UNIVERSITY OF CAPE COAST

FACTORS INFLUENCING PRECONCEPTION HEALTH PROMOTION AMONG STUDENTS OF UNIVERSITY OF CAPE COAST

PATIENCE FAKORNAM DOE

2020

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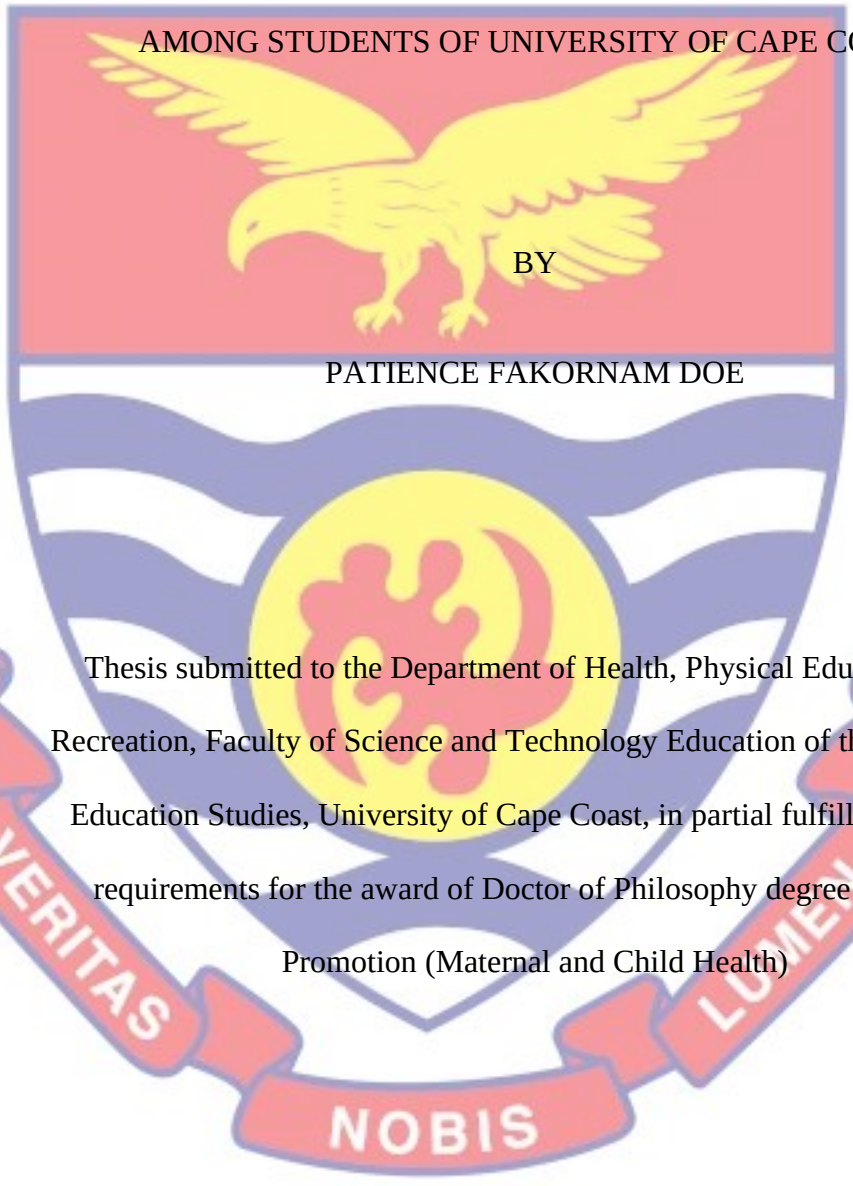

BY

PATIENCE FAKORNAM DOE

Thesis submitted to the Department of Health, Physical Education and Recreation, Faculty of Science and Technology Education of the College of Education Studies, University of Cape Coast, in partial fulfillment of the requirements for the award of Doctor of Philosophy degree in Health Promotion (Maternal and Child Health)

AUGUST 2020

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: ..... Date: .....

Name: Patience Fakornam Doe

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

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ABSTRACT

The purpose of the study was to determine factors influencing PCH awareness levels, attitudes of UCC students towards PCH promotion, and perceived strategies for integrating PCH interventions into routine reproductive health services for UCC students. A mixed-method approach comprised of a survey and qualitative multiple case studies were employed to collect data from students and healthcare professionals of the UCC hospital using questionnaires and interview guides. Descriptive summary measures, logistic regression, and inductive content analysis were used for the data analysis. The findings revealed a moderate (42%) to high (51%) level of awareness on PCH-related issues among students. More than half (54%) of students in this study demonstrated negative attitudes towards PCH promotions. Significant variations were found in PCH awareness levels and socio-demographic factors such as ethnicity, religion, and programme of study. Further, ethnicity (OR = 0.736, *P* = 0.020), product of age and income/remittances (OR =1.160, *P* = 0.021), perceived poor health (OR = 2.097, *P* = 0.012), having reproductive life plans, (OR =1.256, *P* = 0.046), future PCH intentions (OR =2.142, *P* = 0.00), confidence about getting PCH counselling (OR = 2.006, *P* = 0.00) and confidence in practicing PCH behaviours (OR = 2.006, *P* = 0.00) significantly predicted positive attitudes towards PCH promotion. Qualitative analysis revealed awareness creation, institutional and public policy directives, and societal reorientation was necessary for PCH integration for students. There is a need for sensitization on PCH promotion and its relevance to improving future reproductive outcomes of students.

KEYWORDS

Awareness

Health promotion

Healthcare professionals

Perceived attitudes

Preconception health

Preconception interventions

Preconception risk factors

Socio-demographic factors

University students

ACKNOWLEDGEMENTS

I am indebted to God Almighty for giving me the gift of life and His grace to complete this doctoral study successfully. I would also like to express my deep appreciation to my supervisors, Dr. Thomas Hormenu and Dr. Nancy Innocentia Ebu-Enyan, for their immense guidance, valuable suggestions, and encouragement throughout this work. My sincere thanks also go to Dr. Edward Wilson Ansah for the mentorship and supportive role during the most challenging moments. I acknowledge the late Professor Joseph Kwesi Ogah, who expertly guided me during the initial stages of this thesis. I would also like to acknowledge the overwhelming support received from Dr. Precious Mattah and Professor Victor Nuvor. I am incredibly grateful to UCC and the Department of HPER for giving me the opportunity and assistance to pursue my doctoral studies. I would also like to thank my Ph.D. colleagues, Jacob, Elder Sorkpor, Benard, Vida, Prince, and Bismark, for supporting and sharing their knowledge throughout my Ph.D. experience. I am also indebted to my parents, my father, the late Mr. Aaron Kweku Doe, and my mother, madam Edem Korwutu, for their never-ending support. I am grateful to my siblings, Edward, Eric, Edith, Dela, Eunice, and Charles, for pushing me further than I thought I could go. I am very grateful to Selorm, Mawuli, Enam, Jonas, Dr. Aba Abraham, and my friends who supported me during this journey. I am very grateful to all the Heads of Departments who allowed me to collect data for this study. I thank all students and health care professionals who took part in this study by providing me with valuable information and comments.

DEDICATION

To my beloved mother, Madam Edem Adzo Korwutu

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LIST OF ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
ANC	Antenatal Care
BLR	Binary Logistic Regression
BMI	Body Mass Index
CDC	Centre for Disease Control and Prevention
FGD	Focus Group Discussion
GHS	Ghana Health Service
GSS	Ghana Statistical Services
HBM	Health Belief Model
HCPs	Health Care Providers
HIV	Human Immunodeficiency Virus,
KII	Key Informant Interview
LCT	Life Course Theory
LMICs	Low- and Middle-Income Countries
MCH	Maternal and Child Health
MDGs	Millennium Development Goals
MLR	Multinomial Logistic Regression
MMR	Maternal Mortality Ratio
MOH	Ministry of Health
NHIS	National Health Insurance Scheme
PAPM	Precaution Adoption Process Model
PCC	Preconception Care
PCH	Preconception Health
RLP	Reproductive Life Plan

SCT	Social Cognitive Theory
SEM	Socio-Ecological Model
SLT	Social Learning Theory
SSA	Sub-Saharan Africa
STIs	Sexually Transmitted Infections
SWS	Southampton Women's Survey
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
UCC	University of Cape Coast
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

Background to the Study

Maternal and child health [MCH] is fundamental to attaining global health and socioeconomic developmental goals (Singh, Darroch, Ashford, & Vlassof, 2009). Evidence shows a bi-directional relationship between MCH outcomes and Gross Domestic Products [GDP] (Marmot, Friel, Bell, Houweling, & Taylor, 2008). Further, MCH is an indicator of the health status of individuals, families, and a nation as a whole (Li et al., 2017). It also serves as an essential predictor of future health challenges (Gill, Pande & Malholtra, 2007; Pincus et al., 2005). Therefore, it remains a foundation for health and nearly all aspects of human development and progress (Gill et al.; Marmot et al.).

Evidence suggests that MCH is dependent on a wide range of direct and indirect risk factors (Kassebaum et al., 2014; Singh, Darroch, & Ashford, 2014). These risk factors include unsafe sexual intercourse, unintended pregnancies, unsafe abortions, infertility, and sexually transmitted infections (STIs). Again, there is a close relationship between the reproductive health of women and men due to the existence of similar underlying causes and risk factors (Bhutta, Lassi, Blanc, & Donnay, 2010; Black et al., 2016). Consequently, the reproductive health of women and men in their childbearing years is an essential factor that impacts MCH outcomes (Black, Walker Laximinarayan, &Tammerman, 2016; Wright, Bird, & Frost, 2015).

Evidence indicates that remarkable outcomes can be achieved if reproductive health interventions are designed to address health issues that affect women and men across all stages of their reproductive lives (Pies &

Kotelchuck, 2014; WHO, 2013). Proponents of this approach argue that advancement in MCH can be hastened by scaling up an integrated package of strategic interventions organized around a continuum of care strategy (WHO, 2017). This approach to reproductive health comprised a range of issues from menarche to pregnancy outcomes (Hoskin & Varney, 2015; Mishra, Cooper, & Kuh, 2010).

Globally, MCH interventions delivered in a continuum before pregnancy, during pregnancy, and after delivery are associated with the best health outcomes (Singh et al., 2014; WHO, 2013). This approach provides a unique platform for detecting and managing multiple risk factors that impact MCH outcomes across the various stages of the life span (Black et al., 2016; Singh et al., 2014). Estimates suggest that scaling up interventions across the life course could avert 149,000 maternal deaths worldwide (Black et al., 2016). The authors also project that the continuum of care can prevent 849,000 stillbirths, 1,498,000 neonatal deaths, and 1,515,000 child deaths. Yet, adverse sexual and reproductive health outcomes have remained a significant challenge in most developing countries despite evidence-based interventions worldwide (Salam, Das, Ali, Lassi, & Bhutta, 2013; WHO, 2014).

In particular, Sub-Saharan Africa [SSA] has a disproportionate burden of poor maternal, infant, and child health outcomes (WHO, 2018). It has the highest Maternal Mortality Ratio (MMR), with an estimated 546 maternal deaths per 100 000 live births occurring each year. It has a lifetime maternal mortality risk of 1 in 36 compared to the global average lifetime risk of 1 in 180 (WHO, 2015). Adverse infant outcomes persist in SSA countries, with 2.6 million stillbirths and 2.7 million newborn deaths occurring every year (Roos & von Xylander, 2016). Similarly, deaths occurring annually in children under

five years stand at 5.9 million while 1.3 million adolescents die annually (Mason, Chandra-Mouli, Baltag, Christiansen, Lassi, & Bhutta, 2014; WHO, 2015). Moreover, an estimated 214 million women who wish to prevent pregnancy resort to ineffective family planning methods or do not use any family planning method (Singh et al., 2014). This results in an estimated 80 million unplanned pregnancies, 28 million unplanned births, and abortions globally (Cohen, 2011).

This situation accounts for 97% of all unsafe abortions occurring in developing countries every year (Grimes, Benson, Singh, Romero, Ganatra, Okonofua, & Shah, 2006; Haddad & Nour, 2009). A large proportion of the women who survive these unsafe abortions suffer short and long-term complications like severe haemorrhage, uterine perforation, chronic pelvic pain, reproductive tract infections, and infertility (Naghma, 2011; Sama, Aminde, & Angwofo, 2016). However, fertility issues have not received the necessary attention in most developing countries (Boivin, Bunting, Collins, & Nygren, 2007; Cui, 2010).

Research suggests that health status, lifestyle, and behaviours before pregnancy are important factors that affect fertility and pregnancy outcomes in men and women (Berglund, & Lindmark, 2016; Delissaint & McKyer, 2011; Inhorn & Patrizio, 2015; Stern, 2015). For instance, untreated conditions including hypertension, smoking, obesity, and alcohol use affect conception rate and outcomes (WHO, 2013). Thus, it underscores the importance of promoting preconception health [PCH] among women and men of childbearing age to maintain and preserve fertility (Frey, Navarro, Kotelchuck, & Lu, 2008).

Evidence suggests that addressing risk factors before pregnancy could lead to significant improvements in MCH outcomes (Dean et al., 2013; Hemsing, Greaves, & Poole, 2017; Olayinka, Achi, Amos, & Chiedu, 2014). Interventions delivered in a continuum before pregnancy, during pregnancy, and after delivery are associated with the best MCH outcomes (Singh et al., 2014; WHO, 2013). Nonetheless, Preconception health (PCH) promotion is a missing link in the MCH continuum of most developing countries (Ayoola, Sneller, Ebeye, Dykstra, Ellens, Lee, & Zandee, 2016; Hemsing, Greaves, & Poole, 2017; WHO, 2011).

Preconception Care [PCC] is "a set of interventions that aim to identify biomedical, behavioural and social risks to a woman's health or pregnancy outcome through prevention and management, emphasizing those factors that must be acted on before conception or early in pregnancy to have a maximal impact" (Johnson et al., 2006, p. 3). PCH is defined as the health of individuals during their childbearing years with particular emphasis on risk reduction, promotion of healthy behaviours, and pregnancy preparedness, irrespective of gender, sexual orientation, and the desire to give birth (Ontario Public Health Association, 2014; WHO, 2012). PCH emphasizes a healthy lifestyle, risk reduction, pregnancy preparedness, and fertility improvement among individuals of reproductive age (Ontario Public Health Association, 2014). PCC is usually delivered before and between pregnancies (Dean, Imam, Lassi, & Bhutta, 2013). The goal of PCC is to identify risk factors before conception to implement interventions that will augment the reproductive health of women and men. It also emphasizes enhancing an individual's overall health and knowledge before pregnancy (Lassi, Dean, Mallick, & Bhutta, 2014).

Improved PCH is significant to MCH in many ways. First, it provides a framework to identify and address risk factors pertinent to women and men irrespective of their childbearing aspirations (Hemsing, Greaves, & Poole, 2017). As a result, it reduces the prevalence of risk factors for poor MCH outcomes. Second, it ensures that all pregnancies are planned and wanted (Alio, 2017). Third, PCH interventions can potentially avert many maternal and child morbidity and mortality (Hussein, Kai, & Qureshi. 2016). Last but not least, routine PCH promotion provides a unique platform to identify and manage health risks and ensures pregnancy in optimum health (Alio, 2017; Floyd et al., 2013; Misra, Guyer, & Allston, 2003).

Nonetheless, the PCH promotion is virtually missing in developing countries, including Ghana (Ezegwui, Dim, Dim, & Ikeme, 2008). This gap has resulted in a situation where both women and men miss opportunities to improve their health prior to conception (Harelick, Viola, & Tahara, 2014; Mason et al., 2014). Reproductive health experts have argued that extending the reproductive health continuum to include PCH interventions before Antenatal Care [ANC] and actively involving men can substantially improve MCH outcomes (Dean et al., 2014; Mason et al.). Promoting PCH is essential because most women do not plan their pregnancies and only realize they are pregnant after the fifth week of pregnancy. As a result, most of them initiate ANC when the most critical time for embryonic development has already commenced (Dean et al., 2014; Temel, van Voorst, Jack, Denktas, & Steegers, 2013). The implication is that ANC starts too late to ameliorate the harmful effects prospective parents may have on the developing fetus (Dean et al., 2014; Stern, 2015).

Available literature further indicates that pregnancy outcomes are associated with fathers' lifestyles and health status (Tyden, 2016) since men contribute fifty percent of their children's genetic material (Alio, 2017). The PCH of men potentially enhances pregnancy outcomes by augmenting men's biological and genetic input to conception (Frey, Navarro, Kotelchuck, & Lu, 2008). PCH promotion in men ensures that all pregnancies are planned and wanted. It also improves accessibility, usage, and efficiency of male fertility control methods and enhances the capacity of men for parenthood and fatherhood (Alio; Kotechuk & Lu, 2017).

Consequently, the participation of men in PCH interventions potentially enhances their reproductive health status and guarantees that they are accountable as partners and advocates for reproductive health (Dean et al., 2013). PCH promotion is, therefore, a shared responsibility between men and women (Warner & Frey, 2013). "It is important for women and potential fathers to be aware of how men's behaviour impacts the genetic material they pass on, to establish an incentive for making an effort towards healthier outcomes" (Alio, 2017, p. 8). Research evidence, however, shows that there are limited studies on men's PCH awareness and related issues to guide PCH promotion among men (Agricola et al., 2016; Bodin, Kall, Tyden, Stern, Drevin, & Larsson, 2017; van der Zee, 2013).

Bhutta et al. (2014) estimated that increased coverage and delivery of quality preconception, ANC, intrapartum and post-natal interventions could prevent 71% of neonatal deaths, 33% of stillbirths, and 54% of maternal deaths. A related systematic review demonstrates that pre-pregnancy behavioural interventions considerably reduce new Sexually Transmitted Infections [STIs] rates by 35% in women of childbearing age (Dean, Lassi,

Imam, & Bhutta, 2014). The authors also found evidence that STIs management during the preconception period prevents infections among newborns.

PCH interventions consist of two main component actions: provision of information to improve knowledge and behaviour change. These entail health risk assessment, health promotion, counselling, and interventions (Atrash, Johnson, Adams, Cordero, & Howse, 2006; Cefalo, Bower, & Moos, 1995; van der Zee, 2013). Specific PCH interventions comprise medical and sexual health assessment, micronutrient supplementation, dietary and lifestyle modifications, and biomedical interventions to identify risk factors (Robbin et al., 2014). These risk factors include infertility, miscarriage, and chronic pre-pregnancy medical conditions like hypertension, diabetes, and obesity. Other risk factors entail lifestyle and environmental factors. Women exposed to these conditions have a higher risk of giving birth to babies with low birth weight and fetal growth retardation (Alio, 2017; Bortulus et al., 2017).

PCH interventions guarantee that risk factors are identified and managed before pregnancy (Ahmed, Elbashir, Mohammed, Saeed, & Alawad, 2015). Evidence suggests that addressing risk factors before pregnancy could lead to significant improvements in MCH outcomes (Dean et al., 2013; Hemsing, Greaves, & Poole, 2017; Olayinka, Achi, Amos, & Chiedu, 2014). Proponents of PCH have also suggested that the strategy can potentially enhance health outcomes for women and their children by overcoming the existing inadequacies in MCH service delivery (Floyd et al., 2013; Corchia & Mastroiacora, 2013). Further, it provides a window of opportunity for women and men to optimize their health before conception occurs (Rossin-Slater & Brellochs, 2012).

According to Hussein, Kai, and Qureshi (2016), the benefits of PCH promotion on pregnancy outcomes include enhanced maternal knowledge, self-efficacy, perceptions of control over life's events, and reduced risk behaviours among women of childbearing age. In addition, PCH interventions such as genetic counselling, weight management, management of chronic diseases, and substance abuse prevention are associated with reduced pre-eclampsia, the incidence of perinatal mortality, and pre-existing diabetes mellitus. Studies have shown that PCH interventions can significantly reduce adverse pregnancy outcomes among women exposed to these interventions (Ayoola et al., 2016; Hemsing et al., 2017; Hussein et al., 2016). Specifically, congenital anomalies and perinatal deaths can be reduced by 70% and 69%, respectively, among women who receive PCH interventions compared to their counterparts who received only the traditional ANC care (Dean et al., 2014).

Women exposed to preconception care and counselling have a higher probability of adopting positive health behaviours such as preconception micronutrient supplementation, early initiation of ANC, and cessation of alcohol use. Further, women who receive PCH care are about six times more likely to use folic acid and breastfeed their newborns (William, Zapata, D' Angelo, Harrison, & Marrow, 2012). A related study indicates that a daily intake of 0.4 mg daily of folic acid for at least three months before pregnancy reduces the odds of neural tube defects in newborns (Baird, Hill, Kendrick, Inskip & Southampton Women's Survey [SWS] Study Group, 2009). In their study, Dean, Lassi, Imam, and Bhutta (2014) found that women exposed to PCH interventions in developing countries are likely to insist on safe delivery supplies during home deliveries.

Consequently, the literature suggests that all primary healthcare professionals proactively deliver PCH as part of routine reproductive health services (Sallmen, Sandler, Hoppin, Blair, & Baird, 2006). However, PCH promotion has remained a missing link within existing reproductive health efforts in developing countries (Boulet, Parker, & Atrash, 2006; Dean et al., 2013; WHO, 2011).

Statement of the Problem

Although the world has made remarkable advancements in improving MCH (Bustreo et al., 2013; WHO, 2019), low- and middle-Income countries [LMICs] continue to bear a heavy burden of death and disease among women and children (de Bernis et al., 2016). Almost all the estimated 830 daily maternal deaths are attributable to pregnancy, and childbirth-related factors occur in developing countries (Dean et al., 2013; WHO, 2018). The persistence of adverse MCH outcomes has heightened the recognition of PCH promotion as a critical preventive strategy within the MCH continuum of care (Dean et al., 2014; Stern, 2015; WHO, 2016). PCH interventions target the health of men and women of reproductive age to reduce the risk of poor reproductive outcomes before pregnancy (Mason et al., 2014). Recognizing the effect of PCH on future health and reproductive outcomes, the WHO developed a comprehensive package to facilitate the implementation of PCH interventions (WHO, 2013).

A global agreement preceded the development of the PCH package in 2012 on the potential of PCH promotion in reducing poor reproductive outcomes (WHO, 2013). Available evidence indicates that PCH promotion plays several essential roles in MCH (Corchia & Mastroiacora, 2013; Steel, Lucke & Adams, 2015). PCH improves the likelihood of conception when

pregnancy is wanted and decreases the risk of unintended pregnancies (Dean et al., 2014). Additionally, it provides a unique opportunity for early detection and mitigation of risk factors for poor birth outcomes before pregnancy (Moos et al., 2008; Kuruvilla et al., 2016).

Little empirical research exists on PCH-related issues in Ghana and other developing countries (Bialystock, Poole, & Greaves, 2013). Thus, PCH promotion in Ghana is crucial for quite a few reasons. First, the country has incessantly seen an increase in MCH morbidity and mortality (Ghana Millennium Development Goals [MDGs] Report, 2015), with pregnancy-related mortality accounting for 12.1% of the 5247 deaths in women of childbearing age (Der et al., 2013). Second, Ghana has been ranked among SSA countries with high maternal mortality rates, even though the country's ANC services are one of the best in the sub-region (Ghana Statistical Service [GSS], 2015). Third, Ghana failed to achieve the 2015 Maternal Mortality Ratio [MMR] target of 54 per 100,000 live births despite reducing maternal mortality (Ghana MDG Report, 2015). MMR increased from 173 in 2011 to 319 in 2015 (Aninanya, Debpuur, Awine, Williams, Hodgson, & Howard, 2015; WHO, 2016).

According to the UN inter-agency estimates, from 2000 to 2017, the global maternal mortality ratio declined by 38% – from 342 deaths to 211 deaths per 100,000 live births. The above estimate translates into an average annual reduction rate of 2.9%. As high as 533 maternal deaths per 100,000 live births occurred within the same period in SSA. At the same time, Ghana's estimate fell gradually from 398 per 100,000 live births in 2003 to 308 in 2017, a decline of 1.9% from 2016. Though substantive, this is less than half

the 6.4% annual rate needed to achieve the SDG global goal of 70 maternal deaths per 100,000 live births between 2016 and 2030 (WHO, 2019).

Further, the under-five mortality rate remained high at 60 per 1,000 live births instead of 40 per 1,000 live births falling short of the 2015 global target (Ghana MDG Report, 2015). The country's inability to meet the MDG maternal and child health targets should naturally lead to questions on PCH promotion potentials to bridge the existing gaps in reproductive health services. However, MCH interventions in Ghana have tended to focus on risk factors for adverse MCH in pregnancy, delivery, and postpartum, ignoring the PCH period (Dean et al., 2013; Hemsing et al., 2017). This unfortunate situation has persisted despite increasing evidence that MCH interventions delivered before pregnancy can reduce several risk factors associated with adverse MCH outcomes (Olayinka et al., 2014; WHO, 2013; Roberts, Pearson, Cutler, & Lindheimer, 2003).

Ghana's challenge with adverse MCH outcomes necessitates research evidence to incorporate PCH interventions into existing reproductive health services. Unfortunately, PCH-related issues have received little attention in Ghana. It seems no study has examined predictors of PCH awareness and behaviours nor addressed questions pertinent to strategies required to promote PCC in Ghana. Almost all existing evidence on how to package PCH-related interventions comes from developed countries among high-risk women diagnosed with diabetes and hypertension (Dean et al., 2014; Jack et al., 2008; Mitchell, Levis, & Prue 2012).

Adverse pregnancy outcomes remain a significant problem in Ghana. Research indicates that 2%, 12%, and 10% of pregnancies resulted in stillbirths, miscarriages, and abortions, respectively, among women aged 15 to

49 years in the recent past (Ahinkorah, Seidu, Mensah, & Budu, 2020). Nonetheless, individuals of reproductive age do not have opportunities to improve their health before conception in the country because PCH interventions are not routinely provided. Additionally, despite the influence of PCH interventions on MCH outcomes, there seems to be limited evidence linking PCH risk factors to PCH awareness levels.

Further, evidence suggests that awareness of PCH promotion is deficient in most developing countries like Ghana (Ayalew et al., 2017; Idris, Sambo, & Ibrahim, 2013; Olayinka et al., 2014; Patabendige & Goonewardene, 2013). Although PCH promotion completes the continuum of MCH services (Dean et al., 2013), PCH interventions are not components of routine health services in many countries in SSA (Kassa & Yohannes, 2018) including Ghana. Further, little empirical research exists on PCH promotion as an integral part of existing reproductive services for Ghana's non-pregnant male and female university students. This knowledge gap is worrying since university years constitute a crucial period for independent making and behaviour modifications which can affect health and well-being (El Ansari et al., 2011; Lee, Loke, 2005; Miller, Staten, Rayens, & Noland, 2005). By their knowledge and social status, individuals with university education are the leaders in society, influencing society to ensure positive health behaviour (Lee, Kang, & Zum, 2005).

Several studies have shown that university students, per their lifestyle, are predisposed to many lifestyles and environmental risk factors detrimental to their reproductive health (Alio, 2017; Sabarre et al., 2013). For example, university students tend to delay parenthood because of their academic pursuits (Lampic, Svanberg, Karlstrom, & Tyden, 2006). Ghana’s 2010

population census report indicates that education could delay marriage and lower fertility, given that more than half of individuals who have higher tertiary education in Ghana have never married (GSS, ICF Macro, 2010). Additionally, the country's fertility report indicates that Ghana's mean age at childbearing is high at 31.7 years, and this finding reflects childbirth at older age ranges and postponement of births (GSS, 2014). This situation predisposes university students to adverse pregnancy outcomes since most are sexually active (Wade, Herrman, & McBeth-Snyder, 2012).

Risk factors associated with adverse MCH outcomes persist among young adults in Ghana (Doku, 2012; Kugbey, Ayanore, Amu, Asante, & Adam, 2018). UCC students have characteristics similar to young adults in the general population predisposed to adverse MCH outcomes. Studies demonstrate the prevalence of risk factors associated with adverse outcomes, including unsafe abortion, transactional sex, coerced sex, substance use, and risky sexual behaviours among UCC students (Amo-Adjei, Kumi-Kyereme, & Tuoyire, 2014; Evadzi, 2020; Rominski, Moyer, Darteh, & Munro-Kramer 2017). However, little empirical research exists on PCH promotion as an integral part of their reproductive health services. It is unclear the extent to which students are aware of PCH-related issues. Moreover, not much is known about students' attitudes towards PCH promotion within a university community. The present study sought to assess students, contextual and health service-related factors influencing PCH promotion among students of UCC.

Purposes of the Study

The purposes of the study were to: (a) assess the level of awareness and perceived attitudes of UCC students on PCH related issues, (b) estimate the prevalence of PCH risk factors among students of UCC, (c) examine

factors influencing students' PCH awareness and attitudes towards PCH promotion within the context of the university community, and (d) explore qualitatively the perceptions of students and healthcare professionals at the UCC hospital on how to integrate PCH interventions into existing reproductive health services.

Research Qustions

The following research questions guided this study:

1. What is the level of awareness of PCH-related issues among students of the University of Cape Coast (UCC)?
2. What is the prevalence of PCH risk factors among students of UCC?
3. What is the perceived attitude of students of UCC towards PCH promotion?
4. What socio-demographic factors predict PCH awareness of students of UCC?
5. What factors Influence UCC Students' Attitudes towards PCH promotion?
6. How do UCC students describe strategies required to integrate PCH interventions into routine reproductive services at the UCC hospital?
7. How do healthcare professionals at the UCC hospital describe processes required to incorporate PCH interventions into routine reproductive health services?

Significance of the Study

This study was critical for several reasons. First, understanding relationships between the key study variables examined would provide vital information to stakeholders concerned with PCH promotion. Some of these include the Ministry of Health, Ghana Health Service, and the Directorate of

University Services. Second, the results of this study may inform clinical practice and future policy decisions about the design, implementation, and evaluation of PCH programmes in the country. Third, the findings will help estimate the PCH-related needs of women and men of reproductive age in Ghana. The results will also serve as a framework to inform advocacy, communication strategies, and policy directives towards the future integration of PCH strategies into reproductive health services. It can bridge the PCH gap in existing reproductive health services. Finally, the results may serve as a preliminary stage for a nationwide study on PCH-related issues in Ghana.

Delimitation

The quantitative phase of the study mainly examined sociodemographic, behavioural, risk factors, and attitudes associated with awareness of PCH and promotion. The study considered only regular undergraduate and postgraduate students of the University of Cape Coast and excluded sandwich, and distance education students. Only students between the ages of 15 and 49 years were included in this study. The qualitative phase of the research employed focused group discussions (FGDs) among a sub-population of students and conducted key informant interviews (KIIs) among health care professionals who currently provide reproductive health services at the University of Cape Coast Hospital. The qualitative study assessed perceived personal and environmental factors necessary for integrating PCH into existing reproductive services at the UCC hospital.

Limitations

The study was conducted among healthcare professionals and reproductive-aged female and male students in a university setting. While the study provides essential information about factors influencing PCH promotion

among UCC students, some limitations exist. First, although students have characteristics similar to students in other public universities in terms of age, sex, and programmes, the study results reflect students' views in only a single public university. Therefore, the generalizability to young adults in the broader population is unknown. Repeating the in all public universities in the country may increase the generalisability. Second, there might be under-reporting of PCH risk factors among students since data were collected through self-administered questionnaires. Third, the study qualitatively explored the perceptions of a section of students and healthcare professionals in the university hospital on PCH-related issues. Therefore, the transferability of the findings from this study should be considered with caution.

The cross-sectional survey design adopted for the quantitative phase of this research had a limitation for establishing causal effects between PCH predictors and outcomes (Polit & Beck, 2013). Even though the design could examine associations between a health condition and possible risk factors, it was impossible to determine if the risk factor preceded the outcome (Jacob & Ganguli, 2016).

Focus group discussions [FGDs] employed for data collection were valuable tools for eliciting diverse and large amounts of qualitative information within a limited time frame. However, it tended to prevent some participants from expressing their views and experiences regarding the phenomenon of interest (Morgan, 2007). There was a candid moderation of discussions to offset this weakness, and not more than eight participants were allowed in each group to enable everyone in the group to talk. Although there were limitations to the methods and procedures used in this study, the researcher has maintained objectivity and other essential research

characteristics to ensure that the findings and conclusions drawn are as valid and reliable as possible.

Definitions of Terms

Adverse pregnancy outcomes: factors that decrease the chances of having a healthy newborn.

Child health: the physical, mental, emotional, and social well-being of children from infancy through adolescence

Maternal health: women's health during pregnancy, childbirth, and the postpartum period.

Preconception behaviour: personal plans for pregnancy and behavioural modifications to improve fertility and desirable pregnancy outcomes.

Preconception care involves identifying and managing potential risks to improve pregnancy outcomes.

Preconception health awareness: exposure to PCH risk factors and reproductive life plan.

Preconception health: the overall health status of men and women of childbearing age before a potential pregnancy and subsequent pregnancies.

Preconception health promotion: a preventive strategy to assist individuals of reproductive age to prepare for pregnancy by improving their health before pregnancy.

Preconception period: a minimum of one year before the initiation of any unprotected sexual intercourse among women and men of childbearing age

Preconception risk factor: Biomedical, lifestyle, and environmental factors that predispose men and women to adverse birth and pregnancy outcomes.

Reproductive health: the ability of women and men to have a responsible, satisfying and safe sex life and the capability to reproduce, including the freedom to decide if, when, and how often to do so.

Reproductive life plan: A set of personal goals related to conscious decisions about whether or not to bear a child and how to achieve these goals.

Organization of the Study

The study was organized into five main chapters. Chapter one presents the introduction of the thesis describing the background to the study and the statement of the research problem. It also highlighted the purpose of the study, research questions, significance of the study, and definition of terms used in the study. Chapter two reviews the literature on PCH-related issues and the theoretical frameworks underpinning health behaviour. The third chapter describes the research methods employed for the study. Sub-sections include; research design, research philosophy informing this research, study area, population, and sampling procedures used. The chapter consists of a discussion on the methods, instruments, and procedures used to collect and analyze data for the quantitative and qualitative aspects of the study. Chapter four presents the results and summary of key findings emerging from both quantitative and qualitative aspects of the study. Results were discussed with reference to reviewed theoretical frameworks and related literature. Chapter five entails a summary of research findings and conclusions drawn from quantitative and qualitative aspects of the study. It also contains recommendations for theory, health promotion practice, and future research.

CHAPTER TWO

LITERATURE REVIEW

The purposes of this study were to: (a) assess the level of awareness and perceived attitudes of UCC students on PCH related issues, (b) estimate the prevalence of PCH risk factors among students of UCC, (c) examine factors influencing students' PCH awareness and attitudes towards PCH promotion within the context of the university community, and (d) explore qualitatively the perceptions of students and healthcare professionals at the UCC hospital on how to integrate PCH interventions into existing reproductive health services. This chapter presents a review of related literature. Relevant information was retrieved from a range of online and web-based databases. Specific search databases such as Google Scholar, EBSCO Host, HINARI, and PubMed were used to search for journals, thesis, CDC, and WHO reports related to preconception health.

To achieve the purposes of the study; journals, books, and articles perused and literature reviewed under the following thematic areas; the concept of PCH and PCH health care, PCH promotion, components of preconception health care, preconception health care in the MCH continuum of care and rationale for a paradigm shift towards PCH Promotion. Evidence on PCH awareness levels, the prevalence of PCH risk factors, and perceived attitudes of reproductive age individuals towards PCH promotion were also evaluated. Furthermore, the review covered socio-demographic predictors of awareness on PCH-related issues, perceived strategies for PCH and integration into existing reproductive services, macro-environmental factors influencing PCH promotion attitudes, recommended policy guidelines for finance, and

delivery of preconception health care and behavioural change theories and models related to PCH promotion.

The Concept of PCH and PCH Health Care

PCH is "the health of all individuals during their reproductive years" (Ontario Public Health Association, 2014, p. 6). It encompasses the overall health of all individuals during their reproductive years, emphasizing reducing risk factors, promoting healthy behaviour, and increasing preparedness for pregnancy, irrespective of gender, sexual orientation and whether these individuals intend to have children or not (WHO, 2012). Thus, it targets health status before first pregnancy and subsequent pregnancies (Ontario Public Health Association 2014; Dean, Imam, Lassi, & Bhutta, 2013). It consists of preventive and curative interventions by providing biomedical and behavioural interventions before conception (Dean et al., 2013; Johnson et al., 2006; WHO, 2013). Research suggests that health and lifestyles before conception are vital in improving reproductive and MCH outcomes (Charafeddine et al., 2014; Tyden, 2016). Hence, the overall goal of PCH care is to provide health promotion, screening, and interventions for women and men of reproductive age to reduce risk factors that might affect future pregnancies (Coonrod, Bruce, Malcolm, Drachman, & Keith, 2009).

The PCH concept emerged in the United States over 30 years ago (Freda, Moos, & Curtis, 2006) as a "specialty service" for women with a history of adverse pregnancy outcomes in 1980 (Jack, Atrash, Bickmore, & Johnson, 2008). PCH was redefined MCH to include the preconception period in the 1980s. ANC services were expanded to cover interventions before conception (Waggoner, 2013). In response, the United States Public Health Service recommended assessing all women of reproductive age for their

preconception risk conditions, referral, and the provision of preconception intervention in 1990 (Freda et al., 2006). By the 2000s, the notion that a woman's health status and behaviour before conception could influence her health, pregnancy, and developing baby was widely approved. The concept later evolved into a movement supported by specialists and health experts across the United States of America, culminating in a national agreement on the definition of PCH and preconception care. This further resulted in a national agenda targeted at policy change, clinical care, consumer knowledge, public health, and research (Johnson et al., 2006).

A critical era in the development of the concept of PCH occurred when the CDC approved it and began its promotion by launching the Preconception Health Care Initiative in 2004 (Waggoner, 2013). In collaboration with the March of Dimes and other experts in reproductive health, the CDC organized a conference to discuss the agenda for PCH interventions, research, and policy in 2005. This culminated in establishing the Preconception Care Work Group and the Select Panel on Preconception Care (Johnson et al., 2006). The establishment of this internal workgroup served as a significant milestone for PCH care in that it triggered research and public health interest in the concept (Waggoner, 2013). Accordingly, a comprehensive framework for global maternal and child health for its country offices was designed. The framework emphasized PCH and Family Planning as one of the three objectives for reducing perinatal and maternal mortality and morbidity (Schuchat, Tappero, & Blandford, 2014).

The experts have recommended that both men and women of childbearing age be the target for PCH promotion. The health and behaviour of men have important implications for their partners and unborn children

(WHO, 2013, p. 11). Therefore, PCC should be communicated and delivered in a way that ensures that males and females and empowers girls and women will be covered (WHO, p.3). A comprehensive package and strategies have been developed to guide countries adopting PCH initiatives. As a result, the PCH strategy has been rolled out in several high-income countries (HIC), including the Netherland and the United States, and some low- and middle-Income countries [LMICs].

Consequently, several high-income countries (HIC) such as Italy, Netherland, and the United States, and low- and middle-Income countries [LMICs] like Bangladesh, the Philippines, and Sri Lanka have successfully initiated the PCH strategy (WHO).

PCH Promotion

The Best Start Resource Centre (2009) describes PCH promotion as a preventive approach that assists individuals in their reproductive years to enhance their overall health before pregnancy occurs. It entails health behaviour related to fertility protection, pregnancy preparedness, identification, and management of risk factors associated with poor MCH outcomes (CDC, 2014; Ontario Public Health Association, 2014). Literature suggests that the burden of poor MCH outcomes has persisted in most resource-limited countries despite significant progression MCH efforts (WHO, 2015).

Components of Preconception Health Care

The key components of PCC are risk prevention, health promotion, and interventions (Shannon, Alberg, Nacul, & Pashayan, 2013). Experts have catalogued many evidence-based interventions as components of PCH (Atrash et al., 2008; Johnson et al., 2006). Van der Zee (2013) categorized PCH

promotion into two major component actions: the provision of information and behaviour change, which involves risk assessment, health promotion, counselling, and the delivery of interventions. Specific strategies comprise awareness creation, improvements in knowledge, skill development, motivation, and opportunities to address risk factors. It also involves accessibility to services, a supportive environment, policy development, and behaviour change (Tough, Clarke, & Cook, 2007). These interventions can be delivered through health education and promotion, particularly health screening and counselling (Moos et al., 2008; Jack et al., 2008; Johnson et al., 2006; WHO, 2013).

Preconception Health Care in the MCH Continuum of Care

PCH has been emphasized as an effective strategy to bridge the existing MCH continuum care (WHO, 2013). PCC is vital because it completes the MCH continuum by ensuring ongoing surveillance and early intervention to guarantee that the women begin pregnancy in the best possible health (Dean et al., 2014). The strategy has the potential to address pre-pregnancy health risks and health problems that could have negative maternal and foetal consequences for mother and child (van der Zee et al., 2012; Dean et al.). It also provides would-be parents with an opportunity to identify, eliminate or manage pre-pregnancy health risks and potential health problems that may lead to adverse maternal and foetal outcomes (Dean et al. 2014; Ahmed, Elbashir, Mohammed, Saeed, & Alawad, 2015).

The rationale for Paradigm Shift towards PCH Promotion

There is an increasing global interest in PCH promotion to reduce risk factors for poor MCH outcomes (Berglund & Lindmark, 2016; Loafman, Calvo, Wan, & Song, 2009; Poels Koster, Franx, & Steel, 2017; WHO, 2013).

Given that several pregnancies are unintended (Cheng, Schwarz, Douglas, & Horon, 2009; Dean et al., 2014; Delissaint & Mckyer, 2011). Besides, we cannot predict when pregnancy occurs (Biermann, Dunlop, Brady, Dubin, & Brann, 2006; Freda, Moos, & Curtis, 2006; Moos et al., 2008). So, it is pertinent to reduce risk factors for adverse pregnancy outcomes ahead of critical periods of fetal development (Dean et al., 2014). However, ANC overlooks the most critical period of embryonic development, which usually occurs before women become aware of their pregnancy (Atrash, Johnson, Adams, Cordero, & Howse, 2006). As a result, most women predisposed the developing fetus to potential harmful risks such as poor maternal health and teratogenic medications (Cragan, Friedman, Holmes, Uhl, Green, & Riley, 2006; CDC, 2006).

In addition, poor maternal health is associated with increased odds of experiencing adverse maternal and fetal birth outcomes (Witt, Wisk, Cheng, Hampton, & Hagen, 2012). Ironically, these adverse outcomes are associated with a range of modifiable risk factors prevalent among men and non-pregnant women of reproductive age (Mason et al., 2014; Mittal, Dandeka, & Hessler, 2014). Nonetheless, existing reproductive health strategies focus on only high-risk women of reproductive age (Dean et al., 2014; Jack et al., 2008; Mitchell, Levis, & Prue, 2012). Further, the new strategy focus' on how lifestyle, attitudes, traditional beliefs, and practices inform perceptions about health and health behaviours (Bisika, 2008). Therefore, many individuals of childbearing age enter pregnancy with risk factors that predispose them to poor reproductive and pregnancy outcomes without improving their health status (Stern, 2015).

Recommended Policy Guidelines for Financing and Delivery of Preconception Health Care

The WHO (2013) recommended that PCH promotion programmes should be designed according to international, regional, countrywide, and local realities. Policy and finance are significant obstacles to access and the professional practice changes required to improve access to PCH services (Johnson et al., 2006). Thus, they proposed national health insurance coverage and family planning waivers as important policy directions to improve PCH and health care access. Johnson et al. further suggested that the policy development function should involve a comprehensive stakeholder engagement, evidence-based decision-making, strategic interventions, and the development of comprehensive public health policies.

In a related development, Johnson, Atrash, and Johnson (2008) underscored the need to use frameworks to elaborate the role of policy and finance in PCH and health care initiatives at the national and local levels. Specific strategies identified include monetary incentives for PCH screening and promotion, using existing public health programmes to provide PCH services to women after delivery by linking services to family planning and home visiting. Other strategies entail health insurance coverage for low-income women and support national and PCH integration into existing health services. The authors further proposed a partnership between MCH programmes and other state and community agencies to develop and advance comprehensive PCH efforts at the national and local levels (Johnson et al., 2006). Several authors drew similar conclusions (Lassi et al., 2014; Richardson et al., 2007; Young, Urquia, & Ray, 2013). In particular, the authors recommended developing and distributing guidelines, educating

consumers, and integrating preconception care activities into clinical and public health programmes.

Level of PCH Awareness among Reproductive Age Individuals

Awareness of PCH-related issues is the first critical step to the PCH promotion agenda (Johnson et al., 2006; Lassi et al., 2014; WHO, 2013). Experts argued that adequate awareness alone could lead to necessary lifestyle modifications, reducing risk factors that might affect future pregnancies (Vanusha & Parvathavarthini, 2018). Several studies show that PCH awareness improves the overall health status of individuals and provides vulnerable individuals control over their own lives across the life span. (Bialystok, Poole, & Greaves, 2013; Dean et al., 2014; Johnson, Atrash, & Johnson, 2008; Johnson et al., 2006).

The level of awareness on PCH-related issues has been far better among individuals in developed countries than developing countries (Ayalew, Mulat, Dile, & Simegn, 2017; Coonrod, Bruce, Malcolm, Drahman, & Frey, 2009). Nevertheless, inadequate awareness about PCH has remained a significant obstacle to PCH promotion among several population sub-groups (Squiers et al., 2013). For instance, in Canada, 52% of women and 80% of men did not recall receiving any preconception information from their HCPs (Best Start, Resource Center, 2009). A cross-sectional survey among Mexican American women of reproductive-aged revealed that respondents only had average knowledge on PCC (Coonrod, Bruce, Malcolm, Drahman, & Frey, 2009). A related community-based survey conducted in Ethiopia revealed that only 15.9% of reproductive-aged women are adequately aware of pre-pregnancy folic supplementation (Goshu, Liyeh, & Ayele, 2018).

Ayalew et al. (2017), in their systematic review, found the overall PCH awareness in developing countries to be 27.5%, with women having a history of family planning use, secondary school education, and is aged between 25 and 34 having a higher awareness. The study also shows that PCH awareness levels were generally low irrespective of the target population investigated. Tuomainen, Cross-Bardell, Bhoday, Qureshi, and Kai (2013), in a related study, found that women had limited awareness of PCH. Moreover, most pregnancies were unplanned due to little prevailing culture for pregnancy preparedness (Tuomainen et al.). The authors concluded that decision-making for seeking PCH care would be problematic if awareness and knowledge on the importance of PCH are lacking among target populations for PCH interventions.

Further, PCH awareness levels seem to differ in developed and developing countries among individuals in the general population. Idris et al. (2013), Olayinka et al. (2014), and Kassa & Yahannes (2018) found low awareness as a significant barrier to the utilization of MCH and PCH services in Nigeria and Ethiopia. Low awareness of PCH-related issues like pre-pregnancy weight, lack of pregnancy planning, and folic acid supplementation was reported in Sri Lanka by Patabendige and Goonewardene (2013). Comparatively, Mitchell, Levis, and Prue, 2012 found that 52% and 43% of men and women in the US were unaware of PCH-related issues. Conversely, a hospital-based survey reported that women diagnosed with chronic conditions such as diabetes mellitus had better awareness (52%) of PCH issues (Mutale et al., 2017).

