PREGNANCY CARE:
A BURDEN OR A GIFT?

A RESEARCH ABOUT THE PATTERNS AND DETERMINANTS REGARDING THE UTILISATION OF ANTENATAL CARE AND SKILLED DELIVERY BY ADOLESCENT GIRLS IN KENYA, PRIOR AND DURING THE COVID-19 PANDEMIC.

A MASTER THESIS BY ROBIN DANIELLE GEERTS

ADHERENCE TO CARE OF TEENAGE MOTHERS IN KENYA, BEFORE AND DURING THE COVID-19 OUTBREAK

A study about the patterns and determinants that influence the utilisation of antenatal care by adolescent girls in Kenya, before and during the COVID-19 pandemic.

A master thesis by
Robin Daniëlle Geerts

MSc. International Development Studies
Department of Geosciences
Utrecht University
6th of August, 2021

Supervisor: Dr. Femke van Noorloos
Student number: 6904696

Cover image: picture of mother and baby taken by MomCare.

Abstract

Receiving care during pregnancy is important to keep the mother and baby healthy. The World Health Organization recommends eight antenatal care visits, a skilled delivery and four postnatal care visits. However, many pregnant teenage girls in Kenya do not adhere to these numbers. What adds complexity to the adherence of care is the arrival of the COVID-19 pandemic. Since the beginning of 2020, Kenya has been in lockdown and several others measurements against the virus have been taken.

This research aims to discover the patterns and determinants relating to the utilisation of antenatal care and skilled delivery by adolescent girls in Kenya, and what changed in their care seeking behaviour during the COVID-19 outbreak. To obtain the answers to these questions several statistical analyses, a systematic literature and multiple experts interviews have been carried out.

The outcomes of the research identified several patterns and determinants that influence the adherence to care by adolescent girls in Kenya. The utilisation of antenatal care visits and skilled delivery were already relatively low but decreased even further during the COVID-19 outbreak. The most important determinants that contribute to or disrupt the utilisation of maternal health care before COVID-19 are their knowledge about maternal health care services, the support from her boyfriend, family and community, societal stigma, attitudes from health workers and religion. Patterns of utilisation of care did change during the COVID-19 pandemic, with the most influential changes found in the use of transportation to the clinic and the travel distance to the clinic, the social network and support from family and the community, and the knowledge of teenage girls about COVID-19.

Most importantly, a domino effect in the adherence to care is noticed, if the teenage girl enrols early for care, she will have more antenatal care visits what will enlarge the probability of a skilled delivery. This domino effect is visible before and also during the COVID-19 outbreak in Kenya.

Key words: Teenage pregnancy, Kenya, adherence to care, antenatal care, skilled delivery, utilisation of maternal health care services, COVID-19, patterns, determinants.

Acknowledgements

As I am very proud of the results of this research, I could not have done it without the support and assistance of several important people.

I want to thank my supervisor Dr. Femke van Noorloos for her guidance and support these past months. Our frequent contact and good communication during these months really helped me to stay motivated and to get the most out of this experience. Furthermore, the feedback and critical eye helped to look at things from different perspectives and to ask questions I did not think of right away. She really has been an amazing supervisor.

I want to express my gratitude to Teresa de Sanctis and Wendy Janssens for their trust and support, and for allowing me to become a part of the MomCare team. I also would like to thank Andreea and Rianne from the MomCare team for their enthusiasm, help with all my STATA problems and many feedback moments. It was an honour and delight to be part of the team. I would like to convey a special thank you to Teresa de Sanctis, who provided much guidance, motivation and dedication every week over the last months.

Another group of people I really would like to thank are the interns of AIGHD and my peers from IDS. Being able to connect with others who are experiencing a similar journey during this strange time has really been helpful and also contributed greatly to my thinking process. Furthermore, I would like to thank the whole IDS staff for being so understanding and supportive during this academic year.

Lastly, I want to show my appreciation to my parents and friends for their unconditional support and encouragement. Without all your support I would not have been able to write this thesis.

Thank you.

Robin Daniëlle Geerts

Table of content

Abstract I

Acknowledgements II

List of figures III

Abbreviations IV

Terminologies V

1. Introduction 1

2. Theoretical embedding 4

2.1 Literature overview 4

Teenage pregnancy in Sub-Saharan Africa 4

Risks and complications 5

Maternal mortality 5

Maternal health care 6

Access to and utilisation of maternal health care for adolescent girls 8

2.2 Theoretical framework 8

2.3 Conceptual framework 15

2.4 Research objectives 16

2.5 Research questions 16

3. Regional and contextual framework 17

3.1 A breakdown of the health care system in Kenya 17

Kakamega county 18

Kisumu county 19

Nairobi county 19

Vihiga county 19

3.2 Introducing the partner organisation 19

PharmAccess Foundation 19

MomCare 20

4. Methodology 21

4.1 Operationalisation of concepts 21

4.2 Research design 22

4.3 Research methods 23

Systematic literature review 23

Statistical analyses 25

Expert interviews 27

4.4 Quality assurance 29

Ethical considerations ... 29
Reliability ... 29
Validity ... 30
Positionality of the researcher ... 30
Limitations and reflections on the research methodology ... 31
5. Results ... 32
5.1 Statically significant factors influencing the adolescent care seeking behaviour in Kenya .. 32
What does the target population look like? ... 32
The utilisation of maternal health care before COVID-19 ... 34
Transitioning from normal life to the COVID-19 restrictions ... 35
Social support and geographical locations are the tiebreakers during COVID-19 ... 38
What can we learn from this? ... 39
5.2 What influences the care seeking behaviour of adolescent girls? ... 40
The influence of the individual on adherence to care ... 40
The community: a safe haven or the downfall for pregnant teenagers ... 44
''The Kenyan health care system is not built for teenage pregnancy'' ... 45
Religion and culture ... 47
6. Discussion of findings ... 49
7. Conclusion ... 50
7.1 Recommendations for future research ... 52
8. References ... 53
9. Appendices ... 61
Appendix I. Search terms and inclusion criteria ... 61
Appendix i. Search terms for studies ... 61
Appendix ii. Inclusion criteria ... 61
Appendix II. PRISMA flow diagram ... 62
Appendix III. Statistical analyses data selection process ... 63
Appendix i. Data set cleaning process ... 63
Appendix ii. Dropped variables for statistical analyses ... 63
Appendix IV. Descriptive statistics of independent and dependent variables ... 64
Appendix V. Assumptions regression analyses per COVID-19 groups ... 65
Appendix i. Linear regression analysis – Early enrolment ... 65
Appendix ii. Linear regression analysis – ANCs ... 67
Appendix iii. Logistic regression analysis – Skilled delivery ... 69
Appendix VI. Interview guide ... 70
Appendix VII. Outcomes regression analyses per COVID-19 groups ... 71

Appendix i. Linear regression analysis – Early enrolment 71
Appendix ii. Linear regression analysis – ANCs 74
Appendix iii. Binary regression analysis – Skilled delivery 77

List of figures

Figure 1: Behavioural model of Andersen & Newman…….………………………………………… 9
Figure 2: Predisposing and enabling factors……………………………….……………………..… 10
Figure 3: The three delays model of Thaddeus & Maine…………………………………………….. 11
Figure 4: Socioecological analysis of Mekonnen, Dune, & Perz……………………………..…… 12
Figure 5: Conceptual framework……….…………………………………………………………….. 16
Figure 6: Map of Kenya and its counties……….…………………………………………………….. 18
Figure 7: MomCare journey with care bundle……………………………………………………...… 20
Figure 8: Years of publications……………………………………………………………………..… 24
Figure 9: Timeline cleaning process statistical analyses…….……………………………………..… 26
Figure 10: Relevant variables statistical analyses…..……………………………………………… 26
Figure 11: Week of enrolment..……………………………………………………………………..… 33
Figure 12: Number of antenatal care visits………………………………………………………… 33
Figure 13: Utilisation of a skilled birth attendant…………………………………………….……..… 34

Abbreviations

AIGHD: Amsterdam Institute of Global Health and Development.

ANC: Antenatal care.

COVID-19: Coronavirus disease of 2019.

PNC: Postnatal care.

SDG: Sustainable Development Goals.

WHO: World Health Organization.

Terminologies

Adolescence: Adolescence is the period between 10 and 19 years with peculiar physical, social, psychological, and reproductive health characteristics (Kassa, Arowojolu, Odukogbe & Yalew, 2018).

Antenatal care: The care provided by skilled healthcare professionals to adolescent girls to ensure the health of mother and baby during pregnancy. ANC can include risk identification, prevention and management of pregnancy-related or concurrent diseases, and health education and health promotion (World Health Organization, 2016a).

Care bundle: A set of interventions that, when used together, significantly improve patient outcomes (PharmAccess, 2020a). A care bundle consists out of different elements depending on the need of the mother and child. Examples are skilled delivery, access to transportation, SMS reminders for visits, and PNC.

COVID-19: COVID-19 is a disease caused by a new strain of coronavirus. The COVID-19 virus is a new virus linked to the same family of viruses as Severe Acute Respiratory Syndrome (SARS) and some types of the common cold (WHO, 2020).

Determinants: Factors and causes that contribute to if and why a woman receives certain care or not.

Maternal health care: This can also be referred to as pregnancy care. Maternal health care is the care a woman receives during pregnancy and giving birth and the period after giving birth. That period can last up to 20 weeks after giving birth. Maternal health care consists of three components: antenatal care, skilled delivery, and postnatal care.

MomCare: An initiative created by PharmAccess Foundation in 2017, with the aim to enhance access to maternal health care for all pregnant women in Kenya, Tanzania, and Nigeria.

Neonatal period: The neonatal period is the first four weeks of a baby's life (Pathirana, et al. 2016).

Neonatal death: Neonatal death is when a baby passes away within the first 28 days of his or her life (Pathirana, et al. 2016).

Patterns: Patterns are structures and occurrences that are seen within a population group.

Postnatal care: Is the care that is provided to mother and baby in the crucial period after giving birth. The postnatal period can go up until 42 days after birth. The care can consist of helping with feeding the baby, regular check-ups after discharge, making sure that there are no infections or bleeding, and health assessments (World Health Organization, 2015).

Skilled delivery: Is the birth of a baby where a midwife, nurse, or doctor is present to provide care for the mother and baby when needed (World Health Organization, 2004b).

1. Introduction

Imagine that you are 14 years old, your boyfriend is 16 years old and you think you are madly in love with one another. You explore one another and one thing leads to another. You are not sure if you are comfortable, but you do not know any better. After a few weeks, you notice that your body is starting to change and later you discover that you are carrying a baby. You try to hide it and thus do not receive any care to ensure your health and the health of your baby. But after 16 weeks, your belly is starting to show and now your parents will find out. The community is not supportive of your pregnancy, and you feel neglected and clueless about what to do. You decide not to go back to school. You do not go to the health clinic because you are afraid to run into someone you know. What will you do now? How will the future look like?

Perhaps you can relate to the situation of this girl, but many people in the Western world cannot relate to this. Unfortunately, this is the story of numerous teenage girls in low and middle income countries. It is estimated that each year around 17 million adolescent girls give birth in low and middle income countries (World Health Organization, 2014). Teenage pregnancy is a major global health concern that troubles many countries across the world. One of the reasons is because teenage mothers face higher chances of experiencing complications during pregnancy, birth, and during the neonatal period compared to women above the age of 20 (Mekonnen, Dune & Perz, 2019; World Health Organization, 2014; Yakubu & Salisu, 2018). In fact, the leading cause of death amongst young girls in low income countries are the complications that can arise during pregnancy or childbirth (World Health Organization, 2020a).

The number of maternal mortality is slowly reducing, however, it remains relatively high, especially in low and middle income countries. In 2017 alone, more than 196.000 women and adolescent girls in Sub-Saharan Africa died due to complications during pregnancy or childbirth. Out of these maternal deaths, more than 6.000 happened in Kenya (Lang'at, Mwanri & Temmerman, 2019). What is confronting is that more than 90% of these maternal deaths are preventable if proper antenatal care, skilled delivery, and postnatal care are available for mother and baby (UNFPA, World Health Organization, UNICEF, World Bank Group & the United Nations Population Division, 2019). Especially for teenagers the need for good quality care is imperative, as teenage pregnancy comes with more risks and dangers compared to other age groups. The risks and dangers that teenage mothers can face range from low-risk to high-risk complications. Complications during pregnancy can consist out of elevated blood pressure, infections, lower weight of mother and her baby, or even attempts at unsafe abortions (Kassa, et al. 2018; Yakubu & Salisu, 2018). Complications during delivery can include preterm delivery, extensive bleeding, placental problems, and the baby faces risks of dying in the perinatal period (World Health Organization, 2020a). Not only does the mother of the baby faces risks and complications during pregnancy and delivery, but also the newborn can be prone to complications. Newborn babies are at higher risks of malnutrition, lack of physical development, and mental development (Ganchimeg, et al. 2014).

