addressed by the data analyses is as follows: RQ1: Among the teenagers in Guyana ages 15 to 19, is there a relationship between the ethnic origins of a teenage mother and neonatal mortality and low birth weight?

$H_0$1a: There is no statistically significant relationship between the ethnic origin of a teenage mother ages 15 to 19 in Guyana and neonatal mortality.

H_a1a: There is a statistically significant relationship between the ethnic origin of a teenage mother ages 15 to 19 in Guyana and neonatal mortality.

$H_0$1b: There is no statistically significant relationship between the ethnic origin of a teenage mother ages 15 to 19 in Guyana and low birth weight.

H_a1b: There is a statistically significant relationship between the ethnic origin of a teenage mother ages 15 to 19 in Guyana and low birth weight.

RQ2: What is the relationship between the location of the pregnant teenager in Guyana and neonatal mortality and low birth weight?

$H_0$2a: There is no statistically significant relationship between the locations of the pregnant teenager in Guyana and neonatal mortality.

H_a2a: There is a statistically significant relationship between the locations of the pregnant teenager in Guyana neonatal mortality.

$H_0$2b: There is no statistically significant relationship between the locations of the pregnant teenager in Guyana and low birth weight.

H_a2b: There is statistically significant relationship between the locations of the pregnant teenager in Guyana and low birth weight.

RQ3: What is the relationship between the level of education of the pregnant teenage mother in Guyana, neonatal mortality, and the birth weight of her infant?

$H_0$3a: There is no statistically significant relationship between the level of education of the pregnant teenage mother in Guyana and neonatal mortality.

H_a3a: There is a statistically significant relationship between the level of education of the pregnant teenage mother in Guyana and neonatal mortality.

$H_0$3b: There is not a statistically significant relationship between the level of education of the pregnant teenage mother in Guyana and low birth weight.

H_a3b: There is statistically significant relationship between the level of education of the pregnant teenage mother in Guyana and low birth weight.

RQ4: What is the relationship between attendance at antenatal care by teenage mothers and neonatal mortality and also low birth weight in Guyana?

$H_0$4a: There is no statistically significant relationship between attendance at antenatal care by teenage mothers Guyana and neonatal mortality.

H_a4a: There is a statistically significant relationship between attendance at antenatal care by teenage mothers in Guyana and neonatal mortality.

$H_0$4b: There is no statistically significant relationship between attendance at antenatal care by teenage mothers Guyana and low birth weight.

H_a4b: There is a statistically significant relationship between attendance at antenatal care by teenage mothers Guyana and low birth weight.

Round 5 of the 2014 Multiple Indicator Cluster Survey, conducted by the team consisting of UNICEF, the Guyana Ministry of Health, and the Bureau of Statistics used the sample size of 6,000 households for the study. Excluded from the analysis were 1854 (63%) persons with missing data on whether there were from the East Indian, African, Amerindian or Mixed Ethnic background; there were 1677 (57%) persons with missing data on their location as it related to coming from a rural or urban residence. In addition, there were 2279

(77%) missing data on whether the baby received antenatal care or whether these babies received postnatal checks by skilled professionals.

Results

To address the research questions and hypotheses, a series of regressions were conducted, namely:

- The dependent variables in these analyses were neonatal mortality and birth weight
- A binary logistic regression was conducted to determine the relationships between neonatal mortality and ethnic origins, location, level of education, and attendance at antenatal care, and
- A multiple linear regression was conducted to determine the relationships between birth weight and ethnic origins, location, level of education, and attendance at antenatal care.

The following results were found:

- The overall regression model predicting neonatal mortality was not significant, $\chi^2(11) = 9.60$, $p = .567$
- Neonatal mortality was not significantly predicted by ethnic origins, location, level of education, and attendance at antenatal care
- The overall regression model predicting birth weight was not significant, $F(11,191) = 0.91$, $p = .534$, $R^2 = 0.05$
- Birth weight was not significantly predicted by ethnic origins, location, level of education, and attendance at antenatal care
- Therefore, the null hypotheses were not rejected.

Descriptive Statistics

Introduction. Summary statistics were calculated for each interval and ratio variable. Frequencies and percentages were calculated for each nominal and ordinal variable.

Frequencies and percentages. The East Indian ethnic origin (*n* = 420, 14%) was the most frequently observed category of ethnicity. Whereas the most frequently observed category of Location was Rural (*n* = 997, 34%). On considering the variable education, the most frequently observed category of Mother's education was Secondary (*n* = 2022, 68%). The most frequently observed category of Received Antenatal Care was Yes (*n* = 660, 22%); whereas the most frequently observed category of Baby PN Skilled Checked was Not checked (*n* = 352, 12%). It was noted that the most frequently observed category of Baby PN Times Checked Skilled was Not checked (*n* = 352, 12%); and that the most frequently observed category of Neonatal Mortality was did not die within 28 days (*n* = 2886, 98%). Frequencies and percentages are presented in Table 3.