Studies on PCH awareness-related issues among university students suggest that awareness levels differ across different countries. For instance, Paulsen (2017), in a study conducted among undergraduate university students, showed that female students had a high knowledge of PCH-related issues compared to their male counterparts. Several other studies reported low to moderate PCH awareness with varying composite scores of 50% to 64% among university students (Corbett, 2011; Crusenberry, 2016; Delgado, 2008; Mananhar & Subedi, 2018). Manandhar and Subedi found a significant relationship between information acquired and level of PCH awareness and source of information and level of PCH awareness among undergraduate students.

In a related study, Masood and Alsonini (2017) confirmed previous findings that reproductive-aged individuals with higher educational attainments were more likely to have a higher awareness about healthcare interventions in Nepal. For instance, Delgado (2008) found that female university students had a relatively higher awareness score than male counterparts. A similar study reported that awareness of PCH-related issues among university students depends on gender and level of education (Crusenberry, 2016).

Prevalence of PCH Risk Factors among Reproductive Age Individuals

The prevalence of risk factors for poor MCH outcomes has persisted in developed and developing countries. This has resulted in adverse pregnancy and birth outcomes in developing and developed countries (Goshu, Liyeh, & Ayele, 2018; Kent, McClure, Zaitchik, & Gohlke, 2013). Preconception risk factors and behaviours such as obesity, pre-existing medical conditions, alcohol consumption, tobacco usage, and exposures to household and

environmental hazards constitute a significant risk to MCH outcomes if not managed (Agricola et al., 2016; Althabe et al., 2015; Mason et al., 2014).

Research indicates that health behaviours and risk factors for adverse pregnancy outcomes are established long before conception (Seshadri et al., 2012; Stephenson et al., 2018; WHO, 2013). However, a significant proportion of reproductive-aged men and women enter pregnancy with pre-existing risk factors, which are precursors for adverse pregnancy outcomes (Anderson et al., 2006; Coonrod et al., 2009; Denny, Floyd, Green, & Hayes 2012; Harelick et al., 2014) even though these risk factors are modifiable during the preconception period (Jack et al., 2008; Mason et al., 2014; Mittal et al., 2014; Wright, Milne, & Leeson, 2014).

The preconception periods of the reproductive years are critical for managing risk factors for poor MCH outcomes (Lian, Ma, Zhou, & Li, 2011; Robbins et al., 2018). Literature indicates that addressing risk factors before pregnancy can potentially result in significant positive MCH outcomes (Dean et al., 2013; Hemsing, Greaves, & Poole, 2017; Olayinka et al., 2014). Research suggests that most women do not realize their pregnancies until 4-6 weeks old (Denny, Floyd, Green, & Hayes, 2012). Besides, most pregnancies are unintended; it is also impossible to predict when pregnancy will occur (Cheng, Schwarz, Douglas, & Horon, 2009; Dean et al., 2014; Delissaint & Mckyer, 2011; Moos et al., 2008). The implication is that ANC begins too late to address the detrimental effects of PCH risk factors that may have impacted the developing fetus (Dean et al.; Stern, 2015).

Systematic reviews have demonstrated that PCH risk factors span several lifestyles and environmental factors. Data from the Behavioral Risk Factor Surveillance System (BRFSS) and Pregnancy Risk Assessment

Monitoring Systems (PRAMS) of the CDC revealed seven major domains of PCH indicators for public health surveillance (Denny et al., 2012; Robbins et al. 2014; Robbins et al. 2018). According to the authors, PCH risk domains include general health status, lifestyle, behavioural and environmental risks, nutrition and physical activity risks, infections, and immunization risks. Other domains are medical and medication risks, reproductive and obstetric risks, family history/genetic risk factors. Specific risk examples consist of heavy alcohol consumption, depression, diabetes, folic acid intake, hypertension, normal weight, recommended physical activity, current smoking, unwanted pregnancy, and use of contraception.

Self-perceived general health status is an objective proxy for estimating individual health status internationally (Wu et al., 2013). The review also suggests that younger individuals are more likely to report better self-perceived health status than their older counterparts. The tendency to report lower health status ratings increases after the age of 45 (Organization for Economic Corporation and Development [OECD] (2017). Related studies found higher educational levels to be associated with higher ratings of health status (Robbins et al., 2018).

Previous studies demonstrate that several environmental factors and pre-pregnancy behaviours of men and women directly affect the health of future offspring (Bonde, 2010; Toivonen, Oinonen, & Duchene, 2017). Similarly, a systematic review linked occupational exposure to neoplastic drugs to adverse reproductive effects (Connor, Lawson, Polovich, & McDiarmid, 2014). The authors found that routine work activities of health workers who prepare or administer antineoplastic drugs predispose them to adverse reproductive outcomes. This evidence suggests creating awareness

and instituting specific guidelines for workers exposed to hazardous substances.

Case-control studies indicate the prevalence of a wide range of residential and work-related exposure to chemicals among individuals of childbearing age (Meinert, Kaletsch, Krummenauer, Miesner, & Michaelis, 1996; Meinert, Schuz, Kaletsch, Kaatsch, & Michaelis, 2000). Exposure to ionizing radiation has adverse effects on both males and females (Ladner, 1991; Lassi et al.). Research has shown that exposure to ionizing radiation leads to adverse reproductive outcomes such as miscarriages, congenital anomalies, and infertility in males and females (Ladner, 1991; Lassi et al., 2014). For instance, preconception paternal exposure to x-ray is associated with several adverse outcomes like low birth weight, fetal growth retardation, stillbirths, and childhood cancers (Dean et al., 2014; Schuz et al., 1999). Yet, men and women of childbearing age are exposed to hazardous chemicals regularly (van Maela-Fabry et al., 2019). Specifically, domestic products used daily have also been found to be carcinogens that adversely affect MCH outcomes (Sutton et al., 2012). However, one study reported that the prevalence of exposure to environmental risk factors is low among individuals with university education (Lassi et al.).

Homan, Davies, and Norman (2007) reviewed the effect of potentially modifiable lifestyle factors on the reproductive performance of individuals undergoing assisted reproductive technology (ART) therapy. They found strong evidence that several lifestyle factors are associated with the reproductive performance of the respondents. Examples include age, weight, smoking, diet, exercise, caffeine consumption, stress, and exposure to

environmental pollutants. The implication is that lifestyle modifications are required to enhance the chances of conception with ART treatment.

The prevalence of tobacco smoke exposure persists worldwide despite being preventable (Al-Qahtani, 2017; Nketia-Amponsah, Afful-Mensah & Ampaw, 2018). Tobacco smoke exposure is associated with several adverse outcomes for mothers and their unborn babies (Lange, Probst, Gmel, Rehm, Burd, & Popova, 2018; Owusu-Dabo, Lewis, McNeil, Gilmore, & Britton, 2009). Lange et al., in their meta-analysis, found that tobacco smoke exposure is prevalent among pregnant women globally. Paternal cigarette smoking is known to be associated with injury to the deoxyribonucleic acid (DNA) of the sperms as well as a direct impact on the health of female partners due to second-hand smoke exposure (Frey et al., 2008; Floyd et al., 2008; Milne et al., 2012).

According to gender and research context, smoking is prevalent among university students (Al-Qahtani, 2017; Hassan, Hossain, & Khan, 2019; Karadogan, Onal, & Kanbay, 2018). In Saudi Arabia, Al-Qahtani reported a smoking prevalence of 30.1% and 0.5% for males and females, respectively. Turkey found a relatively higher smoking prevalence of 46% and 15.3% for male and female students (Karadogan et al.). Hassan et al. (2019) reported an overall prevalence of 37% among university students in Bangladesh. A similar prevalence (40%) was reported among prospective fathers in Italy (Agricola et al., 2016). An overall active tobacco smoking prevalence of 3.8% was found in Ghana among men and women in the general population (Owusu-Dabo et al., 2009). Previously in 2016, the WHO reported a much higher tobacco smoking prevalence of 7.1 % for the general Ghanaian population (WHO, 2018).

Alcohol is a recognized teratogen linked with MCH complications (Stanton et al., 2016). Pre-pregnancy alcohol use, in particular, is associated with a 30% increase in spontaneous abortion among reproductive-aged individuals (Lassi et al., 2014). Common risk behaviours include intimate partner violence, unwanted sex, unplanned pregnancies, abortions, and associated complications (Poulin & Graham, 2001). Previous research among university students indicates that excessive alcohol consumption is an integral part of university life globally (Dovoren, Cronin, Perry, & O'Connor, 2015; Tarrant, Smith, Ball, Winlove, Gul, & Charles, 2019). Tarrant et al., in their longitudinal study in the UK, found that most students consume unsafe amounts of alcohol as a social norm. Davoren et al. also reported peer influence as a trigger factor for alcohol use in a large Irish university.

Alcohol consumption prevalence varies according to gender, age, population, and geographical location. Robbins et al. in 2014 found that nearly half (49.6%) of women of childbearing age within the ages of 18 and 24 reported alcohol consumption before conception in the US. A recent survey of men's PCH knowledge in England also found a much higher alcohol consumption prevalence of 79% three months before pregnancy (Shawe, Patel, Joy, Howden, & Barratte, 2019). This prevalence is relatively lower than the 26% reported by Oti (2016) among Ghanaian public universities. Ghana's national alcohol use prevalence was 26.7% (GSS, 2009). This was significantly lower than estimates reported for the youth and adults (Osei-Bonsu et al., 2017). Alcohol consumption prevalence for the youth in Ghana was 43% compared to 71.0% and 61.7% for men and women, respectively, adult Ghanaians in Europe. A related study reported a slightly lower

prevalence than the 7.1 % reported in 2016 for the general population in Ghana (WHO, 2018).

Research indicates that pre-pregnancy BMI outside the recommended range is a key risk to adverse MCH outcomes among women of reproductive age (Dean et al., 2013; Dean et al., 2014). For instance, undernutrition and obesity have emerged as a twofold burden among women of childbearing age (Dean et al.). Undernutrition, in particular, is a major risk factor attributable to maternal mortality (Black et al., 2013). Mamun et al. (2011) reported adverse outcomes among a cohort study of 6632 Australian women between 1981 and 1983. Obese women and those who experienced gestational weight gain were at a higher risk of pregnancy complications such as Caesarean section, higher birth weight difference, greater placental weight, and longer length of hospital stay. Similarly, women underweight before pregnancy had a higher risk of giving birth to premature babies. Preconception BMI is also associated with infertility in men and women (Panth, Gavarkovs, Tamez, & Mattei, 2018; Silvestris, de Pergola, Rosania, & Loverro, 2018). Hollingsworth, Callaway, Duhig, Matheson, and Scott (2012) reported pre-pregnancy obesity and overweight prevalence of 31% in Australia. A related study estimated maternal overweight and obesity prevalence to be 33.2% and 22% in Australia. These estimates were considerably lower than the 54% reported for Ghanaian women between the ages of 15 and 49 (Ghana Statistical Service [GSS], Ghana Health Service [GHS], & ICF International, 2015).

Some studies conducted in Europe indicate that the lifetime prevalence of eating disorders among adult women was 6% (Hudson, Hiripi, Pope, & Kessler, 2007; Keski-Rahkonen & Mustenlin, 2016). However, a study in Australia found about 15% of women experience eating disorders at some

point in their lifetime (Dobson et al., 2015). In the African context, van Hoeken, Burns, and Hoek (2016) found no case of anorexia nervosa in a total of 1476 young women in their review of epidemiological studies on eating disorders in Africa. The review also found the combined point-prevalence rate of bulimia and eating disorders not otherwise specified (EDNOS) as 0.87% and 4.45%, respectively.

A meta-analysis involving 34 countries indicates that the prevalence of pre-pregnancy folic acid use differs worldwide, with Africa having a prevalence of 0% (Toivonen et al., 2018). Bhide, Gund, and Kar (2016) found a non-folic acid use prevalence of 99.7% among women planning a pregnancy in India. Related reviews reported folic acid use of between 38.3% and 56% among pregnant women on their first antenatal visit (Callaway, Chang, McIntyre, & Prins, 2016; Kassa, Awraris, Daba, & Tenaw, 2019). Nilsen et al. (2016) reported folic acid supplementation prevalence of 31% among a cohort of Norwegian women studied between 1999 and 2009. While an Australian longitudinal study reported a prevalence of 63% non-pregnant women (McKenna et al., 2017) compared to 37.2% among pregnant women in Ethiopia (Gebre, Mulugeta, & Etana, 2015).

Regarding infection and immunization risk factors, vaccine-preventable diseases were associated with adverse MCH outcomes like spontaneous abortion, premature birth, and low birth weight (Seng, 2002; Moos et al., 2008). According to Lassi et al. (2014), pre-pregnancy vaccination can potentially protect against several diseases associated with adverse MCH outcomes by a 35% reduction in new STIs. A related study reported that rubella immunization protects a growing fetus from congenital rubella syndrome (Seshadri et al., 2012). Hence, the expert stressed that

women of reproductive age require vaccination against vaccine-preventable diseases during the pre-pregnancy period (Braspenningx et al., 2013). Vaccinations recommended include hepatitis B, human papillomavirus, and varicella (Coonrod et al., 2009). Nonetheless, developing countries like Ghana have yet to begin routine pre-pregnancy vaccination programs for individuals of reproductive age (Ezegwui et al., 2008).

There is a growing prevalence of women of childbearing age living with pre-existing health conditions requiring medications (Finer & Zolna, 2016; Robbins et al., 2009). Many studies identified pre-existing conditions as a significant risk to poor MCH outcomes (Mason et al., 2014; Robledo et al., 2017; Stephenson et al., 2018; WHO, 2013). In Europe, more than half of maternal deaths in the United Kingdom are attributable to an existing medical condition (McClure, Cooper, Clutton-Brock, & Center for Maternal and Child Enquiries, 2011). The existence of chronic medical conditions such as hypertension, diabetes mellitus, and obesity before pregnancy is associated with a higher risk of giving birth to babies with low birth weight and fetal growth retardation (Alio, 2017; Bortulus et al., 2017). A study to estimate risk factors for adverse birth outcomes showed that more than 4% of women had pre-existing medical conditions, which can negatively affect pregnancy outcomes if not managed (CDC, 2005).

Mittal, Dandeka, and Hessler (2014) also found that 9.3% of the women had diabetes, 2% had pre-diabetes Mellitus (impaired fasting glucose). Again, 2%-10% of participants' pregnancies had complications associated with gestational diabetes. Genetic conditions differ according to several factors such as paternal age, medical history, and family history among individuals of childbearing age (Solomon et al., 2008). Besides, a significant proportion of

individuals use medications known to be dangerous to developing babies before pregnancy occurs (Hosli, Elsinga, Buitendijk, Assendelft, & Van der Pal-de Bruin, 2008). For instance, Hosli et al. reported over-the-counter medications of 47% among couples contemplating pregnancy in the Netherlands. A prospective study of expectant fathers in Italy revealed a high prevalence of medication use (76%) among respondents (Agricola et al., 2016). Althabe et al. (2015), in their review of population-based studies conducted in LMICs, found the use of over-the-counter medications known to be teratogens among 3% of women of childbearing ages. The findings highlight the need to counsel men and women of childbearing age against the potential teratogenic effects of certain medications.

Concerning the prevalence of reproductive and obstetric PCH risk factors, research indicates that 40 to 50 per cent of all pregnancies are unintended (Kallner & Danielson, 2016; The American College of Obstetricians and Gynaecologists, 2016). Goossens, de Roose, van Hecke, Goemaes, Verhaeghe, and Beeckman (2018) reported a reproductive life (RLP) prevalence of 83% for reproductive-aged women in Belgium. RLP improves health outcomes by encouraging men and women of childbearing age to reflect on their reproductive intentions and family planning and interventions that prevent unplanned pregnancies (Malnory & Johnson, 2011; Steel et al., 2015: Tyden et al., 2016).

Grindlay et al. (2018), in a study conducted in Ghana, reported consistent contraceptive use prevalence of 44% in the general population. According to the GDHS, the prevalence of contraceptive use among sexually active unmarried women aged 15-49 years in 2014 was 45%. Luchters et al. (2016) also reported contraceptive use prevalence of 70% among women of

childbearing age in Australia. In a survey, Gbagbo and Nkrumah (2019) reported emergency contraceptive use prevalence of 31% among female university students. The estimate for non-use of contraceptive methods in a recent Demographic and Health survey was 41% for women in need of contraceptives who do not use any contraceptive method to prevent pregnancy (Moreira et al., 2019). Generally, individual PCH risk factors have been widely investigated. However, most studies were conducted in developed countries, where awareness of PCH-related issues was better than LMICs. More so, limited empirical research exists on all the PCH domains among non-pregnant university students of reproductive age in a single study in an SSA country like Ghana.

Perceived Attitude of Reproductive Aged Individuals towards PCH Promotion

Attitude represents a person's belief regarding whether the consequence of the behaviour will lead to positive or negative outcomes (Fishbein & Yzer, 2003). It is believed that an individual's attitude towards behaviour "represents the person's general feeling of favourableness or unfavourableness for the behaviour in question" (Ajzen & Fishbein, l980, p. 285). Researchers generally assume that individual willingness to perform a health-related behaviour "is a function of such general orientations of health concerns, willingness to seek medical help, perceived vulnerability to illness, faith in doctors and medicine, and feelings of control over disease" (Ajzen & Timko, 2010, p. 259).

Several studies demonstrate a relationship between attitudes and health behaviour (Ogen et al., 2007; Steel, Lucke, & Adams, 2015). According to the authors, attitude is the first predictor of behavioural intention and can translate

into actual behaviour. In the context of PCH promotion, studies have reported that attitude is the main reason for failure to seek PCH counselling among women of reproductive age (Bortulus et al., 2017; Esposito, Ambrosio, Napolitano, & Di Giuseppe, 2015; van der Zee et al., 2013). A qualitative study examined why Italian women failed to seek information relating to PCH and found that the main reason for not seeking PCH information was that participants perceive getting pregnant as a natural event of life, hence requiring no preparation and concerns (Bortulus et al., 2017). A related study guided by Ajzen's TPB, which explored the attitudes of Dutch women planning to become pregnant, further revealed that participants had a positive attitude towards preconception interventions, and their attitude "changed when they imagined preconception care in their personal situation. Hence, most participants responded negatively to considering seeking preconception care consultation (van der Zee, 2013).

Similar studies show that PCH attitudes scores differ among non-pregnant women and mothers (Chuang, Hillemeier, Dyer & Weisman, 2011; Kassa et al., 2019). For instance, women considering pregnancy in the near future have a completely different attitude towards PCH than those without pregnancy intentions (Squiers et al., 2013; Squiers et al., 2014). A systematic review of pre-conception health behaviours (PCHBs) among childbearing age women in the United States confirmed earlier claims. The researchers found that knowledge, awareness, and beliefs of preconception care did not necessarily lead to preconception health practice (Delissaint & McKyer, 2011). Other studies found that a positive attitude towards PCH care does not necessarily translate into PCH behavioural intentions among women (Roudsari et al., 2016; van der Zee, 2012).

Conversely, studies conducted among university students shows that positive attitudes are associated with reducing adverse reproductive outcomes through PCC (Corbett, 2011; Crusenberry, 2016; Sese, 2013; Paulsen, 2017). Corbett examined the degree to which undergraduate female university students were motivated to improve their health before conception found that even though they had inadequate knowledge of PCC. Male students generally had a positive attitude towards PCH counselling [$P < 0.0001$]. The author identified social norms regarding friends and partners influenced participants' self-efficacy to seek PCH counselling. A finding worth noting is that older male students were more likely to negatively affect PCH than younger male students (Sese, 2013).

Further, PCH practices and behaviours were associated with higher PCH knowledge scores (Paulsen, 2017). Interestingly, male and female students underrated the age at which female fertility begins to decline even though they claimed awareness about fertility issues (Peterson, Pirritano, Tucker & Lampic, 2012). Thus, a positive attitude indicates adequate awareness of PCH related issues and risk factors associated with adverse pregnancy outcomes.

Sociodemographic Predictors of Awareness on PCH Related Issues

Socio-demographic factors refer to a combination of social, demographic, and physical factors related to the individual's ability to function normally daily (Koukouli, Vlachonikolis, & Philalithis, 2002). Research indicates that the socio-demographic characteristics of an individual influence not only the level of awareness but also the health behaviours and health outcomes of individuals (Bashar et al., 2012; Moshi et al., 2018; Ukachi, 2019). As mentioned earlier, the results of the studies showed that socio-

demographic characteristics of individuals, including age, level of education, sex, ethnicity, marital status, and paid employment, were positively associated with a range of health outcomes. These outcomes include access to healthcare, health care utilization, health-related behaviour and knowledge about health issues (Ukachi). In their multiple regression analysis, Krueger and Chang also found that sex, education level, and socio-economic status were significant variables in predicting women's physical activities and stress management. One of these studies found that socio-demographic factors were key pointers to access and health information among individuals of reproductive age (Ukachi, 2019).

In general, socio-demographic characteristics of individuals play a significant role in awareness of reproductive health issues (Ayalew, Mulat, Dile, & Sigmegn, 2017; Thongnopakun, Pumpaiboo & Somrongthon, 2018). Zhao et al. (2014), in a survey among Chinese women and their partners planning pregnancy, found statistically significant associations between maternal age, education, occupation and demand for PCH care. Similarly, in Bangladesh, the level of education of women and their husbands was significantly associated with knowledge on HIV/AIDS (Akter & Rahman, 2009). Similar findings in developed and developing countries affirmed that health-related behaviour is influenced by the social context and individual factors like socio-demographic characteristics (Davis, Campbell, Hildon, Hobbs, & Michie, 2015; Michie, van Straten, & West, 2011).

In a documentary review, Adgoy (2018) found the main socio-demographic factors associated with women's health in African countries: education, age, and marital status. Socio-demographic characteristics of reproductive-aged individuals are also associated with preconception decision-

making and awareness among reproductive-aged individuals (Biermann et al., 2006). Consequently, socio-demographic factors cannot be underestimated in reproductive health efforts (Aronson, Wallis, O'Campo, Whitehead, & Schafer, 2007).

Several studies have reported mixed results about specific socio-demographic variables associated with PCH awareness (Ayalew, Mulat, Dile, & Sigmegn, 2017; Goshu et al., 2018; Weisman et al., 2008). Ayalew et al. reported secondary school education, income, maternal age of 25 to 34 and being married to a civil servant to be significantly associated with high PCH knowledge in Ethiopia. Goshu et al. reported better monthly income as a key predictor of PCH awareness. But Gautam and Dhakal (2016) found no significant association between age, occupation, educational status, and PCH knowledge in Nepal. Research shows that specific socio-demographic factors associated with PCH awareness associated among university students have been less studied.

Awareness of PCH-related issues does not seem to differ between university students and individuals in the general population (Corbett, 2011; Delgado, 2013; Falaye & Adeleke, 2012; Manandhar & Subedi, 2018). A study conducted in Nigeria found the level of education, age, religion, sex, marital status and course of study were significant predictors of knowledge of reproductive health issues among university students. Change in attitudes and preventive health behaviours was also associated with students' socio-demographic factors (Falaye & Adeleke). Variations in these findings may be attributable to differences in settings, study population and age of participants.

Educational attainment is another critical social characteristic that enhances the capabilities of individuals. An individual's level of education influences the knowledge and behaviour needed for making healthy choices (Backlund, Sorlie, & Johnson, 1999; Mirowsky & Ross, 1998). Many studies indicate that education is a significant determinant of awareness and health behaviours (van Malderen, Amouzou, Barros, Masquelier, van Oyen, & Speybroeck, 2019; White, Redner, Skelly, & Higgins, 2014; Gupta et al., 2012; Weisman et al., 2008). These studies argue that education enhances individuals' efficacy and critical thinking skills (van Malderen et al., 2019) and provides them with knowledge, personal and social skills for informed decision-making about health interventions (White et al., 2014). Highly educated individuals tend to be more aware of the benefits of health services than their less-educated counterparts (Vikram, Vanneman, & Desai, 2012). Moreover, they are more likely to use preconception services (Weisman et al., 2008) to improve their quality of life. Celik & Hotchkiss (2000) and Gubhaju (2000) reported that education increases the patronage of maternal health services.

Research further showed that educational attainment is associated with PCH awareness and enactment of PC behaviours. The findings showed that those educated were almost seven times more likely to know about PCH than their counterparts with no formal education (Ayalew et al., 2017). Kassa and Yohannes (2018), in a study conducted in South Ethiopia, also found women with secondary education and above had significantly higher odds of a good level of knowledge on PCH than those with lower educational attainments. Goshu et al. (2018) found that educated women had a good awareness of preconception folic acid supplementation than their uneducated counterparts.

Further, PCH awareness levels among reproductive-aged women and men in the general population were generally lower (27.5% overall awareness) than those with university education.

Another factor that may influence the level of PCH awareness is age. It has been described as a biological variable that affects a person's attitude towards life and thinking patterns and opinions (Zhao et al., 2014). Two studies that examined the relationship between age and level of PCH awareness revealed that PCH awareness was generally low among adolescents, young and older adults (Ayalew et al., 2017; Temel et al., 2015). Ayalew et al. reported that older women between the ages of 25 and 34 were more than two times more conversant with PCH issues than their counterparts between the ages of 15 and 24. Whereas women between the ages of 35 to 49 were four times more likely to have better knowledge about PCH than their counterparts between 15 and 24 years.

Temel et al. (2015), in their population-based cross-sectional study in the Netherlands, also reported significantly lower PCH awareness among men and women aged between 16 and 24 years or 45 years and older. In contrast to these findings, a study conducted in the United States among women and men in the general population found a weak positive correlation (r = 0.084) between age and PCH awareness levels (Mitchell, Levis, & Prue, 2012). Research conducted among university students reported considerably higher PCH awareness levels among older students than their younger counterparts (Delgado, 2013; Corbett, 2011). A related study revealed that age was associated with health information-seeking behaviour, awareness, access and utilization of reproductive health information (Falaye & Adeleke, 2012). Younger women, aged 20 years and below, middle-aged women between the

ages of 20 and 34 years, were more likely to seek MCH information than their counterparts, aged 34 years and above (Okutu, 2011). A similar pattern was observed among older women and men in the general population (Toivonen et al., 2017).

Paulsen (2017) also found that university students' PCH knowledge scores statistically correlate with PCH practices and behaviours. Thus, the need to eliminate disparities and barriers to engaging in PCH behaviours by studying how health care utilization differs by socio-demographic factors (Oza-Frank, Kachoria, Keim, Lynch, & Klebanoff, 2015). Therefore, age is critical in designing and delivering specific PCH promotion interventions among university students.

Gender denotes "the economic, social and cultural attributes and opportunities associated with being male or female in a particular social setting at a particular point in time" (Worku & Gebresilassie, 2008 p. 24). Research demonstrates that a considerable difference exists between men and women. Most studies reported significantly higher awareness levels among women than men (Frey et al., 2008; Godfrey & Nachtigall, 2009). The findings of Delgado (2008) showed that female university students obtained higher scores than their male counterparts. A study conducted among men and women in the general population showed that only 48% of men reported they have ever heard, seen or read information about PCH compared to 57% in women in the United States of America (Mitchell et al., 2012). A related study reported that although the respondents had a strong interest in PCH promotion, 52% of women and 80% of men did not recall ever receiving any preconception information from their health care providers (Best Start Resource Centre, 2009).

Conversely, Myles, Gennaro, Dubois, O'Connor & Roberts (2017) found no significant association between men and women regarding PCH awareness levels. One study reported that the poor level of PCH awareness among men could be attributable to the little prevailing culture of preparing for pregnancy and the realities of unplanned pregnancies in most settings (Tuomainen et al., 2013). Others have argued that men's relatively low PCH awareness is because little attention has been given to male involvement in PCH efforts (Bodin et al., 2017). However, the CDC recommended PCH interventions for men and women (Johnson et al., 2006).

Another factor that can influence the level of PCH awareness is marital status. A review of empirically studies examining associations between marital status and PCH awareness demonstrates that marital status affects the level of PCH awareness (Ayalew et al., 2017; Corbett, 2011; Mitchell et al., 2008). Ayalew et al. found that being married to a civil servant was significantly associated with high PCH knowledge among women in Ethiopia. In contrast, some studies showed that married university students had a higher level of PCH awareness than their unmarried counterparts (Corbett; Mitchell et al., 2008). Research conducted in African countries like Nigeria and Tanzania has found that the marital status of women gives them access to information and MCH services since they are more likely to receive support from their husbands (Lwelamira & Safari, 2012; Ochako, Fotso, Ikamari, & Khasakhala, 2011). Evidence suggests that having a supportive husband or support system makes it easier for women to follow recommended health behaviour (Files, David, & Frey, 2008; Squiers et al., 2012; van der Zee, 2013).

In terms of income, research demonstrates that socioeconomic challenges, including financial constraints, are key obstacles to the effective implementation of sexual and reproductive health programmes, especially in LMICs (Mashora, Dzinamarira, & Muvuni, 2019). For instance, women in the lower socio-economic categories are less likely to seek PCH counselling compared to those in the higher socio-economic bracket (Fransen, Hopman, Murugesu, Rosman, & Smith, 2018) therefore tend to be susceptible to poor MCH outcomes. Hence, income is essential in promoting PCH among young people, including university students. A related study in Los Angeles County shows that the most often cited barrier to accessing PCC by uninsured women was lack of money or insurance. (Ayalew et al., 2017). Similarly, in a logistic regression analysis, Temel et al. (2015) reported that low socio-economic status was significantly associated with low preconception folic acid knowledge.

Numerous studies showed that the ethnicity and religion of individuals influence health behaviours, individuals' health outcomes, and level of awareness on health-related issues (Bashar et al., 2012; Moshi et al., 2018; Ukachi, 2019). Ethnic origin is a significant predictor of sexual behaviour among young adults (Odimegwu & Somefun, 2017; Mmari & Sabherwal, 2013). According to Oluga, Kiragu, Mohamed, and Walli (2010), ethnicity is a socio-cultural variable that plays a moderating role in sexual behaviour, particularly in sub-Saharan Africa. Available literature demonstrates that racial and ethnic variation in an individual's level of knowledge and attitudes towards sexual and reproductive health issues measure the person's sexual literacy (Reinish & Beasley, 1991). Evidence indicates that differences in different race-ethnic groups affect the levels of knowledge of individuals

about various aspects of reproductive health (Dehlendorf, Rodriguez, Levy, Borrero, & Steinauer, 2010; Hayford & Guzzo, 2013). Consequently, interventions targeted at preventing sexual risk behaviours for adolescents and young adults should concentrate on the racial and ethnic differences among subgroups to address intrapersonal and contextual issues (Kogan et al., 2010).

Temel et al. (2015) explored the knowledge on preconception folic acid supplementation and intention to seek PCC among individuals of childbearing age in the Netherlands and found an interactive effect between educational level and ethnicity. Their findings suggest that the higher the educational attainment of participants, the lower the knowledge gap between different ethnic sub-populations. This was consistent with other findings that the ethnic background of individuals with higher educational attainments does not influence preconception folic acid knowledge (Paudel, Wing & Silpakar, 2012; de Walle, de Jong-van den Berg, 2007). Nonetheless, ethnicity does not seem to influence PCH awareness among highly educated men and women of reproductive age.

Concerning religion, research from both developed and developing countries revealed mixed findings on the role of religion in reproductive health and sexual behaviour. Some argue that religion plays a significant role in sexual and reproductive behaviours (Kramer, Hogue, Gaydos, 2007; Somefun, 2019) by shaping health decision making and behaviour **(**Stidham, Moreau & Trussell, 2012). For instance, Somefun reported religion as a protective factor for sexual behaviour among young adults in Nigeria. A related study shows that young adults who were highly religious had significantly higher odds of abstaining from reproductive health than their counterparts who were not religious (Olivier & Wodon, 2015).

Religion has impacted reproductive health behaviour and outcomes (Lehrer, 2004). For example, religious beliefs and practices often influence cost/benefit analyses, value perception, perceived behavioural control, and social influence (Rumun, 2014). Religious orientations of individuals have also been found to influence attitudes towards reproductive health behaviours and reproductive outcomes such as relationship, sex, childbearing, contraceptive use, marriage and pregnancy (Kramer, Hogue, Gaydos, 2007; Whitehead, Wilcox, & Rostosky, 2001).

On the contrary, some studies indicate that religious affiliation does not significantly influence reproductive health and sexual behaviour (Olivier et al., 2015; Rumun, 2014). For instance, Stidham et al. (2012) found that women with less religious service participation were 50% more likely to use reproductive health services than those participating weekly (odds ratio [OR] 1.5, confidence interval. A similar study found religious belief an obstacle to PCH lifestyle changes (Goossens et al., 2018).

Perceived Strategies for PCH Integration into Existing Reproductive Services

The evidence indicates that effective health promotion involves dealing with the context-specific need of different target populations (Poland, Krupa, & McCall, 2009). Forgas (2002) also found that a range of interpersonal information processing strategies influence how individuals perceive and interpret social behaviours. Health education and social marketing strategies have been seen as the most efficient strategies for improving PCH knowledge and behaviours among individuals of childbearing age (Hemsing et al., 2017: Squires et al., 2013). Social marketing strategy has also been identified as

suitable for health promotion interventions among populations with different backgrounds (Lassi et al., 2014: Squires et al., 2013).

Systematic reviews on opportunities for packaging and delivering PCH interventions indicate that PCH services can be provided at multiple levels at the primary, secondary and tertiary levels of healthcare (Lassi et al., 2014; Young et al., 2013). These interventions may be delivered as clinical and community-based services using primary health care approaches (Hemsing et al., 2017; Lassi et al., 2014). PCH interventions can also be provided in educational institutions (Charafeddine et al., 2014: Goodfellow et al., 2017; Lassi et al., 2014; Young et al., 2013).

According to the WHO (2013), successful PCH programmes can only be accomplished by designing evidence-based strategies by international, regional, countrywide and local dimensions. In a recent evaluation of contributions made by experts regarding PCH delivery strategies, Mitchell and Verbiest (2015) highlighted several domains. These include health education, clinical care, advocacy, policy directives, research and public health interventions. Reproductive health experts have advocated for coordinated and comprehensive action to deliver PCH interventions (Ontario Public Health Association [OPHA], 2014).

The American Academy of Family Physicians (2016) has specifically outlined strategies for delivering PCH interventions (Crawford, 2016). This comprised discussions regarding reproductive life planning at each visit to the hospital irrespective of the reasons for hospital visits. It also relates to recommendations on daily supplementation of 400 to 800 mcg of folic acid or multivitamin and consumption of balanced diet to all women of reproductive age and providing comprehensive contraceptive services to all sexually active

individuals who want to prevent or delay pregnancy. Other strategies include identification, screening for risk factors and provision of required intervention for reproductive-aged women and men, chronic disease management, counselling on prescription and over the counter medication usage and counselling on lifestyle risk factors-alcohol use, tobacco and substance use.

In a situational analysis to improve PCH services, (Goodfellow, Frank, McAteer, & Rankin, 2017) suggested that multidimensional interventions are necessary to place PCH at the forefront of funding and preventive health services. Several PCH intervention frameworks based on findings from systematic reviews have been designed for low-income countries (Dean et al., 2014; Lassi et al., 2014). Dean et al. identified three broad categories for PCH screening with their corresponding intervening strategies. These entailed physical, environmental, economic and political factors, family, formal and non-formal community structures. On the other hand, Lassi et al. categorized PCH interventions into five delivering packages to be delivered at the community, primary and referral levels. The authors also proposed specific packages including secondary education achievement for adolescent girls and prevention of teenage pregnancy, nutritional counselling and family planning, nutritional optimization and weight management programmes. Other strategies entailed multi-component youth development programmes, including infection prevention, screening, and managing chronic diseases, including mental health. The authors believed these interventions could be incorporated into existing health systems, educational systems, mass media campaigns, social marketing, and community support groups.

In an article on contemporary and future strategies to ensure the implementation of PCH recommendations, Richardson and Parker (2007) suggested ten priority areas for the delivery of interventions. Specifically, (1) the development and dissemination of clinical guidelines and tools, (2) education of consumers and integrating PCC into clinical and public health programmes. (4) monitoring and surveillance of preconception care knowledge, attitudes, and practices, (5) developing and promoting PCH research agenda, (6) promoting public policy and financing in support of PCC, education and (7) training clinical of public HCPs. The rest entail (8) identification and documentation, (9) promotion of best practices, implementation of projects to demonstrate success and (10) supporting state and local initiatives.

MCH specialists have recommended three critical approaches for PCH delivery (Goodfellow, Frank, MCAteer, & Rankin, 2017). These comprise strategic interventions to prioritize PCH promotion in preventive health and healthcare financing. Several studies have highlighted the unique role of healthcare providers in awareness creation and access to PCH services (Goodfellow et al.; Ojukwu, Patel, Stephenson, Howden, & Shawe, 2016; Steel, Lucke, Reid, & Adams, 2016). For example, a systematic review underscored the importance of conscious efforts to provide PCH-related information and knowledge, one-on-one contact with healthcare providers. Goodfellow et al. also identified the critical strategies for improving PCH: integrating PCH into the school curriculum, effective communication to promote PCH awareness, and the use of social media and mobile phone apps. Ojukwu et al. reported lack of public awareness and demand for PCH services, lack of resources and inadequate capacity as the main barrier to providing

PCH services in their situational analysis to explore the views of professionals involved with women of reproductive age.

A review of evidence-based health promotion identified eight key factors which assist practitioners in integrating evidence into practice. These comprised local and cultural relevance, community capacity building, continued exchange of ideas with all stakeholders, established academic-supported partnership, communication that responds to institutional and political readiness, acknowledgement of knowledge gaps between evidence and practice, advocacy and sufficient resources allocation. However, despite recognising the importance of PCH promotion as part of MCH services, there seems to be limited evidence on strategies relevant to specific contexts to facilitate the integration of PCH interventions into routine health services in Ghana.

Macro-environmental Factors Influencing PCH Promotion Attitudes

Reproductive health experts have identified awareness of the broader social contextual predictors as a strategy to understand better how individuals think and communicate information related to reproductive health behaviour and health outcomes (WHO, 2010). The authors suggest that health outcomes such as unintended pregnancies, infertility, preterm birth and maternal death are all influenced by the social. Heiman and Artiga (2015) indicated that aside from biological and individual-level factors, the social environment plays a significant role in health-related outcomes and cannot be ignored by health promotion efforts. Evidence suggests that culture and religion are associated with sexual and reproductive health behaviour and the use of health services (Arousell & Carlbom, 2016; Habtom, 2017). However, Tuomainen et al. (2013) indicate that the absence of a pregnancy preparedness culture is a major

setback to requesting PCC. Therefore, it is imperative to comprehend how culture interrelates with the social environment to influence health (Armenakis & Kiefer, 2007).

Behavioural Change Theories and Models Related to PCH Promotion

The conceptual framework for this study was based on the Socio-ecological Model [SEM]. However, selected constructs of six behaviour change theories/models were used to situate the research within the conceptual framework. These include The Health Belief Model, Theory of Reasoned Action and Planned Behaviour, the Social Cognitive Model, Information Motivation Behavioral Skills, Precaution Adoption process Model and the Life Course Theory. Aside from providing justifications for research, the specific constructs of these theories/models were relevant to understanding factors that influenced PCH awareness and mechanisms of the interactions between study variables.

The Health Belief Model (HBM)

The HBM is an explanatory framework for health decision making and subsequent behaviour change (WHO, 2012). The model is commonly employed to determine the chances of carrying out preventive health behaviours (Von Ah, Ebert, Ngamvitroj, Park, & Kang, 2004). It was propounded by Godfrey Hochbaum, Irwan Rosenstock and Stephen Kegels during the 1950s to explain why people failed to undertake a free health screening to detect Tuberculosis (Rosenstock, 1966). The model has since evolved to address different issues in preventive health such as mammography screening, influenza vaccination and lifestyle behaviours such as sexual risk behaviours and injury prevention (Glanz et al., 1997; Orji, Vassileva & Mandryk, 2012; Taylor et al., 2007).

The underlying assumption of the original model was that health-seeking behaviour or behaviour change is determined by an individual's belief in a personal threat concerning a particular illness or disease (Strecher & Rosenstock, 1997). It is proposed that personal belief in the effectiveness of recommended health behaviours or actions predicts the probability that an individual will adopt the recommended behaviour (Carpenter, 2010). The model proposes that an individual's decision to engage in preventive health behaviour is dependent on their perceptions of four basic constructs (Orji et al., 2012). These include perceived susceptibility, severity, benefits and barriers, cues to action and self-efficacy. These constructs can explain health behaviour individually or in combination (Hochbaum, 1958).

Perceived susceptibility entails an individual's subjective perception of the risk of contracting a particular disease (Glanz et al., 2008). However, "individuals vary widely in their feelings of personal vulnerability to a condition" (Janz & Becker, 1984, p. 2) such that the "the greater the perceived risk, the greater the likelihood of engaging in behaviours to decrease the risk" (Hayden, 2017, p. 59). Perceived severity denotes a person's belief about the seriousness of contracting that particular disease. This entails an appraisal of the health and social consequences of the situation in question (Janz & Becker, 1984: Hayden, 2017). Another important construct in the HBM is perceived benefits. This depicts a person's estimation of the significance of the cost of adopting a new behaviour to reduce the threat of a health condition (Downs, Murray, de Bruin, Penrose, Palmgren, & Fischhoff, 2004; Hayden, 2017).

The model further asserts that behavioural changes are mediated by perceived susceptibility and perceived severity and the conviction that the behaviour in question is profitable (Voh Ah et al., 2004). The individual

would accept the recommended health action if perceived as beneficial. Consequently, the course of action relies on reflecting and appraisal of both perceived susceptibility and perceived benefits. The fourth construct is known as perceived barriers, and it describes an individual's feelings regarding difficulties in performing a new health action (Janz & Becker, 1984; Hayden, 2017).

The HBM also suggests that cues to action impact the behaviour of individuals. These have been described as awareness factors that stimulate action or stimuli required to produce the decision-making process to take a recommended health action. These actions can be internal (signs and symptoms of a disease) or external reminders or prompts to take any action consistent with an intention (Rosenstock, 2005; Orji et al., 2012). Cues to action range from advertisement to information from health care professionals, family members and peers, advice from others, illness of family member and social media (Bish & Michie, 2010; Hayden, 2017).

Self-efficacy is another construct added to the four basic constructs of the model (Rosenstock, Strecher, & Becker, 1988). It signifies people's belief in performing a specific behaviour successfully (Glanz et al., 2008). Demographic and socio-economic variables were added to the HBM following assertions that all behaviours are not based on rational or conscious choice; and that the model supports victim-blaming (Roden, 2004). These modifying factors are demographic and socio-economic characteristics of individuals, including age, gender, income, ethnicity and level of education (Glanz, 1995; McFarland, 2013).

Carpenter (2010), in a meta-analysis, to establish whether variables of the HBM could predict behaviour found benefits and barriers as the most significant explanatory variables (Carpenter, 2010). An important advantage of the HBM is its effectiveness as a simplified health behaviour model that is very easy to apply and evaluate (Conner, 2010). Empirical research suggests that the model applies to three broad categories of health behaviours; preventive health behaviours, assuming the sick role, and targeted health services (Abraham & Sheeran, 2015). The model can explain and predict various health behaviours across several fields and sub-groups (Carpenter, 2010). The model has also proven to be a valuable framework for exploring the cognitive predictors of behaviours (Orji et al., 2012). Moreover, it provides an essential guide for explaining and predicting the processes that prompt people to accept recommendations offered by healthcare professionals (Janz & Becker, 1984).

Several studies evaluated the predictive utility of the HBM and found significant empirical support for dimensions of the HBM as a pertinent contributor in the explanation of health-related behaviours (Charron-Prochownik et al., 2001; Janz & Becker, 1984; Malverdy & Kazemi, 2016; Mohsen, El-Abbassy, & Khalifa, 2016; Tavafian, 2012). For instance, Tavafian found that the model predicts women's participation in cervical cancer screening. This finding was supported by a quasi-experimental study aimed at evaluating the effects of the HBM on birth spacing. The findings demonstrate that the model effectively creates awareness of birth spacing (Mohsen et al., 2016). Similarly, (Charron-Prochownik et al., 2001) reported that constructs of the HBM were correlated with the tendency to adopt anticipated reproductive health behaviours. The findings of Malverdy and

Kazemi supported evidence that the model can be employed to predict PCC weight management practices among obese women. According to Taylor et al. (2007), a systematic application of concepts of the HBM can explain how social, economic and environmental issues impact health behaviour.

Furthermore, the HBM can identify a discrete set of common-sense beliefs that describe or mediate the influence of demographic variables on patterns of health behaviour (Abraham & Sheeran, 2015). Glanz and Rimer (1995) supported this finding, particularly in the design of long and short-term health behaviour interventions. Their findings also showed that aside from its practicality in health education on disease and treatment modalities among clients, the model provides a valuable framework for influencing public health-related behaviour patterns of individuals.

Despite the effectiveness of the HBM in identifying and predicting health behaviours and related health outcomes, some researchers argued that the determinants of the model are not satisfactory predictors of health behaviour (Orji et al., 2012; Norman & Brain, 2005). They criticized the model for emphasizing negative factors overlooking positive motivations that inspire behaviour change. Others critiques believed that the model does not have constructs related to strategies for change (Roden, 2004; Rosenstock, 1974). For example, Orji et al. (2012) argued that the model has no explicit rules concerning the combination and inter-relationships between the individual variables. Similarly, Taylor et al. (2007) condemn the model for not considering environmental and personal factors such as beliefs and attitudes that influence health behaviours. Experts proposed combining the HBM with models that account for contextual issues can facilitate behavioural change interventions (Taylor et al.). It is crucial to indicate that although previous

research has evaluated the constructs of the HBM on several health behaviours, there seems to be limited evaluation in the context of PCH promotion among university students in Ghana.

Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB)

The TRA and TPB were developed by two Social Psychologists, Icek Ajzen and Martin Fishbein. The TRA was the first propounded in 1967 to explain how attitudes increase the likelihood of intentions and actual behaviour (Fishbein, 1967). The prevailing assumption was that a strong correlation exists between attitude and behaviour in that attitudes influence behaviour. However, in 1975 the TRA was reviewed and expanded when proponents found it intended to enact behaviour rather than attitudes that determine behaviour (Ajzen & Fishbein, 1975). The theories assume that actual behaviour is determined by attitudes toward that particular behaviour and social normative perceptions (Ajzen & Fishbein, 1980; Glanz, Rimer, & Viswanath, 2008). In other words, the intention to perform a particular behaviour is affected by a person's motivation to conform to the wishes of significant others (Munro, Lewin, Swart, & Volmink, 2007).

Perceived behavioural control, which refers to the ease or difficulty in enacting a particular behaviour, was an additional construct in the TPB. This addition was a revision to explain behaviours not under the control of individuals (Ajzen, 2002) to address "instances where the individual does not have full control over the behaviour in question" (Glanz et al., 2008, p. 68). Proponents suggest that personal perceived control over the opportunities, resources, and skills required to carry out behaviour also influence behavioural intentions (CDC, 2002). Hence, there is the need to address environmental

restrictions and other factors outside the direct control of individuals, interfering with behavioural changes (Glanz et al.). The implication is that PCH behaviours' performance cannot occur without the required socio-environmental modifications and resource allocation.

According to the TRA and TPB, an individual's intention to carry out behaviour is influenced by two main factors attitudes towards the behaviour (the individual's positive or negative beliefs) and the subjective norms, which include the perceived expectations of significant others such as relatives and friends about a person's behaviour. The theories hypothesize that the likelihood of a particular behaviour depends on a strong intention to perform the behaviour in question. Moreover, intentions depend on whether the individual has the skills and capabilities required to perform the behaviour in question. (Glanz et al., 2008).