The utilisation of antenatal care visits and skilled delivery help minimise these risks and complications, and the World Health Organisation (2020b) strongly advocates that mothers should have eight antenatal care visits during their pregnancy. Unfortunately, many teenage mothers do often not receive the care they need and are unable to adhere to this number of eight antenatal care visits, skilled delivery, and postnatal care (World Health Organization, 2016b).

When focusing specifically on teenage mothers in Kenya, the numbers are far from positive. In Kenya, one out of five adolescent girls has been or is pregnant (Kenya National Bureau of Statistics, 2014). In fact, Kenya has one of the highest teenage pregnancy rates with 82 births per 1000 girls (Muturi, 2021). Moreover, due to recent developments, that number has increased significantly. At the beginning of 2020, the COVID-19 virus infected millions of people throughout the entire world, resulting in a worldwide pandemic from April 2020 onwards. The first COVID-19 case in Kenya was discovered on the 12th of March, 2020, soon after on the 15th of March 2020, the first measurements against COVID-19 were taken, followed by a lockdown (Aluga, 2020). The lockdown meant the closure of schools, which resulted in that teenage girls were stuck at home and bored, could not receive any contraceptives from school, or were trading sex for goods or money. Moreover, teenage girls are also more prone to sexual and physical violence (Rockowitz, et al. 2020; John, Roy, Mwangi, Raval, & McGovern, 2021). A consequence of this is a drastic rise in the number of teenage pregnancies, with local media in Kenya claiming an increase of as much as 40 per cent (Shikuku, et al. 2020; Yusuf, 2020). Additionally, the COVID-19 pandemic and the measurements taken against the spread of COVID-19 can severely affect the accessibility and utilisation of antenatal care for young pregnant girls in Kenya.

Research shows that antenatal care, skilled delivery, and postnatal care are vital for improving and securing the health of mother and baby, and thus, in the end, help to reduce the maternal mortality rate. However, how an increase in the use of ANC and skilled delivery by adolescent girls can be achieved in countries such as Kenya, was relatively unknown. This research focused on a combination of two different debates, teenage pregnancies and (access to) antenatal care. Research showed that teenagers are a very specific and vulnerable age group, and their care seeking behaviour and needs can differ from women above the age of 20. However, what was still unknown about teenage mothers and access to antenatal care, were the patterns and determinants that are related to their care seeking behaviour. In other words, what drives or withholds teenage girls in Kenya to receive antenatal care and skilled delivery. Additionally, the COVID-19 outbreak and lockdown in Kenya brought unforeseen consequences for adolescent girls, and by researching if there was a change in the care seeking behaviour of adolescent girls, more appropriate care can be given to young mothers-to-be.

When zooming out to a more global perspective, the importance of obtaining more knowledge about teenage pregnancies and their care seeking behaviour is also conspicuous. The Sustainable Development Goals, and specifically SDG number three, focuses on ensuring healthy lives and well-being for all ages. The targets of goal number three precisely targets 3.1 and 3.2, aim to reduce the maternal and neonatal mortality rate and how in 2030 preventable deaths should be ended (United Nations, 2015). These targets once more indicate the need for more knowledge about teenage pregnancy and their care seeking behaviour, and by researching this other countries besides Kenya will have more insights into what patterns and determinants contribute to or delay the care seeking behaviour of pregnant adolescents, especially during the COVID-19 pandemic.

The partner organisation for this research project is PharmAccess Foundation. PharmAccess Foundation is located in Amsterdam, the Netherlands, and has the goal to improve global health care. PharmAccess Foundation introduced the initiative MomCare. MomCare is a digitally enabled smart contract or value-based care bundle. Using a trusted platform, mothers and healthcare providers agree to a path of maternal care at a predetermined cost and quality (PharmAccess, 2020a). MomCare offers a digital innovation that can help connect the different stakeholders in the healthcare sector: the mothers receive the care they need, their babies get a better start in life, and care providers are enabled to provide quality care and experience an increase in patients and skills (PharmAccess, 2020a).

This thesis aimed to discover the different patterns relating to antenatal care for pregnant adolescent girls in Kenya, and what care seeking behaviour patterns changed during COVID-19. First, an overview of the existing literature and relevant theoretical frameworks are provided and based on that knowledge the research objectives and questions have been formed. Thereafter, a regional framework of the four regions is elaborated on, and the partner organisation is further introduced. To answer the research question thoroughly, it has been chosen to carry out three different research methods, a systematic literature review, statistical analyses, and expert interviews. The research methods are explained, and afterwards the results of the research are shown. Finally, a discussion and conclusion are provided.

2. Theoretical embedding

In this chapter, the framework surrounding the research is discussed. Several theories, concepts, and frameworks that provide a comprehensive outline of the knowledge about maternal health care and teenage pregnancies are elaborated on. Based on the existing literature and what is still unknown about these concepts, a conceptual framework, research objectives and the research questions have been formed.

2.1 Literature overview

The goal of the research was to discover and understand the patterns of the utilisation of antenatal care by adolescent girls in Kenya. Before being able to discover and comprehend the needs of young girls, it is imperative to know more about adolescent pregnancy and the patterns of health care seeking behaviour in Sub-Saharan Africa. This literature review provides all the available knowledge on both research debates.

Teenage pregnancy in Sub-Saharan Africa

Teenage pregnancy is seen as a major global concern, as it comes with a lot of social, medical, and economic challenges for the mother, her baby, but also for her family and the wider society (Gunawardena, Fantaye & Yaya, 2019). To clarify the topic of teenage pregnancy, with adolescent pregnancy is meant *''the occurrence of pregnancy of a female below the age of 20''* (World Health Organization, 2020a). When reviewing the situation regarding teenage pregnancy in low and middle income countries, countries in Sub-Saharan Africa stand out in comparison to other continents. Sub-Saharan Africa has been notorious for the high adolescent pregnancy rates, and consequently high maternal and neonatal mortality rates. Teenage pregnancy has been on top of the development agenda, and many organisations and governments have attempted to reduce the high adolescent pregnancy rate, and also the maternal mortality rate (Kassa, et al. 2018). Besides many efforts and initiatives, such as governmental recognition, capacity building, and support programs, not enough progress has been made since the pregnancy rate in Sub-Saharan Africa remains too high, around 101 births per 1,000 adolescent girls (World Health Organization, 2019a; World Vision International, 2020). The birth rates in Sub-Saharan Africa, with the highest in Niger with 203,604 births per 100,000 teenage girls (Yakubu & Salisu, 2018). The lowest teenage pregnancy rate is seen in Rwanda, with a total number of 2590 teenage pregnancies, which is equal to 41 births per 1,000 adolescent girls (UNFPA, 2018).

Especially in current times, the efforts taken to reduce teenage pregnancy have been put under a strain. Since the beginning of the COVID-19 pandemic, a drastic rise was noticeable in the number of teenage pregnancies in low and middle income countries (Shikuku, et al. 2020; World Vision International, 2020). Countries in Sub-Saharan Africa are taking various measurements to minimise the number of people infected with the COVID-19 virus, however, most countries forgot to take into account the impact of a global health crisis on adolescent girls. Because of the lockdowns, the schools are often closed, what results in that teenage girls are stuck at home, are bored, or are even forced into labour by their family. Moreover, adolescent girls are more likely to spend increased time with boys, now that they do not have many obligations to school, increasing the likelihood of sexual behaviour (World Vision International, 2020). In general, the COVID-19 pandemic leaves the girls more vulnerable to all sorts of factors from outside their safe environment, which increases their chances of getting pregnant. As a result, many of these girls are not able or are blocked from returning to school and often are neglected by their parents or caretakers (World Vision International, 2020).

Besides these consequences, pregnant teenage girls come across many more societal obstacles, and also health-related challenges and complications due to their young age (Shatilwe, et al. 2020; World Vision International, 2020; Yakubu & Salisu, 2018).

Risks and complications

As explained, there are many risks relating to teenage pregnancy. Besides the higher chances of risks and complications during pregnancy, adolescent girls are also more likely to face mental health issues and psychological problems in comparison to mothers-to-be above the age of 20 (Yakubu & Salisu, 2018). Pregnant teenage girls often have to deal with the social stigma that comes with adolescent pregnancy. Moreover, adolescent girls have an increased probability to encounter physical and domestic violence while adhering to the wishes of the partner or caretakers regarding their pregnancy (Yakubu & Salisu, 2018).

Next to the psychological and physical challenges the mothers come across during their pregnancy, their children also have significantly higher chances of experiencing complications or neonatal death than the babies born from women aged 20 years or older (World Health Organization, 2014; Yakubu & Salisu, 2018). The newborn babies of girls aged under 19 are at higher risks of malnutrition, lack of physical development, and, also, mental development (Ganchimeg, et al. 2014). Moreover, the younger the girl is when she gets pregnant, the higher the chances are that she and her baby die during giving birth or in the postpartum period (Shatilwe, et al. 2020). These risks and complications emphasise the importance of that young girls need to be closely watched during pregnancy and taken care of after giving birth. By monitoring the pregnancy, birth and postpartum period of the teenage girls, several of these above-named risks and complications can be prevented or minimised (World Health Organization, 2018).

Maternal mortality

Out of all 303.000 maternal deaths that have occurred during 2015, almost 70% of them took place within Sub-Saharan Africa (Paul & Chouhan, 2020). This number was equal to 196.000 maternal deaths in 2017 (World Health Organization, 2019b). To put these numbers into a clearer perspective, the Sustainable Development Goals included a target about reducing maternal mortality to less than 70 deaths per 100.000 women and adolescent girls (United Nations, 2015). In 2017, the maternal mortality rate in Sub-Saharan Africa was 553 maternal deaths per 100.000 adolescent girls and women (UNFPA, et al. 2019).

Maternal mortality has been defined by the WHO as *''the death of a woman from pregnancy-related causes during pregnancy or within 42 days of pregnancy''* (World Health Organization, 2004a). The most frequent complications that cause maternal death in Sub-Saharan Africa are severe bleeding, infections, hypertension, eclampsia, complications during delivery, and unsafe abortion (World Health Organization, 2019). Most maternal deaths are preventable when skilled health professionals are present to provide adequate maternal health care (World Health Organization, 2017). Moreover, the maternal mortality rate will reduce if the mother regularly visits health facilities for receiving check-ups and other needed ANC during her pregnancy, and can give birth in an appropriate facility that also provides postnatal care after giving birth (Paul & Chouhan, 2020). The duration of PNC can differ based on the health and needs of the mother and baby.

Maternal health care

Maternal health is defined by the World Health Organization (2017b) as *''the health of women during pregnancy, childbirth and postnatal period. (...) Each stage should be a positive experience, ensuring women and their babes to reach their full potential for their health and well-being.''*. Maternal health and related care consist out of three different components that are equally important for ensuring the health of mother and baby. The three components are antenatal care visits, the presence and help of a skilled birth attendant, and postnatal care.

Antenatal care

Antenatal care is the care that is provided by a professional in a health facility, to make sure that the mother and the baby are healthy. Antenatal care can consist out of different components and include: screening for certain conditions or possible complications, preventive measurements, advice, and support for the mothers, and surveillance of the mother and expected baby (Lincetto, Mothebesoane-Anoh, Gomez, & Munjanja, 2006; World Health Organization, 2016a). Furthermore, antenatal care visits provide mothers and their families with information about how to take care of a baby, what nutrition is needed, but also about the positive impact of skilled delivery and the usefulness of antenatal care (Lincetto, et al. 2006). Antenatal care has proven to be an essential type of preventive healthcare and protects the health and growth of the baby, but also guarantees the health of the mother. In fact, antenatal care contributes to reducing the mortality rate and neonatal deaths, because antenatal care visits help to identify possible preventable complications such as hypertension and unsafe abortion (Lincetto, et al. 2006; Wondemagegn, Alebel, Tesema & Worku, 2018).

For a long amount of time, the recommended number of antenatal care visits stood at a minimum of four visits during the pregnancy, however, as of recently, the World Health Organization changed the minimum adherence to antenatal care visits from four visits to eight visits (World Health Organization, 2020b). The reason behind this was to improve the quality of the antenatal care visits, but also to further minimise the risks of stillbirths and other complications (Sarker, et al. 2020). Furthermore, when a mother makes use of antenatal care visits the risks of neonatal death are reduced by 34%, in comparison to mothers who do not have any antenatal care visits (Wondemagegn, et al. 2018). Additionally, having more antenatal care visits should also contribute to a more positive pregnancy experience (Sarker, et al. 2020).

Even though antenatal care visits bring many positive outcomes, many adolescent girls in low and middle income countries do not adhere to the number of ANC visits.

Skilled delivery

Skilled delivery is named as one of the key components in working towards an improved maternal care system for adolescent mothers in Sub-Saharan Africa. A skilled delivery is a birth of a baby where an accredited health professional, such as a midwife, nurse, or doctor is present to provide emergency care for the mother and baby when needed (World Health Organization, 2004b). Having a skilled birth attendant nearby when giving birth is important because the professional can manage the delivery of the mother-to-be and also identify complications such as haemorrhage and hypertension that can occur during labour. Additionally, the skilled birth attendant can provide the first postnatal care to the girls and their newborns (World Health Organization, 2004b).