Table 3

Frequency Table for Nominal and Ordinal Variables (N = 2960)

	n	*%*
Ethnicity (*N* = 1106)		
East Indian	420	14.19
African	304	10.27
Amerindian	167	5.64
Variable	*n*	*%*
Mixed Other DK	215	7.26
Missing	1854	62.64

Location (*N* = 1283)		
Rural	997	33.68
Urban	286	9.66
Missing	1677	56.66
MotherEducation (*N* = 2960)		
None	111	3.75
Primary	723	24.43
Secondary	2022	68.31
Higher	104	3.51
Missing	0	0.00
ReceivedAntenatalCare (*N* = 682)		
Yes	660	22.30
No	22	0.74
Missing	2278	76.96
BabyPNSkilledChecked (*N* = 681)		
Checked	329	11.11
Not checked	352	11.89
Missing	2279	76.99
BabyPNTimesCheckedSkilled (*N* = 681)		
More than once	199	6.72
Not checked	352	11.89
Once	130	4.39
Missing	2279	76.99
NeonatalMortality (*N* = 2960)		
Did not die within 28 days	2886	97.50
Died within 28 days	74	2.50
Missing	0	0.00

Note. Due to rounding errors, percentages may not equal 100%.

Summary statistics. The observations for wealth index had an average of 11.05 (*SD* = 4.95, SE_M = 0.15, Min = 1.00, Max = 37.00). The observations for times received antenatal care had an average of 7.16 (*SD* = 3.96, SE_M = 0.15, Min = 0.00, Max = 28.00). The observations for birth weight had an average of 3.11 (*SD* = 0.63, SE_M = 0.03, Min =

0.75, Max = 6.00). Skewness and kurtosis were also calculated in Table 4. When the skewness is greater than 2 in absolute value, the variable is considered to be asymmetrical about its mean. When the kurtosis is greater than or equal to 3, then the variable's distribution is markedly different than a normal distribution in its tendency to produce outliers (Westfall & Henning, 2013).

Table 4

Summary Statistics Table for Interval and Ratio Variables

Variable	*M*	*SD*	*n*	SE_M	Skewness	Kurtosis
WealthIndex	11.05	4.95	1087	0.15	0.86	1.42
TimesReceivedAntenatalCare	7.16	3.96	682	0.15	0.30	1.44
Birthweight	3.11	0.63	591	0.03	0.30	2.89

Note. '-' denotes the sample size is too small to calculate statistic.

Binary Logistic Regression

Introduction. To examine whether ethnicity, location, mother's education, wealth index, received antenatal care, times received antenatal care, and baby postnatal skilled checked had a significant effect on the odds of observing the Died within 28 days category of neonatal mortality, a binary logistic regression was conducted. The reference category for neonatal mortality was "did not die within 28 days".

Assumptions. The assumption of absence of multicollinearity was examined.

Variance inflation factors. To detect the presence of multicollinearity between predictors, variance inflation factors (VIFs) were calculated. High VIFs indicate increased effects of multicollinearity in the model. VIFs greater than 5 are cause for concern, whereas VIFs of 10 should be considered the maximum upper limit (Menard, 2009). All predictors in the regression model have VIFs less than 10. Table 5 presents the VIF for each predictor in the model.

Table 5

Variance Inflation Factors for ethnicity, Location, MotherEducation, WealthIndex, ReceivedAntenatalCare, TimesReceivedAntenatalCare, and BabyPNSkilledChecked

Variable	VIF
Ethnicity	1.28
Location	1.20
MotherEducation	1.46
WealthIndex	1.14
ReceivedAntenatalCare	1.00
TimesReceivedAntenatalCare	1.29
BabyPNSkilledChecked	1.10

Results. The overall model was not significant, $\chi^2(11) = 9.60$, $p = .567$, suggesting that ethnicity, location, mother's education, wealth index, received antenatal care, times received antenatal care, and baby postnatal skilled checked did not have a significant effect on the odds of observing the Died within 28 days category of neonatal mortality. McFadden's R-squared was calculated to examine the model fit, where values greater than .2 are indicative of models with excellent fit (Louviere, Hensher, & Swait, 2000). The McFadden R-squared value calculated for this model was 0.20. Since the overall model

was not significant, the individual predictors were not examined further. Table 6 summarizes the results of the regression model.