The theories TRA and PB highlight theoretical concepts related to personal motivational factors as determinants of the probability of engaging in a particular behaviour (Glanz et al., 2008). According to Ajzen (1991), these motivational factors affect a particular behaviour. Attitude is the second construct, and it relates to the extent to which the individual has a positive or negative appraisal of the behaviour in question. Attitude is a personal evaluation of the outcomes of carrying out the behaviour. The third construct, the subjective norm, is a function of beliefs that specific individuals approve or disapprove of performing the behaviour. This is influenced by normative beliefs to carry out particular behaviour (social pressure) and is subject to the individual's motivation to comply with the perceived expectations of the social context (Ajzen & Fishbein, 1980; Glanz et al.).

Several studies have evaluated the association between intention and health behaviour (Ajzen 1985, 2001; Ajzen & Fishbein, 1980; Webb & Sheeran, 2006; Glanz et al., 2008). For instance, Glanz et al. used the TRA to describe behavioural intentions variance theoretically and to predict a range of health-related behaviours. In a comparative meta-analysis of preventive health behaviour models, the authors found TRA to be a better predictor compared to the HBM (Zimmerman & Vernberg, 1994.) Research further showed that the TRA could predict 34% of observed behavioural variance compared to 24% of the HBM. The TRA and PB can also be used to design effective behaviour change interventions (Fishbein, 1990).

Many meta-analyses have successfully evaluated how the TRA and TPB predict and explain health-related behaviours (Albarracin, Johnson, Fisbein, & Muellerleile, 2001; Chuang, Hillemeier, Dyer, & Weisman, 2011; Tlou, 2009). Albarracin et al. (2001) and Tlou (2009) reported findings consistent with predictions of the theories concerning condom use and seeking HIV testing. A meta-analysis found that the theories could explain approximately 25% of the variance in behaviour in intention alone and slightly less than 50% of the variance in intentions (Sutton, 1998).

The TRA and PB have been used in a range of PCH and reproductive health behaviours such as pregnancy intention and folic acid use, emergency contraception (EC) use intention and provision of EC among health care providers [HCPs) (Chuang et al., 2011). The authors found that pregnancy intention within 12 months was related to folic acid use. Moreover, perceived behavioural control of EC among women and health provider attitudes towards EC was the key predictor of intention to use and provide EC.

Nonetheless, some criticisms have been levelled against the TRA and PB (Armitage & Conner, 2001; Godin & Kok, 1996; Kraft, Rise, Sutton, & Roysamb, 2005). Godin and Kok reported that although the model is reasonably good for explaining intention, perceived behavioural control's effectiveness differs between health-related categories. While Kraft et al. found that the assumption that perceived behavioural control predicts actual behavioural control does not hold in all situations. Armitage and Conner (2001) also criticized the TRA and PB for focusing on individual behaviour even though all behaviours are not under the control of individuals. In the same vein, Glanz, Rimer, and Lewis (2002) argued that the theories do not consider environmental, economic and political factors that influence human behaviours.

Social Cognitive Theory (SCT)

The Social Cognitive Theory (SCT) began as the Social Learning Theory (SLT) in the 1960s by Albert Bandura and evolved into the SCT in 1986. It postulates that learning occurs within social contexts through a dynamic and mutual collaboration between the individual, environment, and behaviour (Bandura, 1986; Bandura, 1997). The author explained human behaviour in terms of a three-way, dynamic, reciprocal model in which personal factors, environmental influences, and behaviour continually interacts (Bandura, 2000). The theory holds that there is a reciprocal interaction between personal characteristics, behaviour and the social settings in which behaviour occurs. However, personal characteristics can also influence the environment in which behaviour occurs and regulates behaviour. Therefore, the basic principle for behaviour change is reciprocal determinism, in which

there is a continuous, dynamic interaction between personal, social context and behaviour (Bandura, 1986).

Outcome expectation is the next construct which entails beliefs about the likelihood and value of the consequences of behavioural choices (McAlister, Perry, & Parcel, 2008). While self-efficacy describes beliefs about personal ability to perform behaviours that bring desired outcomes, collective efficacy relates to beliefs about the ability of a group to perform concerted actions that get desired results (Penrose, Perry & Ball, 2007). In other words, the SCT emphasize three major dependent and interactive factors, namely intrapersonal determinants, behaviour and environmental factors, as bases for individual attitudes (Bandura, 1994).

The SCT has been described as the most comprehensive behaviour change theory (Bandura, 1998; Redding, Rossi, Rossi, Velicer, & Prochaska, 2000). It considers both the individual and socio-structural factors that support behaviour change by connecting the key constructs (Bandura, 1998). Its basic principle of reciprocal determinism suggests that individuals respond to change and are agents of change. Reciprocal determinism also indicates a continuous, dynamic inter-relatedness of personal, environmental and behavioural factors. Aside from highlighting the key predictors of behaviour change, the theory recognizes the significance of societal norms and cues, perceived self-efficacy, and environmental influences on human behaviour (Redding et al., 2000). The theory indicates that apart from personal knowledge of health risks and benefits of a behaviour, self-efficacy is critical for change to occur (Bandura, 2004). It also suggests that individuals perform the behaviour when they believe they can control the outcome of their

behaviour and when there are few external barriers (Armitage & Conner, 2000).

The SCT applies to disease prevention, management, and MCH promotion strategies such as obesity prevention, dietary behaviours, and healthy lifestyles (Black et al., 2010; Byrd-Bredbenner, Abbot, & Cussler, 2011; Sen & Sirin, 2015). For instance, Byrd-Bredbenner found that mothers who had the self-confidence to consume a healthy diet also believed in the relationship between diet and health. Additionally, self-regulated dietary behaviours were associated with better BMIs and eating habits. Similarly, Sen and Sirin also pointed out that education based on the SCT among women with gestational diabetes (GD) may be helpful in behaviour change and developing positive attitudes towards GD management.

Overall, the theory proposes multidimensional factors in behaviour change, individual motivation and health actions (Bandura, 2000). It highlights social influence as well as internal and external reinforcement. The theory emphasizes skill development and modification of the social environment to facilitate change and performance of healthy behaviours (Valente, Thesenvitz, & Lombardo, 2006). It also suggests that personal confidence to carry out social change influences policy and public health strategies to health promotion (Bandura, 1998). The SCT indicates a reciprocal interaction between the personal characteristics, behaviour, and the social context in which a particular health behaviour occurs. Consequently, it provides a framework for identifying and addressing individual and environmental determinants of PCH awareness levels, attitudes towards PCH promotion and behaviour change among UCC students.

The Information-Motivational-Behavioral Skills (IMB)

The Information-Motivational-Behavioural Skills (IMB) model was proposed by Fisher and Fisher (1992) to explain HIV/AIDS-related risk behaviours among university students and males with a high affinity for gay relationships. The theory is based on the basic assumption that, for individuals to experience a positive health outcome, which leads to a reduction in risk behaviours, they need enough information, motivation to engage in practices that reduce the risk, and exhibition of the appropriate behavioural skills geared toward the reduction of the risk (Norton, Fisher, Amico, Dovidio, & Johnson, 2012). Consequently, there is a need to provide essential PCH information to increase awareness on lifestyle changes necessary for PCH promotion among university students.

The IMB model is based on three primary constructs: information, motivation, and behavioural skills. These three constructs serve as determinants or predictors of risk reduction. Fisher and Fisher (1992) argue that specific information and motivation contribute to behavioural skills that prompt risk-reduction behaviour. However, an individual's levels of information and motivation are separate entities that influence behavioural skills and the adoption of risk-reduction behaviours.

Attempts to define the individual constructs revealed that information that directly impacts a particular state of health is the first requirement for performing a health behaviour (Misovich, Martinez, Fisher, Bryan, & Catapano, 2003). This means that individuals need specific information from specific sources to appreciate the importance of either engaging or withdrawing from a particular behaviour (Orji et al., 2012). Motivation is another critical construct that relates to both personal and social motivation.

Whilst personal motivation describes an individuals' attitude towards a particular health behaviour, social motivation is based on an individual's perception of social support for their behaviour. The last construct, which is behavioural skills, however, considers skills possessed or developed by an individual which could help them in increasing their self-efficacy in an attempt to perform a particular health behaviour (Fisher & Fisher, 1992; Fisher, Fisher, & Shuper, 2009; Misovich et al., 2003).

The IMB model has been applied extensively in explaining behavioural changes among different populations and fields of study. A systematic review revealed that 9 out of 12 studies investigated patients with HIV/AIDS using the IMB reported a significant change in behaviour at the first post-intervention assessment (Chang, Choi, Kim, & Song, 2014). The model has been used in predicting medication adherence among patients with vasculitis (Alexander, Hogan, Jordan, Devellis, & Carpenter, 2017) and HIV (Rongkavilit et al., 2010). It has also been employed in rational drug use behaviours among patients (Bian et al., 2015) and the prediction of sexual risk behaviours among male students (Bahrami & Zarani, 2015). Its applicability extends to predicting the health outcome of young people with type 2 diabetes (Jung, Lee, Kim, & Jung, 2015) and breast self-examination behaviours of women (Misovich et al., 2003). An essential strength of the IMB model is its ability to provide a good conceptual basis for explaining behaviour change using just three fundamental yet uncomplicated and comprehensive constructs. According to Fisher et al. (2009), the three constructs in the IMB directly influence an individual's health behaviour by providing straightforward explanations.

The validity of the model has also been tested and proven in many studies to have shown high predictability of various health behaviours and has demonstrated its ability to contribute to a reduction in risky health behaviours, and also presents a robust theoretical framework for the development of behavioural interventions for patients diagnosed with chronic diseases (Bahrami & Zarani, 2015; Chang et al., 2014; Rongkavilit et al., 2010). Also, a systematic review demonstrated that the IMB has the potential strength as a theoretical framework that contributes to the development of model-based behavioural interventions using the specific integration strategies outlined for each construct of the model (Chang et al., 2014).

Despite the strengths associated with the IMB model, it has some limitations. A critique of this theory is its inability to prove beyond doubts how information or motivation alone can influence health behaviour permanently. In that, access to information or being highly motivated, although necessary, does not guarantee a permanent behaviour change. Also, this model is limited in its inability to demonstrate how societal environmental and cultural factors, except social motivation, thoroughly explains the effect of a diabetic self-management app on diabetic self-management behaviour changes of diabetes patients (Jeon & Park, 2018). The model indicates that information and motivation are independent constructs that do not share any strong relationship. However, this assertion can be critiqued because the information an individual receives from their immediate society constitutes their social motivation which can predict their future health behaviour.

Conversely, an individuals' motivation can drive them to seek information, which could trigger their engagement in specific health behaviour. Another limitation of this model was found in the study by

Alexander et al. (2017). Their study samples could not demonstrate how information and motivation directly affect medication adherence, as seen in previous research among patients living with HIV. Only behavioural skills was a significant predictor of medication adherence in their study.

Precaution Adoption Process Model (PAPM)

The Precaution Adoption Process Model (PAPM) is one of the few change models that explain behavioural changes in stages with detailed explanations. The concepts of the model first burgeoned in 1988, in an attempt by Weinstein to critique the then-existing theories of preventive behaviour because they overlooked some factors whilst explaining behavioural changes. He argued that most behavioural approaches applied only to individuals who were engaged by the threat, rather than taking into consideration the various stages people might have gone through in adopting a particular behaviour (Weinstein, 1988). However, the model was formally accepted and recognized in 1992 (Weinstein & Sandman, 2002). The model focuses on people's mental ability to make a new decision, how they make the decision, and how it will guide their involvement in a particular action. It was based on the assertion that the process of either adopting or quitting health or risky behaviour involves a logical sequence of qualitatively different cognitive stages (Weinstein, Sadaman, & Blalock, 2002).

The PAPM comprises seven stages, beginning from ignorance to a point where a person performs a behaviour. These distinct stages constitute the key constructs of the model. The first stage, 'unaware of issues', can be explained as a point where people have no idea about a hazard or its potential precaution hence do not have any formed opinions about it. The second stage, 'unengaged by issue', describes when people have heard or learnt about a

precautionary measure but have not decided whether or not to do anything about it. During the third stage, 'undecided about acting' (also known as the decision-making state), the individual is engaged and considering what to do. The fourth stage, 'decided not to act,' explains how people abruptly halt the precaution adoption process. Decided to act, which is the fifth stage is when people have now adopted a precaution leading to the sixth stage, which is 'acting' where they initiate the desired behaviour, and maintaining the behaviour over a period of time, known as 'maintenance' is the seventh and last stage(Weinstein, 1988; Weinstein et al., 2002). This means PCH promotion interventions' success depends on a range of strategies to improve awareness to facilitate decision-making and adoption of PCH promotion behaviours.

Several studies predict osteo-protective behaviours and knowledge related to calcium and exercise, health beliefs and self-efficacy (Elliott, Seals, & Jacobson, 2007). The PAPM has been a useful model in health-related research across different populations. This includes research on fracture prevalence among persons with epilepsy who received antiepileptic drugs and their non-epileptic counterparts. The model has also been used in describing a disaster preparedness intervention among low-income residents of Latino families in Los Angeles (Glik, Eisenman, Zhou, Tseng, & Asch, 2014). Other studies aimed at improving mine safety and its related health technologies (Haas, 2018), alcohol and drug use (Sharma, 2007) and understanding self-regulatory behaviours among older drivers also used the PAPM (Hassan, King, & Watt, 2017). The PAPM has been used in studies related to screening for colorectal cancer (Costanza et al., 2005) and meat consumption patterns during a livestock epidemic in Germany (Sniehotta, Luszczynska, Scholz, &

Lippke, 2005). Related studies supported adherence and adopting a healthy lifestyle among patients with leg ulcers (Heinen, Bartholomew, Wensing, Kerkhof, & van Achterberg, 2006) and improved mammography screening behaviours among women.

The use of the PAPM comes along with many strengths and weaknesses. First, the PAPM describes behavioural change as a dynamic process that provides easy comprehension not only to health professionals (Glik et al., 2014). Another advantage identified by (Weinstein & Sandman 2002) is that the model provides various stages which permit coding of messages for each stage and is useful in cases where behaviour change is difficult and resistance to change is high.

Despite the strengths mentioned above, which the PAPM has, it is limited in providing enough and comprehensive information regarding the barriers an individual could experience at each stage. Also, since the steps begin from unawareness to maintenance, no detailed information has been provided about whether a person who has reached the seventh stage can experience an abrupt change leading to the beginning of the cycles. Again, the PAPM does not identify specific variables that differentiate between the various stages or trigger a progression from one stage to another. Also, the various stage-based interventions require high expenses and are resource-intensive compared to interventions targeted at the entire population (Weinstein, Sandman, & Blalock, 2002).

The Life Course Theory (LCT)

The Life Course Theory (LCT) was developed to understand and improve health patterns and disease across population groups (Fine & Kotelchuck, 2010). The theory originated from the works of sociologists and

developmental psychologists during studies of Polish peasants during 1918 and the 1920s. Glen Elder was one of the early sociologists to write about the life course theory. In an analysis of longitudinal data of studies conducted by the University of California, Berkeley on children of the 1960s, he found strong evidence of the lifelong influence of child health and the relationship between maternal health and infant mortality (Elder, Johnson, & Crosnoe, 2003). Subsequently, he called for developmental theories and further research on the impact of history on family, education, and individuals' work roles (Hutchison, 2010).

The LCT suggests that health outcomes are dependent on a multifaceted interaction between biological, behavioural, psychological, social and environmental factors across the life span of every individual (WHO, 2000). Thus, it targets the underlying biological, behavioural, and psychological pathways that operate across the life course (Kuh & Ben-Shlome, 1997). Proponents hold that aside from the impact of each life stage, social, economic and neighbourhood environments profoundly influence individual and community health (Braveman, Cubbin, Egerter, & Pedregon, 2011). Therefore, it stresses the need to address population health needs throughout the life span, emphasising crucial stages of life and the transitions between them.

The life course approach to health promotion and disease prevention is a recent initiative to address persistent disparities in maternal, infant and child health outcomes (Koh, Blakey, & Roper, 2014). It focuses on disparities in birth outcomes as the consequences of differential exposures during pregnancy and differential developmental pathways across various stages of the life span (Lu, 2008). Therefore, postulates that birth outcome is the end product of the

whole life course of a woman before pregnancy and the nine months of pregnancy. The theory is a new paradigm that can potentially mitigate the health inequalities across different populations and improve the health of other population groups (Fine, Kotelchuck, Adess, & Pies, 2009).

Four key concepts can explain the theory: First, it posits that early life experiences and exposures influence future health outcomes (Fine & Kotelchuck, 2010). It suggests that health is cumulative and longitudinal and develops over time (Elder, Johnson, & Crosnoe, 2003). Second, health and health trajectories are affected during critical or sensitive life course periods (Lu, 2008). Therefore, emphasise the importance of the timing of MCH interventions and suggest emphasising specific interventions during the life span. Examples of these interventions include PCH, ANC, breastfeeding and prevention of teen pregnancy. Third, the broader the environment, the stronger it affects an individual's capacity to be healthy. This aspect relates to the impact of the environment on health outcomes. Fourth, inequalities in health are more influential than genetic and personal choice-equity, drawing attention to the need to reduce inequality to ensure equity in health (Braveman, Cubbin, Egerter, & Pedregon, 2011).

Larson et al. (2018) explained the implications of the four fundamental concepts of the LCT to PCH promotion as follows: **Timing:** This involves a continuum of care and preventive interventions across the life span and guarantees that health is addressed at different stages of life as well as during critical and sensitive periods. It also entails managing health risks earlier during developmentally sensitive periods in the life span in biological, psychological and environmental factors. **Timeline:** This recognises the importance of time in the future well-being of the individual and the health of

future generations. **Environment**: This means effective PCH interventions must incorporate a broad spectrum of strategies across the continuum of care to address genetic, environmental and social factors. **Equity:** this aims to ensure better health outcomes, minimise disparities in preconception risk factors, and reduce broader social, racial and economic inequalities in health.

In a review of the literature to examine the implications of the life course model for the MCH research efforts, (Russ, Larson, Tullis, & Halfon, 2014) identified five (5) key components of the LCT as follows: the importance of biological embedding, the role and developmental influences of risk and protective factors, the health significance of extended developmental time frames, multiple determinants of health outcomes and the representation of health development as functional trajectories The reviewers concluded that researches aimed at identifying single causes of single disease outcomes are ill-equipped to evaluate the multiple cause-multiple outcome paradigms.

The adaption of the LCT for MCH was first proposed by (Lu & Halfon, 2003). The authors argued that the theory would help evaluate racial and ethnic inequalities in birth outcomes. Consequently, a workgroup was formed in 2006 to assess the application of the theory (Pies, Parthasarathy, Kotelchuck, & Lu, 2008). It is argued that LCT is appropriate for MCH promotion because it permits coordination of services across all life course stages (Creanga et al., 2015). Furthermore, the LCT acknowledges the role of time in determining health outcomes (Zhao et al., 2014). Thus, making it ideal for examining MCH within the structural, social and cultural context. The theory suggests that enhancing MCH outcomes necessitates approaches that target risk factors across the life course and not only during the antenatal period (Misra & Grason, 2006). Experts proposed an integrated service

delivery from the pre-pregnancy period, pregnancy, delivery period, immediate postnatal and childhood periods. This approach stems from the assumption that women, newborns, and children's health and well-being are closely connected; therefore, services should be integrated (Kerber, de Graft-Johnson, Bhutta, Okong, Starrs, & Lawn, 2007).

The LCT also postulates that health strategies that decrease risks and increase protective factors can potentially change the health pathways of individuals and populations (Fine & Kotelchuck, 2010). Thus, it disapproves of single biomedical frameworks of disease causation and suggests new strategies that address multiple causes to health outcomes (Fine & Kotelchuck; Russ, Larson, Tulles, & Halfon, 2014). Therefore, it recommends a redirection of resources and approaches for more emphasis on the determinants of health. It advocates for early diagnosis and management of health risks, promoting protective factors, and reducing health risks at the personal, household, and community levels. It also recommends a paradigm shift from separate and episodic health services to integrated, multi-sectoral services for better health outcomes. The theory also highlights the importance of supplementing individual conditions with entire person, family, and community systems strategies (Fine & Kotelchuck, 2010). Two main criticisms against the life course model. Firstly, they described LCT as “excessively deterministic” in that it offers very little or no hope that individuals who have already experienced poor health outcomes are capable of optimizing their health. Secondly, they argued that the concept of early intervention and critical periods results in a “front-loading” of services around pregnancy and early childhood. Therefore, it offers limited information regarding the essence of

health interventions with other sub-populations of the different stages of the life span (Fine & Kotelchuck, 2010).

The Socio-Ecological Model (SEM)

The socio-ecological model (SEM) is a multi-level theory that recognizes the multiple levels of factors that impact behaviour and health outcomes. The model was first published by Urie Bronfenbrenner (1979; 1986) in an attempt to comprehend human development within the context of the multiple systems of interactions within the environment of a developing child (Johnson et al., 2006). He hypothesized that child development occurs through progressive and complex interactions between the child, their significant others, objects and symbols in their environment (Bronfenbrenner, 1998). Bronfenbrenner illustrated the child as surrounded by four concentric circles, each representing different factors that influence the child. The circles begin from the innermost to the outermost. These are microsystem, mesosystem, exosystem, macrosystem and chronosystem (Berk & Meyers, 1996).

McLeroy, Bibeau, Steckler and Glanz (1988) expanded Bronfenbrenner's ecological model by proposing "an ecological model for health promotion which focuses attention on both personal and social environmental factors as targets for health promotion interventions" (Mcleroy et al., 1988, p. 351). The key assumptions of the SEM are; (1) Human health is influenced by personal attributes and environmental circumstances. (2) Interventions should emphasize a dynamic interaction between situational and personal factors rather than focusing solely on social, physical and behavioural factors. (3) The community has multiple physical, social, and cultural dimensions that influence health behaviour and outcomes. (4) Appropriate

changes in the social environment will produce changes in individuals. (5) Support of individuals target for behaviour change is critical when implementing environmental interventions (6) There is the need to create environmental conditions that must support and encourage sustainable behaviour change (Mcleroy et al.).

The model recognizes five different levels of influence on health behaviour and explains the reciprocal relationship. These influences are intrapersonal, interpersonal processes, institutional or organizational, community and public policy factors. The intrapersonal level comprises demographic characteristics, knowledge, attitudes and beliefs, information, motivation and the ability to act (Lu, Kotelchuck et al., 2010). The second component is the interpersonal level factors produced through interaction and relationships between the individuals and significant such as spouse, friends and family. These formal and informal social networks and support systems can function as barriers or constraints influencing individual behaviours. The third level highlights institutional or organizational level factors. It also relates to rules, regulations and policies of social systems. The Fourth component, known as community-level factors, involves social norms, the prevalence of disease in the community and the availability of health facilities that can potentially influence health and health-seeking behaviour. It also captures other factors like community engagement and empowerment are also emphasized at this level. The fifth and the final level entail public policy factors: policies or regulations concerning healthy practices targeted at health-specific outcomes. These involve access to health services, restrictive policies and allocation of resources, and enabling environments by stakeholders (CDC, 2014).

Advocates for SEM suggest that there are connections between all the levels that influence each other (Golden & Earp, 2012). Hence, a change in one part produces a difference in other parts. The SEM model also identifies the multiple effects of the interrelatedness of social factors in the environment on health. They argued that individual health is not a product of only physiological functioning and genetic predisposition but is also influenced by a complex interplay of biological determinants with the social, familial relationship, environmental influences and the broader social and economic context. Social-ecological models recognize individuals as embedded within larger social systems and describe the interactive characteristics of individuals and environments that underpin health outcomes (Sallis, Owen, & Fisher, 2008). The SEM, therefore, aims at producing change at different levels (Kumar & Preetha, 2012).

SEM emphasizes coordinated social interventions and working coherently with national directives that support positive health outcomes (Leon, Jimenez, Vidal, Bermudez, & De Vos, 2020). Apart from identifying level-specific influences on health behaviour, proponents of the SEM have outlined approaches at each level of influence. They underscored the need to direct health promotion to individua; and interpersonal, organizational, community, and public policy factors which support and maintain unhealthy behaviours (McLeoy et al., 1988).

The model has been successfully applied in some health promotions and public health initiatives (Driedger, Maier, Furgal & Jardine, 2015; Kumar et al., 2012; Soderlund, 2017; Quin, Thompson, & Ott, 2005). For instance, Kumar et al. used the model as a framework to determine the uptake of the H1N1 vaccine in the United States. They found evidence that variables at each

level of the model significantly predicted intention and uptake of the H1N1 vaccine. Furthermore, health interventions which target multiple levels were more effective than single-level interventions. This evidence was supported by those of (Driedger et al. 2015). A systematic review to evaluate levels of SEM associated with successful physical activity (PA) outcomes among Hispanic women diagnosed with Type 2 Diabetes. Soderlund (2017) found that successful PA interventions related to SEM's intrapersonal, interpersonal, and community levels.

The SEM has been applied in diverse settings to explain and predict behaviour change interventions (Baral, Logie, Grosso, Wirtz, & Beyzer, 2013; Conn & Marks, 2017; Quin et al., 2006). Quin et al. (2006) used the model risk assessment and risk context of HIV epidemics. Baral et al. (2013) also found that SEM is flexible for funding epidemiological studies among key populations at risk of HIV in diverse socio-cultural contexts. A related study aimed at understanding adolescent prescription drug use found that a wide range of contextual factors influences adolescent non-medical use of prescription medications (Conn & Marks, 2017).

Despite its usefulness, reactions of some researchers regarding SEM as a multiple level framework indicates that it is not sufficient to support multiple level interventions (Scholmerich & Kawachi, 2016). Another major criticism is that the proponents failed to demonstrate how the links between the various levels influence health behaviour. The critiques argued that merely recognizing the connections between the levels does not provide adequate guidance on designing effective interventions (Godin et al., 1996).

The model perceives individual behaviour as a product of multiple, interdependent social and environmental influences. It highlights an expanded

strategy to improve MCH and emphasizes risk reduction during pregnancy and health promotion and optimization across the life course (Lu et al., 2010). Thus, take cognizance of the myriad of individuals, interpersonal, community, organizational, policies at different levels, and environmental factors that impact health behaviour and outcomes.

Conceptual Framework

A conceptual framework is the diagrammatic illustration of the anticipated association between a set of concepts related to a specific phenomenon (Earp & Ennett, 1991). It "is the system of concepts, assumptions, expectations, beliefs, and theories supporting and informing the research" (Maxwell, 2005, p. 33). McGaghie, Bordage, and Shea (2001) further described it as an investigator's literature synthesis regarding presenting a particular phenomenon within a larger framework. A theory, on the other hand, is an aspect of the conceptual framework, defined as "a set of interrelated constructs (concepts), definitions and propositions that present a systematic view of phenomena by specifying relations among variables to explain and predict phenomena" (Kerlinger, & Lee, 1986, p. 9). The overarching aim of a theoretical framework is to guide the collection, analysis and interpretation of data (Glanz et al., 2008).

The conceptual framework for this study was guided mainly by McLeroy et al. (1988) Socio-ecological Model (SEM). The model recognizes that health and health behaviour depend on interrelated and interdependent levels of influence, which are intrapersonal, interpersonal, institutional, community, and policy factors (McLeroy et al.). The SEM provided a comprehensive framework for identifying individual and macro-level factors associated with UCC students' awareness of PCH-related issues, perceived

attitudes towards PCH promotion, and macro-level socio-environmental factors related to integrating PCH interventions into existing reproductive services. The model, therefore, underscores the need to evaluate individual and social context or environmental factors impacting health behaviour (Glanz et al., 2008). The current study merged constructs of other behaviour change theories and models such as HBM, TRA TPB, SCT, IMB, and PAPM with the SEM constructs to explain the study's key findings.

The conceptual framework depicts two major interrelated and interdependent components: students' intrapersonal, socio-cultural, social, and environmental factors, influencing the dependent variables (students' awareness of PCH-related issues and attitudes towards PCH promotion). Overall, three major factors. First, students' socio-demographic characteristics, including age, ethnicity, religion and income/remittance). Second, PCH risk factors such as perceived health status, BMI, medical/family history, and genetics were explored at the intrapersonal level in the current study. These individual level factors were conceptualized as inherent constitutional and biological characteristics (Townsend & Foster, 2011). These include age, gender, employment status, income/remittance, religious affiliations, ethnicity and relationship status.

The third individual-level variable was perceived attitudes towards PCH promotion. This variable describes the students' positive or negative perceptions towards PCH promotion. Literature shows that attitudes are multifaceted and made up of affective, behavioural and cognitive aspects. The affective element relates to feelings and emotions, the behavioural part concerns actual and behavioural intentions, and the cognitive elements depict knowledge and beliefs (Eagly & Chaiken, 1993). Attitudes to a specific

degree guide, influence, direct and predicts intention to perform a particular behaviour (Ajzen & Fishbein, 1980). Consequently, attitudes can translate into actual behaviour (Ogden, Karim, Choudry, & Brown, 2007). Additionally, information regarding individual perceived attitudes and the settings in which this information is obtained is valuable in understanding the relative importance of factors influencing particular health behaviour (Kearney & McElhone, 1995).

Perceived attitude towards PCH promotion was conceptualized as respondents' positive or negative evaluation towards PCH promotion in the current study (Chung, Hwang, Park, & Kim, 2009). The "positive" category includes those who support PCH promotion or intend to engage in PCH interventions. The "negative" category describes individuals who do not support or intend to engage in PCH interventions. This variable was guided by theories of reasoned action and planned behaviour. Exploration of this variable aimed to understand the role of perceived attitudes on students' intentions to engage in PCH promotion. The final individual-level predictors of PCH awareness were described as the presence or absence of risk factors for adverse pregnancy and reproductive outcomes. Several studies have found the prevalence of factors such as chronic medication conditions, medications, previous adverse pregnancy outcomes, history of STI and smoking to be associated with the extent of PCH awareness and pregnancy outcomes (Chen, Jhangri, & Chandra, 2014; Atrash et al., 2006; WHO, 2013; Tyden, 2016). Assumptions underpinning exploration of PCH risk factors were based on the PAPM and IMB.

The socio-cultural, social, and environmental factors were conceptualized as major macro-level factors associated with integrating PCH interventions into current reproductive services at the UCC hospital. It denotes a multifaceted perspective for identifying interpersonal and social environmental factors that influence students' awareness of PCH-related issues and attitudes towards PCH promotion. Specific predictors at the interpersonal level include peer influence, family support, spousal support, family history and PCH recommendations from health care professionals. These interpersonal factors are produced through interaction with others that can serve as support or barriers to PCH promotion. The framework indicates that societal norms and approval for PCH promotion by these significant others in the social environment will potentially influence awareness and attitudes towards engaging in PCH related behaviour. Institutional organization of UCC into colleges, schools/faculties, departments, the programme of study and level of university education were also hypothesized as predictors of the dependent variables.

The macro-level factors also involve multiple strategies in the general university community and the national level that influence PCH promotion. The community-level factors include social norms shared by groups or communities that can affect the delivery and engagement in PCH behaviours. Institutional factors influencing PCH promotion include university policies, rules, and structures that may constrain or promote uptake and delivery of PCH interventions. The macro-level factors also include policies at the national level that support or regulate interventions targeted at PCH promotion. These major themes emerged from the qualitative phase of the study as essential macro-level factors.

The conceptual framework provides the relationship between the dependent variables PCH awareness and perceived attitudes of UCC students towards PCH promotion and independent variables. The independent variables are interrelated and independent, and a change at one level produces changes at the other levels. Individual-level variables comprise socio-demographic factors and the prevalence of PCH risk factors associated with poor reproductive outcomes among students. Independent variables at the macro and social-cultural and environmental levels involve multiple interpersonal, institutional and community-level factors. Figure 2 on page 88 illustrates the conceptual framework for the current study.

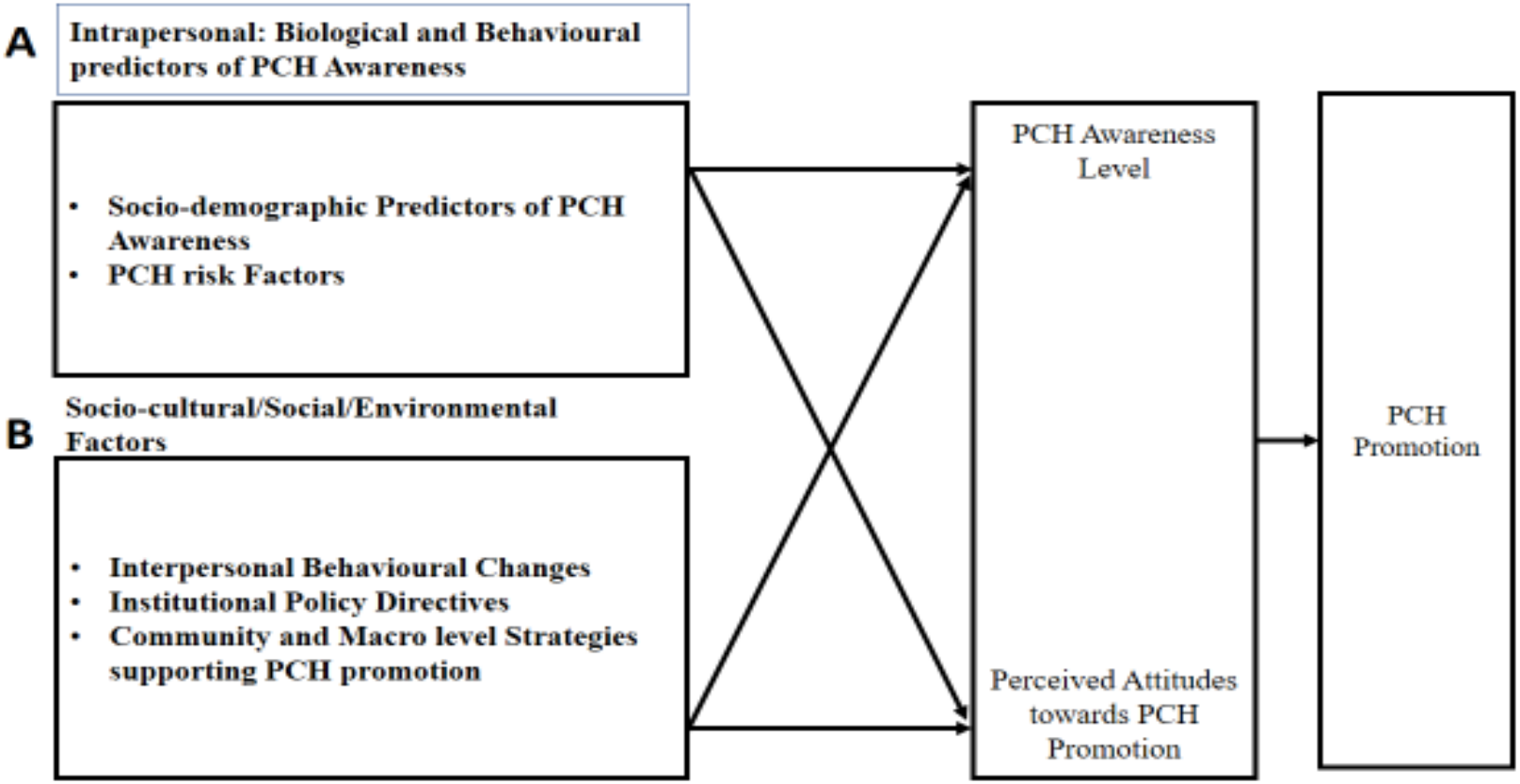

Figure 1: Conceptual Framework of the Study

Source: Adapted from the Socio-ecological Model (SEM)

Summary

The literature review focused on pertinent literature regarding PCH promotion-related issues. The review includes research evidence from level one evidence from meta-analysis, systematic reviews, randomized control trials and observational studies. The review revealed that the PCH strategy offers a unique opportunity to improve MCH outcomes, given that risk factors associated with adverse MCH outcomes long exist before pregnancy occurs. Additionally, engagement in PCH promotion behaviours depends to a large extent on how well-informed men and women of reproductive age on PCH issues are. Further, socio-demographic characteristics and macro-environmental factors such as policy and finance significantly predict PCH awareness and attitudes towards PCH promotion. However, research evidence to guide PCH promotion services, particularly in developing countries where nearly all (99%) on poor adverse MCH outcomes occur, is sparse. The majority of previous research was conducted among individuals of childbearing age in the general population. There is little evidence regarding risk factors peculiar to university students, although they are prone to risk behaviours related to adverse MCH outcomes.

Nearly all previous studies focused on pregnant women and women diagnosed with chronic medical conditions overlooking PCH risk factors associated with the pre-pregnancy period. In addition, very few studies have examined strategies essential to effectively integrate PCH interventions into existing reproductive health services in low resourced countries like Ghana. The review underscores the need for research evidence regarding PCH

awareness, risk factors associated with PCH awareness and attitudes towards PCH promotion and strategies to bridge the PCH gap in the MCH continuum in developing countries like Ghana. Further, it is important to examine contextual factors influencing PCH promotion, such as PCH awareness, predictors of PCH behaviour, and PCH integration into existing MCH efforts in Ghana.

CHAPTER THREE

RESEARCH METHODS

The purposes of the study were to: (a) assess the level of awareness and perceived attitudes of UCC students on PCH related issues, (b) estimate the prevalence of PCH risk factors among students of UCC, (c) examine factors influencing students' PCH awareness and attitudes towards PCH promotion within the context of the university community, and (d) explore qualitatively the perceptions of students and healthcare professionals at the UCC hospital on how to integrate PCH interventions into existing reproductive health services. This chapter describes methods, philosophical assumptions, and underpinnings upon which the study was based, including the implications for the methods used. Major subheadings include the research design, study area, population and sampling procedures. Data collection instruments, procedures, and techniques for analysing data were also described.

Research Design

The study employed the mixed methods approach to guide and provide a focus for strategies of this research. Mixed methods studies combine quantitative and qualitative techniques in a single study to investigate the same underlying phenomenon. It allows the collection and analysis of quantitative and qualitative data in the same study (Creswell, Plano Clark, & Garratt, 2008; Creswell, 2014; Teddlie & Onwuegbuzie, 2008). Aside from addressing the different questions for the different sub-samples in this study, the design provided a comprehensive understanding of the problem under investigation

(Creswell, 2009). It offered an opportunity to examine the research problem from different angles (Creswell, Klassen, Plano Clark, & Smith, 2011). Taking cognizance that PCH promotion has several actors, procedures, and multiple levels, mono-method designs were considered inappropriate for investigating the connections between the multiple levels of the phenomenon under study (Avolio & Bass, 1995; Creswell, 2014).

Several types of mixed methods strategies have been described. However, the current study utilized the embedded mixed methods approach, which entailed the simultaneous collection of quantitative and qualitative data (Bryman, 2012). The premises of embedded design are that "a single data set is not sufficient, that different questions need to be answered and that each type of question requires different types of data" (Creswell, Shope, Plano Clark, & Green, p. 67). Therefore, one form of data, either quantitative or qualitative, is prioritised over the other because it has a major form of data (Creswell, 2014). The qualitative data played a secondary and supporting role within more extensive quantitative data (Creswell, 2009; Creswell et al., 2011). Specifically, the quantitative data examined the level of PCH awareness, perceived attitudes towards PCH promotion, and the prevalence of PCH risk factors. Furthermore, the study evaluated statistically significant socio-demographic predictors of PCH awareness among students of UCC. Conversely, the qualitative data explored the perceptions of a sub-sample of students and healthcare professionals on the strategies and processes required to integrate PCH interventions into routine reproductive health services within the context of the university community.

A cross-sectional survey is "a one-time survey to profile a population or groups of interest" (Aday & Cornelius, 2006, p. 31). Surveys are characterized by a simultaneous collection of information necessary to measure both exposure and outcome status in a population sample at a single point in time (Aday, Cornelius & Cohen). Besides being appropriate for estimating the prevalence, nature, and intensity of health-related conditions and behaviours (Ogah, 2013; Polit & Beck, 2010), cross-sectional surveys permit conclusions from findings to cover a large population (Labaree, 2009). They are multipurpose designs appropriate for research questions about describing, explaining, and predicting a phenomenon and determining cause-effect relationships (Ogah).

The cross-sectional design was employed for the quantitative aspect of this study for the following reasons. It was suitable for estimating the prevalence of PCH risk factors among students. It also permitted data collection from a large sample size which facilitated comparison among the category's levels and levels of students. Moreover, the design allowed examining multiple predictors such as socio-demographic variables, perceived attitudes towards PCH promotion and the outcome variables of PCH awareness. The cross-sectional design was preferable because it was appropriate for answering research questions posed by the quantitative aspect of the study.

The qualitative study employed the case study design defined as "an empirical study which investigates a contemporary phenomenon in-depth within its real-life context" (Yin, 2014, p. 16). This design provides

opportunities to explore and describe "a phenomenon in its natural context from the perspectives of participants involved in the phenomenon" (Gall et al., 1996, p. 545). Several case study designs have been described; however, this thesis employed multiple-case design.

Multiple case designs allow researchers to explore a phenomenon through the replication strategy (Zach, 2006). The goal is to provide a comprehensive description of a phenomenon by comparing findings from different case studies (Stake, 2005). The multiple case study design permitted a detailed description of the views of different categories of UCC students on strategies required to integrate PCH promotion into existing reproductive health services. It also allowed an exploration of the opinions of various cadres of healthcare professionals on the processes needed to integrate PCH interventions into existing services at the hospital effectively. The multiple cases also allowed independent confirmation of emergent concepts and suggestions (Santos & Eisenhardt, 2011).

According to Bryman (2004) and supported by Armitage (2007), researchers usually adopt assumptions that stipulate how research should be conducted and how results should be analysed. These assumptions border on ontology [nature of reality], epistemology [the relationship between the researcher and what is being researched], axiology [the influence of values in the research], rhetoric [the language of the study] and methodology [methods used in the research process] (Creswell, 2007). The assumptions differ depending on whether the researcher adopts the subjective or objective approach to investigate the phenomenon of interest. In lieu of these

standpoints, both post-positivist and interpretivist paradigms have been employed to examine the phenomenon in this study.

The post-positivist belief in the scientific approach to research. This approach consists of a series of related steps. The principal assumption is that "there is a reality out there that can be studied and known" (Polit & Beck, 2003, p. 13). Therefore, it has characteristics of reductionism, logic and emphasizes empirical data collection. Related assumptions include cause-and-effect relationships and determinism based on previous theories (Creswell, 2007). On the other hand, interpretive research philosophy researchers hold that participants in the research process socially construct knowledge. Hence, researchers must endeavour to appreciate participants' lived experiences from their point of view (Schwandt, 2000). The overarching goal of interpretive research is to rely as much as possible on the participants' opinions regarding the phenomenon being studied (Creswell, 2014).

The current study was based on the Pragmatic paradigm. This worldview is not obliged to any specific philosophy but is somewhat concerned with "what works" at the time using different strategies (Creswell, 2014). Therefore, it "values both objective and subjective knowledge" (Creswell et al., 2011, p. 4). Pragmatics postulates that research occurs in several interconnected contexts hence "no single point of view can ever give the entire picture and that there are multiple realities" (Saunders, Lewis, & Thornhill, 2012, p. 107). The researcher requires multiple worldviews and different assumptions to understand the problem under study (Creswell, 2013).

The pragmatic paradigm advocates for concurrent quantitative and qualitative methods and procedures in a single study to gather research evidence (Shaw, Connelly, & Zecevic, 2010). It incorporates both positivist and interpretative philosophies in research to reduce the flaws of employing only one approach and at the same time takes full advantage of the strengths of both approaches (Creswell, 2009). An essential strength of this perspective is that the researcher focuses on the research problem and questions, thus adopting all available strategies to comprehensively understand the phenomenon under study (Creswell et al., 2011; Lincoln & Guba, 1985; Morgan, 2007).

PCH promotion is a multi-level phenomenon that resonates with the pragmatic paradigm. Therefore, the underlying assumption of the current study was that awareness of PCH related issues and the processes required to integrate PCH interventions effectively would be better understood by merging quantitative and qualitative methods.

Study Area

The study was conducted at the University of Cape Coast (UCC), located in the Central Region of Ghana Cape Coast, the region's capital. The University was chosen for the study because it is one of the leading universities in the country. It has culturally diverse groups of students, both local and international, within their reproductive ages expected to have different opinions regarding the phenomenon under study. The University is located a few kilometres west of Cape Coast, on a hill overlooking the Atlantic Ocean. UCC is one of the rare sea front universities globally, established in

1962 with a mandate to provide highly qualified and skilled human resources in education. Currently, the university has diversified its programmes and expanded its faculties to meet the human resource needs of other ministries and industries besides the Ministry of Education (Kwarteng, Boadi-Siaw, & Dwarko, 2012).

The University was initially affiliated with the University of Ghana. However, on October 1, 1971, it attained a full and independent University with authority to confer its degrees, diplomas and certificates. An Act of Parliament and the University of Cape Coast Law, 1992 [PNDC Law 278] established its autonomy. Consequently, the University has added to its functions by training educational planners, administrators, agriculturalists and health care professionals. The University has two campuses: The Southern Campus and the Northern Campus, with 19,975 regular students registered for the 2018/2019 academic year. The university has several residence halls, lecture theatres, offices and several other institutions scattered within its community. The residential policy of the University is that all first-year students will reside in the halls of residence owned by the University and the second year to fourth-year students live in private hostels in the communities surrounding the University.

UCC operates the collegiate systems. Therefore, both undergraduate and post-graduate students were distributed across five colleges. A Provost heads each college. The colleges are the College of Agriculture and Natural Sciences, College of Education Studies, College of Health and Allied Sciences, College of Humanities and Legal Studies, and College of Distance

Education. All the colleges except the College of Distance Education run regular programmes at the university. The colleges have been sub-divided into 14 Faculties/Schools and 70 Academic departments, institutes and centres that offer undergraduate and postgraduate levels programmes.

UCC ran the semester and course unit system and had over 80 academic programmes mounted each year at the Diploma, Bachelor, Masters and Doctoral levels. Thus, students are admitted to different levels based on their entry qualifications. The entry requirements for undergraduate students include the West African Senior School Certificate Examination [WASSCE], Senior Secondary School Certificate Examination [SSSCE], General Certificate of Education at Ordinary Level, and General Certificate of Education at Advanced Level. Other entry qualifications include Higher National Diploma [HND], Diploma in Registered General, Mental Health and Midwifery Nursing.

Students of UCC pursue a wide range of undergraduate and postgraduate programmes. Undergraduate students pursue bachelor's degree programmes in the social sciences, agricultural sciences, education studies and business administration. Postgraduate programmes include Doctor of Philosophy [PhDs], Master of Science, Master of Philosophy degrees, and postgraduate diploma/certificate programmes. Other fields of study include health and allied sciences, physical and biological sciences, humanities, legal studies and arts-related programmes. Officially, students have lectures on weekdays from Mondays to Fridays between 6:30 am and 8: 30pm (Admission Brochure, SGS, 2018/2019; Students' Handbook, 2018).