The presence of a skilled birth attendant can reduce neonatal mortality in Sub-Saharan Africa by between 16 and 33 per cent (Tessema & Tesema, 2020). The study conducted by Negero, Mitike, Worku & Abota (2018) even claims that 74% of the maternal deaths can be prevented if women and adolescent girls have access to a skilled birth attendant. Unfortunately, the skilled delivery rate in Sub-Saharan Africa is low, with an average of 53 per cent (Woldegiorgis, Hiller, Mekonnen, Meyer & Bhowmik, 2019). In Niger the utilisation of a skilled birth attendant is only 32.6%, meanwhile, in Mali, the skilled delivery rates are between 51% in rural areas to 92% in urban areas (Ameyaw & Dickson, 2020)

When diving into the reasons for women and adolescent girls to not have a skilled delivery, the most evident reasons are related to the lack of knowledge. Mothers-to-be think that having a skilled delivery is not important or are not familiar with the concept. Other reasons for the low utilisation in Sub-Saharan Africa are that the facilities are hard to reach or due to the surrounding environment (Negero, et al. 2018). Many communities in Africa prefer a traditional birth attendant above a skilled birth attendant. A traditional birth attendant is a community-based care provider who will assist in providing care during pregnancy and childbirth. Traditional birth attendants are not accredited health professionals and are most of the time not under salaried employment. This leads to the result that the traditional birth attendants often do not have the proficiency to provide proper care during unforeseen obstetric complications (van den Boogaard, et al. 2008).

Factors that influence the utilisation of a skilled birth attendant, according to a study conducted in 12 East African countries, are the age of the mother, the educational level of the mother-to-be and her husband, how wealthy the family is, how accessible the health care in the region is, and the number of antenatal care visits the mother had during her pregnancy (Tessema & Tesema, 2020).

Postnatal care

Postnatal care programmes in Sub-Saharan Africa have the lowest utilisation rate compared to antenatal care and skilled delivery (World Health Organization, 2018). This rate is particularly worrying because postnatal care is as equally important for the survival of mother and baby as antenatal care visits and skilled delivery are. The importance of the utilisation of postnatal care is observable in Sub-Saharan Africa as almost up to 40% of the maternal deaths happen in the postpartum period and are caused by a lack of postnatal care usage (Benova, et al. 2019). To provide more clarity about postnatal care, postnatal stands for the period right after birth until six weeks after giving birth and is also called the postpartum period (World Health Organization, 2018). Receiving care during the postpartum period allows health professionals to monitor and identify possible problems and complications. By doing so, they will be able to timely undertake action to prevent complications such as haemorrhage after giving birth (Agho, et al. 2016). When postnatal care is correctly administered and mothers are receiving the proper amount of postnatal care, the neonatal mortality rate in Sub-Saharan African countries can be reduced by 10 to 27 per cent (Wudineh, Nigusie, Gesese, Tesu, & Beyene, 2018).

One major reason for the lack of PNC use can be explained through delivery at home and the girls who deliver without a skilled birth attendant present (Agho, et al. 2016). Mothers-to-be who do not deliver at a health clinic or deliver without a professional present, are less likely to see the importance of postnatal care and do often not adhere to the recommended number of three or four PNC visits (Agho, et al. 2016; World Health Organization, 2016). Moreover, a study conducted in Nigeria showed that girls who live in rural areas are also less likely to receive PNC in comparison to girls in urban areas. Other factors that can play a role are wealth and knowledge. Nigerian mothers-to-be who were from rich households and girls who had experienced exposure to mass media were more likely to have PNC (Agho, et al. 2016). Another study carried out in 36 countries in Sub-Saharan Africa discovered that an important variable in the utilisation of postnatal care is the education of the mother. The higher the educational level of the mother, the more likely she is to have multiple PNC visits (Tessema, Yazachew, Tesema & Teshale, 2020).

Access to and utilisation of maternal health care for adolescent girls

The possibility of having access to maternal health care is imperative for every pregnant woman and girl, as it reduces the possibility of pregnancy complications and positively contributes to the childbearing process and postpartum period (Mekonnen, et al. 2019). Unfortunately, access to antenatal care services for pregnant adolescent girls is not nearly sufficient in many low and middle income countries. The quality and use of antenatal care differs greatly between high income countries and low and middle income countries since for the latter the maternal health care use remains relatively low. An example is the difference between ANC visits, and it can especially be seen when looking at developed and less developed countries. In developed countries 97% of the pregnant women make use of at least one ANC visit, meanwhile, in Sub-Saharan Africa, only 69% of the women have one ANC visit (Terefe & Gelaw, 2019).

The utilisation of a skilled birth attendant in Sub-Saharan Africa differs greatly per country, with the gap as big as 25 per cent between the countries. Many governments have facilitated the opportunity for a free home delivery, however, some adolescent girls still choose for a traditional birth attendant over a skilled delivery (Tessema & Tesema, 2020). Besides this, many girls do also not have access to the services of a skilled birth attendant (Negero, et al. 2018).

Multiple researchers have researched the lack of utilisation of care in countries in Sub-Saharan Africa, and on paper, it is clear what causes the lack of utilisation of maternal health care for adolescent girls. However, the actual barriers and stimulants of the utilisation of maternal health care differs per community, region and country. An example of where these differences can change per county is Kenya. The available literature did not provide enough knowledge to conclude anything about the patterns or determinants regarding the utilisation of maternal care by adolescent girls.

2.2 Theoretical framework

There are different types of barriers and stimulants for adolescent girls to receive or not to receive eight ANC visits during their pregnancy, and particularly the group of women who need the care the most are often the ones who receive the least care. These women are most of the time from poor families, are less educated, and live in rural areas (World Health Organization, 2018). Three different theoretical frameworks discuss how the utilisation of care is influenced, namely the models by Andersen and Newman (1973), Thaddeus & Maine (1994), and Mekonnen, et al. (2019). Each model plays a role in answering the research question. The models explain different aspects of what factors influence the utilisation of care seeking behaviour, positively or negatively.

The behavioural model of health service use by Andersen and Newman (1973)

The first model, the behavioural model of Andersen and Newman (1973), is about behaviour relating to health service use. It is the oldest framework used for this research that can lead to the question of how relevant and up to date the framework still is for this period of time. Moreover, the model uses the United States of America to explain their model, which is currently not considered to be a low or middle income country, and thus, it can be questioned if this model is representational for the situation in Sub-Saharan Africa. Regardless that the model is not specifically focused on Sub-Saharan Africa, maternal health care or adolescent girls, the model is still very relevant for identifying patterns and determinants regarding the utilisation of care by adolescent girls. With that being said, the model is not elaborative enough to provide an encompassing answer to the research question on its own.

The behavioural framework emphasises three different aspects that lead to the utilisation of care, with the first being the characteristics of the health services system. Examples of these characteristics include the hospital, nurse, doctor, drugs and medication, and primary or secondary care. The second emphasis is on the changes in medical technology and social norms towards the definition and treatment of illness. Finally, and perhaps the most relevant one for this research, is the third emphasis on the individual determinants of utilisation of health care services. The different linkages and influences between these three parts can be seen in the model (figure 1). Societal determinants of utilisation influence the health services system, and together with the health services system they affect the individual determinants of the utilisation of care (Andersen & Newman, 1973). In other words, the health system and different determinants are all intercorrelated with each other and are needed to ensure and enhance the utilisation of care.

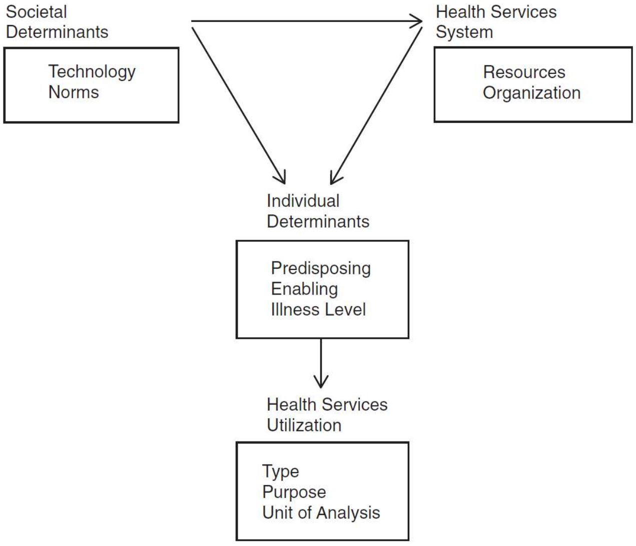


Figure 1. Framework for viewing health services utilization (Andersen & Newman, 1973).

The entire framework is relevant when researching the utilisation of care, however, there is one specific part in the behaviour model that is particularly applicable for this study, namely the individual determinants. The framework of Andersen and Newman (1973) served as the red thread to identify the patterns and determinants of the utilisation of care in the statistical analyses, which was one of the research methods used in this study. The patterns and determinants of utilisation in the statistical analyses were subdivided into predisposing and enabling factors.

The model of Andersen and Newman (1973) puts the factors that contribute to or delay the care seeking behaviour of individuals in three different categories, namely predisposing factors, enabling factors and need factors. Predisposing factors are ''*the socio-cultural characteristics of individuals that exist prior to their illness [or in this case pregnancy]*'' (Andersen & Newman, 1973). In other words, the predisposing factors look at the individual and her drive to seek or not to seek care. The model even further subdivides the predisposing factors into different groups consisting out of demographic, social structure and beliefs (Andersen & Newman, 1973). These predisposing factors can include age, ethnicity, education, religion, family, community and beliefs (figure 2). The second category, enabling factors, are factors that are more related to the logistical side of the care seeking behaviour, such as travel time, availability of care, the knowledge and perceptions about the care, income, and poverty (Andersen & Newman, 1973). The need factors, or also called illness level in figure 1, stands for the perceived care that the mothers think that she requires during her pregnancy (Andersen & Newman, 1973). The need factors are not relevant for this research, and thus, are not included in figure 2.

Predisposing factors			**Enabling factors**	
Demographic	Social structure	Beliefs	Family	Community
• Age, • Sex, • Marital status, • Past illness.	• Education, • Race, • Occupation, • Family size, • Ethnicity, • Religion, • Residential mobility.	• Values concerning health and illness, • Attitudes toward health services, • Knowledge about disease.	• Income, • Health insurance, • Type of regular source.	• Ratios of health personnel and facilities to population, • Price of health services, • Region of country, • Urban-rural character.

Figure 2. Predisposing and enabling factors (Andersen & Newman, 1973).

The three delays model of Thaddeus and Maine (1994)

Another framework that contributes to understanding the patterns and factors relating to the utilisation of maternal health care is the framework designed by Thaddeus and Maine (1994). The framework looks particularly at developing countries, with a specific focus on countries in Africa. What stood out for this framework was that no primary data collection took place, all research was based on existing literature. Furthermore, in contrast to the other two theoretical frameworks that have been and will be discussed, this model focuses more on maternal mortality and its causes rather than on what determines the utilisation of maternal health care. Many different causes can lead to maternal death but this framework centres on the direct causes for maternal mortality, such as haemorrhage, complications from abortion or obstructed labour since these are often the causes that are the most affected by a delayed treatment (Thaddeus and Maine, 1994).

Thaddeus and Maine (1994) argue that the lack of access to maternal health care cannot solely be based on socio-economic and cultural factors, but that in most cases multiple factors contribute, leading to the delay of antenatal care and ultimately death. The three delays model argues that three different delay phases can refrain women from accessing maternal health care. These three delays can differ in duration. Regardless, Thaddeus and Maine (1994) do not discard the influence of socio-economic and cultural factors in their framework and argue that these factors can individually influence the delay of maternal health care. Furthermore, they add that the accessibility of the facilities and the quality of care can also create an impact on the three delays and affect their lengths. In figure 3 the three delays model is shown.

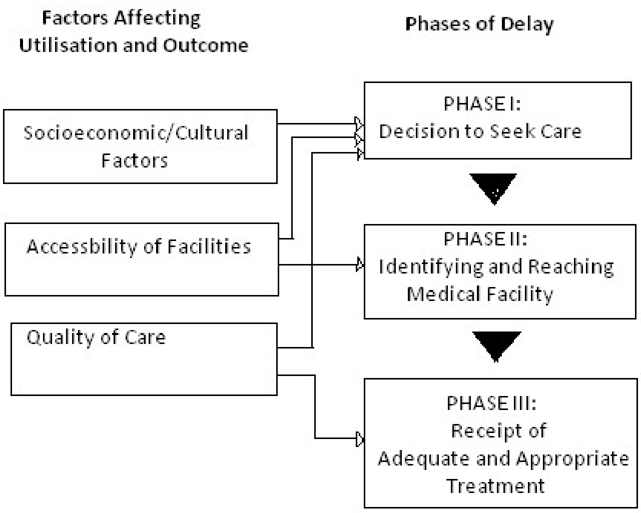

Factors Affecting Utilisation and Outcome
Phases of Delay
Socioeconomic/Cultural Factors
Accessbility of Facilities
Quality of Care
PHASE I: Decision to Seek Care
PHASE II: Identifying and Reaching Medical Facility
PHASE III: Receipt of Adequate and Appropriate Treatment

Figure 3. The three delays model (Thaddeus & Maine, 1994).