Table 6

Logistic Regression Results with ethnicity, Location, MotherEducation, WealthIndex, ReceivedAntenatalCare, TimesReceivedAntenatalCare, and BabyPNSkilledChecked Predicting NeonatalMortality

Variable	*B*	*SE*	95% CI	χ^2	*p*	*OR*
(Intercept)	-0.78	2.01	[-4.72, 3.17]	0.15	.700	
ethnicityAfrican	0.47	1.14	[-1.77, 2.70]	0.17	.681	1.60
ethnicityAmerindian	-17.14	2779.56	[5464.97, 5430.70]	0.00	.995	0.00
ethnicityMixed Other DK	0.22	1.31	[-2.36, 2.79]	0.03	.869	1.24
LocationUrban	-0.39	1.29	[-2.92, 2.13]	0.09	.761	0.68
MotherEducationPrimary	-1.60	1.54	[-4.61, 1.41]	1.09	.297	0.20
MotherEducationSecondary	-3.10	1.53	[-6.10, -0.11]	4.12	.042	0.04
MotherEducationHigher	-18.83	7445.44	[14611.62, 14573.96]	0.00	.998	0.00
WealthIndex	-0.06	0.10	[-0.26, 0.15]	0.28	.596	0.95
ReceivedAntenatalCareNo	-16.20	4761.44	[9348.44, 9316.05]	0.00	.997	0.00
TimesReceivedAntenatalCare	0.08	0.11	[-0.14, 0.30]	0.48	.487	1.08
BabyPNSkilledCheckedNot checked	-1.41	1.21	[-3.77, 0.96]	1.36	.243	0.25

Note. χ^2 (11) = 9.60, p = .567, McFadden R^2 = 0.20.

Linear Regression Analysis

Introduction. To assess whether ethnicity, location, mother's education, wealth index, received antenatal care, times received antenatal care, and baby postnatal skilled checked significantly predicted birth weight, a linear regression analysis was conducted. The 'Enter' variable selection method was chosen for the linear regression model, which includes all of the selected predictors.

Assumptions. The assumptions of normality of residuals, homoscedasticity of residuals, absence of multicollinearity, and the lack of outliers were assessed.

Normality. On using a Q-Q scatterplot, normality was evaluated (Bates, Mächler, Bolker, & Walker, 2014; DeCarlo, 1997; Field, 2013). The Q-Q scatterplot compares the distribution of the residuals with a normal distribution (a theoretical distribution which follows a bell curve). In the Q-Q scatterplot, the solid line represents the theoretical quintiles of a normal distribution. Normality can be assumed if the points form a relatively straight line. The Q-Q scatterplot for normality is presented in Figure 7.

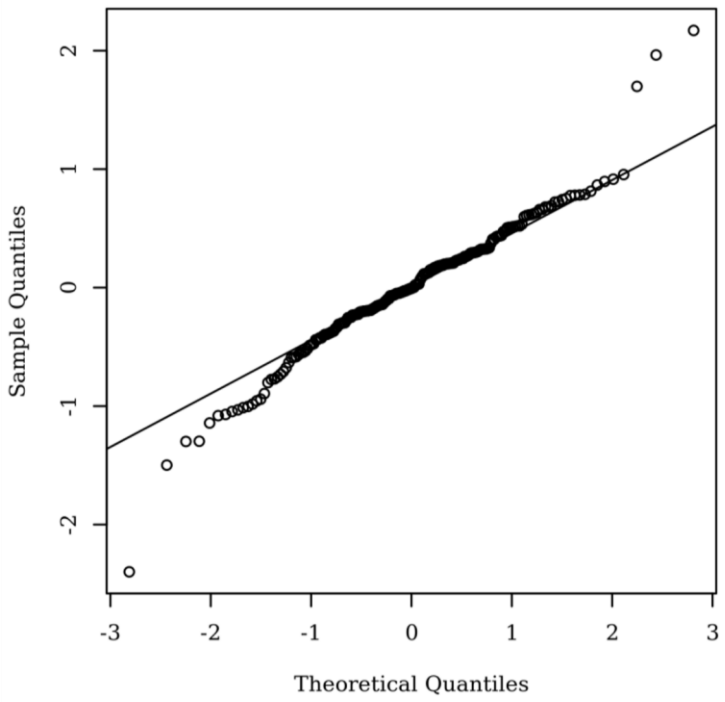


Figure 7. Q-Q scatterplot testing normality.

Homoscedasticity. By plotting the residuals against the predicted values, homoscedasticity was evaluated (Bates et al., 2014; Field, 2013; Osborne & Walters, 2002). The assumption of homoscedasticity is met if the points appear randomly distributed with a mean of zero and no apparent curvature. Figure 8 presents a scatterplot of predicted values and model residuals.