The University has a hospital mandated to offer health services to students, staff and the general public. The hospital is one of the sectors under the Directorate of University Health Services (DUHS), providing quality-driven preventive and curative services to its clients. The University hospital started its operation as a clinic attached to the Adehye hall in 1963. Its vision was "to have a Directorate of University Health Services strongly positioned with nationwide acclaim". The 80 bed-capacity hospital serves roughly 35,624 people, excluding students and staff. It runs 24-hour in-patient and out-patient services. Specialized services provided at the facility include dental, ENT, surgical, obstetrics and gynaecology services. It also provides pharmaceutical, HIV/AIDS counselling, diagnostic services, physiotherapy, reproductive and child health, students' clinic, and mortuary services (DUHS Strategic Plan 2015-2020). The facility also provides clinics on hypertension, diabetes, sickle cell, hepatitis, and anaesthesia (Kwarteng, Boadi-Siaw, & Dwarko, 2012; DUHS Strategic Plan 2015-2020; UCC @ a Glance, 2016).

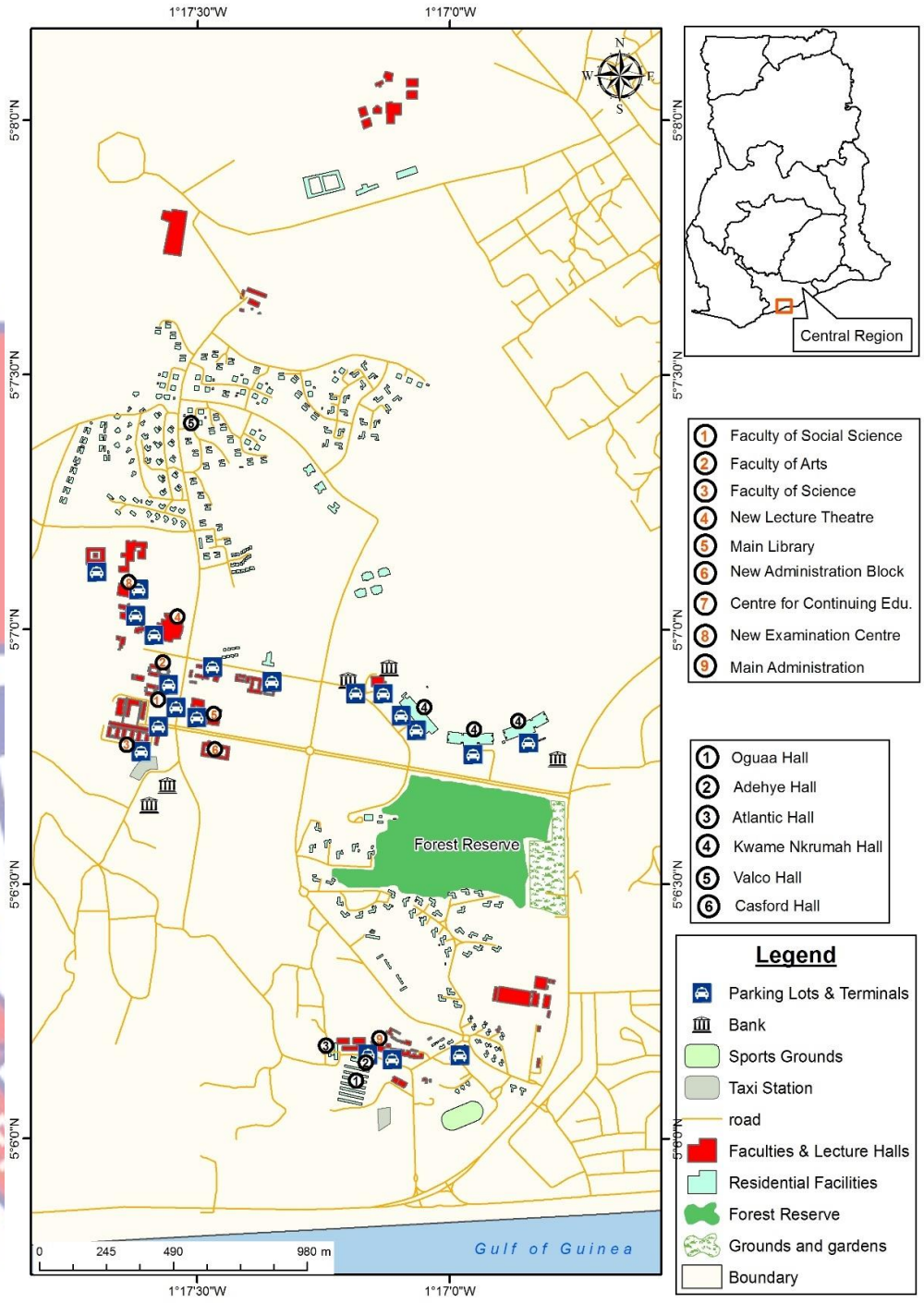

Figure 2: Landscape of UCC

Source: Cartography, GIS and Remote Sensory Unit (Department of Geography and Regional Planning)

Population

The quantitative phase population research comprised Ghanaian students enrolled in regular undergraduate and postgraduate programmes at UCC during the 2018/2019 Academic Year. The total number of students registered for the 2018/2019 Academic Year was 19,975 (Management Information Systems Section, 2019). Out of this population, the male students represented the majority 12,643 (64%), while the female students' population added up to 7,115 (36%). The undergraduate students' population was 18,687 (93.55%). Postgraduate students constituted 4.59% (917) of the entire student population, while postgraduate students numbered 371 (1.59%).

The eligibility criteria for both undergraduate and postgraduate programmes was being a male or female and currently pursuing a Diploma, Bachelors, Masters or Doctorate degrees and aged between 15 and 49 years. This age range was chosen because they are the target group recommended by CDC to receive routine PCH interventions (Johnson et al., 2006). Both male and female students participated in the study. The study population was diverse in age, ethnic background, language, religious affiliations, employment status and level of study. Most of the students recruited in the current study were single and unemployed.

University students were appropriate for this research because aside from being a critical period for exploration, university years signify a phase for making decisions about sexuality, lifestyle modifications, and implementing lifelong health behaviours (Arnett, 2000; Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008). Evidence suggests a lack of parental

restrictions and control over the lifestyles and choices of students during this period (Von Ah, Ebert, Ngamvitroy, Park, & Kang, 2004). Conversely, this autonomy can lead to adopting risk behaviours that impact their health in the future (El Ansari & Stock, 2010). This explains a significant objective of the Healthy Campus 2020 initiative to promote positive health behaviour among university students (U. S. Department of Health and Human Services, 2012).

The population for the qualitative phase of the study involved a section of students and healthcare professionals currently working at the University Hospital and Student Clinic. The sample size for the qualitative research was not estimated a priori but was guided by the principle of data saturation (Creswell, 1998; 2009). According to Bryman (2012) and Creswell (2009), data saturation occurs when recruiting more participants does not add new opinions or information. Thus, sampling continued until no new information emerged from focused group discussions (FGDs) and key informant interviews [KII] (Korstjens & Moser, 2017). Literature suggests that qualitative research approaches do not require large sample sizes. However, the sample should be large enough to acquire sufficient data to describe the phenomenon of interest adequately and address the research questions (Creswell, 1998; Morse, 1994). To ensure a heterogeneous sample, healthcare professionals and sub-groups of students with varied backgrounds were interviewed until the data reached saturation (Korstjens et al., 2017).

Focused group discussions were conducted, given that sample sizes for FGDs often ranged between six and eight (Guest, Namey, & McKenna, 2017; Krueger & Casey, 2015). In all, eight mixed-gender FGDs were conducted

among 55 undergraduate and postgraduate students recruited from four colleges of the University. These include the College of Educational Studies, College of Humanities and Legal Studies, College of Health and Allied College of Agriculture and Natural Sciences.

The population of healthcare professionals consisted of 108 males and females aged between 20 and 62 years distributed among four main categories of professionals with diverse professional qualifications. Among this population, nurses [all cadres] constituted the majority (73%), midwives comprised 10%, while medical officers of various specializations represented 13%. Pharmacists comprised approximately 4% of the health care professionals' population. A minority of the health professionals included dieticians, clinical psychologists and Biomedical Scientists (UCC Hospital Administration, 2019). The present research included healthcare professionals strategically positioned to optimize PCH promotion. Evidence shows that they can significantly influence the uptake and provision of PCH interventions (de Weerd et al. 2002; Shannon et al., 2013).

Inclusion criteria

The study population for the quantitative phase comprised all female and male regular students aged between 15 years to 49 years enrolled in undergraduate and postgraduate degree programmes at UCC. In particular, all regular students available on campus at the study time were included in the study. All permanent health professionals involved in providing reproductive health services with at least one year of post-qualification work experience at the UCC hospital were engaged in the qualitative research.

Exclusion criteria

Regular students who were not available on campus at the time of data collection were not included in the quantitative study. Additionally, the study did not include students on clinical placement and industrial attachment outside campus, past students on internships or national service, and sandwich and distance education students. Students younger than 15 years and those older than 49 were also excluded because they did not fall within the recommended age range for individuals of reproductive age. For the qualitative study, healthcare professionals with less than one year of work experience, those working at the hospitals on a part-time basis and staff on leave were not included.

Sampling Procedure

The quantitative study comprised 1560 regular students drawn from four faculties and schools at UCC. The original sample size was 390, estimated using the Fisher's formula expressed as $n = z^2 pq / d^2$

Where:

n = desired sample size

z = normal standard deviation, usually set at 1.96, corresponds to a 95% confidence interval

p = proportion of the target population with similar characteristics was assumed to be (50%, i.e., 0.50).

q = 1.0 minus 'p' (1.0 – p).

d = degree of error was assumed to be 0.05.

Using a z-statistic of 1.96, margin of error [d] of 0.05% and the proportion of the target population with similar characteristics [p] of 50% (0.50), the [n] was estimated to be: $n = (1.96)^2 (0.50) (0.5) / (0.05)^2 = 385 \equiv 390$. Even though this sample size was theoretically enough to generalize the sample statistics to the population being studied, researchers argued that it was not enough for descriptive studies. Further, larger samples are required when the phenomenon being studied is rare in the population (Ogah, 2013).

Experts also argue that larger sample sizes are required to increase statistical power and make provisions for uncertainties during data collection (Bryman, 2012; Cohen, 1988). Standard formulas can calculate sample sizes for studies that employ cluster sampling. However, the resulting sample size must be adjusted using the desired effect to find the total required sample size (Killip, Mahfoud, & Pearce, 2004). For these reasons, additional adjustments were made to the original sample size to correct the limitations of the design effect (Carlin & Hocking, 1999; Knox & Chondros, 2004). Design effect (deff) is a correction factor that accounts for the weaknesses inherent in the cluster sampling strategy (Carlin & Hocking). According to Killip et al. (2004), although clustered samples techniques are cost-effective and practical when a random survey would be unrealistic, they are not as statistically effective as simple random samples. Besides, cluster sampling violates the simple random assumption of independent estimates due to similarity among responses within a group (Battaglia, 2011; Killip, Mahfoud, & Pearce). Therefore, the need to account for intra-cluster correlation coefficients (ICC) when sampling through clusters or risk underestimation of the sample size

required to generate the desired level of power and significance (Knox & Chondros). The ICC is the proportion of the actual total variation in the outcome variable attributable to variations between clusters (Killip et al.).

The formula employed in the current study was deff = 1 + (m- 1) ICC. Where:

m = the average number of respondents sampled per cluster (583-1)

ICC = the (intra-cluster) correlation coefficient

Using a correlation coefficient of .005 adapted from previous studies (Westgate, 2019), the design effect for the current study was estimated as 1 + (m- 1) ICC = 1 + (583 -1) .005 = 3.91≡ 4. The use of design effect was based on the assertions that "if an outcome with a highly variable design effect is critical to a survey, selection of a relatively high design effect may be prudent to ensure sufficient precision" (Kaiser, Woodruff, Bilukha, Spiegel, & Salama, 2006). Consequently, the original sample size of 390 was multiplied by 4 to arrive at a final sample size of 1560 for the quantitative phase of the study (Knox & Chondros).

A multi-stage sampling technique was used for the quantitative study. This strategy was employed because, aside from being cost-effective, it can result in higher sampling variability (Aday, Cornelius, & Cohen, 2006). The first stage involved grouping students' populations into four clusters based on the four colleges offering regular programmes. This was followed by randomly selecting one school/faculty independently from each college. The primary aim of this strategy was to maximize the distribution of the sample to adequately represent the diversity present in the population at a reduced cost

(Aday & Cornelius 2006; Ogah, 2013). This design was employed to capture the essential uniqueness of students in the final sample (Bryman, 2012; Ogah). Selected schools/faculties comprised the School of Allied Health Sciences, Faculty of Social Sciences, School of Physical Sciences, and Faculty of Educational Foundations.

The second stage involved the proportionate allocation of participants according to the sizes of selected schools/faculties. The strategy ensured that respondents were adequately represented in schools or faculties (Bryman, 2012). Additionally, this was appropriate to capture the essential uniqueness of respondents in the final sample (Ogah, 2013). Sample sizes were calculated in direct proportion to the sizes of selected schools/faculties. In stage three, a random selection of two departments by replacement from each school/faculty was performed using the fishbowl technique to give an equal opportunity to every department to be in the final sample (Bryman; Ogah). This was done by writing the numbers corresponding to the departments on pieces of paper and folding them, then selecting a random sampling of paper from a bowl after shuffling to create a sample. The chosen departments include the Department of Basic Education, Department of Education and Psychology, Department of Geography and Regional Planning, Department of Sociology and Anthropology, Department of Biomedical Sciences, Department of Optometry, Department of Computer Science and Department of Information Technology and Mathematics and Statistics.

In the fourth and final stage, respondents were recruited using a convenience sampling technique from each department. The convenience sampling strategy was employed at this stage because it is the sampling technique most appropriate for a diverse population under study. Although convenience sampling runs a risk of systematic exclusion of some respondents from the data set, it was the most suitable for this study since students were accessible in the halls of residence and lecture theatres (Jager, Putnick, & Bornstein, 2017; Ogah, 2013). Individual students willing to be part of the study were contacted after lecture periods and at their residence halls to participate in the study. Every student in the selected departments was included in the sampling frame irrespective of their gender, level and programme of study.

A purposive sampling method with a strategy of maximum variation of health professionals and students was used in the qualitative study. "Purposeful sampling is used so that individuals are selected because they have experience with the central phenomenon" (Creswell, 2009, p. 217). Two levels of purposive sampling were deemed appropriate for participant recruitment for the FGDs. The first level entailed the recruitment of sub-samples of students recruited through friendship groups. Respondents were recruited from the same departments selected for the quantitative phase of the research. Recruitment was planned to include both female and male students pursuing different programmes and levels in each department. This strategy enabled comparisons of how students collectively constructed meanings about how PCH promotion should be delivered at the UCC hospital (Bryman, 2012;

Creswell, 2007). The second level of sampling involved recruiting healthcare professionals as key informants. The key informants' interviews helped confirm the information collected from students and elaborate on emerging themes. Criteria for recruitment as key informants entailed delivering reproductive health services, specialization, qualification, work experience, and units. Healthcare professionals who fell within the eligibility criteria were identified and contacted through the snowball strategy.

Data Collection Instruments

A self-administered questionnaire and interview guides were used for this study. Aside from being cheaper, self-administered questionnaires require less time to administer. It guaranteed anonymity and prevented interviewer bias (Polit & Beck, 2003). Despite its strengths, questionnaires can potentially lead to non-coverage and non-response biases if adequate measures such as follow-ups are put in place by the researcher (Aday & Cornelius, 2006; Tolmie, Muijs, & McAteer, 2011). The items in the questionnaire were adapted from different studies related to the topic under study. The first section of the questionnaire was adapted from Elyse Corbett's. This instrument assessed the "knowledge, attitudes and perception of wellness of undergraduate women in Colorada in the Western United States. The original instrument had a total of 92 items. However, only fourteen items were adapted to assess the socio-demographic characteristics of participants. Five questions assessing participants living conditions, subscription health insurance, parents' level of education and employment status were not included in the present questionnaire. PCH awareness was estimated using adapted versions of ten

Crusenberry and Delgado instruments items. The Crusenberry study was an "online study of undergraduate's knowledge, awareness and attitudes of PCC published in 2016.

In comparison, the Delgado study explored undergraduate students' awareness of issues related to PCH and pregnancy. The reliability of the original instruments was measured using internal consistency with Cronbach's coefficient alpha statistic, and values for most items ranged from 0.61 to 0.87. It is worth noting that this study's research instrument's subscales recorded relatively higher Cronbach Alpha values.

Items relating to PCH risk factors were adapted from the Zwangerwijzer self-administered internet questionnaire for assessing PCH risk factors. The original questionnaire was designed for would-be parents who visited the Erasmus Medical Centre (MC) in Rotterdam, Netherlands. The instrument developed in 2006 summarises potential PCH risk factors that impact MCH outcomes. The instrument consists of closed-ended questions with dichotomous (yes or no) responses on preconception risk subscales. The present study modified subscales of the items in the original instrument to make them applicable to a broader population of women and men of reproductive age. Thus, out of the 45 items in the original instrument, 38 items representing seven sub-scales of PCH risk factors were adapted to estimate the prevalence of PCH risk factors in the present study. The Zwangerwijer instrument was used in the present study because evidence suggests it has adequate reliability and validity. The instrument was reported to have an overall Kappa statistic of 0.88 compared with a physician's history taking in

research to validate it as a tool for preconception risk assessment (de Weerd, & Steegers, 2002). Weighing scales and stadiometers were used to measure the weight and height of respondents before using the Body Mass Index calculations.

To evaluate the perceived attitude of students towards PCH promotion, the study employed the Reproductive Health Attitudes and Behaviour (RHAB) questionnaire. The RHAB Questionnaire was a theory-based instrument developed by Chorron-Pronchownik, Wang, Sereika, Kim, and Janz (2006). The 48-item instrument was developed based on HBM, TRA, and SCT constructs. The original instrument was used to measure the psychometric properties of sub-categories of these theories among young women diagnosed with Type I Diabetes Mellitus on preconception planning and behaviours. A total of 17 items in the original RHAB questionnaire were adapted to suit the context of the current study. The reliability of the original instrument was assessed using internal consistency with Cronbach's alpha method. The results showed that major subcategories of the instrument clustered according to theoretical underpinnings, with most subscales yielding a moderate Cronbach alpha (.60 -.83). The RHAB Questionnaire was used in the current study because, aside from measuring all the dimensions of attitudes, it demonstrated satisfactory validity and reliability in many related studies (Crusenberry, 2016; Paulsen, 2017).

The 54-item questionnaire used in this study contained four sub-sections: [A, B, C, D] {See Appendix D}. The first section comprised fourteen close-ended questions that assessed participants' socio-demographic

characteristics. The second section consisted of eight questions that measured participants' awareness of PCH-related issues. Items were measured using closed-ended questions with dichotomous (yes or no) or (agree or disagree) responses. The third section of the instrument estimated the prevalence of PCH risk factors. This comprised seven preconception risk subscales adapted from the Zwangerwijzer instrument. The questionnaire items included multiple-choice and Likert-type response questions. The fourth section measured perceived attitudes towards PCH promotion. Even though 17 questions were adapted for this section, 13 items were measured on a Likert scale of 1 to 4, with responses ranging from strongly disagree to strongly agree. The reminders of the questions were either mutually exclusive categorical or rating items.

Qualitative instruments (semi-structured interview guides) were developed by the researcher from similar studies conducted by Mitchell and Verbiest (2013), Tough, Clarke, Hicks, and Cook (2006), Van der Zee (2013) Lassi et al. (2014). The interview guides consisted of two components. The first section determined the socio-demographic characteristics of respondents. In contrast, the second section assessed respondents' views on effectively integrating PCH promotion into reproductive services at the UCC hospital. Both interview guides investigated four main questions about integrating PCH into routine reproductive health services. Sample questions include: *"What comes to mind when you hear preconception health?", "What specific strategies and resources do you think will facilitate PCH promotion among students of UCC?", "Does your clientele usually request for preconception*

services?", and "What processes in your opinion are required to incorporate PCH interventions into routine reproductive health services?"

The validity of the questionnaire used in the current study was established because items were adapted or modified from different instruments. Validity is the extent to which instruments used for a study measure what it was anticipated to measure (Polit & Beck, 2010). For this reason, the content validity of the questionnaire was determined in two ways. First, a pre-test was conducted on 60 students purposively sampled at the College of Distance Education of UCC. Students of this college were chosen because they possessed characteristics comparable to participants included in the main study. The goal of the pre-test was to determine the adequacy of the instruments as well as the feasibility of the full-scale study (Bryman, 2012). Following the pre-testing, the questionnaire was revised by rephrasing some questions, and others were removed. Draft copies of the questionnaire were presented to thesis supervisors, experts in reproductive health and research assistants from the Directorate of Academic Planning and Quality Assurance Unit of UCC for validation. All experts considered the content validity of the questionnaire as satisfactory. Second, the content validity was further assessed through a second pre-test of the corrected questionnaire by engaging regular students from one school that was not included in the main study. In all, 200 students constituting more than 5% of the estimated sample size for the final study were purposively sampled from the School of Nursing and Midwifery for the second pre-test. Subsequently, the questionnaire was improved by thesis supervisors through the rephrasing of ambiguous questions. Findings

from the pre-test were not reported. Prior to the analysis of the pre-tested data, reverse coding was done for some items. This was followed by data cleaning using the Statistical Package for Social Sciences [SPSS] version 20.0 for Microsoft Windows (Arbuckle, 2011). Feedback from the pre-test was incorporated into the final instrument before embarking on the full-scale study. The validity of qualitative instruments was also carried out.

Similarly, the validity of the interview guides used for the study was established. Validity in qualitative research indicates quality checks and procedures employed by the researcher to ensure the accuracy of research findings (Creswell, 2014). The content validity of qualitative instruments was assessed by (1) engaging four students from the School of Nursing and Midwifery in a focus group discussion to pre-test the group interview guide. (2) Two nurses working within the Cape Coast Metropolis were interviewed to pre-test the key informant interview guide. Feedback from the pre-tests was used to review the final interview guides for data collection. Furthermore, thesis supervisors refined the qualitative interview guides' wording and quality of questions and probes.

Reliability refers to the consistency of constructs over time or across techniques of collecting data (Arday & Cornelius, 2006). Even though items in the instrument used for the present research were reliable from previous studies, an additional reliability assessment was conducted using the pre-test data. Internal consistency reliability of the perceived attitudes sub-scale of the instrument was established using internal consistency with Cronbach's alpha coefficient. The internal consistency reliability coefficient of sub-scales

related to PCH awareness levels and PCH risk factors were calculated using the Kuder-Richardson 20 (KR-20) formula. These items were dichotomous responses (Polit & Beck, 2010). The overall reliability coefficient for the PCH awareness sub-scale was .73, while values for the PCH risk factor sub-scales ranged between .65 and .80. Values recorded for most sub-scales ranged from .86 to .90. According to Pallant (2005), these values are adequate for the current study.

Qualitative reliability relates to the consistency of a specific research strategy across different investigators and studies (Bryman, 2012). In the present study, Lincoln and Guba's criteria for trustworthiness were used to ensure the rigour of the qualitative research (Lincoln & Guba, 1985). These criteria comprised four steps. The first step, referred to as credibility, is similar to internal validity (Bryman). It involved having confidence in the "truth" of the research findings (Korstjens & Moser, 2018). This criterion was achieved by carrying out member checking. Respondents were given opportunities to review their statements with the researcher's findings after the data transcription. A reflective journal was kept during the period of data collection. Reflective journaling is a learning tool that facilitates a critical analysis of an incident or experience by linking it with theories or concepts to promote better understanding (Jootun & McGarry, 2014). The second criterion for trustworthiness is transferability. It involves the applicability of the findings in other contexts (Bryman, 2012). Lincoln and Guba (1985) described it as a strategy for achieving external validity in qualitative studies. This was achieved by defining the phenomenon under study in sufficient detail,

allowing the researcher to examine the extent to which conclusions drawn can be transferred to other settings and people.

The third criterion entailed determining the consistency of research findings described as dependability. Ensuring dependability involved providing opportunities for outsiders to critique the process and findings of the qualitative study. Techniques used to determine the qualitative conclusions' dependability were external audits and debriefing (Korstjens & Moser, 2017; 2018). Debriefing entailed appraisal of the findings, interpretations and conclusions of the study by my peers in the PhD programme (Bryman, 2012; Creswell, 2009). An audit trail and a report of important decisions throughout the study were kept to improve trustworthiness.

The final criterion for trustworthiness in Lincoln and Guba (1985) is confirmability. According to Creswell (2014), qualitative research is interpretative, so the researcher is deeply involved in the respondents' experiences. Thus, the researcher must ensure that they have "acted in good faith" (p. 379), although absolute objectivity is not possible (Bryman, 2012). The confirmability of the qualitative findings was established using external audit, debriefing, and triangulation (Graneheim & Ludman, 2004; Korstjens & Moser, 2018). Triangulation is the process of combining data from different sources to study a particular phenomenon to increase the validity of a study (Rugg, 2010). Data was collected from multiple sources to capture varied perspectives on the phenomenon of interest to ensure triangulation. Specifically, multiple methods and investigators were used in the study. Also, the opinions of a diverse cadre of healthcare professionals and students of

diverse backgrounds were compared to facilitate a deeper understanding of the phenomenon under investigation. Finally, multiple perspectives were employed in the interpretation of the study results.

Tashakkori and Teddlie (1998) opined that the researcher's personal values cannot be ignored in qualitative research in interpreting the findings. In applying this assumption to the study, I acknowledged that my values and experiences as a healthcare professional impacted the results of this study. These values include client-centeredness, using multiple perspectives to gain in-depth insight and research evidence to guide decision making. I also employed reflexivity, an iterative and self-reflection about myself as a researcher and how this influenced my relationship with the respondents and their answers to questions posed to them (Korstjens & Moser, 2018).

Data Collection Procedures

Prior to the data collection, ethical approval was obtained from the UCC's Institutional Review Board [UCCRIB/CHAS/2018/86]. Permission was also obtained from the Students Records and Management Information (SRMIS) of UCC to access relevant students' information populations in selected faculties/schools, departments, gender, and telephone numbers. Permission was obtained from the Deans, and Departmental Heads of Departments included in the sampling frame before students were contacted. The study was conducted between March and June 2019. Students were recruited from four schools and faculties of the university. These include the School of Allied Health Sciences, Faculty of Social Sciences, School of Physical Sciences, and Faculty of Educational Foundations.

The data was collected in two parts concurrently. First, qualitative data were collected through semi-structured interviews conducted among sub-samples of students engaged from the eight departments and reproductive healthcare professionals at the UCC hospital. Second, self-administered questionnaires were used to collect data from students recruited from eight departments selected schools/faculties. Individual students were contacted by research assistants and informed about the study. The initial contacts enabled a review of the study's purpose and answered the pertinent questions regarding the study. This strategy further ensured that respondents were informed in advance about the study. The location, date and time for data collection were scheduled according to participants' preferences to reduce non-response. During the first contact, those who were not available during the first contact were followed up at the departmental level or contacted using WhatsApp messages or call-backs (Arday & Cornelius, 2006). Respondents signed a written informed consent form to guarantee their ethical rights before the study. Only regular students registered at the SRMIS during data collection participated in the study. Self-administered questionnaires were then proportionately allotted and administered to students by ten trained Research Assistants. Respondents were allowed to complete questionnaires in a calm setting.

Research Assistants were selected based on their expertise in data collection. They were taken through a training workshop to introduce them to the purpose and general conduct of the study using a manual specially designed for that purpose. The manual contained an overview of the study's

intent, how to establish rapport with respondents and the procedures and norms for data collection. The principal researcher had oversight responsibility for the study through regular monitoring of the performance of research assistants. Other quality checks employed include follow-ups on missing data, inspection and validation of completed questionnaires. The questionnaires were administered over a period of twelve weeks.

In the qualitative phase of the data collection, semi-structured interview guides were employed to collect data from two categories of respondents. The first category entailed health care professionals selected from the UCC Hospital and Students' Clinic. Healthcare professionals were purposively sampled based on their knowledge, experience and expertise on the phenomenon under study using the maximum variation purposive sampling (Bryman, 2012; Creswell, 2009). This strategy "aims at capturing and describing the central themes or principal outcomes that cut across a lot of participants and program variation" (Patton, 2012, p. 172). This technique aims to gather a wide range of perspectives on the phenomenon of interest (Palinkas et al., 2015).

Professional speciality areas considered comprised general medicine, obstetrics, gynaecology, nursing, midwifery, physician assistants, medical laboratory and clinical psychology. Open-ended questions were employed to enable respondents to describe their opinions related to how PCH should be successfully incorporated into existing reproductive health services. Probing questions were used to obtain more elaborative answers. The location, date and time for the interview were planned according to the discretion of

participants. The interviews were conducted in an office, ward or clinic depending on the respondent's choice. Two health care professionals initially recruited were unable to participate in the study because of their busy schedules. Key informant interviews lasted about 45 minutes. The interviews were audio-taped with permission from participants to ascertain accurate accounts of the interviews. The recordings were replayed to the respondents for analytical responses (Bryman, 2012; Creswell, 2009; Palinkas et al., 2015; Patton, 2012).

In the second category of interviews, focus group discussions were conducted among sub-samples of students selected using the maximum variation purposive sampling. This strategy involves selecting respondents with diverse variations to identify critical shared patterns that cut across respondents (Palinkas et al., 2015). "Focus groups typically involves bringing together people of similar backgrounds and experiences to participate in a group interview about major program issues that affect them" (Patton, 2012, p. 173). The respondents were recruited to comprise varied categories of undergraduate and graduate students from different programmes and levels to capture a wide range of perspectives relating to the phenomenon under study. Four students could not partake in the focus group discussions because of time constraints.

Focus group interviews were carried out using open-ended questions with mixed-gender groups comprising six to ten respondents until theoretical saturation was reached (Glaser & Strauss, 1967). Mixed-gender FGDs were well suited for the current study because the questions asked were not

sensitive to require segregation based on sex. Descriptive summary measures of frequencies, percentages, and means were used to measure research questions one, two, and three. Saturation occurs when new information ceases to emerge from the data collected (Bryman, 2012). The FGDs lasted 30 to 60 minutes. Only the (moderator) researcher and a recorder were engaged to accurately capture all perspectives (Creswell, 2009; Palinkas et al., 2015; Patton, 2012).

Each interview was transcribed by myself to ensure the confidentiality of the information obtained. Another independent transcriber transcribed data generated from the interviews to avoid biases. Interview transcripts were checked daily for consistency, accuracy and correct responses by the researcher, and incomplete responses were followed up. Respondents reserved the right to withdraw from the study at any time. Only pseudonyms were used throughout the study to protect the identity of participants. A thank you note was sent to all respondents after data (Bryman, 2012; Creswell, 2009; Creswell, 2014; Palinkas et al., 2015).

Reflexivity Report

Reflexivity is an iterative process in which researchers reflect on their values, experiences, relationships with research participants, and how they affect respondents' answers to them (Korstjens & Moser, 2018; Parahoo, 2006). It entails an appraisal of how the researcher's background influenced selecting the research problem and every stage of the research process (Malterud, 2001). Reflexivity serves as a quality check for researcher beliefs, biases and prejudices (Berger, 2015) and improves the trustworthiness of

qualitative research (Dodgson, 2019). This reflexivity was undertaken using Finlay's typology (Finlay, 2002) as a reference. The typology requires re-engaging the research journey based on five constructs; introspection, inter-subjective reflection, mutual collaboration, social critique and discursive deconstruction.

Reflexivity through introspection denotes self-awareness of the researcher to recognize how personal experiences might affect the selection of the research topic, methods, and themes (Patniak, 2013). My profession as a public health practitioner and faculty, coupled with my reflections on why Ghana could not meet Millennium Development Goals 4 and 5 to reduce child mortality and improve maternal health by 2015, motivated me to conduct this study. I began reading to find possible explanations for this national challenge as part of my preparation to apply for a PhD in Maternal and Child Health (MCH) at the University of Cape Coast. I became aware during my readings of the need to explore preconception health (PCH) promotion as a possible strategy for improving MCH outcomes in developing countries like Ghana. After several internal discourse and discussions with my supervisor and a few experts in MCH on the suitability of this area for my PhD study, I decided to explore PCH awareness levels of university students after several discussions and revisions of the research title.

Inter-subjective reflection goes beyond personal reflection and focuses on exploring the research relationships and challenges to derive shared understanding. Within this context, I had several discussions with my supervisor and experts in MCH on the suitability of this area for my PhD

study. As a result, there were several revisions before a decision was taken on the research topic. Subsequently, I began an in-depth literature review on several themes to identify the knowledge gap relating to the research topic. Following this, I set out to explore factors influencing PCH awareness levels and attitudes towards PCH promotion among the University of Cape Coast students. Equally, I set out to examine students' and healthcare professionals' perceptions about how PCH interventions could be integrated into routine reproductive health care services for university students. I hoped the study would encourage national dialogue and research to advance PCH promotion.

In line with the literature, the embedded mixed methods approach (survey and qualitative multiple case study) was selected as the most suitable design to guide data collection. This research design enabled the integration of diverse viewpoints. Two groups of respondents participated in the study; students and health care professionals working at the university hospital. Based on research evidence, semi-structured interview guides were deemed appropriate for data collection for qualitative research. The researcher designed the interview guides based on related research and pre-tested them accordingly. There were two updates and a proposal defence at my department before the start of the project. Subsequently, the proposal was submitted to the Ethical Review Board of UCC for approval in 2018. Data collection began in March 2019.

Being a nursing faculty with a public health background facilitated the data collection process. Specifically, it permitted easy access and bridged the social gap between the respondents recruited for the study and me. It enabled

rapport and good interpersonal relationships during the focus group discussions and key informant interviews. Respondents willingly shared their opinions on the topics under investigation. Similarly, my academic background as a master's student in public health and competencies acquired during my advanced qualitative data analysis and reporting course gave me the self-confidence to undertake the study. Familiarity with the research environment has the tendency to negatively influence the research process (Berger, 2015; Finefter-Rosenbluh, 2017). Thus, I employed various techniques such as collecting data using different techniques and triangulation during data analysis, bracketing and member checking to increase the credibility of findings.

Mutual collaboration is the notion that respondents are co-researchers and joint contributors in knowledge construction and qualitative research findings. This strategy considers varied and conflicting opinions and offers researchers an opportunity to utilize the knowledge and experiences of respondents in data collection and interpretation. A total of 55 university students and 22 health care professionals working at the university hospital were invited to share their opinions on strategies and processes required to effectively incorporate PCH promotion into routine reproductive services at the UCC hospital. I employed member checking to enable respondents to read through and provide feedback on selected transcripts. As co-researchers, their perspectives and expertise were valuable to developing important themes and, by extension, findings of the study. Aside from appraisal of interview transcripts by colleagues in the PhD programme, regular reflexive discussions

with my two-co-supervisors and their queries deepened my understanding of all methodological decisions.

Qualitative data analysis was done manually using inductive content analysis. The interviews were audiotaped and transcribed verbatim. Two individuals (principal investigator and an experienced researcher) were triangulated during coding, analysis, and interpretation of findings. This was followed by comparing and agreeing on emerging themes based on the transcripts. The findings of this research emerged from respondents' perspectives rather than my personal feelings and prejudices. I spent several days in a serene location to get a sense of emerging themes during the period of data analysis. Overall, the reflection process was a humbling experience that enabled me to analyse major decisions critically and provided a valuable opportunity to learn during this research practice.

Reflexivity under social critique relates to managing power dynamics between the researcher and respondents. I did not ignore potential biases and power dynamics between me and the respondents (Reid, Brown, Smith, Cope, & Jamieson, 2018). Thus, students in the school (School of Nursing and Midwifery) where I teach were not recruited for the main study. This was to avoid power play during recruitment and interactions with student respondents. Also, disclosure that they could skip questions they do not wish to answer and that this will not affect their academic work allowed free information sharing during data collection. Introducing myself as a PhD student and stating in the information sheet that they have the right not to participate in the study increased the personal autonomy of both students and

health care professionals to decide whether they will participate in the study or otherwise.

Reflexivity through discursive deconstruction refers to awareness of uncertainties associated with the language used. It influences the construction of the specific text and how both the researcher and respondents present themselves to each other (Finlay, 2002). Moreover, respondents were fluent in English, so I did not lose track of the meanings and interpretations of the text, transcripts, and analysis of field notes as constructed by respondents. Reflecting on the research journey using this reference enabled a comprehensive review of the research journey. It has been a journey of discovery learning and has impacted my growth as a researcher.

Data Processing and Analysis

The statistical software, SPSS version 20.0 for Microsoft Windows (IBM Corporation 2011) and STATA version 12, was used to compile and analyse quantitative data. Each questionnaire was assessed visually and statistically for accuracy and completeness before the data entry. Further, all responses to questionnaire items were translated into numerical data to enable the transition of questionnaires to the data matrix. Missing and extreme values and the adequacy of the fit between the data and assumptions of specific procedures were determined. Descriptive statistics of frequencies, percentages, and means were used to describe and summarize quantitative results.

Additionally, multivariate statistics of binary and multinomial logistic regression (MLR) analysis were used to predict factors influencing PCH awareness and perceived attitude towards PCH promotion. The specific

analytical procedures per research questions are described below: It also focuses on discussions of significant study findings compared to the literature regarding the problem investigated. Discussions related to connections between findings and health behaviour theories and implications of results were also presented.

Research Question One: What is the Level of Awareness of PCH Related Issues among Students of UCC?

The purpose of this research question was to determine the extent of awareness of preconception health-related issues among UCC students. Descriptive statistics were used to analyse and present findings on this research question. Specific descriptive summary measures include frequencies, percentages and standard deviation. These statistics were employed because they were most appropriate for analysing single categorical variables such as PCH awareness (Bryman, 2012; Pallant, 2005). The sub-scale consisted of 12 statements on PCH awareness with dichotomous response options, agree =1/disagree = 0 response options. Each correct answer was given one point with an aggregate score of 12 points for all correct responses (Mayet, Al-Shaikh, Al-Mandeel, Alsaleh, & Hamad, 2017). In analysing the results, the correct responses of each respondent were summed up. Responses were categorized into three quartiles of PCH awareness. A score greater than or equal to 75% was considered high awareness, whilst composite scores between 50 - 74% were deemed to be moderate and low awareness [0 - 49%] (Delgado, 2008; Moghadam, Azad, Sahebalzamani, Farahani, & Jamaran, 2017).

Research Question Two: What is the Prevalence of PCH Risks Factors among Students of UCC?

Research question two sought to estimate the prevalence of PCH risk factors among students of UCC. Risk factor prevalence estimates were determined with dichotomous "yes" and "no" response options from seven domains of PCH risk factors. The risk domains were based on PCH indicator domains for public health surveillance (Robbins et al., 2014; Robbins et al., 2018). The domains include general health status, lifestyle, behavioural and environmental risks, nutrition and physical activity, infectious and immunization risks, medical and medication history, reproductive and obstetric risks, family history/genetic risk factors. Descriptive statistical analysis was performed to estimate the proportion of PCH risk factors in the sample population (Aday & Cornelius, 2006; Pallant, 2005).

Research Question Three: What is the Perceived Attitude of Students of UCC towards PCH Promotion?

This question assessed the perceived attitude of students of UCC towards PCH promotion using a total of 18 items. The instrument for this sub-scale was adapted from the Reproductive Health Attitudes and Behaviour (RHAB) questionnaire developed by Wang, Charron-Prochownik, Sereika, Siminerio, and Kim (2006). The RHAB instrument was chosen because it was in line with the triadic model for conceptualizing attitudes (Allport, 1935). The model posits that attitude consists of three components; namely, cognitive (knowledge and belief), affective (feeling and emotion), behaviour (actual or intended). Examples of items in the present study include. If I/my partner had

an unplanned pregnancy, I think this would be a serious problem. Would you say that getting PCH counselling would help you maintain or achieve optimal general and reproductive health? Individual items were summarized descriptively using frequencies and percentages. The perceived attitude was measured on a four-point Likert scale and later collapsed into dichotomous "positive" and "negative" perceived attitudes. Each correct response was given one point with an aggregate score of 18 for all correct answers (Mayet, al-Shaikh, et al., 2017). Students who scored fifty per cent and above (50%+) were classified as having positive attitudes towards PCH promotion. Those with scored 49% and below were classified as negative attitudes (Lovelace, & Brickman, 2013; Kassa et al., 2019). Students with positive attitudes were perceived as having a more favourable evaluation of PCH promotion than those with negative attitudes.

Research Question Four: What Socio-demographic Factors Predict PCH Awareness of Students of UCC?

The purpose of research question four was to assess socio-demographic predictors of PCH awareness levels of UCC students. An MLR (Borges, OlaOlorun, Fujimori, Hoga, & Tsui, 2015; Rutaremwa, Kabagenyi, Wandera, Jhamba, Akiror, & Nviiri, 2015) was performed to determine socio-demographic predictors of PCH awareness. The dependent variable (level of PCH awareness) had three categories (y_i = High ≥75%, Moderate = 50 – 74% and Low <50%). The Low level (<50%) of PCH awareness was used as the reference category. The socio-demographic predictor (independent) variables (x_i) (Borges et al.) in this study included age, sex, marital status, ethnicity,

religion, level of university education, employment status, income, college and faculty of UCC students. These socio-demographic variables came out as the model's best possible subset of predictor variables through a stepwise selection process (Peng, Lee, & Ingersoll, 2002; Tannous & Agho, 2017; Wekesa, Askew & Abuya, 2018). The estimated coefficients (β_i) of the multinomial regression were converted into a relative risk ratio (RRR), usually called prevalence ratio in cross-sectional studies (Barros & Hirakata, 2003; Tamhane, Westfall, Burkholder, & Cutter, 2016; Rutaremwa et al.).

The choice of MLR in this study follows the suggestions of Starkweather and Moske (2011). According to the author, MLR helps explain relationships or predictions using a categorical dependent variable with three or more levels and several predictor variables. The independent (predictor/explanatory) variables can be continuous or categorical. Age and income of UCC students were the only continuous variables in the model. As a result, all the other socio-demographic variables were treated as binary values 0 and 1. The categorical dependent variables (level of PCH awareness) were also converted to binary values like 1,0,0 for level-1 against 0,1,0 for level-2 and 0,0,1 for level-3 (Peng et al., 2002). One level of each categorical variable was dropped to avoid the dummy variable collinearity trap (Angrist, 2001; Statacorp, 2011). Subsequently, the levels dropped were used as the base or reference categories for the estimated β_i. There was no beta (β_i) estimates for such reference levels of the variables.

Unlike Ordinary Least Square (OLS) regression and Maximum Likelihood Estimation methods like MLR relaxes assumptions of normality and linearity of the dependent variable (Starkweather & Moske, 2011). However, assumptions about homogeneity or random error are still valid. When these assumptions are not addressed, it becomes problematic when the beta (β_i) is used for prediction (Greene & Hensher, 2007; Haan & Uhlendorff, 2006; Harding & Hausman, 2007; Hartzel, Agresti, & Caffo, 2001).

The homogeneity (homoscedasticity) assumption prescribes that random error (ε) of the data is constant(ε=0) across both the dependent (y_i) and the independent (x_i) variables (Archer & Lemeshow, 2006; Haan & Uhlendorff, 2006; Harding & Hausman, 2007; Hartzel et al., 2001). In other words, all the ε_i must be; a) independent of x_i, y_i and identically distributed (iid) across the data (x_i, y_i). In other words, fulfilling the iid assumption of homogeneity in this present study was essential to make the beta (β_i) estimates efficient (good) predictors y_i. This was addressed in two ways: firstly, each respondent (student) was assumed to have an equal chance (probability) of having low, moderate or high PCH awareness during measurement of the variables. Secondly, the response for any given variable (x_i) was assumed to be identically distributed across the data. The absence of homogeneity means heterogeneity is usually a result of multicollinearity where two or more predictors are highly correlated and can lead to biased results or over-inflation in the standard errors (SE) and confident intervals (CI) of the β_i estimates (Daoud, 2017; Lavery, Achraya, Sivo, & Xu, 2019).

The current study dealt with multicollinearity in five ways: 1) The use of descriptive statistics like mean, median (computed as a proportion), standard deviation (SD), minimum (min) and maximum (max) to determine the dispersion of the data to identify outliers. See descriptive statistics of the model variables in tables 10 and 11 in Appendix G). The stepwise selection process was used to select the best possible set of variables (Tannous & Agho, 2017; Wekesa, Askew & Abuya, 2018). This involved both forward and backward selection of variables depending on how each variable performs individually in the model, using the McFadden pseudo R^2 as the criterion. 3) Use of STATA software permitted automatic removal of all variables, which created dummy traps. 4) Test of multiple correlations of the variables using the point-biserial correlation coefficient matrix (Böckenholt, 2001). The use of robust SE instead of the conventional SE since the robust SE produced more accurate SEs and CIs than the conventional ones. The STATA software made it possible to identify the robust SEs.

The overall goodness of fit of the MLR on PCH awareness was tested at three levels (level a, level b and level c). First, using a pseudo-log-likelihood value (2LogL) and the overall Wald-chi-square (χ^2) and its p-value, a significant χ^2 value indicated that the model was statistically significant or good (Archer & Lemeshow, 2006). The larger (>5) the 2LogL-χ^2 value, the better the model. Second, the use of the pseudo $\mathbf{R2}$ and Log-likelihood Ratio (LR) in STATA was performed. The McFadden pseudo $\mathbf{R2}$, for instance, was used to determine how much variation in the dependent variable, PCH awareness, could be explained by the model. This goodness-of-fit test was

repeated in SPSS to derive the Nagelkerke ^{R2}. Nagelkerke is an adjusted version of Cox & Snell ^{R2,} which indicates the amount of variance explained by the predictors (Bryman, 2012; Tolmie, Muijs, & McAteer, 2011). Nagelkerke R^2 adjusted the scale of statistics to cover less than full range, 0-1(100%), of variance in the data, which is a limitation of pseudo R^2 (Hu, Shao, & Palta, 2006). The explanatory power of the regression was measured using R-square (R^2). Third, the beta β_i efficient test was done to determine if the β_i was an efficient estimator of PCH awareness. The results of the MLR results were presented as a cross-tabulation table 3. Only the sign or direction (±) of β_i was important in this study. Thus, the estimated value of β_i was not reported in the table. The table showed the independent variables (x_i), Wald-chi-square (χ^2) statistic, Alpha value (p-value), relative risk ratio (RRR) with the sign or direction (±) of the β_i. Additionally, the robust standard error (SE) and confidence interval (CI) were shown in the table. Descriptive statistics of the independent variables (x_i) were also presented in the table. Reporting these test statistics was confirmed by Bewick, Cheek, and Ball (2005) as appropriate when determining the predictors or the causal relationship of group membership. The Wald-statistic tested the significance level of the β_i estimates at an alpha (p) value of ≤ 5% or p-value ≤ 0.05 (Bryman, 2012).

Research Question Five: What Factors Influence Students' Attitudes towards PCH promotion?

This research question explored the association between the dependent variable (perceived attitude of UCC students towards PCH promotion) and a set of explanatory variables. The dependent variable was measured on a 4-

point Likert scale. However, based on Sullivan and Artino's (2013) suggestions, the dependent variable was collapsed into a dichotomous variable (1=positive attitudes or 0=negative attitudes). Using the maximum likelihood estimated procedure, a binary logistic regression (BLR) model was performed to determine the variables that significantly influenced a positive attitude towards PCH promotion.

The model was used to determine the association between selected socio-demographic characteristics (age, gender, income, employment status, relation status, college, faculty/school, department and programme) and attitudes towards PCH promotion. The model also evaluated PCH risk factors such as smoking, alcohol consumption, history of STI medical and medication use history. Other risk factors estimated in the model included adverse pregnancy and obstetric outcomes. The stepwise selection method and the best-subset approach were employed to select the model's best possible set of predictor variables (Tannous & Agho, 2017; Wekesa, Askew, & Abuya, 2018). Apart from the model's binary codes of the dependent variables, all the procedures and assumptions explained concerning the multinomial regression were followed.