The three phases of delay of Thaddeus and Maine (1994) can be explained as follows:

1. *Phase 1:* Delay in deciding to seek care on the part of the individual, family, or both. This delay is related to socio-economic and cultural factors, but also due to the accessibility of the facilities and the quality of the provided care.

2. *Phase 2:* Delay in reaching adequate care at the facility. These factors are related to economic or physical accessibility.

3. *Phase 3:* Delay in receiving adequate care at the facility. Refers to factors that are related to the supply side, thus, shortages of supply, equipment, and trained personnel (Thaddeus & Maine, 1994).

The framework helps to understand why women do not always try to access maternal health care, because, for example, the fear of disclosing a girl's pregnancy can lead to a delay in her decision of seeking antenatal care. In comparison to the other two models, these three different components do not do justice to all the different factors that can contribute to the utilisation of care or possible maternal mortality. An example of how the three delays model can be placed within the Sub-Saharan African context is that in countries such as Zambia the perception of the quality of the care that will be provided to the teenage girl strongly influences their decision to seek care (Broccoli, Calvello, Twomey, Wachira & Wallis, 2014). This example specifically looks at the quality of care factor and how that influences delay phase number one.

The model is included in this research because in order to understand the use of maternal health care, it is also important to comprehend what obstructs the utilisation of care in Sub-Saharan Africa, and specifically Kenya. The model is particularly useful for the parts of the sub-questions that focus on the accessibility of maternal health care but also to explain delays that were talked about during the expert interviews. Moreover, the model proves itself useful when looking at the COVID-19 outbreak. Even though the framework itself does not focus on crises or external shocks, a consequence of the pandemic is that delays in the decision to seek care or the accessibility of the medical facility can occur.

When comparing this model to the framework of Andersen and Newman (1973), the main difference is that this framework focuses particularly on delays, meanwhile, Andersen and Newman (1973) review different factors that stimulate care seeking behaviour. Moreover, the framework of Andersen and Newman (1973) views the utilisation of health care from a more holistic approach compared to the framework by Thaddeus and Maine (1994). On the other hand, since the focus of both frameworks is not the same, it is difficult to critically assess which model is more suitable for this research. In the end, a combination of these models is necessary to discover the whole picture regarding the utilisation of maternal care for adolescent girls. When combining the different delays with the different disposing and enabling factors that identify the different patterns and determinants regarding the utilisation of care, these two models of Andersen and Newman (1973) and Thaddeus and Maine (1994) reinforce one another and help identify what patterns cause delays and what determinants stimulate adherence to care.

The conceptual framework of Mekonnen, et al. (2019)

The framework shown in figure 4 is created by Mekonnen, et al. (2019) and describes the different levels and factors influencing the engagement in maternal care. The model is specifically focused on Sub-Saharan Africa, making it more relevant for this study. The framework of Mekonnen, et al. (2019) is the perfect addition to the previously discussed models, because this is the only model that specifically focuses on adolescent girls, and thus adds a new dimension. Furthermore, similar to the framework of Thaddeus and Maine (1994), all the outcomes of this study were based on secondary data. This means that, contrary to the framework of Andersen and Newman (1973), the researchers did not conduct any fieldwork or research themselves. The framework provides insights into the different factors that stimulate or reduce the use of maternal health services and categorised all these influences into different categories.

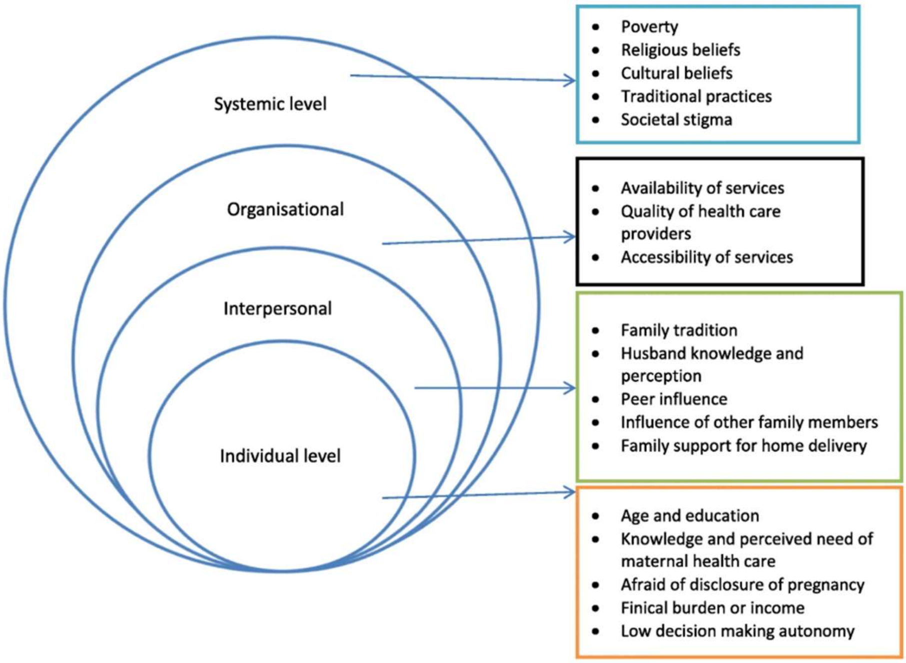

Systemic level
Organisational
Interpersonal
Individual level
• Poverty
• Religious beliefs
• Cultural beliefs
• Traditional practices
• Societal stigma
• Availability of services
• Quality of health care providers
• Accessibility of services
• Family tradition
• Husband knowledge and perception
• Peer influence
• Influence of other family members
• Family support for home delivery
• Age and education
• Knowledge and perceived need of maternal health care
• Afraid of disclosure of pregnancy
• Finical burden or income
• Low decision making autonomy

Figure 4. A socioecological analysis of factors influencing adolescent mothers' engagement with maternity care in Sub-Saharan Africa (Mekonnen, Dune, & Perz, 2019).

To provide better insights of how the model works, it is placed into the existing literature about the utilisation of antenatal care of adolescent mothers in Sub-Saharan Africa.

Systematic level

In regions where there is no safety net for the poor or other interventions that can help women pay for the ANC visits, the costs for the care is often the obstacle and prevents women from getting regular check ups (World Health Organization, 2018). To continue, wealth is seen as an important factor for the use of maternal health care services, particularly in the sense that the richer the adolescent girls are, the more likely they are to have a higher number of ANCs, a skilled delivery and PNC (Mekonnen, et al. 2019).

One of the biggest obstacles for the utilisation of maternal health care services for adolescent girls in Sub-Saharan Africa, is societal stigma. A study in Tanzania found out that particularly unmarried adolescent mothers-to-be were afraid to go to the health clinic because of stigma or felt ashamed about being pregnant (Hokororo, et al. 2015). Another factor that is seen as a barrier to the utilisation of maternal health care is the perceived need of care and the influence of traditional practices. The use of a traditional birth attendant decreases the perceived need of maternal health care of adolescent girls, resulting in a decrease in the utilisation (Mekonnen, et al. 2019).

Organisational level

The health care system differs per country in Sub-Saharan Africa, leading to very different experiences with maternal health care. What is overarching for most countries in Sub-Saharan Africa, is that most antenatal care services are centred around the need of adults, and not teenagers. This outs itself in the lack of privacy and time, but also lack of knowledge about how to take care of pregnant teenagers (Hokororo, et al. 2015).

Another cause of the low number of ANC visits by adolescent girls can be attributed to the lack of communication or certain conflict between formal health providers, traditional birth attendants and community health workers (World Health Organization, 2018). Different studies conducted in South Africa concluded that many adolescent girls experience a lack of trust in their health care workers, which is often due to the communication barriers between the two parties (Govender, Taylor & Naidoo, 2020; James, Rall, & Strümpher, 2012). Moreover, teenage girls in South Africa experience negative attitudes from health care providers and in combination with certain stigma and embarrassment, and as a result become less likely to receive antenatal care (Govender, Taylor & Naidoo, 2020). In other words, a domino effect can be seen on different levels within the framework.

Interpersonal level

There is often a certain discourse surrounding teenage pregnancy that makes these girls believe that teenage pregnancy is something shameful, irresponsible or deviant (Erasmus, Knight & Dutton, 2020). These discourses are put in place by the community, health care providers, or the system (Erasmus, et al. 2020). The two latter have been discussed in the previous sections, but how does the community and family play a role in the utilisation of maternal health care?

In many communities the power and relevance of ANC and skilled delivery is underestimated, and as a result, mothers do not optimally use the care they need (World Health Organization, 2018). Furthermore, families and communities often do not want to teach young girls about sex education because of negative social norms against sex education within the society (Ahinkorah, et al. 2019).

Another factor that influences the utilisation of antenatal care, is if the pregnancy is considered to be unwanted. What can happen is that the teenage girl gets rejected by her partner and experiences social isolation (Hokororo, et al. 2015; Mekonnen, et al. 2019). Adding to this, is that if it is the other way around and the teenage girls do have support from their families or partners, they are more likely to be open to receiving maternal health care (Mekonnen, et al. 2019).

Individual level

At the individual level, factors such as educational status, age, residence, economic status and knowledge and perceived need of maternal health care were identified to influence the utilisation of maternity care by adolescent mothers in Sub-Saharan Africa (Mekonnen, et al. 2019). To dive deeper into the importance of education of adolescent girls, but also the education of their families, is that education helps girls to realise the relevance of antenatal care visits and skilled delivery. The study of Mekonnen, et al. (2019) proved that if mothers had completed secondary education or above, they are far more likely to seek care, compared to mothers who did not complete any education.

Another factor that is important to mention is that many teenage girls hide their pregnancy out of fear of disclosure, shame and reactions of others. As a result they do not visit any health clinics to receive care or deliver their baby (Hokororo, et al. 2015). Connecting to this is also the age of the girls, the younger they are the less likely the teenage girls are to dare to go to the clinic or tell someone about their pregnancy (Hokororo, et al. 2015).

Conclusion

The overview of the existing literature contributed to creating an outline about what is already known about teenage pregnancy in Sub-Saharan Africa and the adherence to maternal health care by adolescent girls. It can be concluded that much information is already available, but the deep dive about the utilisation of care by adolescent girls in Kenya was still missing. To be able to comprehend all possible variables that can influence the utilisation of maternal health care, multiple frameworks were elaborated on. When comparing the three delays model of Thaddeus and Maine (1994) to the framework of Mekonnen, et al. (2019), some overlap can be found in the key components of the care seeking behaviour of adolescent girls in Sub-Saharan Africa. In other words, socio economic and cultural factors and variables such as age, poverty, education, cultural and religious beliefs, and perceived knowledge about maternal care harmonise with one another. Furthermore, the quality of care of the Thaddeus and Maine (1994) model has significant resemblance with the organisational level of the conceptual framework of Mekonnen, et al. (2019). The individual determinants in the framework of Andersen and Newman (1973) have a lot of common ground with the different determinants in the framework of Mekonnen, et al. (2019) what can suggest that the determinants that stimulate or delay care has not changed much over time.

When comparing the location and aim of the three different frameworks, the framework of Mekonnen, et al. (2019) comes the closest to the research topic. The frameworks of the Andersen and Newman (1973) and Thaddeus and Maine (1994) are more focused on a general utilisation of health care services and what kind of delays are preventing women and girls from seeking care. Nevertheless, the frameworks of Andersen and Newman (1973) and Thaddeus and Maine (1994), are still needed in the process towards understanding the different patterns and determinants of the utilisation of care.

To conclude, the three models all correlate with one another and provide different perspectives and ways of thinking about the same topic: the utilisation of health care services. The three frameworks are at the core of the research question, and provide assistance in answering the different sub-questions.

2.3 Conceptual framework

Based on these three different frameworks, a conceptual framework has been created. The most relevant aspects of each of the three frameworks have been integrated in a conceptual framework that guided this research.

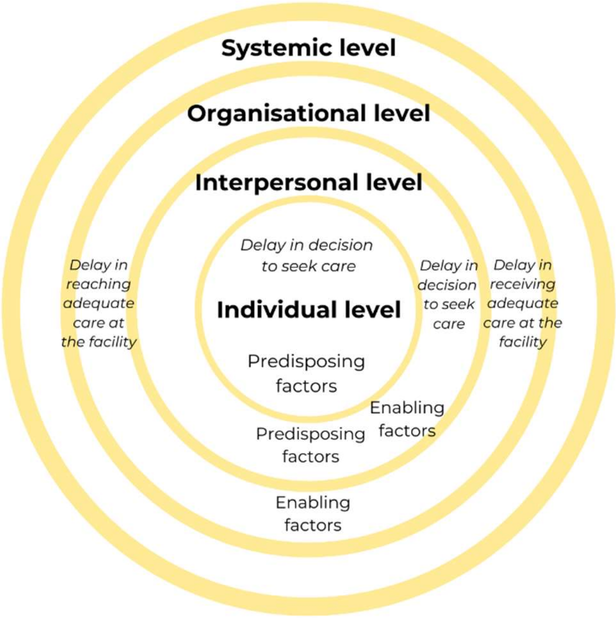

Systemic level
Organisational level
Interpersonal level
Delay in decision to seek care
Individual level
Predisposing factors
Delay in reaching adequate care at the facility
Delay in decision to seek care
Delay in receiving adequate care at the facility
Enabling factors
Predisposing factors
Enabling factors

Figure 5. Conceptual model based on three theoretical frameworks.