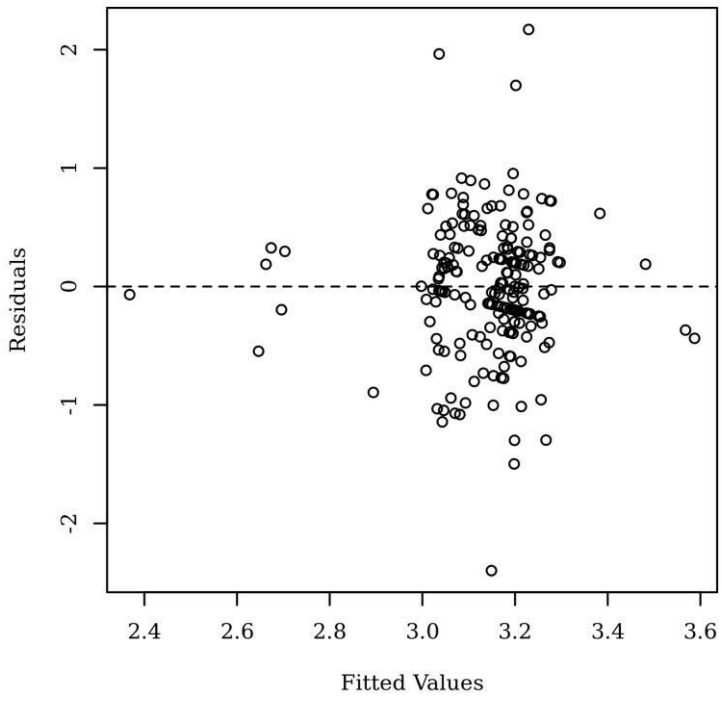


Figure 8. Residuals scatterplot testing homoscedasticity.

Variance inflation factors. To detect the presence of multicollinearity between predictors variance inflation factors (VIFs) were calculated. High VIFs indicate increased effects of multicollinearity in the model. VIFs greater than 5 are cause for concern, whereas VIFs of 10 should be considered the maximum upper limit (Menard, 2009). All predictors in the regression model have VIFs less than 10. Table 7 presents the VIF for each predictor in the model.

Table 7

Variance inflation Factors for ethnicity, Location, MotherEducation, WealthIndex, ReceivedAntenatalCare, TimesReceivedAntenatalCare, and BabyPNSkilledChecked

Variable	VIF
Ethnicity	1.36
Location	1.14
MotherEducation	1.17
WealthIndex	1.21
ReceivedAntenatalCare	1.13
TimesReceivedAntenatalCare	1.17
BabyPNSkilledChecked	1.05

***Outliers*.** To identify influential points, Studentized residuals were calculated and the absolute values were plotted against the observation numbers (Field, 2013; Stevens, 2009). Studentized residuals are calculated by dividing the model residuals by the estimated residual standard deviation. An observation with a Studentized residual greater than 3.13 in absolute value, the .999 quartile of a *t* distribution with 202 degrees of freedom, was considered to have significant influence on the results of the model.

Figure 9 presents the Studentized residuals plot of the observations. Observation numbers are specified next to each point with a Studentized residual greater than three.

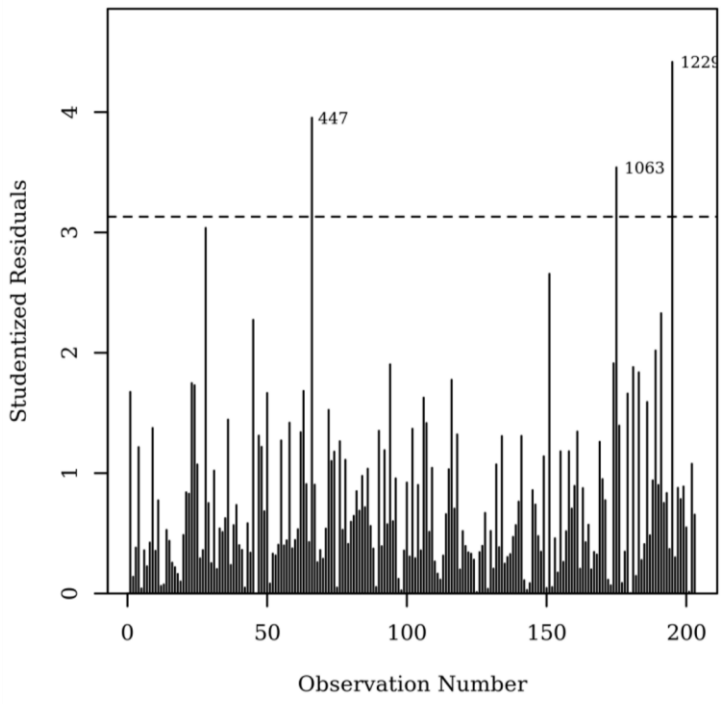


Figure 9. Studentized residuals plot for outlier detection.

Results. The results of the linear regression model were not significant, F (11,191) = 0.91, p = .534, R^2 = 0.05, indicating ethnicity, location, mother's education, wealth index, received antenatal care, times received antenatal care, and baby postnatal skilled checked did not explain a significant proportion of variation in birth weight. Since the overall model was not significant, the individual predictors were not examined further.

Table 8 summarizes the results of the regression model.