The choice for BLR was based on recommendations of several experts, as indicated earlier (Bewick, Cheek, & Ball, 2005). The results of the BLR were presented in a cross-tabulation table format indicating the sign and direction of the beta (β), Wald statistics, Alpha value (p-value), Odds Ratio (OR), Robust SE and Confidence Interval (CI). Descriptive statistics of the explanatory variables and Biserial correlation matrix of binary logistic

variables are presented in Appendices G and H. Variance covariance correlation matrix of coefficients of multinomial logistic model for PCH Awareness is also presented Appendix I.

Research Question Six: How do UCC students describe strategies required to integrate PCH interventions into routine reproductive services at the UCC hospital?

Research question six explored UCC students' perceptions regarding how PCH interventions should be packed and delivered to students at the UCC hospital using inductive content analysis. Content analysis is "a research method for subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns" (Hsieh & Shannon, 2005, p. 1278). It employs orderly methods to transform a huge quantity of qualitative data into a well-structured and accurate summary of significant findings (Erlingsson & Brysiewicz, 2017). Similarly, "inductive approaches are intended to aid an understanding of the meaning in complex data by developing summary themes or categories from raw data" (Thomas, 2006, p. 3).

In the current study, qualitative analysis was done manually using the hands-on guide for content analysis. Suggestions of Erlingsson and Brysiewicz's (2017) specific steps recommended by Burnard, Gill, Stewart, Treasure, and Chadwick (2008) and Datt and Chetty (2016) were employed to augment data analysis procedures. First, the qualitative interviews were audio-taped and transcribed verbatim. Second, Transcripts were read several times by a pair of coders (the principal investigator and an experienced researcher)

independently to build a strong familiarity with the data. Each transcript was independently coded line by line by the two coders using a coding scheme to increase rigour. Qualitative content analysis procedures of Braun and Clarke (2006) and Graneheim and Ludman (2003) were employed during the coding process. Third, texts were broken down into smaller components referred to as meaning units and further reduced into condensed meaning units. Specific labels known as codes were given to exact descriptions of condensed meaning units. This was performed by highlighting and labelling relevant words, phrases, sentences or sections of the transcripts. Four similar and important codes were brought together as categories. The codes were grouped into different categories to depict diverse aspects of the data. Five subcategories were arranged into larger categories to identify key issues and underlying meanings or themes within the data. A theme was "an overall concept of an underlying meaning on a latent interpretative level" (Bengtsson, 2016, p. 12). Researcher triangulation (coding, analysis and interpretation of results) was done by two individuals (principal investigator and an experienced researcher (Korstjens & Moser, 2018). This was followed by a discussion on similarities, variations and agreement on emergent themes.

Data categorization and theme development were guided by the suggestions of Ryan and Bernard (2000) and Vaismoradi, Jones, Turunen, and Snelgrove (2016). Categories and the interrelationship among different categories represented the study's key findings. The study results were presented according to literal and underlying (latent) meanings derived from the analysis (Bengtsson, 2016; Erlingsson & Brysiewicz, 2017). Transcribed

interviews were organized and presented in tables according to meaning units, codes, categories and major themes. Finally, quotes representing typical views and significant statements expressed by respondents were extracted from the transcripts and presented in the results to illustrate the themes identified. Refer to table 3 for an example of the analysis process on students' perceived strategies for PCH integration.

Research Question Seven: How do healthcare professionals at the UCC hospital describe processes required to incorporate PCH interventions into routine reproductive health services?

The research question explored strategies and processes perceived by healthcare professionals for PCH integration into routine health services. Inductive content analysis of key informant interviews was done manually using steps proposed by Erlingsson and Brysiewicz (2017) and Graneheim and Ludman (2003). All steps and procedures described earlier for inductive content analysis (Burnard, et al., 2008; Erlingsson & Brysiewicz's, 2017, Datt & Shruti, 2016) and theme development was followed (Ryan & Bernard, 2000 & Vaismoradi et al., 2016). Refer to table 3 for the analysis process for HCPs' perceived strategies for PCH integration.

Table 1: Analysis Process for Students' Perceived Strategies for PCH Integration into Routine Health Services

Meaning Unit	Code	Sub-categories	Main Category	Major Theme
"They should make a loud noise about it, and they should send messages across using mass media platforms.	Sensitization	Awareness creation	PCH awareness and education	Interpersonal Behaviour Change Strategies
"…They can also use the shuttle to make an announcement or play audios on PCH."	Alerts on PCH	PCH Information dissemination		
	Mass media			
	Social media			
"Sometimes, a key holder a pen drives and fresher's welcoming tickets for socialization can help"	PCH souvenirs			
"I think celebrities and students should be made advocates so that they can help in educating other students through wearing of T-shirts."	Peer and celebrity advocacy	PCH Advocacy		
"…Most of the people involved in the education should be people in our age groups because we relate better with our peers than people who are older than us."	Peer education			

Source: Field Data, 2019

Analysis Process for Students' Perceived Strategies for PCH Integration Cont.

Meaning Units	Code	Sub-category	Main Category	Major Theme
"...There should be a day or a week set aside for such services. As students, we mostly focus on lectures, so if a day is set aside for such services, it will be easily accessible."	Student-friendly services Special clinics/desks Accessibility PCH Days	Health service changes	Institutional support	Institutional Policy Directives
"…They should also make the hospital accessible so that during lunchtime, you can pass by for such services."	Walk-in services Lunch break services Mobile clinics			
"…They should mount PCH services using containers or tent clinics where students can easily pass by for such services."	Integration into university curricula			
"PCH should be introduced in level 100, so it can be a course of study. It can be a liberal course like HIV, Communication skills or African studies."				
"…It should be part of our orientation in level 100. It will psych our minds…"	Sensitization			
"… If the school makes PCH services free, students will be willing to go for such services or because we pay school fees, it should be part of our fees so the university can later reimburse the hospital."	Free services Pre-paid services Reimbursement	University-wide PCH Promotion Strategies		

Source: Field Data, 2019

Analysis Process for Students' Perceived Strategies for PCH Integration Cont.

Meaning Units	Code	Sub-category	Main Category	Major Theme
"First of all, awareness creation, especially in our part of the world where talking about sex, becomes a major problem to the extent that we think that you are not well cultured, so we have to create that awareness."	Awareness creation	Public Awareness Campaigns	Supportive Macro-environment	Public Policy Interventions
"...We have government hospitals in every region, so they should take every week to educate people on the effect of these things."	Cultural acceptance	Societal re-orientation		
	Education on the benefits of PCH			
"I'm also thinking of adding voluntary counselling for young adults who are sexually active."	Voluntary counselling			
"…If a man and woman decide to marry, they should go for genetic counselling before pregnancy. If you're a guy and your partner have candidiasis, you should be bold enough to tell her sometimes; they don't know what is going on."	Spousal support			
"... They should incorporate PCH into NHIS…"	Insurance cover	PCH Policy		

Source: Field Data, 2019

Table 2: Analysis Process for Health Care Providers' Perceived Strategies for PCH integration into Routine Health Services

Meaning Units	Code	Sub-category	Main Category	Major Theme
"…we can even have a clinic in the hospital, say twice or once a week; say a Wednesday afternoon or Friday afternoon. If we have any such thing, there will be somebody sitting there to listen to you and advise you".	Student-friendly services	Student-centred services	Service organization Initiatives	Context-specific strategies
"...There should be a unit for that. They should not mix students with the other patients".				
"...We need to have a day and time for them, we can also have a place where there is someone always there to receive the students."	Priority services	Readily available services		
"…We can have a day dedicated for that purpose, let's say on a Friday afternoon. On that particular day, there will be a Doctor or Nurse available so that you can come in and just have a chat."	Special PCH days			
"...We may have to reach out more. For example, outreaches, public education".	Outreaches services	Community-based services	Levels of service delivery	**Integration at Multiple Levels of Care**
"...We have hall infirmaries and programmes being organized in the halls. At least they can choose a month in each semester, and a team of health professionals go there to inform them".	Hall infirmaries			
"...I think it is possible. This is because …the university is fortunate to have a student clinic which can be used for that purpose".	Students' Clinic	Students' clinic level		

Source: Field Data, 2019

Analysis Process for Health Care Providers' Perceived Strategies for PCH integration Cont.

Meaning Units	Code	Sub-category	Main Category	Major Theme
"...Dedicated service point for experts to deliver services to people within the category".	PCH Desks	Facility level services		
"…a youth corner where we have one consulting room basically for that not necessarily having a Doctor being there to do consulting but any health professional with that background can help".	Consultation			
	Antenatal clinic			
"...I think the RCH, ANC and maternity can provide PCH services. They provide counselling services".	Maternity ward			
	Counselling Unit			
It is an agenda that can be pursued by the hospital but championed by the RCH.				
"...The hospital counsellor at the OPD can also provide counselling."	RCH services			
	OPD services			
"... when they go to the RCH, and it demands screening, they will refer them here".	Case Referral	Inter and intra-facility Referrals system		
"…sometimes if they have problems, we refer them to the gynaecologist."	Client transfer			
	Specialist services			
"...So, a lot of units and professionals have to be involved…"	Teamwork	Intra-departmental collaboration	Integration of disciplines	Inter-professional Collaboration
"…Well, all those involved in maternal care, the O & G Team, then also the Public Health Unit. The public health unit will play a very important role, so it should be a collaboration between the public health and obstetrics and gynaecology team."	Collective responsibility			

Source: Field Data, 2019

Analysis Process for Health Care Providers' Perceived Strategies for PCH integration Cont.

Meaning Units	Code	Sub-category	Main Category	Major Theme
"…that is the way we want to go, let's involve the counselling session, then the public health people and other health-related programmes; medical school and school of nursing, allied health. You will get a lot of professionals interested in that programme. I think it is workable, and they will love it."	Partnership with other health professionals	Inter-department collaboration		
"...I mean integration kind of service. We can even have a clinic in the hospital, say twice or once a week; say a Wednesday afternoon, Friday afternoon we have this clinic".	Integration		Integrated services Dedicated Clinic Days	Integrated Care

Source: Field Data, 2019

CHAPTER FOUR

RESULTS AND DISCUSSIONS

This chapter presents results and discussions of a mixed-methods study that incorporated a cross-sectional survey of regular students of UCC and multiple case studies with healthcare professionals at the UCC hospital. The purposes of the study were to: (a) assess the level of awareness and perceived attitudes of UCC students on PCH related issues, (b) estimate the prevalence of PCH risk factors among students of UCC, (c) examine factors influencing students' PCH awareness and attitudes towards PCH promotion within the context of the university community, and (d) explore qualitatively the perceptions of students and healthcare professionals at the UCC hospital on how to integrate PCH interventions into existing reproductive health services. Data was analyzed using descriptive summary measures, logistic and multinomial regression analysis. The quantitative research initially targeted 1560 male and female students of the University of Cape Coast. However, thirteen questionnaires were excluded from the analysis due to incomplete responses. The overall response rate of the study was 99.2% (1547/1560).

Out of 1560 students, 1547 representing 99.2% (response rate) undergraduate and graduate students from four colleges returned completed questionnaire. Respondents comprised 23.6% (n = 365) students from the Faculty of Educational Foundation, 46.7% (n = 723) from Faculty of Social Sciences, 14.9% (n = 230) from School of Health and Allied Sciences and 14. 8% (n = 229) from School of Physical Sciences. Departmental distributions of respondents were as follows: Basic Education 40% (n = 147), Education and

Psychology 60% (n = 218), Geography and Regional Planning 15% (n =110), Sociology and Anthropology 85% (n= 613), Biomedical Sciences 63% (n = 146), Optometry 37% (n = 84), Computer Science and Information Technology 89% (n = 203) and Mathematics and Statistics 11% (n = 26). Age of respondents ranged from 15 to 45 years (M = 23, SD = 3.870) made up of 54.1% (n=837) males and 45.9% (n=710) females. A significant percent 93.0% (n= 1439) were single, 5.4% (n= 84) were married, only 0.6% (n = 9) respondent was divorced. About 44.6% (n=642) of the singles had sex partners (living with a partner). A large proportion 90.7% (n = 1404) were Christians, 8.3% (n = 128) were Muslims and the rest 1.0% (n=15) were of other beliefs.

Characteristics of Students Involved in the Focused Group Discussion

Age of respondents ranged from 18 to 40 years (M = 24. 3, SD = 6.0) made up of 54.5% (n = 30) males and 45.5% (n = 25) females. A significant number of 83.0% (n = 45.7) were single, 15.1% (n = 8.3) were married, only 1 (n = 1.9) respondent was divorced. A large proportion 87.3% (n = 48) were Christians, and the rest 12.7% (n = 7) were Muslims. Table 3. on page 148 illustrates the socio-demographic characteristics of students' samples for the focused group discussions (FGDs).

Table 3. Socio-Demographic Characteristic of Respondents involved in FGDs (n = 55)

Respondents Characteristics	f	%
Age		
18 to 21	21	38.2
22 to 25	23	41.8
26 to 29	1	1.8
30 to 33	3	5.5
34 to 37	3	5.5
38 to 41	4	7.3
Gender		
Male	30	54.5
Female	25	45.5
Level of University Education		
100	13	23.6
200	12	21.8
300	10	18.2
400	10	18.2
800	6	10.9
900	4	7.3
Marital Status		
Single	45.7	83.0
Marriage	8.3	15.1
Divorced	1	1.9
Religion		
Christian	48	87.3
Muslim	7	12.7
Name of College		
College of Educational Studies	16	29.1
Humanities and Legal Studies	11	20.0
College of Health and Allied Sciences	16	29.1
College of Agric and Natural Sciences	12	21.8

Source: Field Data, 2019

Characteristics of Health Care Professionals Involved in KIIs

In all, a total of 22 health care professionals with diverse backgrounds participated in the key informants' interviews. They comprised 54.5% nurses (n = 12), 9 % midwives (n = 2), 9% general medical practitioners (n = 2), 9% medical laboratory scientists (n = 2), 4.5% physician assistant/counselling psychologist (n =1), 4.5% counselling psychologist (n =1), 4.5% pharmacist (n = 1) and 4.5% anaesthetist (n =1). These 72.7% (n = 16) married men and women and 27.3% single men and women between the ages of 25 and 62. With respect to level of education, 4.5% (n =1) was a certificate holder, 22.7% 9 (n = 5) had diploma, 36.6% (n =8) bachelors' degrees and 36.6% (n = 8) masters degrees. Age of respondents ranged from 25 to 62 years (M = 38.59, SD = 10.13). Their years of work experience ranged from one year to 35 years (M = 12.23, SD = 9.30). The professional specialty areas of respondents include nursing, midwifery, pharmacy, counselling psychology, anaesthesia and medicine. Table 4. on page 150 presents a profile of health professionals recruited for key informants' interviews (KIIs).

Table 4. Profile of Healthcare Professionals (n=22)

Identity	Ward/Unit	Gender	Age	Marital Status	Religion	Qualification	Profession	Rank	Current Position	Current Position (Years)	Work Experience (Years)
R1	Maternity	Female	51	Married	Christian	Degree	Nursing	PNO	IC	8	27
R2	RCH	Female	35	Married	Christian	Diploma	Nursing	SCHN	Staff	1	6
R3	Student clinic	Male	37	Married	Christian	Masters	Nursing	PNO	Head	1	10
R4	A & E	Male	34	Married	Christian	Degree	Nursing	PNO	IC	6	7
R5	Student clinic	Male	62	Married	Christian	Masters	PA	CPA	Head	21	21
R6	RCH	Female	28	Married	Christian	Diploma	Nursing	SN	Staff	2	3
R7	Counselling Unit	Female	42	Married	Christian	Masters	Counsellor	PRA	Head	3	8
R8	OPD	Female	37	Married	Christian	Masters	Nursing	PNO	DNM	3	15
R9	OPD	Male	48	Married	Christian	Masters	Nursing	PNO	IC	12	19
R10	Surgical	Female	36	Married	Christian	Degree	Nursing	SNO	DIC	5	13
R11	A & E	Male	25	Single	Christian	Degree	Nursing	NO	Staff	2	2
R12	RCH	Female	27	Single	Islam	Certificate	Nursing	SN	Staff	1	1
R13	Lab Unit	Female	25	Single	Christian	Degree	MLS	ALS	Staff	1	1
R14	Lab Unit	Male	32	Single	Christian	Degree	MLS	SMLS	IC	9	10
R15	RCH	Female	56	Married	Christian	Degree	Nursing	SNO	Head	5	35
R16	Pharmacy	Male	36	Single	Christian	Masters	Pharmacist	SP	Staff	6	6
R17	ANC	Female	50	Married	Christian	Diploma	Nursing	PNO	IC	1	25
R18	Theatre	Male	49	Married	Christian	Masters	Anaesthetic	CA	IC	13	24
R19	OPD	Female	30	Married	Christian	Degree	MD	MO	Staff	5	5
R20	ANC	Female	35	Married	Christian	Diploma	Midwife	SNO	IC	9	9
R21	Maternity	Male	39	Married	Christian	Masters	MD	SMO	IC	6	13
R22	Paediatric	Female	35	Single	Christian	Diploma	Midwife	SNO	IC	4	9

Source: Field Data, 2019

Research Question One: What is the Level of Awareness of PCH Related Issues among Students of UCC?

This research question aimed to determine levels of awareness of PCH-related issues among UCC students. Awareness levels were assessed using a series of dichotomous response questions. Overall, the students demonstrated moderate to high awareness with an average score of 8.1 out of 12 points. Specifically, half (51%) of the respondents demonstrated high awareness by obtaining more than 75% of the PCH scores.

Overall, the majority of respondents (92%) answered questions posed to them on PCH awareness related questions correctly. Two in five (42%) scored between 50% and74% on moderate awareness. Only a few (8%) students were in the low awareness category (less than 50%). The mean score for students who demonstrated a high PCH awareness level was M = 9.5 with SD = 0.62. While the mean score for students in the moderate category was M= 7.3 with SD = 0.75, the mean score for those with low PCH awareness was M = 3.4 with SD = 1.39. Results also indicate that students' awareness of specific PCH issues differs, with composite scores ranging from 15% to 89%. Table 5 represents the composite scores of PCH awareness levels. The composite scores obtained on individual PCH items are presented in Appendix K.

Table 5: Composite Scores of PCH Awareness by Categories

Composite Score				
Score category	**Mean Score out of 12**	**Std. Dev.**	**f**	**%**
High	9.549	0.627	783	50.6
Moderate	7.320	0.745	643	41.6
Low	3.397	1.39	121	7.8
Total	**8.142**	**1.904**	**1547**	**100**

Source: Field Data, 2019

The present study revealed two things. First, the majority of students (92%) had moderate to high awareness of PCH-related issues. The result indicates that university students will adopt PCH promotion interventions in the near future due to their appreciation of its importance. The finding may be due to respondents' understanding of their questions. The finding concurs with a previous study conducted among undergraduate female students at the Minnesota State University indicating high knowledge of PCH-related issues (Paulsen, 2017).

Nonetheless, the result varies with several related studies (Corbett, 2011; Crusenberry, 2016; Delgado, 2008; Mananhar & Subedi, 2018). These studies reported low to moderate PCH awareness, with composite scores ranging from 50% to 64%. Also, the finding is inconsistent with a previous finding that PCH awareness levels are often low regardless of the sub-group of interest (Ayalew et al., 2017).

Second, the study found that although respondents' overall awareness of PCH related issues was moderate to high, they were deficient in awareness of pertinent PCH information and behaviours. For instance, Majority (85 %) were unaware that a female who has decided to start having children must schedule her first visit to the doctor before pregnancy occurs. Furthermore, awareness about preconception micronutrient supplementation was poor, and only (28 %) knew that a female should take vitamin supplementation before pregnancy. Another finding worth noting was that three in five students (62 %) disagreed that the father's age significantly determines pregnancy outcomes.

These findings may be attributable to the following reasons; respondents may be simply unaware of specific PCH information and behaviours since PCH services are not routinely provided as part of Ghana's current reproductive health services. It is also possible respondents are aware of PCH but have not been actively engaged in PCH related issues. Poor awareness of the effect of older paternal age on pregnancy outcomes may be attributable to the fact that fertility issues are generally seen as women's business. As a result, PCH and men's reproductive health are not often discussed in the general public and the health delivery system (Bodin et al., 2017). Similarities in the present and past findings may be explained by assertions that higher educational levels provide people with the critical thinking skills of individuals (Augustine et al., 2019). A possible explanation for the differences in PCH awareness levels is that the study population was large and diverse. (Age differences, marital status and past experiences of

those who had higher levels of awareness) Inconsistencies could also be due to contextual differences in access to PCH information and services (developed and developing world). In that, reproductive-aged individuals in settings with well-established PCH promotion services are more likely to be better informed about the PCH strategy. Thus, the low awareness rate on micronutrient supplementation reported in the current study is not surprising since vitamin and micronutrients are not a norm for non-pregnant women in the Ghanaian context (Pobee, Aguree, Colecraft, Gernand, & Murray-Kolb, 2020). The finding is also supported by findings of a recent systematic review that Africa has the lowest rate of pre-pregnancy folic supplementation in the world (Toivonen et al., 2018).

Generally, the findings of this study were in line with the conceptual framework guiding the study at the intrapersonal level and assumptions of other behaviour change theories. For instance, the findings tie well with the Precaution Adoption Process Model (PAPM) of Weinstein et al. (2011), which hypothesized that adopting a new behaviour requires purposeful steps, including awareness and engagement on the issues. The findings also resonate with the Health Belief Model (Rosenstock, 2005) that cues to action such as past personal experiences and environmental factors trigger the adoption of health-related behaviours. Moreover, the results align with the postulations of the information motivation behavioural skill (IMB) model that information is imperative to the performance of health behaviours (Fisher & Fisher, 2000). This theory posits that well-informed people are not automatically motivated to engage in PCH health promotion behaviours (Fisher & Fisher, 1992). The

consistencies of the current study and previous ones may be attributed to inconsistencies in the studies' research design and theoretical assumptions. Besides providing adequate PCH information and behavioural skills, the findings imply that it is important to confront intrapersonal and environmental barriers to PCH promotion.

It is worth noting that respondents in the current study have moderate to high awareness of PCH related issues. This finding implies that students are more likely to form opinions about the PCH strategy when engaged in PCH related issues. However, the study revealed that although the majority of the student had a general idea about PCH related issues, they were unaware of specific PCH interventions. A plausible reason is that students have not been engaged in PCH-related issues. The qualitative data confirmed this. A female student said, *"I didn't know anything about this until today, so they should educate students, so they will know what it entails"* A key informant said, *Students do not usually request PCH services.* Another one suggested, *"Let's empower them; it's all about empowering them so that they can take decisions for themselves"*. The results call for intensive PCH education on university campuses and other higher education institutions to increase students' awareness of specific PCH behaviours. For instance, the PCH promotion agenda may be initiated as part of orientation for fresh students or incorporate PCH issues into the university's curricula. This inference aligns with evidence that adequate awareness is the most important step in reducing PCH risks among reproductive-aged individuals (Delgado, 2008; Johnson et al., 2006). Moreover, healthcare providers must be sensitized to see every encounter with

university students as an opportunity to provide PCH education and counselling. It is also imperative to create a supportive environment where students will feel empowered to make decisions relating to PCH promotion.

Research Question Two: What is the Prevalence of PCH Risks Factors among Students of UCC?

This question sought to estimate the prevalence of PCH risk factors among students of UCC. PCH risk factor prevalence was assessed using dichotomous "yes" and "no" response options related to seven categories of PCH risk factors. These risk categories were based on the domains of PCH indicators for public health surveillance proposed by Robbins et al. (2014) and Robbins et al. (2018). The domains of PCH risk factors include general health status, lifestyle, behavioural and environmental risks, nutrition and physical activity, infectious and immunization risks, medical and medication history, reproductive and obstetric risks, family history/genetic risk factors. The descriptive statistical analysis was performed using frequencies and percentages to estimate the prevalence of risk factors (Aday et al., 2006; Pallant, 2005).

The results showed that 96% (n =1481) of students perceived their general health status as good. Only a few 4% (n = 66) reported poor general health status. The study revealed the prevalence of many lifestyles, behavioural and environmental preconception risk factors among respondents. Self-reported passive (second-hand) smoke exposure was quite high at 76% (n = 1181). Alcohol consumption prevalence was 55% (801) and 22% (n =320) among respondents and their partners, respectively. Three out of five 58% (n

= 895) respondents indicated radiation exposure. A good number of 60% (928) of students reported exposure to domestic and occupational chemical PCH risk factors. These include bleach, toilet bowl cleaner, gasoline, pesticides and rodenticides.

Students' nutritional status and dietary habits were also assessed in this study. The weight and height of every student were determined before questionnaire administration to estimate the Body Mass Index (BMI) of respondents. The BMI was assessed and classified according to the WHO criteria (WHO, 2018). A BMI of (≤18.50 kg/m^2) was considered underweight; normal weight was (18.50–24.99 kg/m^2); overweight (25.00–29.99 kg/m^2) and obesity was (≥30.00 kg/m^2). The study showed that 8% (n = 123) of respondents were underweight while less than half, 47% (n = 725), had BMI within the normal range. Prevalence estimates for students who were either overweight or obese were 25% (n = 387) and 20% (n= 307) respectively. Concerning dietary habits, a proportion of 46% (n = 709) of respondents reported ever experiencing eating disorders such as excessive eating. A significant proportion of respondents, 67% (n = 1061), do not take folic acid routinely.

The study also revealed that many infectious risk factors are prevalent among students. The history of ever having a sexually transmitted disease (STDs) was 25% (n = 392) and 6.6% (n = 102) respectively among respondents and their partners. Findings also highlighted the prevalence of medical and medication PCH risk factors among students. Seven in ten students, 74% (n = 1139), reported experiencing unhealthy stress due to their

academic pursuits. Furthermore, nearly, seven in ten 69% (n = 1071) students reported using over-the-counter medications.

With regard to the prevalence of reproductive and obstetric risk factors, the findings indicate that more than half, 54% (n = 829) of the entire study population did not have a reproductive life plan (RLP). The results show that 27% (n = 412) use abstinence to prevent unwanted pregnancies more than one out of four students. The prevalence of consistent contraceptive usage was 11% (n = 162). Students who indicated that they do not do anything (self and partner) to prevent pregnancy constitute 25% (n = 380) of the study population. The study further found that emergency contraception use prevalence was 24% (n = 371). Only 13% (n= 207) of the respondents reported consistent contraceptive usage by their partners. Table 6 below presents a descriptive summary of reported PCH risk factors. Note: only significant findings are presented.

Table 6. Prevalence of Preconception Risk Factors among Students of UCC

Preconception Risk Factors	f	%
Perceived General Health Status		
Good	1,481	95.7
Poor	66	4.3
Lifestyle/Behavioural Hazards		
Passive smoking		
Yes	1,181	76.3
No	366	23.7
Alcohol (self)		
Yes	696	55.0
No	851	45.0
Alcohol (Partner)		
Yes	340.3	22.0
No	1,206.7	78.0
Environmental Hazards		
Radiation (Self)		
Yes	895	57.9
No	652	42.1
Chemical		
Yes	1,064	57.9
No	483	31.2
Nutritional and Physical Activity		
Body Mass Index		
Underweight	123	8.0
Normal	725	47.0
Overweight	387	25.1
Obese	307	19.9
Eating Disorder (Excessive)		
Yes	709	45.8
No	838	54.2
Folic Acid Supplements		
Yes	486	31.4
No	1,061	68.6

Source: Field Data, 2019.

Prevalence of Preconception Risk Factors among Students of UCC Cont.

Preconception Risk Factors	f	%
Infectious Disease Risk Factors		
Sexually Transmitted Disease (Self)		
Yes	392	25.3
No	1155	74.7
Sexually Transmitted Disease (Partner)		
Yes	102	6.6
No	1445	93.4
Medical and Medication History		
Academic Related Stress/General Mental Distress		
Yes	1139	73.6
No	408	26.4
Over-The-Counter Medication		
Yes	1071	69.2
No	476	30.8
Reproductive Risks		
Reproductive Life Plan		
Yes	718	46.4
No	829	53.6
Contraception		
Abstinence	412	26.6
Consistent Birth Control Method (Self)	162	10.5
Emergency Contraception	371	24.0
Consistent Birth Control Method (Partner)	207	13.4
No Contraception (Both Self and Partner)	380	24.6
Not Applicable (I am trying to get pregnant)	15	1.00

Source: Field Data, 2019

The finding suggests that an overwhelming majority of students perceived their general health status as good, and only a few reported poor general health statuses. Students' high self-rated health value suggests a low prevalence of chronic diseases among the study population. This finding was anticipated since a significant proportion (98%) of the study sample was below 35 years of age. Moreover, most respondents were young adults in the prime of life and were not saddled with degenerative health conditions. The result is consistent with what has been found in previous studies that younger individuals tend to report better self-perceived health status compared to their older counterparts (Glanz & Rimer, 1995). These studies found that the tendency to report lower health status ratings increases after 45 years of age. The result also confirmed findings that a higher educational level is associated with higher ratings of health status among respondents (Robbins et al., 2018).

Although the result demonstrates that a significant proportion of respondents (96%) are in optimal health, the prevalence of self-rated poor health of 4% indicates that many students are in poor health. The finding implies that many respondents live with at least one medical condition associated with poor MCH outcomes. Thus, it supports proponents of the Life Course Theory (LCT) that disparities in MCH outcomes are consequences of inequalities in health across different stages of life (Kotekchuck et al., 2009; Lu, 2008).

There is evidence that pre-existing medical conditions are major risk factors to poor MCH outcomes (Mason et al., 2014; Robledo et al., 2015; WHO, 2013). The result, therefore, underlines the need to improve access to

PCH intervention among respondents. An example of such intervention could be periodic health screening for university students' patterns and prevalence of health conditions. This intervention will guarantee an early diagnosis of existing medical conditions likely to exacerbate future pregnancy outcomes. The study also highlights the importance of initiating appropriate PCH strategies, particularly among respondents, to advance the early detection of risk factors for adverse MCH outcomes. Additionally, stakeholders in reproductive health must consider reproductive-age men and women in higher institutions of learning as a priority sub-group for routine PCH screening and education. The study suggests the need for future research to explore predictors of self-rated health status.

The study further revealed the prevalence of several lifestyles, behavioural and environmental preconception risk factors prevalent among university students. First, the study demonstrates that the prevalence of passive (second-hand) smoke exposure was 76%. This finding means that most university students are exposed to high second-hand pre-conception tobacco smoke levels. Compared to the general population in Ghana, self-reported exposure to environmental smoke in the current study were considerably higher than the 4% overall current smoking prevalence reported for both men and women in the general population (Owusu-Dabo et al., 2009). The results also correlate with findings of past studies that tobacco smoke persists as an avoidable risk factor globally (Al-Qahtani, 2017; Nketia-Amponsah et al., 2018). Similarities in the prevalence of second-smoke exposure may be

attributed to the inability of the government to enforce anti-public smoking legislations and Byelaws on bushfires across the countries of the world.

Research indicates that smoking in any form is a major public health problem due to its associated consequences on public health (Owusu-Dabo et al., 2009). For instance, paternal cigarette smoking is said to be associated with not only injury to the deoxyribonucleic acid (DNA) of the sperms but also has a direct impact on the health of female partners due to second-hand smoke exposure (Frey et al., 2008; Floyd, Johnson, Owens, Verbiest, Moore, & Boyle, 2013; Milne et al., 2012). Tobacco smoke exposure is also associated with adverse outcomes for both mothers and their unborn babies (Lange et al., 2018). The finding draws attention to the importance of early detection of risk factors that operate across the life course following suggestions of the LCT (Kuh & Ben-Shlome, 1997). The result underscores the importance of implementing risk reduction and preventive strategies for students and the general public. Aside from providing adequate information on the effects of second-hand smoke on health and reproductive outcomes, it is also imperative to enforce legislation on public smoking.

Second, the study revealed an overall alcohol consumption prevalence of 55%, suggesting that self-reported alcohol consumption prevalence is much higher than rates reported for their partners. Environmental and cultural influences may be a possible reason for the observed alcohol consumption pattern. Again, Autonomy in personal decision-making and independence from parental control may explain the prevalence of alcohol consumption observed among respondents in the current study. This finding resonates with

research that overindulgence in alcohol is an integral part of university life (Anderson, Ebrahim, Floyd, & Atrash, 2016). The results are also aligned with studies conducted among university students (Dovoren et al., 2015). These studies found that alcohol consumption at unsafe levels is a norm among university students. The alcohol consumption prevalence in the present study is somewhat higher than what was reported by Robbins et al. in 2014, where nearly half (49.6%) of women of childbearing age within the ages of 18 and 24 reported alcohol consumption before conception.

Furthermore, this prevalence rate was strikingly higher than the 26% found by a related study conducted among students in Ghana (Oti, 2016). A possible reason for the differences in alcohol consumption estimates is that past studies were conducted among young adults in the general population compared to university students in the present study. The result supports the prediction of the model guiding this study that intrapersonal risk factors associated with poor MCH outcomes are prevalent among UCC students.

Alcohol is a recognized teratogen associated with several fetal and maternal complications (Stanton et al., 2016). Earlier research has found that pre-pregnancy alcohol use is associated with a 30% increase in spontaneous abortion among reproductive-age women (Lassi et al., 2014). Alcohol use leads to several risk behaviours associated with poor pregnancy outcomes (Poulin & Graham, 2001). These include intimate partner violence, unwanted sex, unplanned pregnancies, abortions, and related complications. The result calls for urgent implementation of alcohol preventive interventions by the Directorate of University Health Services (DUHS) to curb alcohol use and its

potential impact on reproductive outcomes. For instance, a multidisciplinary team of University Hospital, the Counselling Center, and other health-related units can be instituted to provide comprehensive alcohol prevention programmes on campus. Additionally, there should be periodic alcohol abuse prevention initiatives emphasizing the adverse effects of alcohol among male and female university students to minimize opportunities for excessive alcohol consumption. Also, the University authority can regulate the selling of alcohol in and around campus.

Another important finding was that most students are exposed to a range of household and hazardous environmental teratogens detrimental to reproductive health. Three out of five (58%) respondents agreed "exposure to radiations". Again, a good number (60%) reported "exposure to both domestic and occupational chemical substances". Respondents reported exposure to domestic chemicals such as bleach, toilet bowl cleaner, gasoline, pesticides and rodenticides. A possible explanation for the estimates in this research might be the unavoidable exposure to diagnostic x-rays and the daily use of chemicals among respondents. On the one hand, the result varies from a related study that reported exposure to environmental risk factors to be less frequent among individuals with university education (Lassi et al., 2014).

Conversely, the results correlate with many case-control studies demonstrating the prevalence of a wide range of residential and work-related exposure to chemicals among individuals of childbearing age (Meinert et al., 1996; Meinert et al., 2000). A possible explanation for similarities between the present and past studies is evidence that individuals of childbearing age are

exposed to hazardous chemicals regularly (van Maele-Fabry, Gamet-Payrastre, & Lison, 2019). This is also in line is with the constructs of the SEM and SCT, suggesting the existence of reciprocal causation and interaction between people and their social contexts (Bandura, 2000; McLeoy et al., 1988).

The present study's findings are worrisome as the evidence demonstrates that exposure to ionizing radiation has adverse effects on both males and females (Ladner, 1991; Lassi et al., 2014). These effects comprised miscarriages, congenital anomalies and infertility. Related studies found preconception paternal exposure to x-ray linked with several other adverse outcomes like low birth weight, fetal growth retardation, stillbirth and childhood cancers (Dean et al., 2014; Meiner et al., 1999). Furthermore, household products used daily have been reported to be potential carcinogens that negatively impact MCH outcomes (Sutton et al., 2012).

The findings call for awareness creation on the dangers of preconception exposure and education on the effects of radiation exposure among university students. A plausible strategy for improving awareness could be incorporating a course on preconception environmental toxins into university curricula, especially at the undergraduate level. Additionally, all individuals of childbearing should be provided with detailed information by health professionals, especially those involved in radiographic diagnostic investigations on safe levels of radiation exposure any time a client visits their facility.

In general, the study revealed that the BMI of more than half (53%) of university students was outside the WHO recommended range. Specifically, 8% of respondents were underweight, while 25% and 20% were overweight or obese. The results suggest that many respondents were prone to nutrition-related risk factors, which can potentially influence their future reproductive outcomes. For instance, undernutrition is a major risk factor associated with maternal deaths (Black et al., 2013). These findings may be attributed to literature that poor nutrition persists as a significant challenge among individuals of childbearing age (Dean et al., 2014; Silvestris et al., 2018). Pre-pregnancy BMI outside the recommended range poses a major risk, particularly to women within reproductive ages (Dean et al., 2013; Dean et al., 2014).

The results reflect previous findings that found undernutrition and obesity emerging as a twofold burden among women of childbearing age (Dean et al., 2014). Reproductive health experts explained that obese, overweight or underweight women tend to have irregularities in ovulation and menstrual cycles, resulting in difficulties in becoming pregnant (Practice Committee of the American Society for Reproductive Medicine, 2015). This finding is disturbing, as between 40 and 50% of pregnancies across the globe are unintended or mistimed (Sedgh, Singh, & Hussain, 2014). Past studies also demonstrate that preconception BMI is associated with infertility in women and men (Panth et al., 2018; Silvestris et al.).

Moreover, the study demonstrates that the prevalence of eating disorders and risk factors for nutritional deficiencies is considerably high compared to the general population. "Ever experiencing eating disorders" ranked highest (46%), followed by self-induced and dietary restrictions prescribed by a doctor. This result indicates that the prevalence of eating disorders is relatively high among the respondents. European studies have estimated the lifetime prevalence of eating disorders among adult women to be only 6% (Hudson et al., 2007; Keski-Rahkonen & Mustenlin, 2016). Similarly, eating disorder estimates were relatively lower (9%) for the general population in Australia, with about 15% of women reported experiencing the phenomenon at some point in their lifetime (Dobson et al., 2015). A probable reason for the high prevalence of eating disorders in the current study may be that most students were young adults predisposed to developmental problems. These findings tie well with the LCT that MCH services must be expanded and delivered as a continuum of care to mitigate risk factors associated with critical periods of the life span (Pies & Kotekchuck 2014; Lu, 2008).

Research indicates that the pre-pregnancy nutritional status of individuals has a major impact on the growth, development and long-term health of their future children (Barker et al., 2018). Hence, the findings point to the need to design and implement preconception nutritional interventions to bridge the PCH promotion gap in current reproductive health services. Integration of preconception nutritional services into routine reproductive health care may provide a platform to address both eating disorders and weight problems prevalent among respondents. In particular, there must be an

education on the importance of adequate nutrition and weight reduction before pregnancy. Respondents should be encouraged to enroll on keep fit clubs on campus to maintain or achieve healthy weights to improve their future MCH outcomes.

Another finding worth noting was that only 31% of respondents take folic acid routinely, indicating that many respondents were unaware of the importance of pre-pregnancy micronutrient supplementation. A related study by Gund et al. (2016) found considerably higher non-folic acid use estimates (99.7%) among women planning a pregnancy. Other studies reported relatively higher folic acid use of between 38.3% and 56% among pregnant women on their first antenatal visit (Calloway et al., 2009; Kassa et al., 2019). However, the estimates found in the present study are comparable to Nilsen et al. (2014) in a study conducted among Norwegian women.

Further, folic acid supplementation in the current study was lower than estimates reported by an Australian longitudinal study in which 63% of women reported taking dietary supplements before pregnancy (McKenna, Hure, Perkins, & Gresham). In Ethiopia, Gebre, Mulugeta, and Etana (2015) found that folic acid supplementation is 37.2% among pregnant women. The finding partly resonates with findings of a recent meta-analysis involving 34 countries that the prevalence of pre-pregnancy use differs worldwide, with Africa having a prevalence of 0% (Toivonena et al., 2018). A possible explanation for the disparities in folic acid supplementation might be differences in the study population (women planning for pregnancy and

pregnant women). Again, the disparities may be due to differences in pre-pregnancy micronutrient supplementation culture.

These findings are in accordance with the postulations of the IMB model that information is essential to the enactment of health promotion behaviours (Fisher & Fisher, 2000). The finding highlights the need for sensitization on micronutrient supplementation among all individuals of childbearing age. Research indicates that pre-pregnancy micronutrient is critical for the intrauterine environment in early pregnancy for the entire successful gestational period (Marangoni et al., 2016). In addition, the Girls Iron Folic Acid Table Supplementation (GIFTS) programme currently being implemented in Ghana should be extended to include female university students.

In that, 25% and 6.6% of respondents and their partners reported a history of STIs, suggesting that university students are susceptible to sexual risk behaviours. This finding may be due to the prevalence of sexual risk behaviours among students. Another plausible explanation is the deficiency in awareness of specific information and behaviours on safeguarding their PCH. The study is consistent with what has been found in previous studies that university students, in particular, are susceptible to several PCH risk factors (Sabarre, Khan, Whitten, Remes, & Phillips, 2013; Santos, Ferreira, Duarte, & Ferreira, 2018).

The findings align with the LCT that MCH services must be expanded and to include PCH intervention services to mitigate risk factors associated with critical periods of the life span (Kotekchuck et al., 2009; Lu, 2008).

Applicability of findings with assumptions of the LCT in our context could be due to similarities in the distribution and trends of PCH risk factors among people of reproductive age. The findings underscore the importance of tailoring PCH awareness strategies according to the needs of university students to equip them with the knowledge and competencies required to make informed decisions regarding PCH. The results also highlight the need to design innovative strategies to improve students' lifestyles and the provision of PCH services at the UCC hospital. Moreover, it is imperative to address other contextual factors within the university community to create a supportive environment where students will feel empowered to decide on PCH promotion.

With regard to the prevalence of medical and medication PCH risk factors, the finding was two-fold. First, more than 70% of the respondents reported ever experiencing unhealthy stress. Second, nearly 70% of the students said they use over-the-counter medications. These findings may be attributable to the demands and stressors of academic life. Another probable reason may be the tendency for self-medication in our part of the world. These findings are broadly in line with previous research showing that multiple risk factors for poor pregnancy outcomes are prevalent among reproductive-aged individuals before pregnancy (Althabe et al., 2015; Msemo et al., 2018; Stephenson et al., 2018; Hosli et al., 2008). Estimates for over-the-counter medication use was relatively high compared to a study that reported that 3% of women in their childbearing ages took over the counter medications known to be teratogens (Althabe et al., 2015). The prevalence of over-the-counter

medication use in the present study was also significantly higher than the 47% reported among couples contemplating pregnancy in the Netherlands (Hosli et al.). The study confirms research that a significant proportion of non-pregnant individuals are exposed to medications known to be dangerous to developing babies before pregnancy occurs (Hosli et al.). The present and past research differences could be due to differences in the characteristics of the study population (unmarried students compared to women contemplating pregnancy). Individuals considering pregnancy are more likely to reduce medication use than students with no pregnancy intentions. The study population of past studies elsewhere may be better informed on the implications of medication use due to exposure to PCH information.

Overall, the findings were in accordance with propositions of the SEM that health promotion interventions should be geared towards changing individual factors and environmental factors that impact health behaviours (McLeoy et al., 1988). Study designs and possible operational definitions of concepts are consistent across the present and past studies. The findings highlight the importance of educational campaigns on the safe use of medications before pregnancy among respondents. Specific PCH medication risk prevention strategies should include education on the adverse effects of prescription and over-the-counter medications. Additionally, periodic medication screening and counselling services could be provided to respondents. This intervention will ensure that potentially dangerous medications are avoided during the pre-pregnancy period or discontinued during pregnancy (Seshadri, Oakeshott, Nelson-Piercy, & Chappell, 2012).

The present study's findings may serve as a framework for discussions on medication use among all men and women of reproductive age in Ghana.

Furthermore, the study revealed the prevalence of reproductive and obstetric PCH risk factors among respondents. The findings showed that 54% of university students do not have a reproductive life plan (RLP). This finding implies that more than half of the student population was predisposed to unintended pregnancies. This previous supported research that between 40 to 50 per cent of all pregnancies are unintended (Kallner & Danielson, 2018). The prevalence estimate observed in the present study was lower than the 83% reported by Goossen et al. (2018) for reproductive-aged women in Belgium. Several factors may explain differences in the RLP prevalence. The first is a lack of awareness of RLP and its importance among the study population. Another possible explanation might be the lack of information and access to routine RLP services in Ghana.

Research indicates that RLP improves health outcomes by encouraging men and women of childbearing age to reflect on their reproductive intentions and family planning and interventions that prevent unplanned pregnancies (Malnory & Johnson, 2011; Steel et al., 2015; Tyden et al., 2016). This finding is critical, given that many women do not realize they are pregnant early enough to initiate the necessary lifestyle changes necessary to reduce poor pregnancy outcomes (Dean et al., 2014; Robbin et al., 2018). Research showed that several women tend to use induced abortion as a strategy for reproductive planning after an unwanted pregnancy has occurred (Delbaere & Stern, 2020). The study points to the importance of integrating RLP into

counselling services at the students' clinic and other reproductive services available at the UCC hospital. This intervention will curb the incidence of unplanned pregnancies and unsafe abortions among university students. In addition, reproductive healthcare professionals must take advantage of every encounter with students to introduce them to the concept of RLP.

Moreover, the present study's findings revealed that the prevalence of contraceptive usage was low compared to other studies. The prevalence of consistent contraceptive use was 11% among respondents. One in four (25%) reported not currently using any contraceptive method. Similarly, the prevalence of emergency contraception use was 24%. The prevalence of effective contraceptive use among respondents' partners was low at 13%. Overall, 25% of respondents reported non-contraceptive use by themselves and their partners. These findings may be attributed to inadequate knowledge about contraceptives and accessibility to family planning services. The prevalence of consistent contraceptive use in the present study was relatively low compared to estimates reported by Grindlay et al. (2018) in a related study conducted in Ghana. This study showed that the overall contraceptive use prevalence was 44% in the general population. The 2014 GDHS also reported a relatively higher prevalence of contraceptive use of 45% among sexually active unmarried women aged 15-49 years.

The estimate for the nonuse of contraceptive methods by respondents in the present study is consistent with a recent Demographic and Health survey that 41% of women in need of contraceptives do not use any contraceptive method to prevent pregnancy (Moreira, Ewerling, Barros, & Silveira, 2019).

Furthermore, estimates observed in the present study were lower than the 70% Luchters et al. (2016) reported among women of childbearing age in Australia. However, emergency contraceptive use prevalence reported in the present study was similar to results obtained by Gbagbo and Nkrumah (2019) in a study among female university students. Differences in the present and past research could be attributable to differences in the characteristics of populations studied (several unmarried university students as opposed to married individuals in the general population). Another likely reason is differences in the contraception prevalence could be poor accessibility to family planning services.

The findings support arguments of the LCT that reproductive health services must be extended to include PCH interventions (Kotekchuck et al., 2009; Lu, 2008). According to these theorists, MCH services need to be delivered seamlessly across all critical stages of life to enhance the early identification and mitigation of risk factors associated with poor MCH outcomes. A plausible explanation of consistencies in the present and past research may be due to similarities in theoretical underpinnings and strategies guiding data collection and analysis. Overall, the findings reveal that university students have an unmet need for contraception. This finding suggests that sexually active respondents are predisposed to PCH risk factors such as unintended pregnancy, mistimed pregnancy and abortions and their associated complications.