The conceptual framework is a simplified version, and all elements presented in the previous three frameworks are applicable to this conceptual framework. The three delays of Thaddeus and Maine (1994), and predisposing and enabling factors of Andersen and Newman (1973) are placed within the framework of Mekonnen, et al. (2019). Moreover, all individual components and determinants displayed in the three frameworks are all relevant throughout this research. The conceptual framework shows how they are intertwined with one another.

2.4 Research objectives

The research objective was to discover and explore the patterns and influential factors for the utilisation of maternal health care for adolescent girls in Kenya. Additionally, time was a relevant element in this study, as the research focused on the utilisation of antenatal care prior to and during the COVID-19 pandemic. Researching two different time periods was relevant for discovering if COVID-19 influenced the utilisation of maternal health care for adolescent girls in Kenya.

2.5 Research questions

The research question connecting to this research objective was as follows:

'' What are the patterns and determinants relating to the utilisation of antenatal care and skilled delivery among pregnant adolescent girls in Kenya, and what changed during the COVID-19 outbreak?''

To answer the research question thoroughly, the following sub-questions have been created:

1. How was the utilisation of antenatal care for pregnant adolescent girls in Kenya?
    - *How was the antenatal care and skilled delivery for adolescent girls in Kenya before March 2020?*
    - *What patterns and interrelating factors can be found amongst pregnant adolescent girls who received antenatal care and skilled delivery in Kenya before March 2020?*
    - *What determinants influence if an adolescent girl wants to receive or can receive antenatal care and a skilled delivery in Kenya?*

2. What changed regarding the utilisation of antenatal care and skilled delivery for pregnant girl in Kenya during the COVID-19 pandemic?
    - *How is the antenatal care and skilled delivery for adolescent girls in Kenya since the COVID-19 outbreak?*
    - *What patterns and interrelating factors can be found amongst pregnant adolescent girls who have received antenatal care and a skilled delivery in Kenya since March 2020?*
    - *What determinants influence if an adolescent girl wants or can receive antenatal care and skilled delivery in Kenya during the COVID-19 pandemic?*

3. Which patterns and determinants are the most influential before and during the COVID-19 pandemic, and why?

3. Regional and contextual framework

The regional framework provides an overview of the different regions the research was focused. The aim of the regional framework is to get insights into the situation regarding teenage pregnancy and maternal health care services in Kenya and several counties within Kenya. After the overview, the partner organisation is introduced and the previous work of MomCare is elaborated on.

3.1 A breakdown of the health care system in Kenya

The focus of the research is on Kenya, as pictured in figure 6. Kenya has a total population of 52.5 million people of which 26.4 million persons are women (World Bank, 2019a; World Bank, 2019b). Approximately 75% of the Kenyans live in rural areas, and it is estimated that roughly 46% of the people living in Kenya are living below the poverty line (World Health Organization, 2017a). The average amount of births per woman in Kenya is around 3.9 births, however, in rural areas, this number equals 4.5 births. Additionally, the average amount of births increases drastically when a woman is not educated, namely to an average of 6.5 births. On the other hand, when a woman has received education the average births drop to 3.0 Wealth is also an important factor in Kenya when looking at influential factors for average births per woman. Women from rich households experience on average 2.8 births, and the poorest households 6.4 (Kenya National Bureau of Statistics, 2014).

Even though child mortality is declining in Kenya, the rate is still relatively high, as the infant mortality is 35 deaths per 1000 births, and 1 in 20 children born in Kenya die before their fifth birthday (Kenya National Bureau of Statistics, 2014).

The health care system in Kenya partially provides free care for every citizen, this care includes antenatal care (World Health Organization, 2017a). However, even with the free maternal health care, the majority of the women and girls are not making optimal use of the antenatal health care services. Kenya makes a distinction between private clinics and public clinics, and only in the public health facilities, all the maternal health care is free for the teenagers (Gitobu, Gichangi & Mwanda, 2018). However, the health care policy also knows its downsides as there are gaps in drugs and supply shortages in the clinics, not enough funding to take care of all the maternal health care services and attitudes of health workers towards pregnant teenagers (Gitobu, et al. 2018).

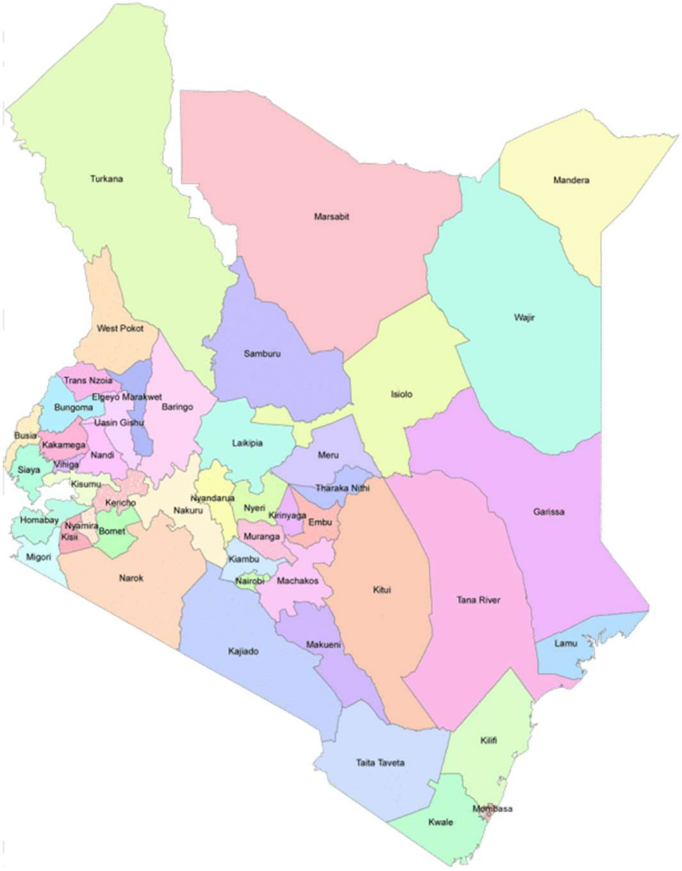

Turkana
Marsabit
Mandera
Wajir
West Pokot
Samburu
Trans Nzoia
Elgeyo Marakwet
Bungoma
Baringo
Uasin Gishu
Busia
Kakamega
Nandi
Vihiga
Siaya
Kisumu
Isiolo
Laikipia
Meru
Tharaka Nithi
Garissa
Kericho
Nyandarua
Nakuru
Nyeri
Kirinyaga
Embu
Homabay
Nyamira
Kisii
Bomet
Muranga
Migori
Kiambu
Narok
Nairobi
Machakos
Kitui
Tana River
Lamu
Kajiado
Makueni
Kilifi
Taita Taveta
Mombasa
Kwale

Figure 6. Areas that are covered by Counties in the new Kenya constitution (Kenya Open Data Project, 2012).

As aforementioned, the research is focused on Kenya, however, the partner organisation is active in four different counties within Kenya. Therefore, part of the research is solely focused on four counties, namely: Kakamega, Kisumu, Nairobi, and Vihiga. The counties are pictured in figure 6.

The partner organisation works together with multiple health facilities, and in these facilities, they have helped over 16.800 pregnant females, of which approximately 11 per cent are teenagers (PharmAccess, 2020b). For each county, the necessary regional context is provided to create a better understanding of the situation surrounding pregnant adolescent girls and the health care opportunities.

Kakamega county

1.8 million people are living in the county of Kakamega, of which 970 thousand are females (Kenya National Bureau of Statistics, 2014). Kakamega is the 15th largest county in Kenya and is county number five on the list of the highest maternal deaths per year (Mwanza, et al. 2019). Kakamega country has a surface of 3.034 kilometres and has in total 282 health facilities spread out over the county (Mwanza, Mose & Owano, 2019). Out of all pregnant women and girls in Kakamega, 66% of them delivers in a facility (County government of Kakamega, 2019).

The average household size in Kakamega is around 3.4 people. One out of four persons is estimated to be an adolescent, meaning that there are approximately 460 thousand girls under the age of 19 living in Kakamega. The adolescent pregnancy rate in Kakamega lies above the national average and is 19% (Kenya National Bureau of Statistics, 2014). There were around 17.550 adolescent pregnancies in Kakamega in 2019 (African Institute for Development Policy, 2019).

Kisumu county

Kisumu has a total population of 1.15 million people, and of these people, 594 thousand are female (Kenya National Bureau of Statistics, 2019). Kisumu has the smallest population compared to the other two counties MomCare is active in, however, the county possesses the third biggest city in Kenya. Kisumu has a total surface of 2085 kilometres and is considered to be densely populated (Republic of Kenya, 2013). The average household size in Kisumu is around 3.8 persons (Kenya National Bureau of Statistics, 2014). The same prediction about the number of adolescent girls is accurate in Kisumu, meaning that around one out of four citizens is an adolescent, resulting in that 297 thousand adolescent girls are living in Kisumu. The adolescent pregnancy rate in Kisumu is approximately 15%, which is the same as the national average (Kenya National Bureau of Statistics, 2014).

The main challenges that Kisumu faces concerning antenatal health and access to maternal health care are the lack of proper access to the health care services, the lack of quality of the services, and a relatively high number of unskilled deliveries (Kilonzo, Kamaara & Magak, 2017).

Nairobi county

Nairobi officially has a population of 4.3 million people, however, when taking the whole urban area surrounding the centre into consideration, the total citizen number consists out of 9.3 million people. Nairobi city has a surface of 696 square kilometres. Of the 4.3 million people, 2.2. million are female (Kenya National Bureau of Statistics, 2019). The average household size is significantly lower than in the other two counties and is around 2.9 persons (Kenya National Bureau of Statistics, 2014). In 2019, there were around 26.635 adolescent pregnancies in Nairobi (African Institute for Development Policy, 2019).

What is important to take into consideration in Nairobi is the number of people living in slums, as the people living in slums accounts for approximately 60% of the people living in Nairobi. The people living in slums are known to have much poorer health and decreased access to health care services than the people living in urban areas in Nairobi (Rossier, et al. 2014). Furthermore, the maternal mortality rate in the slums of Nairobi is significantly higher compared to the one in the urban area, as in the slums it was as high as 706 deaths per 100 thousand births (Rossier, et al. 2014).

Vihiga county

The population of Vihiga now stands at 688.778 people (Vihiga County, 2017). Around 44% of the population living in Vihiga is aged below 15 years old. 13% of the girls between the age of 15 and 19 years old in Vihiga has been pregnant or has given birth to a child. The birth rate for adolescent girls equals to 83 births per 1000 girls. The number is lower compared to the national average of Kenya.

3.2 Introducing the partner organisation

PharmAccess Foundation

PharmAccess Foundation beliefs that technology holds the solution for revolutionizing the health care sector by providing healthcare solutions that leaves no person behind (PharmAccess Foundation, n.d.). Their goal is to ensure that health markets become more inclusive and to achieve universal health coverage. PharmAccess focuses on developing low-cost insurance platforms in Africa, improving the quality of health care by introducing certain standards, creating care bundles and use data to improve the healthcare outcomes, providing loans and business support to help private healthcare business and they conduct independent academic research about Sub-Saharan Africa.

PharmAccess created the program MomCare what aims to strengthen the health care sector and provide better maternal health care for pregnant women of all ages.

MomCare

The MomCare program was launched in 2017 by PharmAccess Foundation and has grown significantly over the past years and is now active in Kenya, Tanzania and Nigeria. MomCare first worked together with multiple health facilities in Nairobi, and later expanded to Kakamega and Kisumu. Vihiga has been the most recent county to be included in MomCare. The choices for the counties and health facilities were based on four different decisions. The first being that the selected clinics were private or faith based clinics, because that resulted in more effective collaborations in comparison with public clinics. After the private or faith based clinics proved to be efficiently working, MomCare expanded to public clinics to launch and expand the MomCare program to the public. The second reason is that the clinics should offer maternal, newborn and child health services. Thirdly, the clinics should be able to reach the target population; the very vulnerable and in low income areas. Finally, PharmAccess foundation had several connections and alliances with M-TIBA and SafeCare.