Table 8

Results for Linear Regression with ethnicity, Location, MotherEducation, WealthIndex, ReceivedAntenatalCare, TimesReceivedAntenatalCare, and BabyPNSkilledChecked predicting Birthweight

Variable	*B*	*SE*	95% CI	β	*t*	*p*
(Intercept)	3.09	0.26	[2.59, 3.59]	0.00	12.11	< .001
ethnicityAfrican	0.02	0.11	[-0.20, 0.23]	0.01	0.18	.857
ethnicityAmerindian	-0.16	0.14	[-0.43, 0.11]	-0.10	-1.20	.233
ethnicityMixed Other DK	-0.11	0.12	[-0.34, 0.12]	-0.07	-0.91	.366
LocationUrban	0.06	0.11	[-0.15, 0.27]	0.04	0.56	.578
MotherEducationPrimary	0.16	0.24	[-0.30, 0.62]	0.10	0.68	.498
MotherEducationSecondary	0.14	0.22	[-0.29, 0.57]	0.10	0.64	.521
MotherEducationHigher	0.54	0.36	[-0.18, 1.25]	0.13	1.48	.139
WealthIndex	-0.00	0.01	[-0.02, 0.01]	-0.03	-0.43	.665
ReceivedAntenatalCareNo	-0.51	0.26	[-1.02, -0.01]	-0.15	-2.00	.047
TimesReceivedAntenatalCare	0.00	0.01	[-0.02, 0.02]	0.00	0.01	.991
BabyPNSkilledCheckedNot checked	-0.02	0.08	[-0.19, 0.15]	-0.02	-0.23	.815

Note. Results: F (11,191) = 0.91, p = .534, R^2 = 0.05

Summary

On using linear regression, it was found that ethnicity, location, education, the teenage mother receiving antenatal care and the number of times the teenage mother

receiving antenatal care as well as the baby getting checked post-natally by skilled personnel, did not have a significant effect on the odds of neonatal mortality as the overall model was not significant, χ (11) = 9.60, p = .567. In addition, the above – mentioned independent variables did not have a statistically significant. This study had shown that when birth weight was correlated among the independent values, it was not found to be a significant predictor as F (11,191) = 0.91, p = .534, R^2 = 0.05. This model did not explain a significant proportion of variation in birth weight. Interestingly, however, my study was found to have a little association between secondary education and neonatal mortality, and a small association with the pregnant teenager attending the health facility and receiving adequate antenatal care, and birth weight of the baby. The quantitative study examined the relationship between the independent variables ethnicity, location, education and antenatal care and the dependent variables neonatal mortality and LBW. Results of the statistical analysis substantiated that the null hypotheses were not rejected. Section 4 allowed me to discuss the applications of the study to professional practice and implications for social change; to draw conclusions and show how this study contributed to knowledge advancement. In this section, the findings of the study were interpreted considering also the Bronfenbrenner theory; pregnancy outcomes were examined as they related to the research questions and variables, the strength and limitations of the study were determined. Recommendations were also made with the possibility of implications for social change to better influence decisions and interventions at a policy level. Inferences were drawn as to the relationship and effect of sociodemographic and socioeconomic factors on pregnancy outcomes among teenage pregnancy outcomes in Guyana.

Section 4: Applications to Professional Practice and Implications for Social Change

Discussion

As has been described previously, sociodemographic factors and socioeconomic factors have been correlated with teenage pregnancy outcomes. In countries in Latin America and the Caribbean including Guyana, teenage pregnancy has been a cause for concern especially among the indigenous communities. The teenage mother is prone to have higher risk of neonatal mortality and low birth weight and other adverse pregnancy outcomes. These pregnancies among the teenagers occur in rural communities as seen in Pakistan, among teenagers with low socioeconomic status as in Bangladesh, and in settings where there are no skilled personnel at the antenatal health facilities as noted in Nigeria, Uganda, Ethiopia, and Korea.

The review of literature has supported findings indicating that independent variables like the teenager's ethnicity, location, educational level and her attendance at clinic by a skilled health personnel do have an influence on the dependent variables such as neonatal mortality and low birth weight. According to Adewuyi & Lamichhane, (2017), there are disparities in risk factors which stem from inequalities and social determinants of health; while the debate continues about the risk with teenage pregnancies of preterm birth, LBW, and neonatal death. Teenage pregnancy continues to be a public health challenge and requires both human and financial resources to allow the pregnant teenage mothers to complete secondary school, to put system in place to prevent delays in access to quality health care and to have good physician to patient relationship at the antenatal clinic where

the pregnant teenage mother is encourage to attend regularly and in a timely manner. If the pregnant teenage mothers complete secondary school, they would be able to make better choices about their health and well-being thus enhancing their ability and motivation to prevent pregnancy or delay their first sexual encounter (Gyan, 2013; Arceo-Gómez and Campos-Vázquez, 2014).

This quantitative study was done to ascertain whether ethnicity or race, location or place of residence, level of education, and attendance at antenatal clinic by a pregnant teenager where skilled health personnel were present had any influence on the pregnancy outcomes of neonatal mortality and LBW. The study used secondary data from UNICEF MICS5 2014. It was ascertained that the relationship between the sociodemographic factors, socioeconomic factors, and adverse perinatal outcomes among teenagers in Guyana could be established using the household-based, cross-sectional surveys of the 2014 UNICEF MICS5. They used health facilities across Guyana. As the data was relatively large with 6000 households—it is thought that this sample size was adequate to reveal statistically significance. The study allowed the researcher to have access to information that allowed for a correlation to be established when looking at the sociodemographic factors and the socioeconomic factors and neonatal mortality and LBW.