The study's findings further revealed the prevalence of multiple risk factors for poor pregnancy outcomes among students. The study emphasizes

the need to bridge the PCH promotion gap to generate interest in pre-pregnancy lifestyle modifications and demand for family planning services through education on the PCH promotion agenda. It is also imperative for all stakeholders in the university to create a supportive environment that guarantees demand and access to family planning services among respondents. The findings align with the concerns of respondents in the qualitative data. A key informant indicates, *"I think people do not have knowledge of such services, but if awareness is created that there is something like preconception care, people will come"* A respondent in the FGDs said, "*We need more education on PCH because if you're not aware of the risk factors, you can't do anything".*

Research Question Three: What is the Perceived Attitude of Students of UCC towards PCH Promotion?

This research question was aimed at assessing the perceived attitude of students of UCC towards PCH promotion. The perceived attitude was measured on a four-point Likert scale and dichotomized into "positive" and "negative" attitudes at the analysis point. Students expressed perceived attitudes towards PCH promotion on three items for self and partners/spouses. Overall, 46% (n = 715) of the students expressed a positive attitude towards PCH promotion. More than half, 54% (n =832) of the students had a negative attitude towards PCH promotion. Table 7 shows a descriptive summary of respondents' perceived attitudes towards PCH promotion.

Table 7: Perceived Attitudes towards PCH Promotion

Perceived Attitudes	f	%
Positive	715	46.2
Negative	832	53.8
Total	**1547**	**100**

Source: Field Data, 2019

From the findings, it is clear that students who had negative attitudes towards PCH promotion were significantly higher than those with positive attitudes. A plausible explanation for this finding could be that respondents may be deficient in knowledge about the influence of PCH promotion on MCH outcomes. Another explanation could be that knowledge about PCH promotion was not strong enough to be translated into PCH attitudes. The finding is inconsistent with previous studies demonstrating that university students have positive attitudes towards preconception health care (Crusenberry, 2016; Corbett, 2011; Paulsen, 2017; Sese, 2013). The finding was also dissimilar with past findings that reproductive-aged individuals usually have a positive attitude towards preconception health care (Ahmed et al., 2015; Coonrod et al., 2009; Delissaint & Mckyer, 2011; van der Zee, 2012).

Past research found a relationship between attitudes and health behaviour (Steel & Adams, 2015). In particular, Albrecht and Carpenter (1976) and Ogden, Karim, Choudry, and Brown (2007) found attitude as the first predictor of behavioural intention. Attitudes can translate into actual behaviour (Ajzen & Fishbein, 1980: Albrecht & Carpenter, Ogen, et al.).

However, approximately half of the students had negative attitudes towards PCH promotion in this study. Although students were aware of the importance of promoting healthy status prior to conception, they did not perceive PCH promotion as a necessary intervention. Variability in attitudes could be due to differences in settings, lack of PCH awareness, and PCH promotion interventions in our context. Another possible explanation is the lack of policy regarding the routine delivery of PCH interventions. Some of these concerns were highlighted in the qualitative findings. One key informant said, *"I'm not too sure if the Ghana Health Service has a policy, but if there is, we haven't adopted it, but as a university, we can have a policy,"* Another health professional said, *"We need something to guide us. As I told you, we don't have a protocol available. A protocol would make it easier.*

This finding highlights the need to bridge the PCH promotion gap in our settings. Translation of international guidelines and recommendations on PCH promotion into clinical practice across settings would have influenced the findings. The finding supports the theoretical assumptions of that present study that individuals with perceived negative attitudes do not support the PCH promotion agenda. Hence, they may not have intentions to engage in PCH interventions. The finding calls for intensive education on PCH among respondents to improve uptake of PCH promotion programmes. Students also need to be involved by health promotion practitioners on the importance of PCH promotion to MCH outcomes. Moreover, these interventions must be supported by a supportive environmental change to promote positive attitudes among the target population.

Another important finding was that a positive attitude towards PCH promotion does not predict PCH behavioural intentions. For instance, most (86%) agreed that getting preconception health counselling can help them maintain or achieve optimal general and reproductive health. Similarly, a significant number (75%) of students expressed confidence that they can change their lifestyle and practice key preconception behaviours even if they are not ready for pregnancy. Nonetheless, only 33% indicated that they have intentions to use PCH intervention in the near future. Several factors may explain possible discrepancies between the current and previous studies. First, the result may be explained by the lack of public sensitization and a well-established PCH promotion strategy as a component of the existing health system in Ghana. Second, age difference, pregnancy intentions, marital status and obstetric history of the study population (most students were young, unmarried, non-pregnancy) planners with few or no experiences in adverse MCH outcomes. The finding agrees with previous findings that a positive attitude towards PCH care does not necessarily translate into PCH behavioural intentions (Delissaint & Mckyer, 2011; van der Zee, 2012). These studies found that even though respondents had positive attitudes toward the PCH concept, they did not see themselves as targets for PCH interventions.

Past studies demonstrate that PCH attitudes scores vary among non-pregnant women and mothers (Chuang, Velott, & Weisman, 2010; Kassa et al., 2019). Women contemplating pregnancy in the near future seem to have different attitudes towards PCH than those without pregnancy intentions (Squiers, et al., 2013; Squiers, et al., 2014). This finding is directly linked with

theoretical propositions that people assign a personal interpretation to an attitude when that attitude seems significant to self-interest, values and subjective norms (Howe & Krosnick, 2017). This finding is worth mentioning as negative attitudes may constitute a key obstacle to PCH promotion among university students. This finding indicates the importance of audiences' segmentation according to unique characteristics to communicate PCH interventions' relevance to all students.

PCH campaigns on campus may raise awareness of the significance of the PCH strategy and facilitate a supportive context for PCH promotion. Moreover, it is essential to explore intra and extra-personal factors associated with the PCH attitude-behavioural intention gap before implementing PCH promotion initiatives. The finding also calls for a reorientation of reproductive health services to include PCH strategies as part of the existing health system in Ghana.

Research Question Four: What Socio-Demographic Factors Predict PCH Awareness of Students of UCC?

The purpose of research question four was to assess socio-demographic predictors of PCH awareness levels of UCC students. An MLR was performed to explore the association between high or moderate PCH awareness (as a response) and a set of predictor variables. This comprised age, sex, ethnicity, religion, level of university education, employment status, income, and faculty/school of students. The coefficients of the multinomial regression were interpreted into relative risk ratio (RRR), a measure of the likelihood of a factor to predict another factor (Rutaremwa et al., 2015), for

each of the independent variables excluding the reference categories. The results in Table 8 revealed that the overall MLR model was statistically significant (-2LogL = 1366.6, X^2 = 75.20, P = 0.000), with Nagelkerke R^2 (0.0281) explaining 2.8% of the variance of high or moderate level of PCH awareness among the students. This percentage contribution of the independent variables to the entire model means the whole model can significantly predict high and moderate levels of PCH awareness in reference to low PCH awareness levels.

Overall, statistically significant variations were found in the dependent variables (high and moderate PCH awareness) relative to variations in four socio-demographic factors, including ethnicity, religion, income, and students' faculty. Holding all other things constant, Ewe students were less likely to have high PCH awareness (RRR = 0.40, 95% CI = 0.21-0.79, P =0.008), and moderate (RRR = 0.44, 95% CI = 0.23-0.86, P =0.016) compared to students of other ethnic groups ("Ga/Dangme, Guan, Grusi, Guma, and Mole-Dagbani").

Students affiliated with the Christian religion were more likely to have high PCH awareness than all other religions (RRR = 6.21, 95% CI = 2.94-46.77, P = 0.003). They were also 12 times more likely to have moderate PCH awareness than students affiliated with other religions (RRR = 11.73, 95% CI = 1.89-20.38, P = 0.000). Similarly, Muslim students were more likely to be associated with a moderate level of PCH awareness than students of all other religions (RRR= 6.33, 95% CI = 1.49-26.90, P = 0.012). Moreover, the result showed no difference in a percentage change in the average monthly

income/remittance of Gh¢ 362.18 compared to all incomes/remittance categories and the likelihood of having high PCH awareness (RRR = 1.00, 95% CI = 0.99 - 0.99, *P* = 0.030). Students in the Faculty of Social Science were less likely (RRR = 0.42, 95% CI = 0.21 - 0.80, *P* = 0.009) to have high PCH awareness than students in the School of Allied Health Science.

No statistically significant variations were observed in the likelihood of high PCH awareness as a result of some socio-demographic factors such as age (RRR = 1.04, 95% CI = 0.97 - 1.12, *P* = 0.285), gender (RRR = 0.781, 95% CI = 0.51 - 1.19, *P* = 0.254) and being single (RRR = 1.270, 95% CI = 0.85 - 1.90, *P* = 0.243). Similarly, age (RRR = 1.018, 95% CI = 0.95 - 1.10, *P* = 0.630), gender (RRR = 0.808, 95% CI = 0.53 - 1.24, *P* = 0.327) and being single (RRR = 1.123, 95% CI = 0.75 - 1.68, *P* = 0.575) did not produce statistically significant results with moderate PCH awareness. Furthermore, being an Akan (RRR = 0.578, 95% CI = 0.32 - 1.06, *P* = 0.076), a Muslim (RRR = 2.223, 95% CI = 0.63-7.90, *P* = 0.217), a Bachelors student (RRR = 0.342, 95% CI = 0.07 - 1.77, *P* = 0.201), or being employed (RRR = 1.691, 95% CI = 0.73-3.88, *P* = 0.215) did not determine one's likelihood of high PCH awareness. The analysis also showed no statistically significant variations in the likelihood of moderate PCH awareness and being an "Akan" student (RRR = 0.632, 95% CI = 0.34 - 1.16, *P* = 0.140), being a Bachelors student (RRR = 0.399, 95% CI = 0.08 - 2.07, *P* = 0.275), being employed (RRR = 1.474, 95% CI = 0.64-3.42, *P* = 0.367), monthly income/remittance (RRR = 1.000, 95% CI = 1.00 - 1.00, *P* = 0.090).

Table 8: Multinomial Logistic Regression of Socio-Demographic Predictors of PCH Awareness

Independent variables			High PCH Awareness (50.6%)						Moderate PCH Awareness (41.6%)				
	N	*%*	*Mean*	*RRR*	*SE*	*Wald*	*Sig.*	*95%CI*	*RRR*	*SE*	*Wald*	*Sig.*	*95%CI*
Age*	1547		22.8	1.040	0.038	1.070	0.285	0.97-1.12	1.018	0.038	0.480	0.630	0.95-1.10
Gender													
Female	710	45.9		0.781	0.169	-1.140	0.254	0.51-1.19	0.808	0.175	-0.980	0.327	0.53-1.24
Male (ref)	837	54.1											
Marital status													
Single (no partner)	797	51.5		1.270	0.261	1.170	0.243	0.85-1.90	1.123	0.232	0.560	0.575	0.75-1.68
Otherwise (ref)	750	48.5											
Ethnicity													
Akan	958	61.9		0.578	0.179	-1.770	0.076	0.32-1.06	0.632	0.196	-1.480	0.140	0.34-1.16
Ewe	276	17.8		0.403	0.137	-2.670	0.008	0.21-0.79	0.441	0.150	-2.400	0.016	0.23-0.86
All others etc. (Ref)	313	20.3											
Religious Affiliation													
Christian	1404	90.8		6.213	3.765	3.010	0.003	1.99-20.38	11.74	8.279	3.490	0.000	2.94-46.77
Muslim	128	8.3		2.223	1.438	1.230	0.217	0.63-7.90	6.329	4.672	2.500	0.012	1.49-26.90
All other religions	15	0.9											
Educational level													
Bachelor	1466	94.8		0.342	0.287	-1.280	0.201	0.07-1.77	0.399	0.336	-1.090	0.275	0.08-2.07
Masters/PhD (ref)	81	5.2											
Employment status													
Employed	166	10.7		1.691	0.717	1.240	0.215	0.73-3.88	1.474	0.633	0.900	0.367	0.64-3.42
Unemployed (ref)	1381	89.3											

Source**:** Field Survey 2019; Note: *****=Continuous variable; SE=Standard Error; Sig.=p-value; ref=Reference Variable Category.

Multinomial Logistic Regression of Socio-Demographic Predictors of PCH Awareness Cont.

	N	*%*	*Mean*	*RRR*	*SE*	*Wald*	*Sig.*	*95%CI*	*RRR*	*SE*	*Wald*	*Sig.*	*95%CI*
Income/remittance*	1547		362.2	1.000	0.000	-2.170	0.030	1.00-1.00	1.000	0.000	-1.690	0.090	1.00-1.00
Faculty/School													
SPS	229	14.8		0.783	0.326	-0.590	0.557	0.35-1.77	0.816	0.348	-0.480	0.633	0.35-1.88
FEF	365	23.6		0.640	0.250	-1.140	0.253	0.30-1.38	0.811	0.324	-0.530	0.599	0.37-1.77
FSS	723	46.7		0.409	0.141	-2.590	0.009	0.21-0.80	0.777	0.273	-0.720	0.472	0.39-1.55
SHAS (ref)	230	14.9											
Constant				4.482	6.752	1.000	0.319	0.23-85.85	1.793	2.778	0.380	0.706	0.09-37.37

Source: Field Survey 2019; Note: *=Continuous variable; SE=Standard Error; Sig.=p-value; ref=Reference Variable Category.

The study revealed that many socio-demographic factors such as ethnicity (Ewe), Christianity and Islamic religions, and studying at the Faculty of Social Sciences were determinants of PCH awareness among UCC students. The findings demonstrate that the likelihood that a student with Ewe ethnic background will have either high or moderate PCH awareness was less compared to students of ethnic groups such as "Akan", "Ga/Dangme", "Guan", "Grusi", "Guma" and "Mole-Dagbani". Students with the Ewe background may not have adequate knowledge on PCH-related issues because they do not understand the Akan language. Akan is the most often used language in the Cape Coast Metropolis. Another possible explanation is that PCH services are yet to be integrated into routine health services in most developing countries, including Ghana (Dean et al., 2013; Ezegwui et al., 2008). It is also likely that respondents of the current study have never been sensitized on PCH related issues. This finding supports research that ethnicity does not influence the PCH knowledge of individuals with higher educational attainments (Temel, Erdem, Voorham, Bonsel, Steegers, & Denktas, 2015; Paudel, Wing, & Silpakar, 2012). These studies found that higher education attainment lowers the knowledge gap between individuals with diverse ethnic backgrounds. This finding is worth exploring in the near future since previous research shows that ethnicity does not influence the PCH awareness levels of individuals with higher educational attainments.

Some empirical works suggest that ethnic discrepancies in knowledge and attitudes towards sexual and reproductive health play an important role in health literacy levels (Kilfoyle, Vitko, O'Conor, & Bailey, 2016; Yee &

Simon, 2014). Sorensen et al. (2012) argued that health literacy is a resource that empowers individuals to access healthcare information, therefore, can influence disease prevention and engagement in health promotion interventions. Variations in the present and past findings may be because PCH promotion is a relatively new health concept or a missing link in the health systems of most developing countries (Dean et al., 2013; Ezegwui et al., 2008). The result aligns with assumptions of the behavioural theories that people reside within and are affected by their social environment. Therefore, there are reciprocal interactions between personal and environmental factors (Bandura, 2000; Mcleroy et al., 1988). The finding also supports theoretical propositions that some socio-demographic factors such as ethnicity modify factors that indirectly influence health behaviour (Glanz et al., 2008). It is pertinent to improve PCH literacy levels to bridge the awareness gaps among various ethnic groups. Health care professionals at the UCC hospital must be sensitized to take advantage of their relationships with students to educate them on PCH related issues.

The study further showed that religion strongly predicts PCH awareness levels. Students who demonstrated high or moderate PCH awareness levels were more likely to be affiliated with the Christian (12%) and Islamic (6%) religions than those affiliated with other religions. This finding could be explained by the protective effect of these two religions on reproductive health knowledge (Martin et al., 2018). Previous research indicates that religion is a protective factor that shapes sexual and reproductive behaviours and health decision-making (Kramer et al., 2007; Somefun, 2019).

On the contrary, Goossens et al. (2016) and Stidham et al. (2012) believed that religious beliefs are obstacles to PCH lifestyle changes and reproductive service usage. Disparities could be attributable to differences in settings and characteristics of the study population (developed versus developing countries) and (university students versus reproductive-aged individuals in the general population). This finding supports propositions of individual-level behaviour models and theories that individual characteristics cannot be ignored in behavioural change efforts (Bandura, 2000; Mcleroy et al., 1988; US Department of Health and Human Services, 2005). The study highlights the importance of considering the personal characteristics of the target audience during PCH promotion efforts.

Furthermore, the findings show that a percentage increase in the income or remittances of respondents had a corresponding effect on the likelihood of high PCH awareness. A possible explanation is that most students in this study were unemployed (89%) and had low economic status as their average monthly income/remittance was only Gh¢ 362.18 ($64.5). The result differs from the findings of Ayalew et al. (2017) and Goshu et al. (2018) that income is a crucial predictor of PCH knowledge. It is also important to note that most respondents in the current study are unmarried and unemployed, so they may not be motivated to seek PCH information. This finding is consistent with the claim that demographic factors indirectly affect the perceptions of individuals (Zhao et al., 2014). This finding implies that students within the lower-income or remittance category may not be motivated to seek PCH information. Again, students in this category may be willing to

adopt PCH behaviours, but the cost of services may deter them from patronizing PCH services. This finding means the social contexts in which people change cannot be ignored in designing and implementing PCH promotion programmes. Hence, PCH services should be accessible and affordable to the reproductive-aged population.

Finally, students studying in the FSSP were less likely to have high PCH awareness than students of SAHS. This finding may be because most students in the SAHS may be more familiar with reproductive health issues due to health-related courses in their programmes of study. These programmes include Physician Assistant Studies, Nutrition and Dietetics and Biomedical Sciences. A similar pattern of results was observed in Nigeria (Falaye & Adeleke, 2012), where the course of study significantly predicted knowledge of reproductive health issues among university students. The similarity of the current findings with the previous ones could also be due to similarities in settings and characteristics of the sample population. For instance, students in West African Universities and students pursuing health-related courses. The findings' consistency may also be due to the relatively large sample size and study designs employed in the current study. The result fits well into the intrapersonal level of the socio-ecological model that individual-level factors influence health behaviour and health outcomes [SEM] (Mcleroy et al., 1988). This finding demonstrates that curriculum developers at UCC must consider incorporating PCH information into various curricula to reflect and advance awareness of PCH-related issues.

Overall, the present study found no significant association between age, gender, marital status, employment status, level of university education and levels of PCH awareness. This finding supports similar studies conducted among other university students (Corbett, 2011; Delgado, 2013; Falaye & Adeleke, 2012; Manandhar & Subedi, 2018). The findings are also consistent with many studies conducted among the general population (Ayalew, et al., 2017; Goshu et al., 2018). However, socio-demographic characteristics such as ethnicity, religion, and programme of study may be the key pointers to access and demand PCH intervention among the students. Past research indicates that socio-demographic factors influence health awareness levels and the demand for health interventions (Ayalew et al.; Thongnopakun et al., 2018). Socio-demographic characteristics have also influenced health behaviour and health outcomes (Bashar et al., 2012; Moshi, Ernest, Fabian, & Kibusi, 2018; Ukachi, 2019).

The findings related to the socio-demographic characteristics of respondents are well situated within the HBM. This finding may be attributed to assumptions that socio-demographic factors represent inherent intrapersonal characteristics which serve as intermediaries for health behaviour and knowledge (Lu et al., 2010). Thus, behaviour theorists underscore the need to identify specific personal factors related to health behaviour to design comprehensive health promotion interventions (Glanz et al., 2008). Furthermore, evidence suggests that socio-demographic factors are important predictors for preconception decision-making among reproductive-aged university students (Biermann et al., 2006). This means health promotion

practitioners must target both personal and multiple and interdependent factors within the environment to achieve intended outcomes (Kumar & Preetha, 2012). For that reason, demographic characteristics, particularly ethnicity, religion, and programme of study, cannot be ignored in designing and implementing PCH promotion efforts among university students. In the qualitative arm of the study, the affordability of PCH services emerged as an important factor that can influence PCH promotion among both students and healthcare professionals. The following statements confirmed this. *"If the school makes PCH services free, students will be willing to go for such services. "I suggest that the cost should be added to the school fees because sometimes, cost prevents people from getting access to these services."*

Research Question Five: What Factors Influence UCC Students' Attitudes Towards PCH Promotion?

This research question explored the association between perceived attitudes of UCC students towards PCH promotion and selected socio-demographic variables (age, gender, income, employment status, relation status, college, faculty/school, department and programme). Other explanatory variables estimated included smoking, alcohol consumption, STD history, poor health status. and medication history. Chemical exposure, eating disorder history, RLPs and future PCH intentions were also estimated. BLR analysis was performed to determine specific variables that significantly influenced attitudes towards PCH promotion. The results revealed that the logistic regression model was statistically significant (-2LogL = 923.0, X^2 =243.3, P = 0.000), Nagelkerke R^2 of 0.228 explains 23% of the variance in positive

attitudes towards PCH promotion among university students and has 66% accuracy of prediction (See Table 9).

The results showed that twelve variables were statistically significant predictors of positive attitudes towards PCH promotion. The variables span three main categories: socio-demographic factors, PCH risk factors, and future intention/self-efficacy to engage in PCH behaviours. The reference categories of variables estimated were presented in the text and Appendix I.

Students of Akan ethnic backgrounds were less likely to have positive attitude towards PCH promotion than those from other ethnic backgrounds (OR = 0.736, 95% CI = 0.569 - 0.953, *P* = 0.020). Further, there was a statistically significant association between positive attitudes towards PCH promotion and the product of the age of students and monthly income (OR = 1.160, 95% CI = 1.022 -1.316, *P* = 0.021). This suggests that a unit increase in the product of a student' age and monthly income increases the likelihood of having a positive attitude towards PCH. Nonetheless, no statistical significant variations were found in the odds of positive attitudes towards PCH promotion and gender (OR = 0.916, 95% CI = 0.725 - 1.158, *P* = 0.464), age of students (OR = 1.060, 95% CI = 0.903 - 1.245, *P* = 0.475), Ga/Dagbme ethnic background (OR = 0.733, 95% CI = 0.479 - 1.122, *P* = 0.153), Christian religion (OR = 1.033, 95% CI = 0.342 - 3.122, *P* = 0.954), Muslim religion (OR = 1.103, 95% CI = 0.346 - 3.516, *P* = 0.868), the product of being a female and age (OR = 0.807, 95% CI = 0.639 - 1.019, *P* = 0.072), and being a student of Department of Sociology and Anthropology (OR = 1.214, 95% CI = 0.960 - 1.534, *P* = 0.105). Besides, high PCH awareness has no statistically

significant associating with positive attitudes towards PCH promotion (OR = 1.109, 95% CI = 0.884 - 1.390, *P* = 0.372). This demonstrates that socio-demographic factors such as sex, religion, age, monthly income, high PCH awareness, and department of students were not significant predictors of positive attitudes towards PCH promotion. Nonetheless, ethnicity (Akan) and interaction (product) between age and monthly income of students were combined statistically significant predictors of positive attitudes towards PCH promotion (See Table 9).

With regard to PCH risk factors, the regression analysis revealed that students who reported poor health status were 2 times more likely to have positive attitude towards PCH than those who reported good health status (OR = 2.097, 95% CI = 1.175 - 3.741, *P* = 0.012). Moreover, students who have RLPs were more likely to develop positive attitude than those who do not have RLPs (OR = 1.256, 95% CI = 1.004 - 1.571, *P* = 0.046). In addition, students who reported that their partners consume alcohol were more likely to be associated with positive PCH attitudes than those who reported that their partners do not drink (OR = 1.633, 95% CI = 1.145 - 2.28, *P* = 0.007). Similarly, students with reported history of eating disorders were more likely to develop a positive attitude towards PCH promotion than students with no history of eating disorders (OR = 1.345, 95% CI = 1.056 - 1.714, *P* = 0.016). However, no significant association was found between positive attitude towards PCH promotion and ever given birth (OR = 0.868, 95% CI = 0.524-1.439, *P* = 0.583), exposure to chemical substances (OR = 1.245, 95% CI = 0.972 - 1.594, *P* = 0.083), and having a partner (OR = 0.790, 95% CI = 0.585 -

1.068, *P* = 0.125). Again, students with history of STIs (OR = 1.251, 95% CI = 0.96 - 1.629, *P* = 0.096), mental health history (OR = 0.804, 95% CI = 0.638-1.013, *P* = 0.065), and history of urological surgery (OR = 1.567, 95% CI = 0.914-2.687, *P* = 0.103) were not significantly associated with positive attitudes towards PCH promotion (See Table 9).

Furthermore, students who had the intention to use some type of preconception interventions were two times more likely to develop positive attitudes than those who did not have such intentions (OR = 2.142, 95% CI = 1.694 - 2.719, *P* = 0.000). Also, students who agreed that they had confidence about getting preconception counselling before pregnancy had a higher likelihood of being associated with PCH positive attitudes than students who said otherwise (OR = 2.006, 95% CI = 1.445 - 2.758, *P* = 0.000). Students who were confident about changing their lifestyles to practice key preconception behaviours even if they were not ready for pregnancy were two times more likely to be associated with positive PCH attitudes than those who said otherwise (OR = 2.279, 95% CI = 1.612 - 3.222, *P* = 0.000). Students who were confident that getting PCH counselling can help them maintain or achieve optimal general and reproductive health were two times more likely to have a positive PCH attitude towards PCH promotion than those who said otherwise (OR = 2.404, 95% CI= 1.518 - 3.806, *P* = 0.000). Students who said they were confident that getting PCH counselling could assist them in understanding how PCH impacts pregnancy outcomes were 1.5 times more likely to develop positive attitudes toward PCH promotion than those who said otherwise (OR = 1.588, 95% CI = 1.208 - 2.451, *P* = 0.037) (See Table 9).

Table 9: Binary Logistic Regression (BLR) of Factors Influencing Attitudes towards PCH Promotion

	N	*%*	*B*	*Wald*	*OR*	*95% CI*	*Sig.*
Female students	710	45.6	0.110	-0.73	0.916	0.725-1.158	0.464
Age of students	1547		0.087	0.71	1.060	0.903-1.245	0.475
Akan Ethnicity	958	61.0	0.097	-2.33	0.736	0.569- 0.953	0.020
Ga/Dagbme Ethnicity	144	9.30	0.159	-1.43	0.733	0.479-1.122	0.153
Christian religion	1404	90.8	0.583	0.06	1.033	0.342-3.122	0.954
Muslim religion	128	8.30	0.652	0.17	1.103	0.346-3.516	0.868
Age*Income	1547		0.075	2.3	1.160	1.022-1.316	0.021
Female*Age	1547		0.096	-1.8	0.807	0.639-1.019	0.072
Socio & Anthrop	613	39.6	0.145	1.62	1.214	0.960-1.534	0.105
High PCHawareness	783	50.6	0.128	0.89	1.109	0.884-1.390	0.372
Poor health status	63	4.10	0.619	2.51	2.097	1.175-3.741	0.012
Has a RLP	718	46.4	0.143	2	1.256	1.004-1.571	0.046
Ever given birth	84	5.40	0.224	-0.55	0.868	0.524-1.439	0.583
Chem Exposure	1064	68.8	0.157	1.74	1.245	0.972-1.594	0.083
Has a Partner	656	42.4	0.121	-1.53	0.79	0.585-1.068	0.125
Partner drinks	339	21.9	0.295	2.71	1.63	1.145-2.328	0.007
Eating Disorders	512	33.1	0.166	2.4	1.34	1.056-1.714	0.016
History of STD	392	25.3	0.168	1.66	1.251	0.961-1.629	0.096
Mental health. Hist.	935	6.04	0.095	-1.85	0.804	0.638-1.013	0.065
Urological surgery	89	5.80	0.431	1.63	1.567	0.914-2.687	0.103
Hereditary disorders	209	13.5	0.105	-1.54	0.822	0.641-1.055	0.124
Future PCH intentions	517	33.4	0.259	6.33	2.146	1.694-2.719	0.000
PCH counselling	1123	72.6	0.336	4.16	2.006	1.445-2.758	0.000
Lifestyle changes	0.726	0.748	0.403	4.66	2.279	1.612-3.222	0.000
Efficiency of PCH	1336	86.4	0.564	3.74	2.404	1.518-3.806	0.000
Effect of PCH Counselling	1324	85.6	0.352	2.09	1.588	1.208-2.451	0.037
Constant			0.032	-4.81	0.051	0.015-0.171	0.000

Source: Field Data, 2019 Note: ***=** Continuous variable; SE = Standard Error; Sig.= p-value; ref= Reference Variable Category

The findings demonstrate that four core categories of socio-demographic factors: PCH awareness, PCH risk factors, and future PCH intention and self-efficacy of students to adopt PCH behaviours are linked with positive PCH attitudes towards PCH promotion. Ethnicity and the combined effect of age and income were also significantly associated with positive attitudes towards PCH promotion in the current study. Similarly, students' age and income had a joint effect on positive attitudes towards PCH promotion. This implies that an increase in the age and income of a student is associated with a higher likelihood that the student will have a positive attitude towards PCH promotion. However, student characteristics such as gender, religion (Christian or Islamic), age, monthly income, and department of students were not significant predictors of positive attitudes towards PCH promotion. More so, students with Akan background were less likely to have positive attitudes towards PCH promotion. There are two plausible explanations for these findings. Students in this ethnic group may have never been engaged in PCH-related issues to evaluate PCH promotion positively. The combined effect of age and income on positive attitudes towards PCH may also be due to past experiences regarding poor reproductive outcomes among students in the higher income and age categories.

The first part of the results partially aligned with Gautam and Dhakal (2016) that there is no significant association between age, occupation, educational level, and PCH knowledge of reproductive-aged women. The second finding related to the combined effect of age and income varies with the results of Sese (2013). According to Sese, age and income of university

students are mutually exclusive predictors of positive PCH attitudes. The differences in the current and past studies may be due to discrepancies in settings, respondents' age range, and unfamiliarity with pertinent PCH issues. Another probable reason is disparities in the appraisal of personal vulnerability to adverse reproductive health outcomes among respondents.

Generally, these findings are somewhat consistent with theoretical propositions that certain socio-demographic factors mediate health-related behaviours (Taylor et al., 2007). Thus, personal skills and capabilities are important predictors of behavioural intentions (Glanz, et al., 2008). A similar indicate that personal attitude toward performing health behaviour is dependent on beliefs about the costs and benefits of performing that behaviour (Fieshbein & Yzer, 2003). The result suggests that younger students who are not economically endowed are less likely to have positive attitudes towards PCH services due to personal economic capabilities and financial constraints. This finding supports the predictions of McLeoy et al. (1988) that individual factors impact health behaviour and attitudes. The current study sheds light on the need to consider the ethnic background and combined effect of age and income of university students in the design and implementation of PCH initiatives among university students. Again, there is the need to embark on a comprehensive education on PCH promotion among students. Subsidizing the cost of PCH services could also be an incentive for improving attitudes and uptake of PCH interventions among university students.

In the current study, high PCH awareness was not associated with positive attitudes towards PCH promotion. This result may be attributed to the students' lack of reproductive life planning culture. The finding is similar to the results of studies that PCH awareness does not necessarily correlate with PCH behaviours (Delissaint et al., 2011: Roudsari et al., 2016) but contrary to findings of (Toivonen et al., 2017). Related research shows that women who are not considering pregnancy have a completely different attitude towards improving PCH than those with pregnancy intentions (Squiers et al., 2013; Lynch et al., 2014). The inconsistencies in the findings may be explained by differences in accessibility to PCH services and the reproductive health intentions of respondents. The findings fit well into assumptions that individuals assign a personal interpretation to an attitude that appears important to their interests, values, and subjective norms (Howe & Krosnick, 2017). The implication for health promotion practice is that reproductive-aged individuals may not engage in PCH interventions without purposeful sensitization on the significance of PCH to improving MCH outcomes.

Further, four PCH risks and behaviours were associated with positive attitudes towards PCH promotion. These include perceived poor health status, a reproductive life plan, drinking alcohol (partner), and eating disorders (self-induced vomiting). According to the current results, students who reported poor health status are more likely to affect PCH than positively reported good health status. This might be due to the quest among poor health rated students to improve their health status. This result is consistent with past evidence that persons with low self-rated health status tend to patronize health care services

more often than their counterparts with higher ratings (Shields & Shooshtari, 2001). The consistency between this finding and past research may also be attributable to the predictive ability of self-perceived health status as an objective proxy for general health status (Wu et al., 2013). This finding is noteworthy given the relationship between poor self-perceived health status and disease prevalence (Wu et al., 2013). Evidence indicates that PCH has short- and long-term impacts on MCH outcomes (Larson et al., 2018; Stephenson et al., 2018). The finding also agrees with the conceptual framework and theoretical propositions that personal experiences such as ill-health may trigger decision-making towards adopting recommended health actions (Bish & Michie, 2010; Rosenstock, 2005). This finding implies that although students with poor perceived health status are more likely to seek PCH services, those who reported good health status may not be motivated to patronize PCH interventions.

The findings further revealed that students who have RLPs were more likely to develop a positive attitude towards PCH than students who did not have such plans. A probable reason is that these students may have been exposed to adverse reproductive health experiences in the past. Hence, they are already motivated to improve their reproductive health status before pregnancy. This finding is consistent with research that persons with RLP tend to reflect on their reproductive intentions to prevent unplanned pregnancies (Malnory & Johnson, 2011; Steel et al., 2015: Tyden et al., 2016). The result also supports Borges, Santos, Nascimento, Chofakian, & Gomes-Sponholz's (2016) findings that PCH behaviour is associated with planned pregnancies

and that behavioural intention considerably impact behaviour (Ajzen & Fishbein, 1980; Glanz et al., 2008). Similarities in the current findings and past studies might be explained by similarities in the study designs and suggestions of Ajzen and Fishbein. People usually think about the outcomes of their actions before they decide to perform the behaviour in question. The implication is that students who do not have an RLP and those with no pregnancy intentions in the near future may not adopt PCH behaviours. The majority of the university students are unmarried young adults who might not have reproductive intentions, therefore, may not see the need to engage in PCH behaviours. Moreover, most students may not control PCH behaviour due to unfamiliarity with key PCH recommendations and a lack of routine PCH services.

Moreover, students who reported that their partners drink alcohol and those with eating disorders (self-induced vomiting) had a higher probability of developing a positive attitude toward PCH promotion than their counterparts who do not experience these acts. A possible reason is that students know that alcohol consumption and eating disorders are risk factors for adverse MCH outcomes. The findings prove that cues to action are essential determinants of attitudinal change (Bish & Michie, 2010; Larson et al., 2018; Orji et al., 2012). The finding also correlates with predictions of the HBM that an individual's subjective perception of the risk of acquiring a health condition predicts attitudes towards recommended health behaviour (Rosenstock, 2005). Overall, these findings highlight the need to educate university students until they are

conversant with PCH risk factors, particularly pre-pregnancy alcohol consumption and eating disorders.

Strategies for effective health promotion such as advocacy, public policy, lifestyle modifications and resources for PCH promotion must be employed to facilitate the PCH promotion strategy among students. Moreover, it is crucial to create an enabling environment for students to engage in PCH promotion programmes. Furthermore, periodic reminders on the significance of PCH promotion through text messages and WhatsApp messages may serve as prompts for university students to seek PCH services.

Students who said they had intentions to use preconception interventions and those confident about getting preconception counselling before pregnancy were more likely to develop positive attitudes towards PCH promotion than their colleagues. Similarly, those who believed that PCH counselling could help them maintain optimal general and reproductive health were more likely to develop positive attitudes towards PCH promotion than students who felt otherwise. Students who had the confidence to change their lifestyle to practice key preconception behaviours even if they were not ready for pregnancy were more likely to develop positive attitudes towards PCH promotion. Again, those who said getting PCH counselling can assist them in understanding how PCH affects pregnancy outcomes were also more likely to have a positive attitude than students who had no confidence to practice preconception behaviours. These findings may be explained because students with future intention and self-efficacy to engage in varied PCH behaviours might have already thought about making lifestyle modifications to improve

their health status. A plausible reason for these findings is that students who had future intentions and self-efficacy to engage in varied PCH behaviours might have already thought about making lifestyle modifications to improve their health status.

On the whole, findings on future PCH intention and self-efficacy to engage in PCH behaviours support previous findings of Corbett (2011) and Sese (2013) that university students usually have positive attitudes towards PCH counselling. The findings are also consistent with past studies that individuals with no pregnancy intention within a year are less likely to have positive attitudes towards PCH counselling (Chuang et al., 2011; van der Zee et al., 2013).

The findings demonstrate that endorsing PCH promotion initiatives among university students is connected to their behavioural intentions and self-efficacy. The findings also support the conceptual framework and predictions of TRA and PB. The theorist posits that the likelihood of performing a particular behaviour depends on a strong intention to perform the behaviour in question (Fishbein et al., 2002; Glanz; et al., 2008). Previous research explains that failure to seek PCH counselling is linked to a lack of pregnancy preparation culture and a lack of proactive PCH information by health care professionals (Bortulus et al., 2017).

As highlighted by respondents in the qualitative data, there is a need for societal re-orientation on PCH promotion. *"We may have to reach out more, for example, outreaches and public education" Especially in our part of the world where talking about sex becomes a major problem, to the extent that*

we think that you are not well cultured, so we have to create that awareness"

Behavioural experts have argued that aside from personal knowledge of health risks and the benefits associated with specific behaviours, self-efficacy is a critical predictor of behavioural and attitudinal changes (Bandura, 2004). Reproductive health practitioners must consider the relevant underlying factors at the individual, intrapersonal, and environmental levels required to improve university students' attitudes towards PCH promotion initiatives.

Past research suggests that improving the PCH of reproductive-aged individuals can reduce poor pregnancy outcomes (Black et al., 2016; Singh et al., 2014; WHO, 2013). Hence, identifying pertinent predictors associated with positive attitudes towards PCH promotion can guide policymakers and health promotion practitioners in designing comprehensive PCH programmes. PCH promotion initiatives must be emphasized, particularly among university students not contemplating parenthood since they are less likely to consider themselves at risk of poor pregnancy outcomes. It is also important to sensitize students on the importance of future PCH intentions and believe in their ability to practice, given that 40 to 50% of pregnancies are not planned (Kallner & Danielson, 2016). It is also important to roll out innovative strategies such as PCH awareness campaigns, student-friendly PCH counselling and interventions to build students' confidence to seek PCH services routinely. The study also draws attention to the need to integrate PCH issues from childhood to childbearing years to ensure PCH risk factors across the entire life span of individuals.

Research Question Six: How do UCC students describe strategies required to integrate PCH interventions into routine reproductive health services at the UCC hospital?

This section presents findings of the qualitative phase of this study, which sought to explore students' perceptions of how PCH interventions should be packed and delivered to students at the UCC hospital. Transcribed data were analysed manually using inductive content analysis methods (Burnard et al., 2008; Erlingsson & Brysiewicz, 2017; Graneheim & Ludman, 2004). Findings were presented according to major themes, main categories, sub-categories, codes and meaning units [verbatim responses of students] (Burnard, et al.; Erlingsson & Brysiewicz).

Three major themes, three main categories and eight sub-categories emerged from the analysis of transcripts from FGDs conducted among students. The themes generated on perceived strategies for PCH integration included interpersonal behaviour change strategies, institutional policy directives and public policy interventions. The emergent categories were PCH awareness creation and education, institutional support and supportive macro-environment. Sub-categories comprised awareness creation, PCH information dissemination, PCH advocacy, health care system integration, institutional level integration, public awareness campaigns, societal re-orientation and PCH policy.

Theme One: Interpersonal Behaviour Change Strategies

This theme connotes respondents' views regarding how interpersonal relationships can be employed to disseminate PCH messages among students

of UCC. It produced one main category (awareness creation and education) with three sub-categories. The sub-categories were awareness creation, information dissemination and advocacy for PCH.

Awareness Creation and Education

This sub-theme represents respondents' opinions on creating awareness and interest in PCH promotion among UCC students. Emergent sub-categories included sensitization, PCH information dissemination and PCH advocacy. The narratives highlighted specific educational strategies like PCH alerts on mobile devices, social media and mass communication. PCH souvenirs and week celebrations also emerged as preferred strategies for PCH awareness creation among students. This is evident in the quotes below:

"They should make a loud noise about it. They should send messages across using mass media and social media platforms. They can also use the shuttle to make an announcement or play audios on PCH" (Female, 22 years, FGD 4). *"I think education through the media like TV, radio to create awareness"* (Male, 20 years, FGD 6). "*I also think awareness creation through mass media is very important"* (Female, 21 years, FGD 6). "*...The media should emphasize PCH related issues; if you are observant, the media promotes adverts relating to alcohol consumption and sex, they should reduce those adverts and lay more emphasis on PCH issues*" (Females, 22 years, FGD, 4).

Further, respondents emphasized PCH education among students to ensure behavioural change and PCH promotion decision-making. The narratives also revealed the dissemination of PCH information and associated

risk behaviours during the early years of university education as critical interventions during PCH integration efforts. The excerpts on page 204 illustrate this:

> *"We need more education on PCH because if you're not aware of the risk factors, you can't do anything*" (Male, 24 years, FGD 4). *"They can bring resource persons to talk to us about some of these things right from scratch, so you have an idea about these things and the risk of getting involved, so you know what decision to take"* (Male 26 years, FGD 1). *"I think education will help. I didn't know anything about this until today; so, they should educate students to know what it entails"* (Female, 19 years, FGD 3). "*When we come fresh, and at that time if we can get information, we will get acquainted with it better before we get to level 200*" (Male, 24 years, FGD 2).

Advocacy emerged as yet another strategy for PCH sensitization and education. This category generated two sub-categories: peer and celebrity education. From the narratives, advocacy techniques can be an essential strategy to support PCH behavioural change. In particular, students prefer their peers and celebrities as advocates for the PCH promotion agenda. They felt they would relate better with their peers if involved in the PCH advocacy process. The narratives indicate that images of celebrities will generate interest in PCH issues among students. The following narratives buttress this finding:

> "*I think celebrities and students should be made advocates so that they can help in educating other students through wearing of T-shirts"* (Female, 24 years, FGD 6). "*Sometimes, a key holder a pen drives and*

fresher's welcoming tickets for socialization can help" (Female, 21 years FGD 4). "…*Most of the people involved in the education should be people in our age groups because we relate better with our peers than people who are older than us*" (Male, 23 years, FGD 3).

Theme Two: Institutional Policy Directives

This theme described respondents' views on contextual interventions that can facilitate the uptake and delivery of PCH interventions within the university as an institution. Respondents recommended using university resources and opportunities such as health services, curricula, and pre-service payment schemes to facilitate PCH integration into routine health services. One main category (institutional support) and two sub-categories emerged from the narratives. The emergent sub-categories were health service changes and university-wide PCH promotion strategies.

Institutional Support

This sub-theme described respondents' perceptions regarding the role of the university hospital and the university at large to advance interest and demand for PCH interventions among students. The result is in two folds: health care system strategies and university-wide PCH promotion interventions.

Health Service Changes

This sub-theme signified respondents' views on health services re-orientations required to streamline PCH integration efforts at the UCC hospital. The analysis highlighted student-friendly services, PCH days, walk-in/lunch break services, and special clinics/desks for PCH as initiatives

required to successfully deliver PCH services among the student clientele. Community-based services such as counselling services at the halls of residence and mobile PCH clinics were also identified as potential strategies to support students' PCH promotion efforts. The following narratives illustrate this:

> "*There should be a day set aside or a week set aside for such services. As students, we mostly focus on lectures, so if a day is set aside for such services so that it will be easily accessible*" (Male, 22 years, FGD 2). "*…They should also make the hospital accessible so that during lunchtime you can pass by for such services*". *Just as we have a counsellor at the various halls, we can have counsellors at the various halls so that anyone who needs help can get help at the hall level"* (Male, 23 years, FGD 6). *"…They should mount PCH services using containers or tent clinics where students can easily pass by for such services"* (Male, 22 years, FGD 5).

University-wide PCH Promotion Strategies

Regarding university-wide PCH Promotion strategies, respondents suggested PCH-related issues should be integrated into the university curricula as a course of study. Respondents suggested that students take the proposed course in the first year of university education. Sensitization on PCH and screening of all fresh students for PCH risk factors was emphasised as part of the mandatory medical screening required by all fresh students admitted. The excerpts also revealed free or prepaid PCH services as the main strategies for

funding PCH interventions. Respondents described the findings above as follows:

"PCH should be introduced in level 100, so it can be a course of study. It can be a liberal course like HIV, Communication skills or African studies" (Male, 23 years, FGD 6).

"*… Maybe when we come afresh, PCH could be added to the tests that we do before lectures start*" (Male, 22 years, FGD 2). "*…It should be part of our orientation in level 100. It will psych our minds* (Male, 23 years, FGD 6).

"...If you go to the university hospital for this kind of check-ups, sometimes you need to pay a certain amount. I'm a student if I'm having and I have to pay like 100, 200 cedis maybe and my monthly remittances is 100 cedis, it means I cannot afford if they will make those things free for students" (Male, 21 years, FGD 4). *"... If the school makes PCH services free, students will be willing to go for such services because we pay school fees, and it should be part of our fees so the university can later re-reimburse the hospital"* (Male, 24 years, FGD 5).

Theme Three: Public Policy Interventions

This theme summarized respondents' perception of broader societal interventions required to integrate PCH into existing routine reproductive health services. It also describes how public policy can be utilized for PCH behavioural change. One main category (supportive macro-environment) and

three sub-categories emerged from the narratives. The sub-categories were public awareness campaigns, societal re-orientation and PCH policy.

Supportive Macro-environment

This category stressed creating an enabling environment within the larger social context to support PCH behavioural change and integration. Overall, the findings suggest that the policy and societal contexts of behaviour must not be ignored in PCH promotion efforts.

Public Awareness Campaigns

It produced two sub-categories: awareness creation and education. This sub-category denotes the need for PCH sensitization and education in the general public. Respondents stressed the need to create public awareness of PCH and its benefits to MCH outcomes in the country. The main strategy proposed by respondents was weekly PCH education in all government health facilities in the country. This is evident in the excerpts below:

> *"First of all, awareness creation, especially in our part of the world…we have to create that awareness"* (Male, 31 years, FGD 1).
>
> *"…We have government hospitals in every region, so they should take every week to educate people on the effect of these things"* (Male, 22 years, FGD 4).

Societal re-orientation

The category generated three sub-categories: cultural acceptance, spousal support and voluntary counselling. This sub-category relates to the need to re-orient value systems to promote pregnancy preparedness culture in the larger social context. Respondent' stressed the need to promote preventive

health culture and voluntary counselling, especially among individuals of reproductive age. Respondents highlighted the need for PCH behavioural change communication in our social context. The findings also drew attention to the need to demystify and encourage uptake of PCH interventions among young adults. The quote below illustrates the above conclusions:

> *"First of all, awareness creation, especially in our part of the world where talking about sex becomes a major problem. To the extent that they will think that you are not well cultured"* (Male, 31 years, FGD 1).
>
> *"I'm also thinking of adding voluntary counselling for young adults who are sexually active"* (Male, 40 years, FGD 1).
>
> *"...If a man and woman decide to marry, they should go for genetic counselling before pregnancy. If you're a guy and your partner have candidiasis, you should be bold enough to tell her sometimes. They don't know what is going on*" (Male, 24 years, FGD 4).