MomCare aims to empower women through providing affordable maternal health care and providing them with trustworthy and reliable care. The goal of MomCare is to stimulate women to seek pregnancy care early on in their pregnancy to reduce pregnancy complications and risks, and thus reduce the maternal mortality rate. Moreover, MomCare particularly wants to increase the adherence to maternal and child health care throughout the journey of an expecting woman or girl by ensuring the full tracking of her treatment, risk profile and the risk mitigation with the goal to decrease maternal and child mortality. MomCare, through PharmAccess, tries to enable both sides, the mothers and the providers of health care, to ensure that mothers receive the care they need and the health care providers are able to practice their skills and gain new patients. The initiative does this through handing out partially or fully subsidized care bundles to women and girls who come to one of the 27 clinics spread across the four counties. The care bundles are shown in figure 7 and consist out of four antenatal care visits, skilled delivery, two postnatal care visits and immunizations for the newborn until week 14 after the delivery (PharmAccess, 2020b). The teenage girls can come to the clinic at random and there is no selection bias because all girls are welcome to enrol into MomCare.

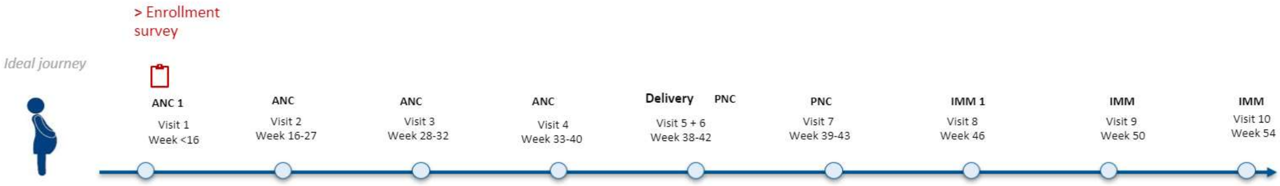


Figure 7. MomCare journey with care bundle.

Besides the care bundles do all women and girls also receive a health-wallet where they can view their next check-ups or appointments. Moreover, the mobile platform sends the girls SMS reminders or incentives to stimulate or reward their adherence to care.

4. Methodology

This chapter elaborates on the research design and research methods, and will also operationalise the different concepts that were relevant during this research. The research was carried out by the researcher from the 1st of February until the 30th of June 2021. The three different research methods that are discussed are a systematic literature review, statistical analyses and multiple expert interviews.

4.1 Operationalisation of concepts

The concepts and theories that have been used throughout the research can require further elaboration and operationalisation. The concepts are operationalised according to definitions that are fitting for the research and frequently used in literature.

Access to antenatal care

Antenatal care also referred to as ANC, is defined by the World Health Organization (2016a) as '' *the care provided by skilled health-care professionals to pregnant women and adolescent girls in order to ensure the best health conditions for both mother and baby during pregnancy. The components of ANC include: risk identification; prevention and management of pregnancy-related or concurrent diseases; and health education and health promotion''.* Antenatal care is an important element in the fight to reduce maternal mortality and morbidity and is considered to be a basic component of maternal health. Access to antenatal care can be measured through reviewing the different patterns and determinants that are connected to if a girl is making use of the care or not, and what the reasoning behind the lack of use is.

Access to maternal health care

Access to maternal care is defined as access related to the utilisation of maternal healthcare services, the timely decision to seek care, physical accessibility to health facilities, and receiving adequate healthcare (Dahab & Sakellariou, 2020). Access to maternal health care can, quite literally, mean that a girl is able to use services that are essential for caring for her and her baby during and after her pregnancy (Tsawe & Susuman, 2014).

Determinants (of access to antenatal care and skilled delivery)

Determinants are certain elements or circumstances that identify or determine the nature of something or that fixes an outcome. In other words, a determinant is a contributing factor that influences if a girl makes use of antenatal care or not. These determinants can be visible on different levels as seen in the theoretical framework of Mekonnen, et al. (2019), shown in figure 4. Moreover, the behavioural framework of Andersen and Newman (1973), includes predisposing factors and enabling factors that indicate the different elements that influence the care seeking behaviour of adolescent girls.

Patterns

Patterns can be referred to as structures that can be seen in a certain population group. For this research, the patterns indicate in what frequencies they receive the care or visit the facilities and mostly what are the reasons behind the number of ANCs, at what stage these girls arrive in their pregnancies and other patterns that still are unnoticed. In contrary to the determinants, the patterns in this research are related to the health care behaviour of adolescent girls, and more specifically the need factors in the framework of Andersen and Newman (1973), but also the framework of Thaddeus and

Maine (1994), which refers to the delay in receiving adequate care. An example of a pattern is that most adolescent girls experience a delay in the decision to seek care, and as a result, most of the girls have their first ANC visit in their third trimester.

Adolescent or teenage girls in Kenya

Teenage girls also referred to as adolescents, are girls within the age category of 10 until 19 (World Health Organization, n.d.; Kassa, et al. 2018). The girls that fall into the desired age category for this research will be between the age of 10 and 19. One in five girls within the age category 15 until 19 have experienced pregnancy, and are therefore the group that is impacted the hardest (Kenya National Bureau of Statistics, 2014). Nonetheless, what cannot be overlooked is the importance of age for these girls. The more the age of a girl decreases, the more the risks of complications with a fatal end for mother and baby increases (Neal, et al. 2012).

COVID-19 restrictions

COVID-19 restrictions mean that measurements are taken by the government during the battle against the COVID-19 pandemic. Restrictions can come in forms such as a curfew from 22:00 until 04:00 in Kenya, and in the Western part of Kenya from 19:00 until 04:00 (U.S. Ambassy in Kenya, 2021). The measurements taken against the COVID-19 outbreak are often taken according to the number of COVID-19 patients in a country. The higher the number of COVID-19 patients, the more strict the measurements will be. From one of the least strict measurements such as a mouth mask to strict measurements such as the closure of certain public buildings and a curfew.

4.2 Research design

The goal of the research was to discover the patterns and determinants relating to the utilisation of antenatal care for adolescent girls in Kenya, specifically looking at the situation before the COVID-19 outbreak and what changed during the pandemic. The research placed itself within two different well-researched debates, teenage pregnancy and the utilisation of antenatal care. Since both topics have been extensively researched, this research was considered explanatory, because the focus was on connecting different aspects and not exploring a whole new topic. However, the study focused on the unknown aspect of the combination of these two different debates, namely what stimulates or refrains adolescent girls from using of maternal health care services in Kenya. Furthermore, by adding the COVID-19 pandemic time frame, the research pointed towards a more exploratory research. Research about the COVID-19 virus and the consequences of the pandemic on the lives of people is slowly emerging, however, because the pandemic is still ongoing it is difficult to comprehend what the long term effects are. The research was viewed as a longitudinal study, due to the focus on the two different times, prior to and during the COVID-19 pandemic.

To adequately answer the research question, there had to be made a choice for the most fitting research methods. The choices for the research methods were based on several considerations. First, the target group for this study were pregnant adolescent girls living in Kenya. The fact that these girls are below the age of 19 and are considered to be minors, made it unethical to interview and observe them. Furthermore, due to the current COVID-19 pandemic, it was impossible to travel to other countries to conduct work in the field. Taking this into account and the knowledge that COVID-19 is a relatively new phenomenon within research, the best research methods for this study were a systematic literature review, statistical analyses and expert interviews. To elaborate, a systematic literature review was relevant since the COVID-19 outbreak in Kenya has not been much researched, especially not in combination with the utilisation of antenatal care. Adding to this, there was no other systematic literature review available on these two topics, and, thus, the need for a review was evident.

The second research method were statistical analyses based on data provided by the MomCare program. The statistical analyses provided data about the different variables that influence the care journey of teenage girls and provided insights into what the most influential factors were. What made the analyses especially relevant was that MomCare possessed data from before the COVID-19 pandemic and also during the COVID-19 outbreak. However, the statistical analyses based on the available data provided by MomCare only provided one perspective, and that is the perspective of teenage girls who were enrolled in the program and were receiving care. On the other hand, the systematic literature review focused on all pregnant adolescent girls in Kenya, and thus, included the entire target population. These two research methods compliment one another and provided a comprehensive overview to understand more about the patterns and determinants of the utilisation of care. Finally, expert interviews had been chosen since they provided the opportunity to gain another perspective on the utilisation of antenatal care, but they were also able to fill in certain uncertainties based on the statistical analyses and the systematic literature review. As a result, the study made use of a mixed methods approach.

4.3 Research methods

Systematic literature review

One of the chosen research methods was a systematic literature review through the analysis of secondary data. The goal of the systematic literature review was to provide an all-encompassing overview of the available knowledge about the utilisation of antenatal care for adolescent girls in Kenya, and the effect of COVID-19 on the care seeking behaviour of teenage girls. A systematic literature review was particularly relevant for this study because such a review did not exist yet. A literature review is often carried out by researchers when they want to discover and identify parts of a specific topic that has not been researched in much detail yet (Western Sydney University, 2017). Hence, the systematic literature review was a good way to obtain all written knowledge about the patterns and determinants relating to the utilisation of maternal health care by adolescent girls in Kenya, and the effect of COVID-19 on the care seeking behaviour was collected through this review.

The secondary data consisted out of academic publications, statistics, governmental reports, policy reports, and other types of data that were considered as relevant. The secondary data has been collected and reviewed, and then rewritten in a clear and elaborative review. The steps taken during this process are elaborated on in the following section.

Selection process

The data selection process consisted out of several steps. It was important to first define several search methods and search terms, followed by the selection process of the different studies. Afterwards, the different studies were reviewed once more to ensure the right participant groups were included and what types of studies were eligible. Each of the steps that led to the definite number of studies for the systematic literature review is discussed down below.

Search methods for identifying studies

The search for articles and studies was based on a manual search strategy. The academic databases and search engines that were used for the collection of the secondary data were SCOPUS, WorldCat, GoogleScholar, JSTOR: Journal Storage, MEDLINE, PubMed, ResearchGate, ScienceDirect, and SpringerLink. On each database or search engine, several searches have been conducted with search terms (appendix 1). The search terms consisted out of primary search terms, as seen in column 1 of the appendix, and search terms that have been added to the primary search terms or be searched individually. Each column deepened further into the desired research topic, and several search terms were combined with other search terms. Terms with the same definitions were used and switched up to create a broader search area. Furthermore, during the search, several new terms arose and they were used to deepen and improve the search for data.

Selection of studies

As shown in the flow diagram in appendix 2, there were 78 studies identified based on the search terms. Duplicates were removed from the total number of studies, and the next step was to screen the title and abstract of each article to discover if the study was in alignment with the topic of the systematic review. To keep a record of all the articles, they were saved in an Excel sheet, which also kept track of each stage of the selection process. When an article was excluded from the systematic review because it did not adhere to a certain inclusion criteria, the reason for the exclusion was written down in the sheet, so it could be rediscussed with a supervisor later on when needed. As shown in appendix 2, in the end 24 studies were the most fitting and, thus, used for the systematic literature review.

Types of studies and participants

The nature of the eligible studies were quantitative as well as quantitative. The studies had to be academic studies or other relevant and trustworthy studies, and written in English. The participants in the 34 eligible studies range from 10 years old to 49 years old. Ultimately, the girls aged from 10 to 19 years old were the target group for this systematic literature review. All studies used for the systematic literature review had to be focused on Kenya or applicable to the situation in Kenya.

A total of 24 studies were included in the systematic literature review, and 14 of them were published in 2020. All the publishing years of the used studies are shown in figure 8, with the oldest being published in 2014 and the newest is from 2021. The studies came from 17 different journals, and not one article came from the same journal. The other seven articles were from sources such as the World Health Organization and news channels from Kenya.

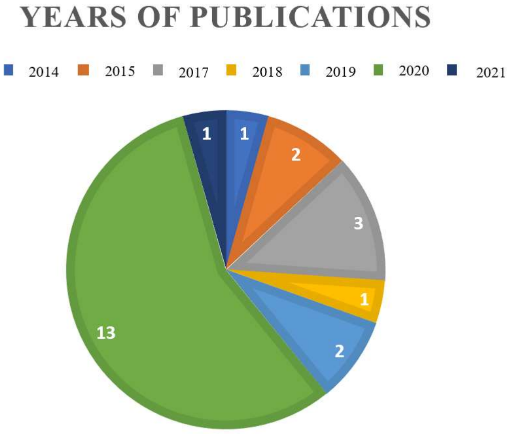


Figure 8. Years of publications.

Data analysis

For the analysis of the data in each of the 24 chosen academic articles, the articles were carefully read through, line by line. To ensure no relevant information was unnoticed, every interesting sentence or section was highlighted and after completing, several codes and themes were created based on similarities in the articles. The codes and themes helped to create an overview of the outcomes of the articles, in which some statements were in alignment with each other and other statements contradict one another.

Statistical analyses

The second research method were the statistical analyses. Statistical analyses are an interesting research method because it allows the researcher to verify or reject certain hypotheses about what patterns and determinants influence the patterns of utilisation of care, and by doing so draw valid conclusions based on the outcomes.