Interpretation of Findings

According to the findings of the study, (a) East Indian teens accounted for 14% of the teenage births (East Indian households, the largest ethnic group, constitute 44% of the Guyanese population); (b) African Guyanese teens accounted for 10% of teenage births

(African Guyanese households, the second largest group, constitute 31% of the Guyanese population); and (c) teens from the minority groups, the Amerindians and the mixed groups, accounted for 5.64% and 7.26% respectively. The Amerindians and the Mixed groups do make up 9% and 17% of the population in Guyana respectively, thus being the minority groups in Guyana and have been the groups more likely to have a greater risk of adverse birth outcomes, which is in keeping with the literature (Opondo et al., 2019). In contrast, Morisaki et al. (2017) reported that differences in ethnicity have not contributed to differences in LBW and neonatal mortality when 14 races and ethnicities were studied.

This study found that most (34%) of the pregnant teenagers resided in rural communities while 10% of the teenage mothers had resided in urban areas. This fitted well with the study in Nigeria, where it was reported that infants in rural residence have higher rates of mortality than their urban counterparts and that there are disparities in risk factors due to inequalities and the social determinants of health (Adewuyi & Lamichhane, 2017; Oyekale & Maselwa, 2018). Ghouse and Zaid (2016) reported that the place of residence was significant enough to decrease the baby's weight owing to the great competition between the mother and the infant as a result of accessibility and availability of the mother to obtain the needed nutrient during & the pregnancy.

The study shows education is statistical significance at p-value 0.04 in relation to secondary education and teenage pregnancy. In Guyana, primary education is compulsory, however 15 % teenagers drop out of school rather than pursuing a secondary education (Situation Analysis of Children and Women in Guyana, 2016). Oyekale and Maselwa (2018) reported that education is a critical determinant and has a statistical significant

positive correlation with infant survival at $p<0.05$. Grytten, Skan, & Sorensen (2014) reported that increasing a teenage mother's education will reduce the likelihood of LBW the predictor of neonatal death.

The study suggested that there is no statistical significance as it relates to the birth weight of the infant and antenatal attendance at the maternal health clinic. Nasrullah and Jaleel (2016) reported that there is a strong correlation between inadequate antenatal care and LBW, and that the lack of checkup for complications among pregnant teenagers is associated with neonatal mortality [OR 2.4, 95% CI 1.5 -4.0] From my study and the linear regression, it was predicted that birth weights were not significant when teenage mother attending the ANC, the times she attended [-0.14, 0.30; p value 0.48], and whether her baby was checked by skilled personnel [-3.77, 0.96; p value 1.36] significant difference between neonatal survival rates on comparing skilled or unskilled birth attendance – the baby for the teenage mothers did not die less than 28 days. This study also suggested that there is no significant correlation between the teenage mother visiting the ANC once and less than four times and adverse pregnancy outcomes as shown in table 8.

Analysis and Interpretation of Findings to Bronfenbrenner Theory

The framework for this study was the Bronfenbrenner theory (BT). The constructs of the BT the microsystem, the mesosystem, the exosystem, and the macro system assisted me in understanding the interaction and interplay between the independent and the dependent variables; in addition to the choices teenagers make that can have adverse effects. Examining the results in the context of BT provided knowledge as to how the

sociodemographic and socioeconomic factors including the use of antenatal health services with skilled personnel can relate to pregnancy outcomes such as neonatal mortality and LBW.

The BT highlighted the physiology of the teenager who is still maturing between ages 15 and 19 and being vulnerable to increase sexual activity. This ecological framework brought to light the factors such as ethnicity, the role of the school system, and other influences such as the family and the community in guiding the young teenage mother to contemplate higher ideals. The teenager attending school and remaining in school for a secondary education is of vital importance and can help to delay the first sexual encounter, as the teenage mother is usually unprepared and without coping skills in the company of peer pressure (Vincent & Alemu, 2016). The provision of good health services with skilled personnel, the availability of good transportation, and network connection can allow for a positive influence among this vulnerable group of teenagers. With the enactment of appropriate policies, sex education in schools, and support from the community there can be better awareness and prevention of pregnancy among the teenagers in this middle to late teenage group.

Pregnancy Outcomes

Teenagers who are pregnant in Guyana may be at higher risk of complications but not at high risk of having a neonatal death. Teenage mothers are encouraged to have regular antenatal and postnatal visits to the health care facility. The time at which a teenager commences antenatal care clinic visit and the number of times a teenage mother had a visit does have a strong influence on pregnancy outcomes (Ezugwi et al., 2014; Wang et al.,

2011). WHO (2005) reported that with increase access to health services by skilled health care workers, there has been a significant decrease in neonatal deaths in developing countries. All the teenage mothers under review delivered a live baby within 28 days and it was further found from the study that the independent variables ethnicity, location, mother's education, wealth index, antenatal care received by the baby, the times antenatal care was received by the baby, and whether the baby was checked Post-Natally by Skilled Personnel, did not have a significant effect on the odds of neonatal mortality as the overall model was not significant, χ (11) = 9.60, p = .567.