PCH Policy

This sub-category underlined the need for a legal and policy framework to remove financial barriers to accessing PCH interventions. Respondents specifically advocated for enacting a policy to support PCH promotion efforts. They suggested that the National Health Insurance Scheme (NHIS) benefits should be expanded to cover PCH services provided to students. A 20-year-old female student indicated this in the quote below:

> "... *They should incorporate preconception into NHIS…"* (FGD 6).

The present study indicates three major factors operating at the interpersonal, institutional and public policy levels critical to PCH integration at the UCC hospital. First, interpersonal behaviour changes strategies described by participants include PCH awareness creation and education, information dissemination and advocacy for PCH promotion. Respondents believed that PCH education should begin early, specifically in the first year of university education, to improve PCH knowledge, decision-making, and uptake of PCH services. Mass media, social media platforms, alerts on mobile devices and PCH week celebrations were identified as the most effective channels through which students can be reached during PCH promotion efforts. Students also proposed PCH advocacy using peer educators, images of celebrities and souvenirs. These findings could be attributed to respondents' knowledge and experiences regarding the most effective platforms for reaching students on campus.

Generally, the results ties with Hemsing et al. (2017) and Squires et al. (2013) that health education and social marketing strategies are the most effective strategies for improving PCH knowledge and behaviours among individuals of childbearing age. The findings directly align with earlier empirical studies that the social marketing strategy is suitable for health promotion interventions diverse target groups in different settings (Lassi et al., 2014: Squires et al., 2013). Consistencies in the present and prior findings may be due to current trends and growing interests in technology and mass communication strategies. Another plausible explanation might be similarities in the characteristics of the study population (young adults). The findings

agree with an assumption of the PAPM that new preventive behaviour cannot occur when a person is unaware of the behaviour in question (Weinstein & Sandman, 1992). Further, the findings support the propositions of the IMB model that information is imperative to the performance of health behaviours (Fisher & Fisher, 2000).

It is evident from the findings that PCH sensitization and information are essential precursors to PCH behaviour. One key informant reiterated this assertion: *"I think people do not have knowledge of such services, but if awareness is created that there is something like preconception care, people will come."* This result highlights the need for students' sensitization and comprehensive information on PCH and associated risk behaviours. The results also call for PCH education using mass media and social media intervention. It is imperative for healthcare professionals at the UCC hospital and the GHS to regularly embark on PCH awareness campaigns for all students in tertiary institutions, given that they are susceptible to PCH risk behaviours.

Second, respondents proposed institutional policy directives is crucial for integrating PCH into routine practice at the UCC hospital. They highlighted contextual strategies necessary to advance the uptake and delivery of PCH interventions at the UCC hospital. According to the narrative's facility-based intervention such as student-friendly services, walk-in/lunch breaks services, PCH clinics/desks, PCH days can be employed to improve accessibility to PCH services. Students also suggested community-based PCH services such as counselling at residential halls and mobile PCH clinics. These

findings may be attributed to time constraints encountered by students in their previous attempts to access health care services.

Third, the results support previous findings that PCH interventions can be delivered in clinical and community-based settings using primary health care approaches (Hemsing et al., 2017; Lassi et al., 2014). The present study's findings correlate with past studies probably because of similarities in contextual factors. Results are in line with the prediction of the SEM that context cannot be ignored in the design of successful health promotion programmes. The findings have implications for collaboration between the University at large and the University hospital regarding how to improve access to PCH services among students. The study also emphasized developing and implementing a PCH strategic plan and protocols by the University hospital or the GHS to guide the delivery of PCH interventions.

Another institutional support underscored by the study was termed university-wide PCH promotion strategies. This finding described how resources and opportunities within the university could improve awareness, accessibility and demand for PCH services among students. Specific strategies include PCH integration into curricula, sensitization during orientation of fresh students and PCH screening for all fresh students. In addition, respondents recommended pre-service payment options to remove barriers to the affordability of PCH services. The findings reflect students' perceptions of the approaches required to improve awareness and accessibility to PCH services. Findings support evidence that PCH promotion can be successfully delivered in educational institutions (Charafeddine et al., 2014: Goodfellow et al., 2017;

Lassi et al., 2014; Young et al., 2013). These studies stressed the need to incorporate PCH into the educational curricula to improve PCH awareness among young people. According to the authors, this strategy helps young people prepare for parenthood before pregnancy. Similarities between the present study and past studies may be attributable to similarities in characteristics of the study population and study designs. The results bring to light the need to revise university curricula to include content on PCH promotion. It is also imperative for the university management and the Directorate of University Health Services to explore how prepayment options could avert financial barriers to accessing PCH services among students.

Fourth, the study revealed that students' ability to afford PCH services should not be ignored during the PCH implementation programme. They perceived the out-of-pocket payments as a potential barrier to uptake of PCH services among students. For that reason, they proposed pre-service payment schemes and broadening the NHIS to include PCH services. A possible explanation for this finding may be because a significant number of respondents were unemployed undergraduate students who may not be able to afford the cost of PCH services at the point of service delivery. Similar conclusions were reached by reproductive health experts such as Lassi et al. (2014) and Young et al. (2013) in their reviews on opportunities for delivery and packaging PCH interventions. The findings were consistent with evidence showing that policy and finance are the main barriers to health access and health system changes (Jack, Atrash, Coonrod, Moos, O'Donnell, & Johnson, 2008; Johnson et al., 2006). These experts strongly recommended national

health insurance coverage, waivers and policy directions as the most effective strategies for advancing access to PCH interventions. Similarities in the present and previous studies may be due to study design, theoretical underpinnings and characteristics of the study population. Findings correlate with the position of advocates of the SEM that integration at personal, interpersonal and social environmental levels may influence efforts to change health behaviour (McLeroy et al., 1988). This means that social norms, finance and policy cannot be ignored in the PCH promotion initiatives among UCC students. Literature indicates that individuals are embedded within the larger social systems (Sallis, Owen, & Fisher, 2008); therefore, changes in societal attitudes and norms related to PCH are crucial during the design and implementation of the PCH promotion agenda.

Fifth, the study revealed that public policy interventions such as public awareness campaigns, societal re-orientation and PCH policy are critical for PCH integration and behavioural change among students. According to the narratives, public sensitization and education can promote PCH as a preventive health strategy. They also stressed the need for societal re-orientation to eliminate apathy towards PCH services among students. Further, spousal support, male involvement and voluntary PCH counselling, especially among sexually active young adults, also emerged as critical strategies for PCH promotion at the macro-level. Students felt that implementing these measures would advance the PCH promotion agenda and the preventive health culture. The findings may be explained by respondents' perceptions of the prevailing culture, values and attitudes towards engagement in reproductive

health services by young and unmarried people. Another plausible explanation may be fear of being stigmatized in the absence of a national sensitization and acceptance of the PCH concept.

The results were similar to findings of a past study that multifaceted interventions are required to position PCH at the forefront of funding and provision of preventive health services (Goodfellow et al., 2017). The results also correlate with Tuomainen et al.'s (2013) findings that lack of a prevailing culture of pregnancy preparedness is a major barrier to the uptake of PCH services. The results also fit into the theoretical basis of this study. In particular, theoretical underpinning to the TRA and SEM assumptions that subjective norms, peoples perceived over economic and environmental factors affect health behaviours (Ajzen, 2002; McLeroy et al., 1988). The current study's findings are consistent with the theoretical assumptions of the SEM that health promotion initiatives must consider several factors operating at the interpersonal, institutional and public policy levels to ensure behaviour change. Similarities in the present and past studies could be due to similarities in study samples' context and age range (developing countries and individuals in their childbearing ages). The results have several implications for PCH promotion and practice. First, there is the need for public education and participation towards accepting the PCH agenda. Second, spousal support and male involvement in PCH should be encouraged since evidence suggests improving MCH outcomes by improving men's genetic input to pregnancy and ensuring that pregnancies are planned and wanted (Alio, 2017; Frey et al.,

2008). The study also underscored the role of public engagement on PCH during the policy-making process.

The study also casts light on the need to empower all health institutions and institutions of higher education to embark on PCH education to provide students with the needed competencies on PCH. Given that both health facilities and institutions of learning are key settings appropriate for PCH promotion. Further, it is crucial to integrate PCH into the university curricula as the settings have proved to be a platform for PCH education. The findings may help design a national education campaign for PCH awareness creation in the general public. There is a need for policy formulation and interventions by the UCC, MOH, and government stakeholders.

Research Question Seven: How do healthcare professionals at the UCC hospital describe strategies and processes required to incorporate PCH interventions into routine reproductive health services?

This segment comprised findings from the inductive content analysis of key informant interviews conducted on health care professionals. The main purpose was to identify strategies and processes perceived by healthcare professionals for PCH integration into routine health services. Findings were presented in two sections: (1) themes generated on health care provider perceived strategies for integration, and (2) themes produced on perceived PCH integration facilitators. In each section, findings were presented in major themes, main categories, sub-categories, codes and meaning units (Burnard, et al., 2008; Erlingsson & Brysiewicz, 2017). Overall, the analysis emerged five major themes, four main categories, and nine sub-categories. The major

themes were context-specific strategies, integration at multiple levels of care, inter-professional collaboration, integrated care and integration facilitators.

Theme One: Context-Specific Strategies

This theme summarized respondents' views on how PCH services could be effectively organized and delivered to students. It produced one main category (service organization initiatives) with two sub-categories: student-centred services and readily available services. Respondents identified students-tailored services to facilitate demand and accessibility since time constraints are possible to patronage among students. They emphasized the need to give students priority at the hospital for PCH services. They also proposed using dedicated units, special PCH desks and clinics. The narratives indicate that PCH services can be organized once or twice a week to encourage uptake of services among students. The following narratives support this:

> *"There is a challenge between their academic work and their health, so we must think about how to schedule things"* (Female, 35 years, 6years experience, KII 2). *We need to have a day and time for them. We can also have a place where someone is always there to receive the students"* (Female, 27 years, 3 months 3 years KII 12).
>
> *"There should be a unit for that. They should not be mixed with the other patients"* (Male, 25 years, 1year experience, KII 13). Another indicated, *"...we can even have a clinic in the hospital, say twice or once a week; say Wednesday afternoon or Friday afternoon. Where somebody will be sitting there to listen to and advise students"* (Male,

49 years, 24years experience, KII 18). "…*We can have a day dedicated for that purpose, let's say Friday afternoon. On that particular day, there will be a Doctor or Nurse available so that students can come in and just have a chat*" (Male, 39 years, 13years experience, KII 21).

Theme Two: Integration at Multiple Levels of Care

This theme illustrates HCPs' appraisal of levels at which PCH services can be provided within the healthcare delivery system. This theme generated one main category (levels of service delivery) with four sub-categories. Emergent sub-categories comprised community-based services, students' clinic level services, facility-level services, and inter and intra-facility referrals. Emergent codes revealed that PCH services could be delivered outside and within the health facility using outreaches, hall infirmaries, and students' clinic services. Other service delivery points identified by respondents include the Out-Patient Department (OPD), consulting rooms, the RCH and the hospitals' counselling unit. Some respondents suggested that the RCH unit should be at the forefront of the PCH promotion initiative. The findings revealed that PCH integration could be implemented at multiple levels within and outside the UCC hospital using referral systems.

A 42-year-old female suggested:

"*...We may have to reach out more, for example, outreaches, public education and any couple that comes to the facility should be educated"* (Work experience, 8 years, KII 7).

Other respondents added*:*

"...We have hall infirmaries and programmes being organized in the halls. At least we can choose a month each in a semester and a team of health professionals can go there for such services." (Male, 25 years, 2years experience, KII 11). "…*You know some of the students in the halls are health professionals so they can take charge and when there is any problem they can refer, or they call the doctor to go and see them*" (Female, 56 years, work experience 35 years, KII 15).

"...*There should be a dedicated service point for experts to deliver services to people within this category*" (Female, 41 years, work experience, 8 years, KII, 3). "... *Some hospitals have a youth corner where we have one consulting room basically for that not necessarily having a Doctor being there to do consulting, but any health professional with that background can help*" (Male, 25 years, work experience, 2 years, KII 11). "...*These services may be given at the reproductive and child health (RCH) sections, but for us at the emergency, it is always I'm in trouble get me out it. The RCH is one of the best units with the Antenatal clinic. They can help initiate these policies. The hospital can pursue this agenda but champion by the RCH*" (Male, 34 years, work experience, 7 years, KII 4).

Another respondent suggested:

"There is a consulting room at the OPD, purposely for students, so I think the doctor can be informed about the need for students to have such a screening so that whenever they come, they can add such things

to their labs so I think we can do it" (Female, 37 years, work experience, 15 years, KII 8).

The study further shows that inter and intra-facility case referrals should be employed when necessary. Several HCPs shared their opinions as follows:

"... I do refer to the family physician specialist. I have also referred to the clinical psychologist" (Female, 42 years, work experience, 8 years, KII, 7). "*...We have a doctor from the Teaching Hospital, he comes here to do the gynae clinic on a part-time basis but by the time they come they are already pregnant... The cases usually come from the OPD"* (Female, 50 years, work experience, 25 years, KII 10). "…*Oh yes, but when they go to the RCH, and it demands screening, they should refer them here*" (Male, 25 years, work experience, 1 year, KII 13).

Theme Three: Inter-professional Collaboration

This theme reflects respondents' perceptions of the departments and calibre of healthcare professionals best fit to deliver PCH interventions. One main category was (integration of disciplines) with two sub-categories that emerged from the analysis: intra-departmental and inter-departmental collaboration. A significant number of HCP proposed inter-disciplinary collaboration in delivering PCH interventions at both intra-departmental and inter-departmental levels. The HCPs described their opinions as follows:

"A *lot of units and professionals have to be involved*" (Female, 56 years, work experience 35 years). "…*Well, all those involved in*

maternal care, the O&G Team, then the Public Health Unit. The public health unit will play a very important role, so there should be a collaboration between the public health and then obstetrics and gynaecology, especially the gynaecology part so that they could come out with something that will help them" (Male, 39 years, work experience, 13 years, KII 21).

"...that is the way we want to go, let's involve the counselling session, then the public health people and other health-related programmes; medical school, school of nursing, allied health, you will get a lot of professionals who have interest in that programme. I think it is workable, and they will love it" (Male, 49 years, work experience, 24 years, KII 18).

Theme Four: Integrated Care

This theme described respondents' preferred models for delivering PCH interventions. It generated two categories (integrated services and dedicated days). The analysis revealed respondents anticipated delivery of PCH interventions using the integrated care approach on dedicated PCH clinic days every week. This finding is evident in the excerpt below:

"... I mean integration kind of services... ". We can even have a clinic in the hospital, say twice or once a week; say a Wednesday or Friday afternoon, we have this clinic. If you have any such thing, there will be somebody sitting there to listen and advise you" (Male, 49 years, work experience, 24 years, KII 18).

Theme Five: Integration Facilitators

This theme depicts healthcare professionals' opinions on initiatives and processes required within the university and the broader social context to advance PCH integration at the UCC hospital. Six major categories and four sub-categories emerged from this theme. The categories were PCH awareness, staff capacity building, time considerations, funding initiatives, PCH policy and guidelines and management engagement. Overall, the findings underscored the need to create a supportive environment using institutional initiatives and policy frameworks to advance PCH the uptake and delivery of PCH services at the UCC hospital.

PCH Awareness:

Respondents identified a lack of awareness about the PCH services among students as a major challenge for the PCH promotion. Thus, they stressed awareness creation as a critical initiative to promote the uptake of PCH services among students. This is exemplified by the quotes below:

"... I think people do not have knowledge of such services, but if awareness is created that there is something like pre-conception care, people will come" (Female, 33 years, work experience, 9 years, KII 22). *"...Yes, let's empower them, it all about empowering them so that they can take decisions for themselves and that, of course, will help them become good mothers or during their pregnancy" So things that will help them do what is right* (Male, 39 years, work experience, 13 years, KII 21). *The students should also be talked to so they would*

give in to the services" (Male 25 years Work experience 2 years, KII-11).

Staff Capacity Building

Respondents identified the need for staff capacity building on PCH promotion strategy to enhance staff competencies in delivering PCH interventions. In particular, staff training in professional communication skills, maintenance of privacy and confidentiality were the dominant competencies mentioned and discussed by most respondents. This category generated three sub-categories: staff training, professional communication skills, privacy and confidentiality. The following narratives illustrate this:

"...the staff also needs to be trained on the services to increase their willingness" (Male 25 years Work experience 2 years, KII-11). "*...It is a person-to-person interaction. Suppose I'm a doctor and you come to me, and I meet you with a smile and even before you tell me what the problem is. In that case, I ask you how you are doing, or I complement your dress, it's a very potent ice breaker" (Male, 32 years, work experience, 10 years, KII 14). "...the problem with confidentiality is that students do not want their colleagues or their lecturers to know about their cases" (Female, 36 years, work experience, 13 years, KII 10). "…. Students do not usually request PCH services. Still, sometimes they come to me in my office and confide in me. I usually refer them to a Doctor. Once there is privacy and confidentiality, they will open up*" (Male, 48 years, work experience 19 years, KII 9).

Time considerations

This category represents health care professionals' perception of how time spent during hospital could interfere with the demand for PCH services among university students. They suggested that PCH services must be organized efficiently to reduce the time spent by the students during hospital visitations. This is highlighted in the extract below:

"...There is a challenge between their academic work and their health, so we must think about how to schedule things".

Funding Initiatives:

The most frequent PCH financing opportunities which emerged from the narratives were incorporating the cost of PCH services into school fees, the medical component of school fees, or the NHIS. Two sub-categories emerged from this category: pre-service payment and health insurance cover. Respondents believed that establishing pre-service payment schemes is necessary to reduce financial barriers to students requesting PCH services. The quotes below illustrate this:

"*…I suggest that the cost should be added to the school fees because sometimes, cost prevents people from getting access to these services"* (Female, 36 years, 13years experience, KII 10).

"...with the finances, I think it can be included in the medical bills for the semester" (Male, 25 years, work experience 2 years, KII 11).

"*…My problem is the funds. If it involves money, it may be a challenge. Integrating PCH into NHIS will be useful" (*Female, 41 years, experience 27 years, KII 1).

PCH Policy and Guidelines:

Two main sub-categories emerged from this category: policy and guidelines. Respondents expressed uncertainty about the existence of any policy on PCH. Consequently, they suggested strong advocacy towards developing an institutional or national policy on PCH. Additionally, they emphasized the need for a standardized protocol to guide the HCPs in delivering PCH services. The excerpts below confirm this:

> "*… I'm not too sure if the Ghana Health Service has a policy, but if there is, we haven't adopted it, but as a university, we can have a policy"* (Male, 49 years, work experience 24 years, KII 18). *"…I think we should make a case for it, now what is lacking is the case for it. Knowing our system when it comes to making policies, the policymakers are there, how to get your issue into the agenda is the main issue. A protocol would make it easier. If there is no protocol, everyone will do whatever they want to do"* (Male, 39 years, work experience, 13 years, KII 21).
>
> "*… We need something to guide us. As I told you, we don't have protocol available. We need the full support that will guide us"* (Female, 56 years, work experience, 35 years, KII 15).

Management Engagement for Support

Respondents believed that hospital management is paramount to the success of the PCH integration agenda. They emphasized the sensitization of management on the importance of the PCH strategy to guarantee the adoption of the PCH initiative at the study area. The analysis revealed that management

involvement is crucial during the PCH awareness campaigns. The following quote exemplified this finding:

> *"... I think for it to be very effective, those who are going to bring the policies need to be well abreast with the concept very well. I mean the hospital the management because they will enforce it. Afterwards, when they know the importance, they will be willing to let the professionals who are to handle it do their work effectively and also provide them with the things that they need to work very well*" (Female, 37 years, work experience, 15 years, KII 8).

This study revealed five major strategies that can be employed for PCH integration into routine health services at the UCC hospital. These included context-specific strategies, integration at multiple levels of care, inter-professional collaboration, integrated care and integration facilitators. In particular, health care professionals identified some student-tailored strategies to enhance accessibility to PCH services. They suggested student-friendly services, priority services for students, and PCH services on special days. The results may explain respondents' perceptions of challenges students may encounter during attempts to access PCH services. This finding is confirmed by (Stephenson, Fleming, Godfrey, & Barker, 2018) that PCH promotion initiatives must be supported by enabling contextual factors. The results also agreed with Steel et al. (2016) that specific times must be allocated for PCH counselling services. Similarities in the present and previous results may be due to similarities in the population studied (healthcare professionals). The findings support the recognition of the SEM that health behaviour and

behaviour change is dependent on social and environmental influences (McLeroy et al., 1988; Sallis, Owen, & Fisher, 2008). The implication is that the UCC hospital management must streamline PCH services by considering the special needs of university students.

Another novel finding was that PCH integration is feasible at multiple levels of healthcare in the study area. The narratives revealed four levels of care at both the community and health facility level. These include community-based services (outreaches and student-led services at residential halls), students' clinic services, hospital-based services and referral systems (intra-departmental and inter-facility referrals). Respondents' evaluation of context-specific strategies ideal for PCH integrating PCH services may explain the findings. Another likely reason is that respondents envisage the delivery of PCH services based on Ghana's Primary Health Care approach. The results were directly in line with the levels of care suggested by Lassi et al. (2014) and Hemsing et al. (2017).

The findings also support evidence that PCH interventions can be implemented as a component of existing health care and public programmes in LMICs to improve MCH outcomes (Berglund & Lindmark, 2016; Dean et al., 2013; Young et al., 2013). Results concur with the conceptual framework which guided the study. Specifically, the standpoint of McLeroy et al. (1988) is that the SEM can be employed as a framework to identify vital factors which influence behaviour change. Primary health care emerged as a critical setting for integrating PCH in the present study. Findings suggest that the residence halls and the community should be the first level of contact in

implementing PCH promotion programmes to ensure that services are as close as possible to the students. The results indicate that the primary health strategy must be utilized as a platform for PCH integration at the primary, secondary, and tertiary health care delivery systems.

The results show that PCH interventions can be delivered using inter-professional collaboration and the inter-disciplinary strategy. A possible explanation may be due to respondents' understanding of the role of partnership in implementing effective health promotion programmes. Results align with previous studies demonstrating that collaboration in healthcare settings reduces health care costs and improves job satisfaction (Morley & Cashell, 2017; Mahdizadeh, Heydari, & Moonaghi, 2015). Research indicates that collaboration in health care benefits HCPs and improves health outcomes (Verbiest, McClain, & Woodward, 2016). Verbiest et al. found partnership across diverse disciplines and sectors as a promising PCH transitional strategy given the complexities associated with PCH promotion.

Agreement between the present and past research could be attributable to similarities in study samples and advantages of the partnership during health promotion. The result supports predictions of the SEM that community and institutional factors are essential factors in health promotion efforts (Mcleroy et al., 1988). From these results, it is clear that PCH integration may not be successful in the context of the university community without deliberate collaboration among health care professionals. There is a need for broad consultations among the different healthcare professionals to harness the right mix of health professionals required for PCH integration efforts.

The study also revealed that PCH services could be delivered at the UCC hospital using an integrated care model. Respondents suggested that all health care professionals at the UCC hospital and the university should be involved in providing PCH services. Service integration is designed to provide multiple health services to clients during one visit to facilitate access and care from different providers (Briggs & Gamer, 2006). This finding may be attributable to respondents' level of knowledge regarding how to improve the quality of health care in a resource-limited country like Ghana. This finding is consistent with past research evidence showing the integrated health model of care as an essential strategy for improving health care access, patient satisfaction and quality of health care services (Milford et al., 2018). According to the WHO (2016), integrated care can be implemented at different levels and settings within the healthcare delivery system. Integrated care guarantees the provision of coordinated care within the health delivery system, efficiency and improves the experiences of health care consumers (Shaw, Rosen, & Rumbold, 2011). Similarities between the present study and previous literature may be due to the respondents' level of education and appreciation of university students' appropriate health care model. This finding is in accordance with institutional-level factors highlighted by McLeroy et al. (1988) in the SEM for effective health promotion interventions. To integrate PCH at the UCC hospital, hospital management must restructure services to ensure PCH services access and delivery.

In addition, the study drew attention to many factors as facilitators to the PCH integration at the UCC hospital. First, respondents identified the need for PCH awareness creation as an essential facilitator to requesting PCH services. They perceived a lack of PCH awareness as a major barrier to the PCH promotion agenda among university students. This finding may be explained by the absence of clear policy directives on the PCH strategy within the current health system in Ghana. The result supports previous findings that information and client education are critical to improving PCH awareness (Ayalew, Mulat, Dile, & Sigmegn, 2017; Johnson et al., 2006; Lassi et al., 2014; Hayden, 2017; Mitchell & Verbiest, 2013; WHO, 2013). This finding is important as research indicates that PCH awareness alone can lead to the lifestyle adjustments necessary to reduce risk factors associated with adverse pregnancy outcomes (Vanusha & Parvathavarthini, 2018). The findings further correlate with research showing that unawareness about PCH services is the dominant reason people of reproductive age do not request PCH services (Bortolos et al., 2017; Fransen et al., 2018; Goodfellow et al., 2017; Poels et al., 2017).

Consistencies in the past and present studies may be due to similarities in contexts and characteristics of study designs. In the propositions of McLeroy et al. (1988), intrapersonal factors such as awareness of health-related issues influence health-seeking behaviour. This assertion was confirmed in students' words as follows, *"First of all, awareness creation is necessary…." "They should make a loud noise about it…."* This finding has

implications for developing comprehensive PCH education materials and campaigns among health professionals and university students.

Staff capacity development regarding PCH promotion emerged as another vital initiative imperative for successful PCH integration at the UCC hospital. The narratives highlighted professional communication skills, privacy, and confidentiality as areas where health providers require training. A possible explanation for these findings may be respondents' understanding of health services related factors necessary for PCH promotion among students. The results ties in with findings reported by several studies that training HCPs on how to deliver PCH interventions is an important strategy for advancing PCH promotion (Frey et al., 2008; Hemsing et al., 2017; Verbiest et al., 2016). For instance, Verbiest et al., in sharing their experiences of lessons learnt in the United States, found staff training a critical process in PCH integration into clinical practice. Similarities between the current and past findings can be explained by recommendations of the Reconvened Preconception Select Panel in the United States that provider and system changes are crucial in PCH integration efforts (Floyd, Johnson, Owens, Verbiest, Moore, & Boyle, 2014). This is consistent with predictions of the SEM that systemic factors are very important enabling factors worth attention in health promotion interventions (Mcleroy et al., 1988). The study draws attention to the need for training workshops on the PCH concept and competencies required for services provision at the university hospital.

Time considerations also emerged as an essential factor in the uptake of PCH interventions among university students. Respondents proposed efficient scheduling of PCH services to reduce time spent by the students during hospital visitations. This finding may be explained by fear regarding missing lectures due to time spent at the hospital during PCH consultations. This finding is consistent with research showing that prolonged waiting times is a major barrier to health-seeking behaviour among university students in Nigeria (Afolabi, Daropale, Irinoye, & Adegoke, 2013). The excerpt below in a study conducted by Onokerhoraye and Dudu (2017) among adolescents on the accessibility and utilization of reproductive health services further reiterates the finding of the current research *"Waiting for a long time in health centre..., I believed it is a big challenge to get treatment".* Consistencies between current and previous research could be due to similarities of characteristics of the study population. This finding is directly in line with the conceptual framework and theoretical propositions that characteristics of target populations constitute critical mediating factors that cannot be ignored in the design and implementation of health promotion programmes (Mcleroy et al., 1988; Kumar & Preetha, 2012). This means the Directorate of University Health Services has to employ student-friendly initiatives to deal with students' possible delays during PCH hospital visitations. The finding also underscores the need to identify all other intrapersonal factors which may interfere with students' access and demand for PCH interventions.

The findings also revealed that innovative PCH financing options such as pre-service payment schemes and health insurance coverage must be

implemented to ensure affordability and accessibility to PCH services among university students. This finding supports evidence that funding and health insurance cover improve the likelihood of engaging in PCH promotion initiatives (Atrash & Johnson, 2008; Lassi et al., 2014; Young et al., 2013). Respondents' previous experiences could explain similarities in the past and present findings regarding the affordability of healthcare costs. The proponents of the SEM reached similar conclusions that intrapersonal factors influence the adoption of health behaviour Mcleroy et al., 1988; Kumar & Preetha, 2012). A probable reason for this result is common knowledge among respondents that most university students are not financially independent. This finding may be attributable to uniformities in the operationalization of concepts explored in the past and the present study. The implication is that stakeholders must consider students' individual needs to remove financial barriers to PCH promotion among university students.

The findings found evidence that national policy and standardized protocols are required to advance the PCH agenda in Ghana. This may be due to the lack of clear policy directives and guidelines for PCH promotion in Ghana's health care system. The result may also be due to the respondent's knowledge of the policy implications of new health promotion programmes. A similar conclusion was reached by Richardson et al. (2007) in their article on contemporary and future strategies for PCH implementation. In particular, the authors recommended developing and distributing guidelines, educating consumers, and integrating preconception care activities into clinical and public health programmes. The results were also in line with Atrash &

Johnson, Adams, Cordero, and Howse (2006) report that health system changes require policy to support or regulate PCH initiatives. The findings also compare with a 2013 report by the WHO that PCH promotion programmes should be designed in accordance with international, regional, countrywide and local realities. Consistencies in the current and past evidence may be attributed to current evidence-based of what works in PCH interventions. McLeroy et al. (1988) have argued that rules, regulations, and public policies are essential components of successful health promotion programmes. Therefore, it is imperative for stakeholders at the university hospital, UCC and the MOH to translate the above findings into policy directives to promote the PCH promotion agenda. The study also emphasized the need for a standardized protocol to guide the delivery of PCH services.

This qualitative study showed that management support is necessary for the effective implementation of the PCH agenda at the UCC. A probable explanation for this result is that necessary actions such as resource allocation and policy and practice changes required for successful PCH integration at the UCC hospital depend on management approval. The finding compares with recommendations of experts that PCH policy development requires all-inclusive stakeholder engagement and evidence-based decision-making (Johnson et al., 2006). Similarities between the present and expert recommendation on the need for stakeholder engagement and broader consultation during the design and implementation could explain respondents' past experiences on what worked during similar projects. The findings tie in with propositions of the SEM that health behaviour is not the exclusive

responsibility of those expected to enact the behaviour in question but a supportive social context (McLeroy et al., 1988; Sallis, Owen, & Fisher, 2008). The study provides evidence that Ghana is yet to translate international recommendations on PCH promotion into clinical practice. This emphasises the need to develop a PCH strategic action plan to guide PCH promotion in the UCC. Overall, the findings support different levels of influence on health behaviour proposed by the SEM.

This chapter presented the findings of both the quantitative and qualitative phases of this mixed-methods study. The purposes of the study were to: (a) assess the level of awareness and perceived attitudes of UCC students on PCH related issues, (b) estimate the prevalence of PCH risk factors among students of UCC, (c) examine factors influencing students' PCH awareness and attitudes towards PCH promotion within the context of the university community, and (d) explore qualitatively the perceptions of a section of students and healthcare professionals at the UCC hospital on how to integrate PCH interventions into existing reproductive health services. The quantitative analysis demonstrates that although many students had moderate to high awareness of PCH-related issues, they lack awareness of relevant PCH information and behaviours necessary to inform PCH promotion decision making. The findings also highlighted the prevalence of lifestyle, behavioural and environmental preconception risk factors associated with adverse reproductive outcomes among university students. Students who demonstrated negative attitudes towards PCH promotion were considerably higher than those who showed positive attitudes. The PCH awareness regression model

presented in table 4.6 found ethnicity (Ewe), Christianity and Islamic religions, and studying at the Faculty of Social Sciences as significant predictors of PCH awareness levels.

Additionally, the study found ethnicity and the combined effect of age and income as significant predictors of positive attitudes towards PCH promotion. PCH risk factors and future PCH intention and self-efficacy of students to adopt PCH behaviours were also associated with positive PCH attitudes towards PCH promotion. The qualitative study revealed how specific strategies at the interpersonal, institutional, societal and public policy levels could facilitate PCH integration at the UCC hospital.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purposes of the study were to: (a) assess the level of awareness and perceived attitudes of UCC students on PCH related issues, (b) estimate the prevalence of PCH risk factors among students of UCC, (c) examine factors influencing students' PCH awareness and attitudes towards PCH promotion within the context of the university community, and (c) explore qualitatively the perceptions of students and healthcare professionals at the UCC hospital on how to integrate PCH interventions into existing reproductive health services. This chapter provides an overview of the whole thesis. It outlines the summary, major findings from quantitative and qualitative phases of the study, conclusions, and recommendations to policy, practice and future research.

Summary

PCH relates to the health of men and women during their reproductive years, emphasising reducing risk factors, improving healthy behaviours, increasing pregnancy preparedness, and safeguarding fertility. University students, in particular, are prone to numerous risk behaviours which might affect their health and future MCH outcomes. These include alcohol use, unsafe sex, unplanned sex, unintended pregnancies, non-use of contraceptives, unsafe abortions and STIs. Evidence suggests that PCH promotion provides a unique opportunity for early detection and amelioration of these risk factors.

Ironically, PCH promotion remains a missing link in routine reproductive health services in Ghana. Previous studies show that risk factors for adverse pregnancy outcomes among reproductive-aged individuals exist long before pregnancy occurs. Thus, addressing these risk factors before pregnancy can lead to major improvements in MCH outcomes. However, past studies revealed that most reproductive-aged individuals in developing countries are unaware of PCH recommendations. Nevertheless, past PCH literature has focused on women with pregnant women, women with chronic conditions, ignoring non-pregnant university students.

Further, there seems to be no study in Ghana on PCH awareness, a critical step to engaging in PCH promotion among university students. Similarly, information regarding strategies and approaches to integrate PCH into existing reproductive services for university students in Ghana is limited. The findings of this study have serious implications for health care practitioners and policymakers responsible for developing policies to safeguard MCH outcomes.

PCH promotion can potentially prevent a considerable proportion of MCH morbidity and mortality. Aside from ensuring that all pregnancies are planned and wanted, PCH promotion assists individuals to begin pregnancy in the best state of health. More so, the PCH strategy offers framework identification and management risk factors associated with adverse MCH outcomes. Further, it is appropriate for reducing the prevalence of risk factors for poor MCH outcomes. However, it seems Ghana has no explicit protocols and policies to guide the delivery of PCH interventions.

A review of major behavioural theories and models demonstrates that health promotion is a promising approach for advancing behaviour change and health promotion practice using the socio-ecological perspective. Notable levels of influence highlighted include individual, interpersonal, institutional, social, and public policy level factors. In other words, health promotion interventions must seek to address health problems using a wide range of strategies across multiple levels. These include initiatives to influence individual characteristics or perceptions and institutional, societal and public policy factors that may be barriers or facilitators to recommended health behaviour.

The present study employed the embedded mixed methods approach guided by the Pragmatic paradigm. Thus, quantitative and qualitative methods and procedures were concurrently used in a single study to collect data from students of UCC and health care professionals at the UCC hospital. The study adopted cross-sectional and multiple case study designs. Data were collected from 1,547 students in the quantitative phase using a 54-item self-administered questionnaire with four sections [A, B, C, D]. Section A assessed socio-demographic characteristics such as age, gender, ethnicity, relationship status, study programme, and year of university education. Section B measured respondents' level of awareness on PCH related issues.

Furthermore, sections C explored the prevalence of PCH risk factors and students' perceived attitudes towards PCH promotion, respectively. For the qualitative phase, perceived strategies for PCH integration were explored using semi-structured interview guides with 22 students and 55 healthcare

professionals. Both instruments were pre-tested among students and healthcare professionals who were not part of the main study. The Kuder-Richardson 20 (KR-20) formula was used to test the internal consistency of all dichotomous items on the quantitative instrument. In contrast, the instrument's internal consistency reliability of Likert-scaled items was established with the Cronbach's Alpha coefficient. Most sub-scales of the instrument ranged between .86 and .90. Lincoln and Guba's four steps criteria for trustworthiness were employed to establish the rigour of the qualitative study. These entailed credibility, transferability, dependability and conformability.

Maximum variation purposive sampling technique was utilized to recruit a sub-population of students and healthcare professionals for the qualitative study. Mixed-gender FGDs and KII were conducted independently until theoretical saturation was reached. Binary and multinomial logistic regression models were employed to estimate research questions four and five. The stepwise selection process enabled selecting the best possible set of variables for each model. The test of multiple correlations of the variables was performed using the point-biserial correlation coefficient matrix. SPSS version 20 for windows (IBM Corporation 2011) and STATA version 12 were employed to compile and analyse quantitative data. Research questions six and seven were explored manually using the inductive content analysis methods.

Key Findings

The present study found that most students have moderate to high awareness of PCH related issues. However, they are generally unaware of important information and behaviours required to optimize PCH status. For

instance, most students erroneously indicated that "A female who has decided to start having children should schedule her first visit to the doctor when she discovers she is pregnant". "A female should start taking vitamins when she discovers that she is pregnant". The majority wrongly reported that the father's age is not a significant determinant of pregnancy outcomes.

Also, the study found the prevalence of several PCH risk behaviours associated with adverse MCH outcomes among respondents. The most prevalent risk behaviours and risks included second-hand smoke exposure, alcohol use, exposure to radiation and household teratogens harmful to reproductive health and STIs history. Other PCH risk factors found were unhealthy stress, unmet needs for contraception, undernutrition, eating disorders, lack of folic acid supplementation and RLPs.

Significant differences were found between PCH awareness levels (high and moderate) and some socio-demographic characteristics. Students' characteristics such as ethnicity, religion, and programme of study were each found to be related to PCH awareness levels. However, no significant difference was found between age, gender, marital status, employment status, level of university education and PCH awareness levels.

Students who demonstrated negative attitudes towards PCH promotion were substantially more than those with positive attitudes. Ironically, positive attitudes towards PCH do not predict future PCH behavioural intentions among students. Furthermore, ethnicity and the combined effect of age and income were predictors of positive attitudes towards PCH promotion. For instance, a unit increase in the product of a student's age and monthly income

increased the probability of demonstrating a positive attitude towards PCH promotion. Interestingly, high PCH awareness did not predict positive attitudes towards PCH promotion in this study.

PCH risk factors and behaviours associated with positive attitudes towards PCH promotion include particular, self-perceived poor health status, having a RLP, alcohol consumption (partner) and eating disorders. Furthermore, students who had RLPs, future PCH intention and self-efficacy to adopt PCH behaviours were likely to have positive PCH attitudes towards PCH promotion.

The qualitative study showed that PCH integration into reproductive health services at the UCC hospital would be feasible using many interpersonal level education and behavioural change strategies. Specific strategies highlighted by respondents were PCH awareness creation and education, sensitization and information on PCH. Participants also stressed routine PCH advice from health care professionals, PCH promotion alerts on mobile devices, social media campaigns, and PCH advocacy for information dissemination and education strategies to increase uptake of PCH services among UCC students.

Health care professionals also emphasized the need for institutional support for the PCH promotion strategy with policy directives and a standardized protocol to guide the delivery of PCH interventions at the UCC hospital. The essence is to provide institutional support to facilitate the PCH integration agenda at the UCC hospital. A range of strategies recommended by respondents to facilitate PCH promotion includes PCH integration into

curricula and PCH screening as a component of the mandatory medical screening for all fresh students. They also proposed pre-service payment schemes by health care professionals to remove financial barriers to accessing PCH services. They also offered broad consultation to inform decision-makers in the planning process for PCH integration.

According to the study, innovative student-tailored strategies such as walk-in and lunch breaks services, clinics/desks, and PCH days may facilitate students' demand and accessibility to PCH services. Respondents described a range of strategies for the effective delivery of PCH interventions. These include community-based PCH promotion initiatives like mobile PCH clinics, PCH counselling during hospital visits at the consulting rooms and counselling in students' residential halls

The findings also showed that PCH service could be delivered at multiple levels within the health care systems as a holistic strategy for PCH integration. Specifically, they identified the provision of community-based PCH services, facility-based services at the hospital and students' clinic supported by referral systems. They also recommended inter-professional collaboration and the integrated care approach as models for delivering PCH services to students. According to the narratives, decision-makers should pool all health professionals at the hospital and the University hospital to improve the human resource of the PCH strategy. Respondents also proposed integrated clinics where PCH services will be incorporated into each health care system level as the best model for delivering PCH interventions.

The findings showed that a supportive social environment is essential for promoting PCH into the existing healthcare system. Respondents identified public awareness campaigns, spousal support, societal orientation and a national policy on PCH as pre-requisites for acceptance of the PCH strategy in our context. In addition to the strategies proposed for PCH integration, health care professionals described a number of enabling factors for the PCH integration agenda at the UCC hospital. Perceived PCH enabling factors include PCH awareness creation, staff capacity building, time considerations for students, management support and innovative PCH financing options such as health insurance coverage.

Conclusion

1. The findings suggest that PCH awareness was commendable, but students lack vital information about PCH promotion and improved MCH outcomes.
2. The high prevalence of PCH risk factors puts students at increased future adverse MCH outcomes such as unwanted pregnancy, miscarriage, induced abortion, and giving birth to babies with congenital anomalies.
3. Students' negative attitudes about PCH promotion could result from the lack of awareness of pertinent PCH information and the unavailable of routine PCH services in the University hospital.
4. The students' awareness level on issues related to PCH varied by socio-demographic factors (ethnicity, religion, and faculty of the

student), which could inhibit or promote engagement in PCH promotion interventions.

5. Subsidizing the cost of PCH services could be an incentive for improving attitudes and uptake of PCH interventions among university students; the endorsement of PCH initiatives is connected to their future PCH behavioural intentions and self-efficacy.
6. PCH promotion among university students can be advanced through awareness creation, advocacy, and student-centered strategies.
7. PCH promotion among university students can be advanced through capacity building of healthcare professionals, development of protocols to guide the delivery of PCH interventions, and a broader policy forum on the PCH promotion agenda.

Recommendations

Based on the conclusions of this study, the following strategies are recommended;

1) The University's Counselling Unit and Hospital should tailor PCH education and interventions to bridge the knowledge gap on PCH-related issues among students.
2) The University hospital should develop PCH screening tools to facilitate early identification and management of risk factors that may lead to future MCH outcomes. Additionally, healthcare professionals at the University must take advantage of every encounter with students to introduce them to the essential components of the PCH strategy.

3) Healthcare professionals should offer sensitization on PCH promotion and its relevance to improving reproductive outcomes to students to translate positive attitudes towards it into actual PCH behaviours. Stakeholder consultation is required among health care professionals and specialists in MCH to develop PCH educational materials and messages to promote PCH within the University community.
4) There is a need for stakeholders of the University community to formulate policies and design PCH promotion interventions to target socio-demographic factors such as age, ethnicity, religion, and faculty of students to remove potential barriers to accessing PCH services.
5) The university's management should make accessing PCH services a part of the healthcare cost; there is the need for a supportive social context that facilitates and sustain student engagement in PCH behaviours.
6) Provosts, Deans and Heads of various departments in the University should take a proactive decision to incorporate the PCH promotion agenda into the university curricula to improve students' awareness of the PCH concept. Stakeholders of the university should incorporate PCH education into student orientation also use advocacy, social media campaigns, and student-led initiatives. Also, the university should issue policy directives to enable PCH integration into routine health care services and the University curricula.
7) The university's management should engage relevant stakeholders to develop staff capacity and develop policies and protocols for PCH

interventions to facilitate a paradigm shift towards PCH promotion among university students. Mainly, staff training on the PCH promotion strategy should be undertaken by the in-service training unit of the University hospital to ensure that service providers have the competencies required to bridge the PCH promotion gap in current reproductive health services.

Suggestions for Further Studies

Based on the findings of the present study, the following recommendations were put forward for future research:

1. Future research is needed to explore interactions between key socio-demographic factors such as age, ethnicity, religion, programme of study, and PCH services uptake among university students.
2. More rigorous research is required on the causal effect of exposure to selected PCH risk factors on pregnancy outcomes among women of reproductive age to inform health policy.
3. A longitudinal study is necessary to explore the impact of PCH education on uptake of PCH services among university students and individuals of reproductive age in the general public over time.
4. The current study should be replicated among individuals in the general population to deepen understanding of how PCH awareness levels, socio-demographic characteristics, and attitudes influence PCH promotion efforts.

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APPENDICES

APPENDIX A: INTRODUCTORY LETTER

UNIVERSITY OF CAPE COAST
COLLEGE OF EDUCATION STUDIES
FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION
DEPARTMENT OF HEALTH, PHYSICAL EDUCATION & RECREATION

TELEPHONE: +233 - (0)206610931 / (0)543021384 / (0)268392819

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Our Ref: ED/HTP/15/0001/7

4th February, 2019

TO WHOM IT MAY CONCERN

INTRODUCTORY LETTER:
MS. PATIENCE FAKORNAM DOE (ED/HTP/15/0001)

The bearer of this letter, Ms. Patience Fakornam Doe, is a PhD (Health Promotion) student of the Department of Health, Physical Education and Recreation in the University of Cape Coast. She is working on her thesis titled **"Preconception Health Awareness of Students of University of Cape Coast"** as part of the requirements for the programme.

She would like to collect data in your institution for her research work. The data will be used for academic purposes only and be assured that the information collected will be treated with utmost confidentiality.

We would therefore be very grateful if she is given the permission and also offer her any assistance needed from your outfit.

We count on your usual co-operation.

Thank you.

Yours faithfully,

Dr. Daniel Apaak
(Head of Department)
Tel.: +233 (0)208587866
Email: daniel.apaak@ucc.edu.gh

APPENDIX B: ETHICAL CLEARANCE

UNIVERSITY OF CAPE COAST

INSTITUTIONAL REVIEW BOARD SECRETARIAT

TEL: 0558093143 / 0508878309/ 0244207814
E-MAIL: irb@ucc.edu.gh
OUR REF: UCC/IRB/A/2016/325
YOUR REF:
OMB NO: 0990-0279
IORG #: IORG0009096

C/O Directorate of Research, Innovation and Consultancy

21ST MARCH, 2019

Ms. Patience Fakornam Doe
Department of Health, Physical Education and Recreation
University of Cape Coast

Dear Ms. Doe,

ETHICAL CLEARANCE – ID: (UCCIRB/CHAS/2018/86)

The University of Cape Coast Institutional Review Board (UCCIRB) has granted **Provisional Approval** for the implementation of your research protocol titled **Health awareness of students of University of Cape Coast.** This approval requires that you submit periodic review of the protocol to the Board and a final full review to the UCCIRB on completion of the research. The UCCIRB may observe or cause to be observed procedures and records of the research during and after implementation.

Please note that any modification of the project must be submitted to the UCCIRB for review and approval before its implementation.

You are also required to report all serious adverse events related to this study to the UCCIRB within seven days verbally and fourteen days in writing.

Always quote the protocol identification number in all future correspondence with us in relation to this protocol.

Yours faithfully,

Samuel Asiedu Owusu, PhD
UCCIRB Administrator

21/03/19

APPENDIX C: INFORMED CONSENT FORM

Title: Factors influencing preconception health promotion among students of University of Cape Coast

Principal Investigator: Patience Fakornam Doe

Address: School of Nursing and Midwifery, University of Cape Coast

General Information about Research

This study proposes to determine the extent of PCH awareness among UCC students and the perceived attitudes of students towards PCH promotion within the context of the university community. The study also intends to explore qualitatively the perceptions of a section of students and healthcare professionals at the UCC hospital on how to integrate PCH interventions into existing reproductive health services. The study will be conducted between March and June 2019 using a mixed-methods approach. Participants will include undergraduate and postgraduate students recruited from the School of Allied Health Sciences, School of Agriculture, Faculty of Arts and Faculty of Science Education.