Due to ethical reasons, the COVID-19 restrictions and the timeframe of the study, the data could not be collected by the researcher, and thus, no primary data collection was conducted for this part of the research. Instead, the data for the analyses were provided by the partner organisations. The partner organisations retrieved the data from the field in Kenya. The organisations are working closely together with several health clinics across Kenya, which provide care to the mothers. When a mother comes in for the first time she or her caretaker has to fill out an enrolment survey. The enrolment survey contains questions about the socio-demographic and socio-economic background of the mother-to-be. The second data extraction point is the carepay utilisation information, which is filled in by the health facility. The carepay utilisation keeps track of the care the girl receives, billing information, and other relevant developments. All this data is forwarded to MomCare in Amsterdam, and they process the qualitative and quantitative data.

Before proceeding to the analysis of the data, the different data sets needed to be scanned to get an overview of what kind of data was actually available about the adolescent mothers. Information ranged from age to medication use and the level of education of the household head. The goal was to merge two data sets, one data set being the care pay utilisation information and the other being the enrolment survey of the mothers. An important thing that needed to be taken into consideration about these data sets was that the enrolment survey of the adolescent girls could be renewed every month, and as a consequence, the data changed per month as well. The cause for this was because each month new girls enrol into the program, and the girls who were already in the program moved up one month and perhaps have had a check-up or certain complications arose. To ensure that the data was not switched up every month, it has been decided to take the enrolment survey that was available during the first week of April 2021. For the carepay utilisation data set the information was retrieved on the 16th of April, 2021.

Data analysis

The final regression analyses were analysed through the statistical program named STATA. Before running the regression analyses in STATA, the cleaning of the data sets needed to be completed. The researcher had never worked with STATA before, so to make sure that the cleaning in STATA was done correctly, all the cleaning was also done in SPSS as an insurance policy.

The datasets were still quite raw upon obtainment and required lots of cleaning. The different steps taken in the cleaning process is shown in figure 9, and in appendix 3.1 the cleaning process of the data sets is further elaborated on.

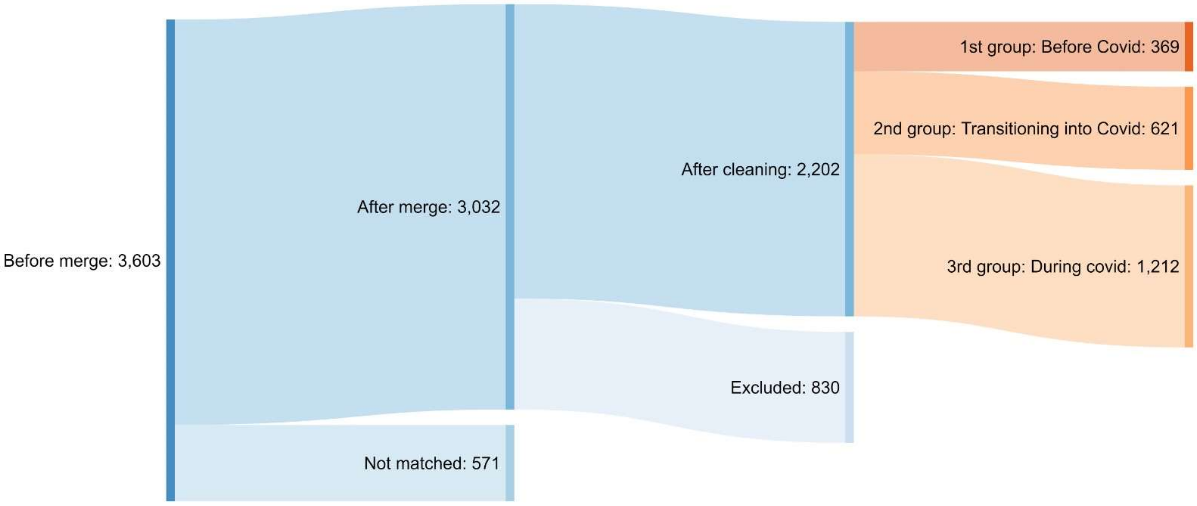


Figure 9. Timeline cleaning process statistical analyses.

After removing the inaccuracies, the next step was to create a selection of relevant variables. The selection process is shown in appendix 3.2. The other variables were selected based on the available data in the literature review and theoretical framework. The most relevant variables that were used for the final regression analyses were based on the predisposing and enabling factors presented in the framework of Andersen and Newman (1973). A total of 13 relevant variables were included in the study, and are shown in the table down below.

Age
Region
Enrolment period
ANCs
Skilled delivery
Has been pregnant before
Transportation use
Travel time to the clinic
Number of times been pregnant before
Who can she count on in times of need
Educational level of household head
Has she or a family member experienced hunger in the past 12 months

Figure 10. Relevant variables for statistical analyses.

The descriptive statistics of these variables are displayed in appendix 4. To create more clarity in the data set, multiple categories were created for the variables enrolment period, travel to the clinic in minutes, transport use, how many people the mother can count on in times of need and the educational level of the household head. The categories for each of these variables are shown in appendix 4.

The final step was to split the teenage mothers into three different categories. The reason for this is because the research focused on what changes occurred in the care seeking behaviour of pregnant teenagers due to the COVID-19 outbreak. The first group are the adolescent girls who enrolled and were pregnant prior to COVID-19. The selected separation date for this group is the 15th of March, 2020, because the first official measurements against COVID-19 were taken that day (Kenyatta, 2020). The second study group are the mothers who got pregnant before COVID-19 but gave birth during the COVID-19 outbreak. The distinction for this group was set at the 16th of September 2020. The third and final group of mothers is the group who got pregnant and enrolled in MomCare during COVID-19, specifically after the 16th of September 2020 and until the 16th of April 2021. The sizes of the three study groups are 369, 621 and 1,212 respectively.

The reason as to why the third group is relatively bigger than the other two groups is because the capacity of MomCare grew remarkably over the last year, leading to more space for the enrolment of mothers.

To get the most all-encompassing answer to the research question, it had been decided to focus on three different outcome variables that help allocate the patterns of utilisation. The three dependent variables that were chosen were: the number of antenatal care visits, early enrolment into the MomCare program and skilled delivery. The *ANC visits* and *early enrolment* were both continuous variables, whereas *skilled delivery* was a binary variable. The early enrolment variable requires a more thorough explanation, as enrolment is shown as the categorical variable *enrolment period* in the descriptive statistics (appendix 4). For the regression analyses it had been chosen to reverse the categories made for the enrolment period back to a continuous variable. The reasoning behind this is because the focus for the enrolment variable is on early enrolment, however, given the low number of girls who enrolled in their first trimester, the regression analyses use a cut-off of 16 weeks to investigate the determinants of early enrolment.

The different sort of dependent variables resulted in two different type of regression analysis, namely two multiple linear regression analyses and a binary logistic regression. For each regression analysis, several independent variables were included, and those are: age, region, has been pregnant before, times she has been pregnant before, the travel time to the clinic, transportation use, how many people she can count on in times of need if she or a family member has experienced hunger in the last 12 months and the educational level of the household head. Next to this, in the regression for the dependent variable *ANC*, early enrolment was included, and for the dependent variable *skilled delivery,* the variables early enrolment and ANCs were included in the regression. Finally, the analyses were sorted by the three different COVID-19 groups, meaning that a total of nine regression analyses were conducted.

Prior to conducting the regression analyses, several assumptions needed to be checked and adhered to, for both the multiple linear regression, as well as, the binary logistic regression. The assumptions were based on the statistical syllabus by de Vocht (2019). For all three regression analyse the assumptions were met and are shown in appendix 5. There were some slight deviations in the assumptions for the antenatal care visits, however after consulting with the supervisors it had been decided to discard these deviations as worrying and to continue. After successfully testing the assumptions, the final step was to carry out the regression analyses in STATA.

Expert interviews

The third and final research method were the expert interviews. The reason why expert interviews were the most fitting for this research was because experts in the health care field could provide more extensive insights about the situation for adolescent girls in Kenya, mostly because they are working directly with teenage girls, but also because they can look at their situation from a helicopter view. The expert interviews helped gain more perspectives on the situation for adolescent girls, but also served as a useful tool to clear up any doubts about the statistical analyses or the systematic literature review.

The aim was to have at least five experts for the expert interviews to reach a satisfactory data collection point. A total of 10 experts were contacted, however, only three experts were willing open for being interviewed. Several experts indicated that they were too busy to get interviewed, while several others never replied to the e-mails. Moreover, since the research topic was very particular, there was a limited availability of experts in these fields. The used sampling method for the expert interviews was done through expert sampling, which involves identifying key informants who can provide their knowledge and expertise about a certain topic (Frey, 2018).

The experts were found through the academic articles that were used for the theoretical framework or for the systematic literature review, and through searching for organisations over the internet. The experts were required to know all important details about the field of antenatal care, teenage pregnancy or adaptation to COVID-19 in Kenya. Most of the experts were involved with organisations or universities in Kenya that promoted sexual and reproductive health and rights for the youth.

During the advanced stage of the research, the researcher was allowed to present her research in front of a group of five, doctors, health workers and researchers who are connected to MomCare. During the presentation, lots of insights and clarification was given about the outcomes of the statistical analyses. The knowledge and information that was obtained during the presentation were so insightful, that it was decided to regard the presentation as an expert panel. As a result, the information that came out of the expert panel is integrated into the results of the research, as they provided more in-depth explanations, especially regarding the changes in the care seeking behaviour due to COVID-19.

Even though the number of experts that were interviewed was lower than anticipated, an interesting revelation was made. What stood out after the third expert interview was that a certain point of saturation was obtained. Especially with the addition of the information that came to the surface during the presentation, not much new data was gathered during the third expert interview.

Analysis of interviews

As mentioned, a total of three expert interviews were conducted to help answer the research question. To ensure that the semi-structured interviews were carried out in a correct manner and had the same main questions, an interview guide was used. The interview guide is displayed in appendix 6. All expert interviews were conducted through online mediums, mostly through Microsoft Teams. The confidentiality and input of the interviewees were regarded as very important, thus, a consent form was integrated in the interview guide. In the introduction of the interview, there was asked if the interview could be recorded, there was stated that all data was processed anonymously and that all data had been deleted after transcribing the interview. All interviewees gave their consent. To make the interviewees as comfortable as possible the recording was not visible in the screen. With regard to the presentation and the input of the expert panel, all participants gave consent to being recorded and agreed to the input being used for the research.

For analysing the data present in the interviews, a thematic analysis has been conducted. The thematic analysis consisted out of several steps, and started with reading through the interviews and getting familiar with the data. The second step was to code the data. Based on the information of the literature and the statistical analyses, there were several deductive codes included in the coding process. Moreover, there were also several inductive codes included, because of the different topics that some of the experts went into detail about, such as sexual education and the use of social media. Based on the different codes, several themes were created to refer to the different patterns that are related to the utilisation of antenatal care for adolescent girls. These themes range from demographic information such as age and education, to community based patterns such as stigma and traditional beliefs, and to health care related patterns such as the quality and availability of care.

The final step was to review all the interviews and the related codes and themes once more to ensure that every code was placed into the right theme. The experts and the expert in the panel are all addressed as participants in the research to keep their identity confidential.

4.4 Quality assurance

Ethical considerations

Before the data was collected by MomCare or the researcher, all participants gave their written or verbal consent, allowing the collected data to be processed and used for development and research purposes. The data sets, that included all sensitive data of the target population, have been treated carefully and have not been shared with others. Since the target population involved minors and sensitive data, all participants have been made anonymous.

Before the interviews with the experts, a consent form where information about the research and an introduction of the researcher was read out. Additionally, the consent form informed them about their options to withdraw their participation in the research and that they would remain anonymous at all times. Finally, it was mentioned that all collected data would be stored safely and deleted after being processed.

Reliability

The research made use of three different research methods. Each of the three methods and their reliability are discussed in the following paragraphs.

The systematic literature review has several facets that contribute to its reliability and replicability. The studies that were included for the systematic literature review were chosen through the PRISMA method (appendix 2), which ensured that the same process was carried out for each article. Moreover, the inclusion criteria (appendix 1) made sure that the right studies were selected for the systematic literature review. As a result, the systematic literature review is easy to replicate and produces consistent results.

To measure the reliability of the statistical analyses the data cleaning process was done in two different statistical programs to ensure that it was done properly and no mistakes could slip through. Furthermore, for the statistical analyses the test-retest method was carried out, meaning that the analyses have been conducted several times to check if the same results came out of the regression analyses.

For the expert interviews an interview guide was created to ensure that the same questions were asked to every expert. The interview guides were checked by two peers and also by a team member of MomCare to detect any errors or biases in the questions. Furthermore, to create consistency all interviews were held through Microsoft Teams. The gap between the first expert interview and the others was several weeks, which lend the opportunity for the researcher to evaluate the interview guide and to optimise the questions. For the expert interview, the test-retest reliability was also accurate, as the answers of the questions all had the same red thread and after several interviews a level of saturation was measured.

Validity

Internal validity

Since there was made use of a mixed method approach, the internal validity was more likely to be higher in comparison to a completely quantitative or qualitative approach. Moreover, since all three research methods have relatively high reliability, they also have a better validity. Construct validity was the most fitting for this research, since the statistical analyses measured several outcomes for a certain population group, and the systematic literature reviews aimed to do the same. Finally, the expert interviews were integrated to confirm or reject outcomes and to provide another perspective. In this way, all methods were ensured to fulfil its purpose in a correct manner.