Factors associated with LBW, often termed as 'risk factors', and their presence in an individual woman indicates an increased chance, or risk, of bearing a LBW infant (Shahnawaz et al., 2014). On using linear regression, this study shows that when birth weight was correlated among the independent values, it was not found to be a significant predictor as F (11,191) = 0.91, p = .534, R^2 = 0.05. This model was unable to explain a significant proportion of variation in birth weight. Interestingly, the study indicates that there was no significant proportion of variation in birth weight of the neonate when the two variables were correlated and considered, namely, the number of times the teenage mother attended antenatal clinic, and when the newborn was checked postnatally by a skilled health personnel.

Strengths of Study

The population-based nature of the MICS5 well-organized national database UNICEF study, covered and represented teenage mothers ages 15 to 19 in the 10 administrative regions of Guyana, including the coastland, the hinterlands or interior areas,

as well as rural and urban, thus making the findings more generalizable. The predictors in the regression model has shown VIFs less than five and thus are not a cause for concern but rather serves as a strength of the study (Menard, 2009).

Limitations of the Study

Reservations are raised in my study that may have impacted generalizability, validity, and reliability of the findings. The data may not have been sufficiently large to reveal statistically significant associations. There are missing data. Kang (2013) reports that there can be reduce statistical power of a study, biased estimates leading to invalid conclusions when there is missing data. There is also self-reporting by the teenager mothers of the household which could have given rise to recall bias. In addition, there may have been selection bias and heterogeneity of the family factors in the 10 different developmental regions of Guyana. In this study it is difficult to pay attention to the subjective behaviors taking place in the context of the environment. I was unable to control for factors associated with LBW such as medical risks or weight gain during gestation of pregnancy. I have not considered the period of time the pregnant teenager lived in the particular location.

Recommendations

Multiple strategies must be put forward to assist the teenagers to delay first sexual encounter, to have knowledge of proper parenting, while allowing for increase educational opportunities and academic engagements; such as the teaching of sexual education in schools to prevent teenage pregnancy and adverse health outcomes. Ramaiya et al. (2014) noted that a good family support and return to school of the teenage mother after delivery

of the baby is known for the protective factor that is displayed towards good pregnancy outcomes among teenage mothers such as neonatal mortality, an indicator of the social well-being in a country, and the baby's weight at birth. Capacity building should be done to ensure that there are qualified health care workers and good governance in communities to deliver quality, effective, and efficient health care to teenage mothers. There should also be a robust integrated health systems development network across agencies and sectors such as health, education, communities, social welfare and protection be established to address teenage pregnancy and the outcomes. There is scope of future studies in identifying other factors such as religious, cultural practice, norms and beliefs, and family orientation impacting on teenage pregnancy outcomes in Guyana.

Implications for Professional Practice

As a result of this study, the knowledge gleaned as to how the sociodemographic and socioeconomic factors impact teenage pregnancy outcomes in Guyana has been recognized. The results of this study provide information as to where the priority of a policy maker should be placed and what type of intervention programs should be targeted as it relates to education and antenatal service delivery among teenagers who become pregnant prematurely. Alithabe et al. (2015) noted that increased adverse pregnancy outcomes not mediated by a different access to antenatal care or different quality of care but by skilled birth attendants, therefore, capacity building should be done to ensure that there are qualified health care workers and good governance in communities to deliver quality, effective, and efficient health care to teenage mothers. The authors noted also that

pregnancy risks cannot be explained by socioeconomic factor, or inadequate antenatal care but by unknown age related factors. According to Shahnawaz et al. (2014) reported that socioeconomic status of the mother were not significantly associated with LBW, but there was a multi-factorial phenomenon and that interventions proposed in future should target sectors concerned with social development and social welfare programs in addition to the health sector and obstetrical interventions. There has not been any similar study in Guyana based on my knowledge; however my using the Bronfenbrenner Theoretical framework, a behavior change research study done to consider the teenager's approach to sex education and contraceptive use as well as the adequacy of family support given to teenagers at this vulnerable period in their live could be done in future studies.

Thus understanding the interplay with teenager, peers, mentors, the family, and the community can allow for better oversight and monitoring of this at risk group. There can also be a greater provision of health and social services available at the macro level, and a more integrated approach to search for strategies to assist the teenagers to delay their first sexual encounter whist gaining knowledge on proper parenting.