Procedures for focus group discussions (FGD)

To find answers to some of these questions, we invite you to take part in this research project. If you accept, you will be required to participate in a 45 minutes discussion with 7-8 other persons with similar experiences. This discussion will be moderated by a moderator or me. You are invited to participate in this discussion because we feel that your experience as a student can contribute much to the debate on how preconception health services can be delivered at the UCC hospital. However, during this discussion, we do not

wish you to tell us your personal experiences but give us your opinion on the questions we will pose to the group based on your personal experiences and your experience within your community. If you do not wish to answer any of the questions or participate in any part of the discussion, you may say so and keep quiet. The debate will occur in [location of the FGD], and no one else but the people who participate in the discussion and the moderator or myself will be present during this discussion. The entire debate will be tape-recorded, but **no one will be identified by name on the tape**. Additionally, the tape will be kept [explain how the tape will be stored]. The recorded information is considered confidential, and no one else except [name of person(s) with access to the tapes] will have access.

Procedures for Key Informant Interviews (KII)

The interview will take place in [location of the interview], and no one else but the interviewer will be present. The information recorded is considered confidential, and no one else except [name of person(s) with access to the information] will have access to the information documented during your interview. If you do not wish to answer any of the questions posed during the interview, you may say so, and the interviewer will move on to the next question. The interviews will be audio-taped with your permission to ensure accurate accounts of your viewpoints. The recordings will be replayed to you for corrections and additional responses. The expected duration of the interview will be approximately 45 minutes.

Procedures for Survey

We invite you to take part in this research project. You will be expected to fill out a questionnaire that Research Assistants will provide. Individual students will be contacted, and informed consent sought from participants in advance. Pertinent questions regarding the study will be answered, after which the date, time and location for data collection will be scheduled according to participants' preference. The same Research Assistants will collect completed questionnaires. If you do not wish to answer any of the questions included in the survey, you may skip them and move on to the next question. The information recorded is considered confidential, and no one else except my supervisors will have access to your survey. The questionnaire will take approximately 30 minutes. You have been selected to participate in this study because any information you provide will inform advocacy and policy directives towards the integration of preconception health into reproductive health services in Ghana.

Possible Risks and Discomforts

The questionnaire is anonymous, and any information you provide will be kept strictly confidential. Understandably, participants involved in the survey may feel some form of temporary embarrassment or upset, especially due to the questions posed about their sexuality or other sensitive/private information. If you do not wish to answer any of the questions during the interview, you may skip them and move to the next question.

Possible Benefits

There may be no direct benefit to you as a participant. However, the findings of this study will impact the policy and the delivery of PCH services in Ghana. Specifically, this study's findings will also provide information to stakeholders in reproductive health on the level of PCH awareness, the prevalence of PCH risk factors, predictors of PCH behaviour, and attitudes of students towards PCH promotion. The study is also pertinent as strong evidence for government and stakeholders for revising the reproductive and child health policies to incorporate the concept of preconception care into existing reproductive health services.

Confidentiality

We will protect information about you to the best of our ability. You will not be named in any reports. However, my supervisor and other research committee members may access the research records and may sometimes look at your research records for the purposes of data verification.

Compensation

This research project does not intend to compensate participants at the end of the study.

Voluntary Participation and Right to Leave the Research

Your participation in this study is strictly voluntary, and you have the right to withdraw from this study anytime in the future while the survey progresses. You will not be penalized or lose any of the future benefits that result from the findings of this study. Please be informed, however, that in the event that the data you supplied has been entered into some interim analyses, it may be

impossible at that point to retrieve your data since your identity is concealed in the database.

Key Contacts for Further Clarifications or Complaints

For further information, you may contact the Principal Investigator (Miss Patience Fakornam Doe) on 0244225957. You may also contact my supervisors; Dr. Thomas Hormenu (244213465) and Dr. Nancy Innocentia Ebu-Enyan (0541145193).

Your rights as a Participant

This research has been reviewed and approved by the Institutional Review Board of the University of Cape Coast (UCCIRB). If you have any questions about your rights as a research participant, you can contact the Administrator at the IRB Office between 8:00 am and 4:30 p.m. through the phone lines 0558093143/0508878309/0244207814 or email address: irb@ucc.edu.gh.

VOLUNTEER AGREEMENT

The above document describing the benefits, risks and procedures for the research title **(**Factors influencing preconception health promotion among students of the University of Cape Coast**)** has been read and explained to me. I have been given an opportunity to have any questions about the research answered to my satisfaction. I agree to participate as a volunteer.

_____ _____

Date Name and signature or mark of volunteer

If volunteers cannot read the form themselves, a witness must sign here:

I was present while the benefits, risks and procedures were read to the volunteer. All questions were answered, and the volunteer has agreed to take part in the research.

_____ _____

Date Name and signature of witness

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual.

_____ _____

Date Name Signature of Person Who Obtained Consent

APPENDIX D: QUESTIONNAIRE

UNIVERSITY OF CAPE COAST

COLLEGE OF EDUCATION STUDIES

FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION

DEPARTMENT OF HEALTH, PHYSICAL EDUCATION AND RECREATION

QUESTIONNAIRE

Dear Respondent,

This questionnaire seeks to assess the **Factors Influencing Preconception Health (PCH) Promotion among Students of the University of Cape Coast.** It is part of research work in partial fulfilment of Doctoral Degree from Faculty of Science Technology Education. I would be grateful if you could complete the items below to assist in the realization of the intent of this study. The questionnaire will take approximately 15 minutes of your time. Please note that any information you provide will be kept confidential and used for research purposes only. You may contact my supervisor Dr. Thomas Hormenu (0244213465), for any clarification.

Name: Patience Fakornam Doe (0244225957)

Thank you very much for your assistance.

SECTION A: DEMOGRAPHIC DATA OF PARTICIPANTS

INSTRUCTION: Kindly respond by writing in the blank spaces or placing a tick [√] inside the box provided

1. Age at last birthday:…….years

2. Gender:
   a. Female [ ]
   b. Male [ ]
3. What is your ethnicity?
   a. Akan [ ]
   b. Ga/Dangme [ ]
   c. Ewe [ ]
   d. Guan [ ]
   e. Mole-Dagbani [ ]
   f. Grusi [ ]
   g. Guma [ ]
   h. Mande [ ]
   i. Other please specify…….
4. What is your weight? ……..... (in Kilograms (kg))
5. What is your height? ……..... (in centimetre (cm))
6. What is your religious denomination?
   a. Catholic [ ]
   b. Anglican/Methodist/Presbyterian [ ]
   c. Pentecostal/Charismatic [ ]

d. Other Christian Denomination, please specify……...

e. Muslim [ ]

f. African Traditional Religion [ ]

g. Other Religions, please specify……..……

h. Other please specify..…….

7. What is your relationship status?

a. Single and not living with a partner [ ]

b. Single but living with a partner [ ]

c. Married [ ]

d. Divorced [ ]

e. Separated [ ]

f. Widowed [ ]

g. Other status, please specify……

8. Please indicate a range for your estimated monthly income/remittances……..

9. Faculty /School …….

a. School of Health and Allied Sciences [ ]

b. Faculty of Social Sciences [ ]

c. School of Physical Sciences [ ]

d. Faculty of Educational Foundation [ ]

10. Department …….

a. Dept. of Optometry [ ]

b. Dept. of Biomedical Sciences [ ]

c. Dept. of Sociology and Anthropology [ ]

d. Dept. of Geography and Regional Planning [ ]

e. Dept. of Mathematics and Statistics [ ]

f. Dept. of Computer Science & Information Technology [ ]

g. Dept. of Education and Psychology [ ]

h. Dept. of Basic Education [ ]

11. Programme of study…….....

12. Level of Programme …….

13. Current level of university education

a. Bachelors 's degree [ ]

b. Masters degree [ ]

c. PhD [ ]

14. What is your employment status:

a. Unemployed [ ]

b. Self-employed [ ]

c. Government employee [ ]

d. Private company employee [ ]

e. Other, please specify……

SECTION B: AWARENESS ON PRECONCEPTION HEALTH (PCH) RELATED ISSUES

This section of the questionnaire is meant to assess your **level of awareness of PCH related issues**.

Please indicate your level of agreement with each of the following statements using a tick [√], to select "Agree" or "Disagree"

Statements	Agree =1	Disagree =2 (0)
15a. Preconception health relates to the health of a woman before she becomes pregnant		
15b. Preconception health encompasses the overall health of men and women in their childbearing years		
15c. Preconception health focuses on the health of a woman before her first and subsequent pregnancies		
15d. A female who has decided to start having children should schedule her first visit to the doctor when she discovers she is pregnant		
15e. A female should start taking vitamins when she discovers that she is pregnant		
15f. Folic acid is effective in reducing the risk of birth defects		
15g. Smoking and second-hand smoke exposure is dangerous to the unborn baby		
15h. Medications (prescribed and non-prescribed) need to be reviewed with the doctor before pregnancy		
15i. It is important to attain and maintain good health prior to pregnancy		
15j. Certain foods should be avoided when contemplating a pregnancy		
15k. The age of the father is a significant determinant		

of pregnancy outcomes		
15l. The health and behaviour of women is more important to pregnancy outcomes		

SECTION C: PREVALENCE OF PRECONCEPTION RISK FACTORS

This section **assesses PCH risk factors** you might have been exposed to in the past years.

Please respond to each question by ticking [√] in the appropriate box.

16a. How would you rate your general health status?

1) Excellent [ ]
2) Very good [ ]
3) Good [ ]
4) Fair [ ]
5) Poor [ ]
6) Very poor [ ]

16b. Do you have a reproductive life plan?

1=Yes [ ]
0=No [ ]

16c. Have you ever given birth?

1=Yes [ ]
0=No [ ]

If "no" move to question 16d

If "yes" move to question 16e

16d. How long do you want to wait before you begin having children?

1) Within a year [ ]

2) 2-5 years [ ]

3) 6-10 years [ ]

4) more than ten years [ ]

5) I do not want any children [ ]

16e. How long do you want to wait before you give birth again?

1) A year [ ]

2) 2-5 years [ ]

3) 6-10 years [ ]

4) More than ten years [ ]

5) I do not want any more children [ ]

6) I have had all my children [ ]

16f. What are you doing currently to prevent a pregnancy? **Tick [√] only one**

1) Not having sexual intercourse [ ]

2) Consistently using an effective birth control method [ ]

3) Relies on emergency contraception if necessary [ ]

4) Ensuring that my partner/spouse uses an effective birth control method [ ]

5) Nothing [ ]

6) Not applicable: I am trying to get pregnant [ ]

The statements below assess PCH risk factors you may have been exposed to in the past years. Please respond to each item by ticking [√] Yes or No in the appropriate box.

No.	17. Lifestyle, Behavioural and Environmental Exposures	Yes =1	No =2
a.	Have you ever been exposed to radiation? Example: diagnostic x-ray examination and radiation treatment for cancer (radiation from computers, televisions and mobile phones excluded)		
b.	Have you ever been exposed to chemical substances at work or at home? Example: anti-cancer drugs, bleach, toilet bowl cleaner, gasoline, pesticides and rodenticides		
c.	Do you have a partner (boyfriend/girlfriend/husband/wife)		
d.	Has your partner ever been exposed to radiation?		
e.	Is your partner exposed to chemical substances at work or at home?		
f.	Do you smoke?		
g.	Have you ever been exposed to second-hand smoking?		
h.	Does your partner smoke? (wife, husband, girlfriend, boyfriend etc)		
i.	Do you drink alcohol?		
j.	Does your partner drink alcohol? (wife, husband, girlfriend, boyfriend etc)		
k.	Do you use illicit drugs (cocaine, marijuana, heroin etc)		

l.	Does your partner use illicit drugs?		
	18. Nutritional History		
a.	Have you ever experienced an eating disorder characterized by excessive eating?		
b.	Have you ever experienced an eating disorder characterized by self-induced vomiting?		
c.	Do you usually consume an adequate amount of the various food groups? (fruits, vegetables, carbohydrate, proteins etc)		
d.	Do you have a special diet that includes any of the following? Example: vegetarian (no meat and fish), vegan (no animal products), macrobiotic (unprocessed), slimming diet, diet prescribed by a doctor		
e.	Do you take folic acid supplements?		
f.	Does your partner take folic acid supplements?		
g.	Have you ever eaten any raw food such as those stated below? (raw or not properly cooked meat, fish or shellfish, raw vegetables, raw egg, raw milk (straight from the farm)		
	19. Infectious and Immunization History	**Yes =1**	**No = 2**
a.	Have you ever had a sexually transmitted disease (STD) which includes any of the following? (Hepatitis B, genital herpes, Chlamydia, Genital warts,		

	Gonorrhoea, Syphilis (lues), HPV (Human Papillomavirus), HIV/AIDS, Trichomonas)		
b.	Has your partner ever had a sexually transmitted disease (STD) which includes any of the following? (Hepatitis B, genital herpes, Chlamydia, Genital warts, Gonorrhoea, Syphilis (lues), HPV (Human Papillomavirus), HIV/AIDS, Trichomonas)		
c.	Does anyone of the following apply to you? a. several or frequently changing sexual partners b. works professionally with blood, and other bodily fluids c. use injection needles to inject drugs		
d.	Does anyone of the following apply to your partner? **(Indicate NA if you don't have a partner)** a. Several or frequently changing sexual partners b. Works professionally with blood and other bodily fluids c. Uses injection needles to inject drugs		
e.	Have you ever received any vaccination within the past year? a. If yes specify the type of vaccination……		

f.	1. Has your partner ever received any vaccination within the past year? 2. If yes specify the type of vaccination ……..		
	20. **Medical History**	**Yes =1**	**No =2**
	Do you experience (unhealthy) stress as a result of your academic pursuits?		
	Have you ever experienced a health condition which includes any of the following? (Depression, anxiety, seizure disorder, intimate partner violence)		
	Have you ever had any health condition for which you are being or were treated by a doctor? If yes specify condition……....		
	21. Medication History	**Yes = 1**	**No = 2**
a.	Do you use any medicine prescribed by a doctor? (**This does not include contraceptives such as 'the pill').**		
b.	Does your partner use any medicine prescribed by a doctor? (This does not include contraceptives such as 'the pill').		

c.	Do you use over-the-counter medication(s), which you can buy at a chemist's or pharmacy? Examples: Paracetamol, Aspirin, nasal drops, cough medicine, ointments and alternative medicines.		
d.	Does your partner use over-the-counter medication(s), which you can buy at a chemist's or pharmacy? Examples: Paracetamol, Aspirin, nasal drops, cough medicine and ointments etc.		
	22. Reproductive and Obstetric History	**Yes = 1**	**No = 2**
a.	Is your partner currently pregnant? (Males only: choose **NA** if you are a Female)		
b.	Has your partner been pregnant before? (This includes abortion and/or miscarriages) (Males only: choose **NA** if you are a Female)		
c.	1. Are you currently pregnant? (**Females only**): choose **NA** if you are a Male) 2. Have you been pregnant before? (This includes abortion and/or miscarriages)(**Females Only**: choose **NA** if you are a Male)		

d.	If yes to **questions C1 or C2** did you experience any of the following problems during your previous pregnancy or pregnancies? a. Premature baby b. a baby with low birth weight (less than 2.5 kg) c. stillbirth (death baby before or during pregnancy) d. two or more pregnancies that ended in a miscarriage before the first 16 weeks of pregnancy e. a child born by caesarean section f. a child born with a congenital defect g. abortion		
e.	Have you ever had any of the following diseases during previous pregnancy or pregnancies? a. gestational diabetes b. formation of blood group antibodies (rhesus factor disease) c. eclampsia or pre-eclampsia (forms of toxaemia of pregnancy) d. Other serious pregnancy-related complications		
f.	Have you ever undergone a surgery performed by a gynaecologist during or outside pregnancy? (**Females only**: choose NA if you are a Male)		
g.	1. Have you ever experienced any anomalies of the		

	penis, testis/scrotum? (**Males only**: choose NA if you are a female**)** 2. Have you ever undergone a surgery of your manhood performed by a urologist? (**Males only**: choose NA if you are female)		
	23. Family History	**Yes = 1**	**No = 2**
a.	1. Do you have or ever had any hereditary or birth defects? 2. If yes specify ……..……..		
b.	1. Does any of your relatives have or ever had any hereditary or birth defects? 2. If yes specify ……		
c.	Does your partner (husband/boyfriend/wife/girlfriend) and/or any of his relatives have any of the above hereditary or birth defects?		

SECTION D: PERCEIVED ATTITUDE TOWARDS PRECONCEPTION HEALTH

24. This section of the questionnaire is meant to assess your **attitude towards PCH**

Please indicate your degree of agreement using a tick [√], to select the following options.

Key [SD = "Strongly Disagree", D = "Disagree", A = "Agree", SA = "Strongly Agree"]

Statements	**SD =1**	**D =2**	**A =3**	**SA =4**
24a. I worry that I/my partner/future partner could become pregnant				
24b. I worry that I/my partner/future partner could develop health problems during pregnancy				
24c. I worry that my baby could develop health problems during pregnancy				
24d. If my baby develops problems during pregnancy, I think these problems will be serious				
24e. If I/my partner had an unplanned pregnancy, I think this will be a serious problem.				
24f. Having blood sugar levels within the normal range before pregnancy will improve my chances of having a healthy baby				

25. **Please indicate your degree of agreement using a tick [√], to select the following options.**

Key [SD = "Strongly Disagree", D = "Disagree", A = "Agree", SA = "Strongly Agree"]

Statements	**SD =1**	**D =2**	**A =3**	**SA =4**
25a. When it comes to using preconception health counselling, I want to do what my wife/husband/partner/boyfriend/girlfriend thinks I should do.				
25b. When it comes to preconception counselling, I want to do what my parents think I should do.				

26. Respond to each item by ticking [√] Yes or No in the appropriate box

Statements	**Yes =1**	**No =2**
26a. Has a healthcare professional ever told you to get preconception health care before you become pregnant or plan a pregnancy?		
26b. Has anyone else (boyfriend, parent, partner, friend, etc) told you to get preconception counselling (special medical care and advice) before you become pregnant or plan for pregnancy?		
26c. Has a healthcare professional ever told you to use some type of birth control when preventing a pregnancy?		

26d. Has anyone else (boyfriend, partner, parent, friend, etc) told you to use some type of birth control when preventing pregnancy?		

27. Do you intend to use some type of preconception intervention in the near future?

a. Very Unlikely [ ]
b. Quite Unlikely [ ]
c. Don't Know [ ]
d. Quite likely [ ]
e. Very likely [ ]

28. If preconception screening costs 100-200 Ghana cedis will it be affordable?

a. Very affordable [ ]
b. Fairly affordable [ ]
c. Not affordable [ ]

29. On a scale of 0 - 10, rate how confident you are that you could do each activity below for at least 6 months. Please check [√] as appropriate

Statement	0	1	2	3	4	5	6	7	8	9	10
a. **I am confident that I can get** preconception counselling before pregnancy occurs											

b. **I am confident that l can** Change my lifestyle and practice key preconception behaviours even if I am not ready for pregnancy.										

30. Respond to each of the following statements by ticking [√] Yes or No

a. Would you say that getting preconception health counselling would help you to maintain or achieve optimal general and reproductive health?

1= Yes [ ]

0= No [ ]

b. Would you say that getting preconception health counselling would help you to understand how preconception health affects pregnancy outcomes?

1= Yes [ ]

0= No [ ]

APPENDIX E: INTERVIEW GUIDE (FGDs)

Dear Participant,

Thank you for taking the time to meet with me today. My name is Patience Fakornam Doe, a PhD candidate of the University of Cape Coast at the Department of Health, Physical Education and Recreation. I would like to seek your opinion regarding how preconception interventions could be effectively incorporated into the current reproductive health services at the University of Cape Coast Hospital. The interview will take between 30-60 minutes and I will be taping the session because l don't want to miss any of your comments. You are assured that your information will be treated confidentially and your name will not be included for anonymity. Are there questions about what I have just explained? Are you willing to participate in this interview? Please sign in the space below to indicate your consenting to take part in this study if you wish to participate in this study.

Thanks for your cooperation.

Participant_____ Date_____

SECTION A: SOCIO-DEMOGRAPHIC CHARATERISTICS OF PARTICIPANTS

1. Identity code of Student _____
2. Name your College and Programme _____
3. Current level of study in the University _____
4. What is your gender _____
5. What is your age?_____

6. What is your marital status? _____
7. What is your religious affiliation?_____

SECTION B: STRATEGIES AND RESOURCES REQUIRED TO INTEGRATE PCH INTERVENTION INTO EXISTING REPRODUCTIVE SERVICES

8. What comes to mind, when you hear preconception health?
9. Have any of you ever accessed PCH services?
10. In your opinion, what are the reasons why students do not request PCH services as an aspect of routine reproductive services? (Reasons for not engaging in preventive health services)
11. What do you think should be done to enable students to have more control of their PCH?

PROBES

a. What specific strategies and resources do you think will facilitate PCH promotion among students of UCC?
b. What do you think should be done by stakeholders such as the government, MOH, hospital management, UCC etc to facilitate PCH promotion among UCC students?
c. What is your view on how PCH services should be packed and delivered to students of UCC?
d. What in your opinion are the most effective strategies to influence awareness on PCH related issues among UCC students?

12. Are there any questions that have not been asked? Which ones?

13. Is there anything more you would like to add?

Thank you for your time

Interviewee _____ Date _____

APPENDIX F: INTERVIEW GUIDE (KIIs)

Dear Participant,

Thank you for taking the time to meet with me today. My name is Patience Fakornam Doe, a PhD candidate of the University of Cape Coast at the Department of Health, Physical Education and Recreation. I would like to seek your opinion regarding how preconception health (PCH) interventions could be effectively incorporated into current reproductive health services at the University of Cape Coast Hospital. The interview will take between 30-60 minutes and I will be taping the session because l don't want to miss any of your comments. You are assured that your information will be treated confidentially and your name will not be included for anonymity. Are there questions about what I have just explained? Are you willing to participate in this interview? Please sign in the space below to indicate your consenting to take part in this study if you wish to participate in this study.

Thanks for your cooperation.

Participant_____ Date _____

SECTION A: SOCIO-DEMOGRAPHIC CHARATERISTICS OF PARTICIPANTS

1. Identity code of health professional _____
2. What is your gender? _____
3. What is your age? _____
4. What is your marital status? _____
5. What is your religious affiliation? _____

6. Highest academic qualification _____
7. What is your profession? _____
8. Professional rank _____
9. What is your current position? _____
10. How long have you been in this position? _____
11. What about your years of working experience? _____

SECTION B: PROCESSES FOR INTEGRATING PCH INTO REPRODUCTIVE SERVICES

1. Please can you give me an overview of your daily routines in the provision of reproductive health services?
2. What comes to mind, when you hear about preconception health?

PROBES

a) What are your experiences regarding the provision of preconception care (PCC) to peoples of reproductive age?

b) Does your clientele usually request for preconception services?

c) Why do you think they do not ask these questions?

3. What is your opinion about the possibility of integrating PCH into existing reproductive health services?
4. What processes in your opinion are required to incorporate PCH interventions into routine reproductive health services?

PROBES:

a) What specific strategies or resources in your opinion are required to promote PCH among UCC students and other individuals of reproductive age?

b) What in your opinion are the most effective strategies to influence awareness on PCH related issues among UCC students?

5. We have reached the end of the interview. Do you any additional suggestions about how PCH can be effectively integrated into current reproductive health services at the UCC Hospital?

Thank you for your time

Interviewee _____ Date _____

APPENDIX G: DESCRIPTIVE STATISTICS OF VARIABLES IN MULTINOMIAL PCH REGRESSION

Table 10: Descriptive statistics of variables in the multinomial PCH regression

Variables (x_i)	Moderate- 50-74% PCH Awareness					High - ≥75% PCH Awareness				
	n	Mean	Sd	Min	Max	n	mean	Sd	Min	Max
Age (Years)	643	22.628	3.689	16	45	783	22.930	4.116	15	42
sFemale*	643	0.482	0.500	0	1	783	0.427	0.495	0	1
mSingle1*	643	0.505	0.500	0	1	783	0.531	0.499	0	1
eAkan*	643	0.621	0.486	0	1	783	0.622	0.485	0	1
eEwe*	643	0.174	0.380	0	1	783	0.170	0.376	0	1
rChristains*	643	0.902	0.298	0	1	783	0.927	0.260	0	1
rMuslim*	643	0.093	0.291	0	1	783	0.065	0.247	0	1
EduBac*	643	0.953	0.211	0	1	783	0.937	0.242	0	1
Ep*	643	0.100	0.300	0	1	783	0.120	0.325	0	1
Income (Ghs)	643	355.830	418.912	30	3000	783	359.054	423.566	20	4000
FacSPS*	643	0.128	0.334	0	1	783	0.169	0.375	0	1
FacEF*	643	0.216	0.412	0	1	783	0.259	0.439	0	1
FacSS*	643	0.529	0.500	0	1	783	0.398	0.490	0	1

For each x_i *= Proportion (n subset over N total) where n=Frequency of x_i and N= total sample size1547

APPENDIX H: DESCRIPTIVE STATISTICS OF REFERENCE VARIABLES OF THE MULTINOMIAL PCH REGRESSION

Table 11: Descriptive statistics of reference variables of the multinomial PCH regression

Variables (x_i)	Low >50% PCH Awareness					Overall PCH Awareness				
	n	Mean	Sd	Min	Max	N	Mean	sd	Min	Max
Age (Years)	121	22.157	3.006	18	34	1547	22.744	3.870	15	45
sFemale*	121	0.545	0.500	0	1	1547	0.459	0.498	0	1
mSingle1*	121	0.463	0.501	0	1	1547	0.515	0.500	0	1
eAkan*	121	0.595	0.493	0	1	1547	0.619	0.486	0	1
eEwe*	121	0.256	0.438	0	1	1547	0.178	0.383	0	1
rChristains*	121	0.810	0.394	0	1	1547	0.908	0.290	0	1
rMuslim*	121	0.140	0.349	0	1	1547	0.083	0.276	0	1
EduBac*	121	0.983	0.128	0	1	1547	0.948	0.223	0	1
Ep*	121	0.066	0.250	0	1	1547	0.107	0.310	0	1
Income (GHS)	121	416.12	1115.64	50	12000	1547	362.177	510.374	20	12000
FacSPS*	121	0.124	0.331	0	1	1547	0.148	0.355	0	1
FacEF*	121	0.190	0.394	0	1	1547	0.236	0.425	0	1
FacSS*	121	0.587	0.494	0	1	1547	0.467	0.499	0	1

For each x_i *= Proportion (n subset over N total) where n=Frequency of x_i and N total =1547

APPENDIX I: BISERIAL CORRELATION MATRIX FOR PCH AWARENESS LEVELS AND SOCIO-DEMOGRAPHIC VARIABLES

Variables (y_i , x_i)		High ≥75%	50-74%	Low >50%	Age	sFemale	mSingle1	eAkan	eEwe	rChristrains	rMuslim	EduBac	Ep	Income	FacSPS	'acEF	FacSS
High ≥75%		1															
Moderate 50-74%		-0.854	1														
	p-value	**0.000**															
Low >50%		-0.295	-0.246	1													
	p-value	**0.000**	**0.000**														
Age		0.049	-0.025	-0.044	1												
	p-value	0.056	0.321	0.082													
sFemale		-0.066	0.039	0.051	-0.107	1											
	p-value	**0.010**	0.123	0.047	**0.000**												
mSingle1		0.033	-0.016	-0.031	0.064	-0.044	1										
	p-value	0.200	0.518	0.230	**0.012**	0.087											
eAkan		0.006	0.002	-0.015	-0.133	-0.015	0.015	1									
	p-value	0.825	0.931	0.568	**0.000**	0.551	0.569										
eEwe		-0.023	-0.009	0.059	0.079	-0.006	-0.014	-0.594	1								
	p-value	0.374	0.714	0.020	**0.002**	0.824	0.578	**0.000**									
rChristian		0.069	-0.016	-0.098	-0.036	-0.002	0.066	0.177	-0.015	1							
	p-value	**0.007**	0.526	**0.000**	0.156	0.948	**0.010**	**0.000**	0.569								
rMuslim		-0.065	0.032	0.061	0.045	0.011	-0.066	-0.166	0.007	-0.941	1						
	p-value	**0.011**	0.203	0.016	0.075	0.677	0.010	0.000	0.779	**0.000**							
EduBac		-0.046	0.022	0.047	-0.540	-0.022	0.004	0.031	0.003	-0.015	0.007	1					
	p-value	0.068	0.396	0.065	0.000	0.381	0.868	0.225	0.893	0.558	0.771						
Ep		0.042	-0.021	-0.039	0.281	-0.068	-0.023	-0.055	0.013	-0.048	0.048	-0.219	1				
	p-value	0.101	0.405	0.128	0.000	0.008	0.364	0.030	0.609	0.059	0.062	0.000					

APPENDIX I: BISERIAL CORRELATION MATRIX OF VARIABLES PCH AWARENESS LEVELS AND THE SOCIO-DEMOGRAPHIC VARIABLES CONT.

Variables (y_i , x_i)	High ≥75%	50-74%	Low >50%	Age	sFemale	mSingle1	eAkan	eEwe	rChristrains	rMuslim	EduBac	Ep	Income	FacSPS	FacEF	FacSS
Income	-0.006	-0.011	0.031	0.269	0.000	-0.031	-0.030	-0.015	-0.020	-0.002	-0.305	0.245	1			
p-value	0.808	0.680	0.226	0.000	1.000	0.222	0.233	0.560	0.432	0.933	0.000	0.000				
FacSPS	0.059	-0.049	-0.020	-0.114	-0.238	-0.106	-0.044	0.020	-0.037	0.040	0.090	0.032	-0.040	1		
p-value	**0.021**	0.056	0.438	0.000	0.000	0.000	0.082	0.439	0.150	0.116	0.000	0.210	0.110			
FacEF	0.056	-0.039	-0.032	0.260	0.005	0.076	0.060	-0.028	0.030	-0.023	-0.204	0.078	0.050	-0.232	1	
p-value	**0.029**	0.123	0.216	0.000	0.859	0.003	0.019	0.266	0.236	0.362	0.000	0.002	0.070	0.000		
FacSS	-0.140	0.104	0.070	-0.003	0.271	0.043	-0.087	0.047	-0.041	0.024	0.052	-0.057	0.000	-0.391	-0.521	1
p-value	**0.000**	0.000	0.006	0.917	0.000	0.092	0.001	0.062	0.107	0.339	0.043	0.025	0.940	0.000	0.000	

P-value <0.005 are a significant level of correlation. https://www.statalist.org/forums/forum/general-stata-discussion/general/1497280-correlation-matrix-with-dummy-variables

APPENDIX J: CORRELATION MATRIX OF **COEFFICIENTS** OF MULTINOMIAL LOGISTIC MODEL: MODERATE PCH

AWARENESS VERSUS PREDICTOR COEFFICIENTS

ε_i **variance**	Age	sFemale	mSingle1	eAkan	eEwe	rChristrain	rMuslim	EduBac	Ep	Income	FacSPS	FacEF	FacSS	constant
Age	1													
sFemale	0.212	1												
mSingle1	-0.166	0.058	1											
eAkan	0.043	0.002	-0.030	1										
eEwe	-0.060	0.009	0.017	0.734	1									
rChristian	-0.062	-0.133	-0.028	-0.138	-0.085	1								
rMuslim	-0.020	-0.114	-0.026	-0.018	0.039	0.917	1							
EduBac	0.463	0.195	-0.093	-0.035	-0.117	-0.015	0.016	1						
Ep	-0.367	0.026	0.196	0.097	0.005	-0.036	-0.069	-0.145	1					
Income	-0.123	-0.078	-0.055	0.010	0.064	-0.007	-0.004	0.103	-0.113	1				
FacSPS	-0.054	0.040	0.024	0.110	0.009	-0.019	-0.031	-0.027	0.057	0.019	1			
FacEF	-0.188	-0.226	-0.098	-0.003	-0.025	0.059	0.071	-0.095	0.068	0.021	0.570	1		
FacSS	-0.184	-0.211	0.018	0.051	-0.002	0.087	0.095	-0.068	0.126	-0.002	0.660	0.767	1	
Cons	-0.714	-0.200	0.086	-0.123	-0.024	-0.382	-0.418	-0.758	0.228	-0.015	-0.117	-0.024	-0.091	1

APPENDIX K: CORRELATION MATRIX OF COEFFICIENTS OF MULTINOMIAL LOGISTIC MODEL: HIGH PCH AWARENESS VERSUS PREDICTOR COEFFICIENTS

ε_i variance	Age	sFemale	mSingle1	eAkan	eEwe	rChristrain	rMuslim	EduBac	Ep	Income	FacSPS	FacEF	FacSS	Constant
Age	1.000													
sFemale	0.217	1.000												
mSingle1	-0.161	0.064	1.000											
eAkan	0.038	0.000	-0.031	1.000										
eEwe	-0.062	0.007	0.011	0.738	1.000									
rChristian	-0.084	-0.100	-0.012	-0.168	-0.133	1.000								
rMuslim	-0.041	-0.080	-0.018	-0.024	0.029	0.885	1.000							
EduBac	0.458	0.208	-0.088	-0.036	-0.121	-0.006	0.029	1.000						
Ep	-0.367	0.021	0.212	0.099	0.000	0.016	-0.022	-0.163	1.000					
Income	-0.128	-0.064	-0.034	0.017	0.070	0.082	0.080	0.118	-0.173	1.000				
FacSPS	-0.061	0.044	0.028	0.104	0.009	0.022	0.005	-0.022	0.062	0.051	1.000			
FacEF	-0.184	-0.229	-0.095	-0.008	-0.032	0.063	0.078	-0.090	0.069	0.023	0.571	1.000		
FacSS	-0.179	-0.212	0.027	0.044	-0.003	0.091	0.103	-0.064	0.124	0.017	0.659	0.762	1.000	
Cons	-0.725	-0.237	0.072	-0.118	-0.007	-0.321	-0.360	-0.783	0.222	-0.066	-0.135	-0.022	-0.089	1.000

APPENDIX L: VARIANCE COVARIANCE CORRELATION MATRIX OF COEFFICIENTS OF MULTINOMIAL LOGISTIC MODEL FOR PCH AWARENESS

ε_i variance	Age	sFemale	mSingle1	eAkan	eEwe	rChristrain	rMuslim	EduBac	Ep	Income	FacSPS	FacEF	FacSS	constant
Age	0.876	0.190	-0.158	0.030	-0.058	-0.051	-0.009	0.419	-0.350	-0.100	-0.054	-0.151	-0.155	-0.633
sFemale	0.190	0.855	0.049	-0.003	0.005	-0.116	-0.098	0.197	0.019	-0.069	0.035	-0.206	-0.176	-0.191
mSingle1	-0.158	0.051	0.858	-0.033	0.010	-0.030	-0.035	-0.088	0.205	-0.059	0.022	-0.085	0.034	0.088
eAkan	0.030	-0.003	-0.033	0.896	0.668	-0.134	-0.025	-0.038	0.095	0.011	0.097	-0.006	0.040	-0.098
eEwe	-0.057	0.005	0.009	0.665	0.863	-0.096	0.026	-0.119	-0.002	0.062	0.007	-0.029	-0.001	-0.004
rChristian	-0.069	-0.096	-0.017	-0.158	-0.129	0.381	0.322	-0.011	0.014	0.022	0.015	0.052	0.075	-0.098
rMuslim	-0.018	-0.075	-0.026	-0.030	0.017	0.316	0.407	0.028	-0.023	0.020	0.002	0.069	0.089	-0.154
EduBac	0.419	0.190	-0.088	-0.037	-0.116	-0.016	0.017	0.937	-0.159	0.078	-0.022	-0.092	-0.060	-0.702
Ep	-0.354	0.021	0.204	0.096	0.000	-0.033	-0.063	-0.159	0.909	-0.101	0.063	0.069	0.123	0.229
Income	-0.092	-0.063	-0.054	0.012	0.063	-0.012	-0.014	0.078	-0.124	0.583	0.036	0.007	0.003	-0.007
FacSPS	-0.054	0.035	0.020	0.098	0.007	-0.013	-0.023	-0.023	0.064	0.022	0.886	0.511	0.593	-0.105
FacEF	-0.155	-0.208	-0.087	-0.006	-0.029	0.050	0.063	-0.092	0.068	0.012	0.511	0.884	0.682	-0.021
FacSS	-0.157	-0.180	0.034	0.039	-0.005	0.075	0.085	-0.062	0.123	-0.005	0.591	0.680	0.879	-0.082
Constant	-0.645	-0.207	0.084	-0.099	0.001	-0.084	-0.134	-0.723	0.213	-0.017	-0.118	-0.019	-0.080	0.805

APPENDIX M: DESCRIPTION, MEASUREMENT AND DESCRIPTIVE STATISTICS OF THE EXPLANATORY VARIABLES

Description of the selected variable from the research questionnaire			Measurement level			statistics (N=1547)	
				Codes		"Yes" response	"Yes" response
Variable labels		Description of variables	type	No	Yes	Freq.	Proportion
Socio-demographic factors Section A: personal	Female	Female students	binary	0	1	710	0.459
	Age	Age of student in years (the mean age is 23 years, sd=4)	years			1547	
	Akan	Students of Akan ethnic origin	binary	0	1	958	0.619
	Ga/Dagbme	Students of Ga ethnic origin	binary	0	1	144	0.093
	Christian	Students of Christian religious denomination	binary	0	1	1404	0.908
	Muslim	Students of Muslim religious denomination	binary	0	1	128	0.083
	AgeIncome	Interaction between age and monthly income (mean income is 362GHC sd=510)	Scale			1547	
	FemAge	Age of female students (the mean age of female student is 22 years, sd=3.5)	Scale			1547	
	Dptsa	Students of the department of sociology and anthropology	binary	0	1	613	0.396
Section B	AwHigh	High preconception health awareness level	binary	0	1	783	0.506

DESCRIPTION, MEASUREMENT AND DESCRIPTIVE STATISTICS OF THE EXPLANATORY VARIABLES CONT.

Description of the selected variable from the research questionnaire			Measurement level			statistics (N=1547)	
				Codes		"Yes" response	"Yes" response
Variable labels		Description of variables	Type	No	Yes	Freq.	Proportion
Section C: preconception health risk Factors	GHSp	Student who have a poor general health status	binary	0	1	63	0.041
	RLP	Do you have a reproductive life plan?	binary	0	1	718	0.464
	Evgb	Students who have ever given birth	binary	0	1	84	0.054
	I_EvChem	I have ever been exposed to chemical substances at work or at home. E.g. anti-cancer drugs, bleach, toilet bowl cleaner, gasoline, pesticides and rodenticides	binary	0	1	1064	0.688
	I_HvPtner	I have a partner (Boyfriend/girlfriend/husband/wife)	binary	0	1	656	0.424
	P_dkAlco	My partner (wife, husband, girlfriend, boyfriend etc) drinks alcohol	binary	0	1	339	0.219
	I_edv	I ever experienced an eating disorder characterized by self-induced vomiting	binary	0	1	512	0.331
	I_std	I ever had a sexually transmitted disease (STD) which includes Hepatitis B, genital herpes, Chlamydia, Genital warts, Gonorrhoea, Syphilis (lues), HPV (Human Papillomavirus), HIV/AIDS, Trichomonas)	binary	0	1	392	0.253
	I_Dep	I ever experienced a health condition which includes any of the following (depression, anxiety, seizure disorder, intimate partner violence)	binary	0	1	935	0.604
	I_Msxs	Male students who ever undergone a surgery of your manhood performed by a urologist	binary	0	1	89	0.058
	Hr	likelihood of having a hereditary disease in the family of a student, the partner or relative (the modal value is 0)	ordinal	0	3	1547	0.135

DESCRIPTION, MEASUREMENT AND DESCRIPTIVE STATISTICS OF THE EXPLANATORY VARIABLES CONT.

	Description of the selected variable from the research questionnaire		Measurement level			statistics (N=1547)	
				Codes		"Yes" response Freq.	"Yes" response Proportion
Variable labels	Description of variables		Type	No	Yes		
Section D: future PCH intentions	D27	I have intentions to use some type of preconception intervention in the near future	binary	0	1	517	0.334
	D29a	I am confident that I can get preconception counselling before pregnancy occurs	binary	0	1	1123	0.726
	D29b	I am confident that I can change my lifestyle and practice key preconception behaviours even if I am not ready for pregnancy.	binary	0	1	1157	0.748
	D30a	I am confident of getting preconception health counselling to help me maintain or achieve optimal general and reproductive health	binary	0	1	1336	0.864
	D30b	I am confident of getting preconception health counselling to help me understand how preconception health affects pregnancy outcomes	binary	0	1	1324	0.856

APPENDIX N: PCH ATTITUDE TEST SCORE PER QUESTIONS/STATEMENTS

PCH attitude test statements posed to respondents	Positive (+)			Negative (-)		
	score	Freq.	%	score	Freq.	%
Category A						
D24a: I worry that I/my partner/future partner could become pregnant	8.5	730	47.2	9.5	817	52.8
D24b: I worry that I/my partner/future partner could develop health problems during pregnancy	9.8	842	54.4	8.2	705	45.6
D24c: I worry that my baby could develop health problems during pregnancy	9.7	837	54.1	8.3	710	45.9
D24d: If my baby develops problems during pregnancy, I think these problems will be serious	8.5	733	47.4	9.5	814	52.6
D24e: If I/my partner had an unplanned pregnancy, I think this will be a serious problem.	9.7	831	53.7	8.3	716	46.3
Category B						
D24f: Having blood sugar levels within the normal range before pregnancy will improve my chances of having a healthy baby	11.5	986	63.7	6.5	561	36.3
D25a: When it comes to using preconception health counselling, I want to do what my partner wants.	8.0	692	44.7	10.0	855	55.3
D25b: When it comes to preconception (counselling, I want to do what my parents think I should do.	6.8	581	37.6	11.2	966	62.4
D26a: Has a healthcare professional ever told you to get preconception health care before you become pregnant or plan a pregnancy?	3.2	276	17.8	14.8	1271	82.2
D26b: Has anyone else told you to get PCH counselling before you become pregnant/plan for pregnancy?	3.6	310	20	14.4	1237	80

PCH ATTITUDE TEST SCORE PER QUESTIONS/STATEMENT

CONT.

PCH attitude test statements posed to respondents	Positive (+)			Negative (-)		
	score	Freq.	%	score	Freq.	%
D26c: Has a healthcare professional ever told you to use some type of birth control when preventing a pregnancy?	4.1	351	22.7	13.9	1196	77.3
D26d: Has anyone else told you to use some type of birth control when preventing pregnancy?	4.9	421	27.2	13.1	1126	72.8
D27: Do you intend to use some type of preconception health (PCH) intervention in the near future?	6.0	517	33.4	12.0	1030	66.6
Category C						
D28: If preconception screening costs 100-200 Ghana cedis will it be affordable?	12.6	1083	70	5.4	464	30
D29a: I am confident that l can get preconception counselling before pregnancy occurs	13.1	1123	72.6	4.9	424	27.4
PCH Attitude Test Score Per Questions/Statement cont.						
D29b: I am confident that l can Change my lifestyle and practice key preconception behaviours even if I am not ready for pregnancy.	13.5	1157	74.8	4.5	390	25.2
D30a: Would you say that getting preconception health counselling would help you to maintain or achieve optimal general and reproductive health?	15.6	1336	86.4	2.4	211	13.6
D30b: Would you say that getting preconception health counselling would help you to understand how Pc health affects pregnancy outcomes?	15.4	1324	85.6	2.6	223	14.40%

APPENDIX O: DESCRIPTIONS OF DUMMY EXPLANATORY VARIABLES AND THEIR REFERENCE GROUPS

Dummy Variables	Binary codes	Proportion	Std. Err.	95% Conf. interval	
				LCI	UCI
Sex: Female students	1	0.459	0.013	0.434	0.484
Reference to male students	0	0.541	0.013	0.516	0.566
Marital status: Single Student living without a partner	1	0.515	0.013	0.49	0.54
Reference: Student living with a partner	0	0.485	0.013	0.46	0.51
Ethnicity: students of "Akan" origin	1	0.619	0.012	0.595	0.643
Reference to other ethnic groups i.e. "Ewe", "Ga/Dangme", "Guan", "Grusi", "Guma", "Mole-Dagbani"	0	0.381	0.012	0.357	0.405
Ethnicity: student "Ewe" ethnic origin	1	0.178	0.01	0.159	0.198
Reference to other ethnic groups i.e. "Akan", "Ga/Dangme", "Guan", "Grusi", "Guma", "Mole-Dagbani"	0	0.822	0.01	0.802	0.841
Religion: Catholic students in	1	0.159	0.009	0.141	0.177
Reference to all the other religions observed in the study	0	0.841	0.009	0.823	0.859
Religion: Protestants in	1	0.248	0.011	0.226	0.269
Reference to all the other religions observed	0	0.752	0.011	0.731	0.774
Religion: Charismatic/Pentecostalstudents in	1	0.352	0.012	0.328	0.376
reference to all the other religions observed	0	0.648	0.012	0.624	0.672
Religion: other charismatic Christian students in	1	0.149	0.009	0.131	0.166
Reference to all the other religions observed	0	0.851	0.009	0.834	0.869
Religion: Muslim students in	1	0.083	0.007	0.069	0.096
Reference to all the other religions observed	0	0.917	0.007	0.904	0.931
Bachelor Level students in	1	0.948	0.006	0.937	0.959
Reference to master & PhD students observed	0	0.052	0.006	0.041	0.063
Female student educational level in	1	0.432	0.013	0.408	0.457
Reference to male student educational level	0	0.568	0.013	0.543	0.592
Employed students in	1	0.107	0.008	0.092	0.123
Reference to Unemployed students	0	0.893	0.008	0.877	0.908

DESCRIPTIONS OF DUMMY EXPLANATORY VARIABLES AND THEIR REFERENCE GROUPS CONT.

Dummy Variables	Binary Codes	Proportion	Std. Err.	95% Conf. interval	
				LCI	UCI
Monthly income group below500GHC in	1	0.874	0.008	0.857	0.891
Reference to income above 500GHC	0	0.126	0.008	0.109	0.143
Income group between 500 to 100GHC in	1	0.083	0.007	0.07	0.097
Reference to monthly income group below 500 and above 1000GHC	0	0.917	0.007	0.903	0.93
Department of Basic Education in	1	0.095	0.007	0.08	0.11
Reference to all the departments observed	0	0.905	0.007	0.89	0.92
Education and psychology in	1	0.141	0.009	0.124	0.158
Reference to all the departments observed	0	0.859	0.009	0.842	0.876
Department of Biomedical science in	1	0.094	0.007	0.08	0.109
Reference to all the departments observed	0	0.906	0.007	0.891	0.92
Department of Optometry in	1	0.054	0.006	0.043	0.066
Reference to all the departments observed	0	0.946	0.006	0.934	0.957
Department of Computer Science. & IT in	1	0.131	0.009	0.114	0.148
Reference to all the departments observed	0	0.869	0.009	0.852	0.886
Department of Medical science in	1	0.017	0.003	0.01	0.023
Reference to all the departments observed	0	0.983	0.003	0.977	0.99
Department of Sociology and anthropology.	1	0.396	0.012	0.372	0.421
Reference to all the departments observed	0	0.604	0.012	0.579	0.628

APPENDIX P: MODEL ILLUSTRATING THEMES ON PERCEIVED STRATEGIES FOR PCH INTEGRATION