Implications for Positive Social Change

The study findings indicate that there is little statistical significance between the sociodemographic and socioeconomic factors and teenage pregnancy outcomes in Guyana; but demonstrates the impact and effect of these factors on teenage mothers at the individual, at the level of the immediate and future family, the community, and at the country level. The study notes that teenage mothers with low maternal education from families with a low wealth index and pregnant teenagers, especially with an Amerindian background can benefit

from policies and programs focused on personal development Inequities between coastal and hinterland or the interior regions can be addressed leading to universal coverage and increased quality of services to this vulnerable population. In addition, the influence and link of sociodemographic and socioeconomic factors on pregnancy outcomes call for swift interventions at the local, regional and national level in Guyana, and among the policy makers. Teenage mothers who have low maternal education, who come from family with low wealth index (as in the interior regions 1, 7, 8, and 9), and the pregnant teenagers especially with an Amerindian background should benefit from policies and programs that bring about personal development (Poudel et al., 2018). According to Ministry of Public Health Guyana in Collaboration with PAHO/WHO, Guyana Office and other agencies (June 2018), the infant mortality peaked at 23.9 per 1000 live births in 2014. The study revealed that inequities between coastal and hinterland/ interior regions should be addressed as it relates to universal coverage and quality of services rendered to this vulnerable population. Health Services must provide accessible youth friendly spaces for teenagers in order to prevent early sexual activity, and for delivery packages (Ministry of Public Health Guyana in Collaboration with PAHO/WHO, Guyana Office and other agencies, June 2018).

The Integrated Health System Network which is spearheaded by the Regional Health Service Department under the aegis of the Ministry of Public Health with technical support from the Pan American Health Organization must hold relevant sectors and agencies accountable for the training and capacity building of teenage mothers. This tutoring should include but not limited to educational exercises on the psychological changes of pregnancy, nutrition, labor care, family planning, and preparation for the

reintegration of teenager in schools after pregnancy (Ministry of Public Health Guyana in Collaboration with PAHO/WHO, Guyana Office and other agencies. June 2018).

The findings of this doctoral study will be communicated to the policy makers at the Ministry of Public Health and other agencies to ensure that there is inter and intracollaboration to correct this public health concern, to prevent teenage pregnancies, and to provide appropriate, timely, and relevant response to the adolescents needs in the communities' country wide (Dulitha et al., 2013). Hence, the results of this study will be disseminated via press release, community meetings and policy briefs, the health website and scientific seminars. The stakeholders to be engaged include the various communities in the 10 administrative regions, the implementing team, policy makers, the research community, and the ethical review community.

Conclusions

The sociodemographic and socioeconomic factors and teenage pregnancy outcomes in Guyana were examined using quantitative cross-sectional, correlational, and a household base study. The Bronfenbrenner theory helped in bringing to the fore the interplay of the environment, the influences of the home, school, the community, and the policy makers in addressing this scourge. The study revealed that sociodemographic and socioeconomic factors seem to have had a modest impact on pregnancy outcomes on teenagers in a household study. There was no association among the independent variables ethnicity, location, education, wealth index and low birth weight; however, my study was found to have a small association between secondary education and neonatal mortality, and a small association with the pregnant teenager attending the health facility and

receiving adequate antenatal care, and birth weight of the baby. Teenage pregnancy remains a public health concern as it could have a negative impact on the physical health and economic wealth of the mother. Robust efforts through sexual and reproductive education and public awareness must be made to encourage teenagers to delay their first sexual encounter. It is my wish that this quantitative study creates a long lasting impact on teenagers' as to the immense cost that can be accrued from early pregnancy.

Contribution to the Advancement of Knowledge

Strong quantitative studies test the objectives of examining the relationship among variables. It is my wish that cognitive enhancement will be developed on using the Bronfenbrenner grounded theory to address this topical public health concern. I hope that this scientific study can guide policy makers to make appropriate interventions to address the public health issue. The Ministries of Public Health and Education, the main beneficiaries may profit from the information shared on using the selected independent and dependent variables in this doctoral study so that the health and education systems can be strengthened. At the meso and regional levels, it is also my wish that the Regional Democratic Councils of the Regions can act on this vital statistical data to prioritize matters of concern that will enhance the social determinants of health. It will augur well if the Health Care Practitioners be more inclined to have better physician to patient relationship especially among this vulnerable group - the teenagers on reading this scientific study.

Candidate's Role

Under the guidance of my Chair and Supervisor, I have completed this research and Final Study and then to the final stage to the Final Defense. I also proposed to lead in the authorship of peer-reviewed articles resulting from the research and present findings to academic, and the Maternal and Child Health Department at the Ministry of Public Health Guyana as well as to focused audiences.

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Appendix A: Items Considered Showing Affluence of the Household

Survey questions that assess whether or not the household have various resources and items were considered. The items included are

1. Cooking fuel
2. Electricity
3. Radio
4. Television
5. Tractor/combine
6. Bus
7. Boat
8. Car/truck
9. Land dredge
10. Cable TV
11. Computer
12. Mattress
13. Refrigerator
14. Table and chairs
15. Solar panel
16. Power generator
17. Washing machine
18. Cell phone

19. Bicycle

20. Motorcycle

21. Cattle, and

22. Digital camera

The items are weighted equally, with the exception of:

- Refrigerator being given a weight of 2 and
- Tractor/combine, bus, boat, car/truck, and
- Land dredges each being given a weight of 5.

The numbers of "yes" responses are summed to compute the wealth index, resulting in an interval-level variable with a possible range of 0 to 43.