To shortly clarify the validity of each research method, for the systematic literature review multiple inclusion criteria were created and adhered to. For the statistical analyses, the assumptions of all regressions analyses have been met, indicating that there were no errors in the analyses and what they were supposed to measure. Furthermore, the dependent and independent variables were based on results of previous research and the literature review. Finally, for the expert interviews were based on the literature review and outcomes of the statistical analyses and the systematic literature review.

A threat to the internal validity could have been participant selection, since for the statistical analyses only teenage girls in the MomCare program were used. However, due to the inclusion of the expert interviews and systematic literature review the threat was minimal and the study population was representative for the whole teenage population in Kenya.

External validity

There were three different methods used to answer the research question, that all focused on the same study population but approached them from a different perspective. The large sample group available in the datasets enhanced the generalizability and the systematic literature review made it possible to see if the outcomes of the statistical analyses were also applicable for the whole target population. Then the results of the statistical analyses and the systematic literature review could then be discussed with experts in the field to verify if these results were representative for the whole target population.

As also mentioned in the internal validity, sampling bias could also have been a threat to external validity. However, because of the mixed methods approach and the verification of the representativity of the study population, the threat was prevented.

Positionality of the researcher

The positionality of the research was quite strange during this research. The researcher dove into a very sensitive topic with the goal to draw conclusions about people she had never seen before, she knew nothing about and about a place where the culture was unfamiliar to her. On top of that, she had to do it all from her home in the Netherlands.

During these past months, it was important for the researcher to remain objective and to not let the results or outcomes be influenced by the desires and needs of the partner organisation. Furthermore, the researcher needed to take her position very well into account as she was focusing on a topic that is regarded as worrying, wrong and even a taboo in some communities. Moreover, while interviewing she needed to take different cultures, values, and norms into consideration to ensure that she would not upset or insult any of the experts. Lastly, it was important that the researcher did not generalise situations that were only applicable for a few girls or draw conclusions based on minimal data.

Limitations and reflections on the research methodology

One of the biggest limitations was one of the largest parts of the research, namely: COVID-19. Because COVID-19 is such an ongoing and relatively new research topic, there was some doubt about how much studies and information was already published about the implications of COVID-19 on maternal health care. Especially the combination of COVID-19, maternal health care and adolescent girls in Kenya resulted in a niche in the research world.

A reflection about the statistical analyses is that the sample size of the before COVID-19 group is relatively small compared to the other two groups (only 157 girls are included in the before COVID-19 group). The small size could result in a lack of power to conclude much about this study group. The lack of power is particularly seen in the outcome variable skilled delivery where only the variable ANCs was significant with a p-value of 0.1. This results in the question if statistical analyses were a good option for a research method, and I think the answer is still yes. The statistical analyses provided a good opportunity to analyse a population group and when complimenting it with interviews or a literature review, you will get an encompassing overview about the target population. Another point about the statistical analyses was that the focus of the statistical analyses was only on the mothers in the MomCare program and how representative this group was for the whole population. The teenagers enrolled in MomCare are not selected, and thus, there is no bias in who enrols and who does not. During the execution of the research, it was difficult to draw conclusions based on the teenagers in MomCare because the information about them is still limited and so it was hard to determine possible biases. However, when looking at the national statistics and the statistics about the MomCare teenagers there were no outstanding differences.

A suitable alternative approach would have been fieldwork in Kenya in the health clinics or in urban and rural areas. Naturally, due to COVID-19 that was not possible and ethical considerations had to be taken into account. However, what would have been of utmost useful for the research, was contact with the actual target population, perhaps through an organisation or other mediums. When being able to contract data direct from the target population, the data is the most reliable and trustworthy. Moreover, the teenagers themselves can confirm or reject hypotheses based on their situation, because now it is still partially speculation if this is representative for the whole adolescent girl population in Kenya.

5. Results

In this chapter the outcomes of the statistical analyses, systematic literature review and expert interviews are discussed to answer the different sub-questions of the research questions. This result chapter is divided into two parts, where the first chapter aims to statistically explain the different patterns and determinants of the utilisation of antenatal care, skilled delivery and early enrolment based on the mothers in the MomCare program. The patterns and determinants based on the variables used in the regression analyses are linked to the different predisposing and enabling factors explained in the behavioural framework of Andersen & Newman (1973). The second part of the results focuses on the outcomes of the systematic literature review and expert interviews, but look at the same aspects as the statistical analyses. The three sub-questions are answered while being assisted by the levels presented in the conceptual model of Mekonnen, et al. (2019), and the three delays model of Thaddeus and Maine (1994). Both result chapters have the goal to paint a picture about the utilisation of antenatal care before COVID-19 and what changed relating to care seeking behaviour during the COVID-19 outbreak.

5.1 Statically significant factors influencing the adolescent care seeking behaviour in Kenya

What does the target population look like?

The 2,202 teenage girls in the data set all live in four different counties, namely: Kakamega (492), Kisumu (1,265), Nairobi (401), and Vihiga (44). Vihiga contains the smallest number of mothers since the county has been the most recent addition to the MomCare program. Even though the scope of the research focused on girls between the age of 10 and 19 years old, the youngest girl that remained eligible for this study is 13 years old. The girls who were younger than 13 years old did not adhere to the conclusion criteria discussed in chapter 3. Data from the Demographic Health Survey (2014) shows that 23.30% of the girls below the age of 18 have experienced a pregnancy. 4.10% Of the Kenyan girls below the age of 15 have given birth. Based on the target population present in the sample size of MomCare, it shows that 70.94% of the mothers are 18 or 19 years old and that only 4.18% is 15 years or younger. 11.90% Of the 2,202 mothers is not a first-time mother, this percentage is significantly lower than the results from the Demographic Health Survey (2014).

The included study group brings to light several interesting facts about the mothers enrolled in the MomCare program. One can have the hypotheses that one of the delays, as mentioned in Thaddeus and Maine (1994) is the distance to the clinic, however, more than 54% of the mothers lives between a travelling distance of 20 and 30 minutes to the MomCare clinics, what is relatively close by. Another interesting aspect is education. The educational level of the household head is something that is regarded as important for the utilisation of care for adolescent girls. Since the girls are still young, they often live by the rules of their parents and also regard their parents' opinions and values as important (Makii, 2015). Several studies proved that the educational level of people helps determine if they want to receive antenatal care or not, thus, the higher the educational level of the household head is, the more positive it will be for the adherence to care. When looking at the mothers in the sample size, more than half of the parents of the teenage girls have completed secondary education. On the other hand, only 5.54% of the household heads have completed university or other tertiary education. The other 40% of the household heads had completed primary education or no school at all.

To be able to discover differences in patterns and determinants, the teenage girls have been split into three different COVID-19 groups. An illuminating discovery was that during COVID-19 the number of girls and their family members who experience hunger decreases during the pandemic. Additionally, the number of mothers who were from Kisumu increased with 28.92 per cent from before COVID-19 to during COVID-19.

While research indicated the importance of early enrolment, teenagers are very likely to enrol in the third trimester of their pregnancy (55.63%), followed by enrolment in the second trimester (38.96%). The three designated groups show changes in enrolment in the health facilities (figure 11). Before COVID-19 mothers were more likely to enrol in the second trimester, or even in the first trimester. However, when zooming in on the first months of the COVID-19 outbreak, the in-between COVID-19 group, and the completely during COVID-19 study group, the week of enrolment became significantly later, with as much as a 10% increase. When looking specifically at one of the outcome variables of the regression analyses, early enrolment into the MomCare program, only 10.99% of the mothers enrolled before the cut-off at sixteen weeks.

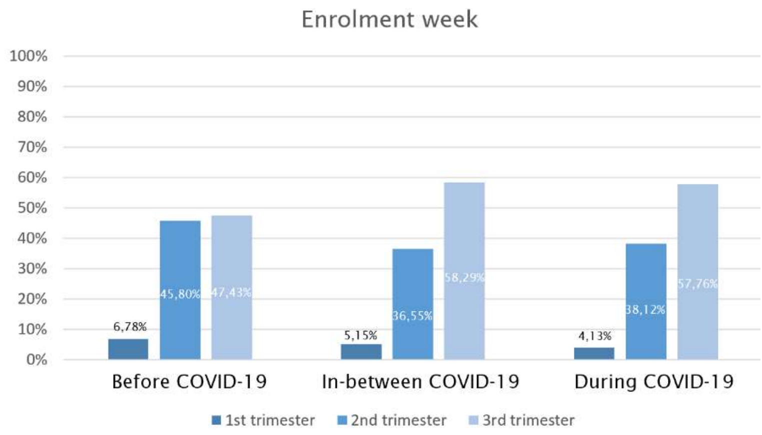


Figure 11. Week of enrolment.

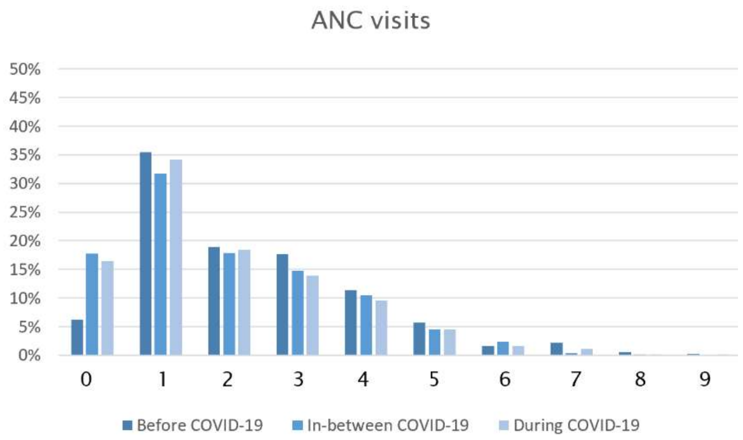


Figure 12. Number of antenatal care visits.

Another outcome variable is the number of antennal care visits. ANC visit is an important indicator for the utilisation of care by adolescent girls.

The World Health Organization (2020b) strongly advocates that mothers should have eight ANC visits during their pregnancy, however, the data shows that and only seven out of 2,202 girls had eight or more ANC visits, and only 18.07 per cent of the girls have had four or more ANC visits. Most girls (33.70%) only had one ANC visit during their pregnancy.

When zooming in on the three different study groups (figure 12), the biggest dip in the adherence to ANCs can be seen for the in-between group, or in other words: the group of teenage girls who were pregnant during the transition from normal life to the adapted life according to the COVID-19 restrictions.

The final outcome variable used as an indicator for measuring the patterns of the utilisation of care for teenagers is having a skilled delivery. The utilisation of a skilled birth attendant has been remotely higher compared to the other two outcome variable and has a utilisation rate of 59.83% mothers, which equals 1,315 out of 2,202 mothers in the MomCare program.

The histogram in figure 13 shows that before the COVID-19 outbreak almost half of the girls (46.85%) delivered in the presence of a skilled birth attendant. Interestingly, in contrary to the early enrolment in MomCare and the antenatal care visits, more mothers had a skilled delivery during COVID-19 compared to before COVID-19. The largest increase in skilled delivery was seen for the in-between COVID-19 group, with an increase of 19.98 per cent. After the first months of COVID-19, the use of a skilled birth attendant decreased a bit by approximately 6 per cent.

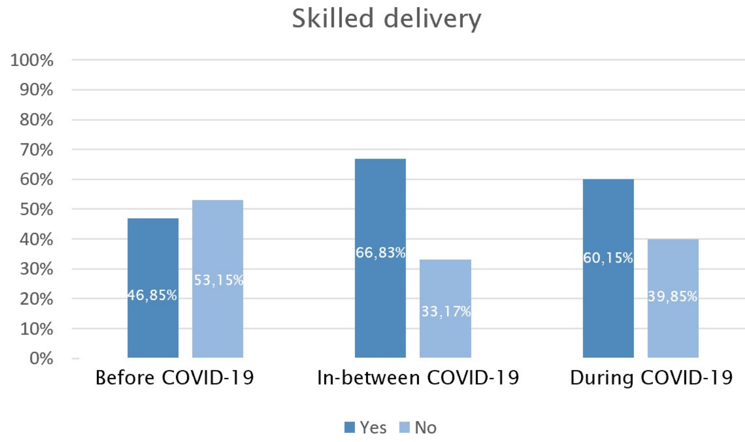


Figure 13. Utilisation of a skilled birth attendant.

As this research focused on the patterns and determinants of utilisation before the COVID-19 pandemic and what changed during the pandemic, several regression analyses have been carried out looking at the situation of adolescent girls before COVID-19, during the transitioning months into COVID-19 and the situation of pregnant teenagers completely during COVID-19.

The utilisation of maternal health care before COVID-19

The analyses based on the mothers who enrolled into the MomCare program included a total of 369 mothers. The descriptive statistics (appendix 4), show that before the COVID-19 outbreak 314 out of the 369 mothers in the MomCare program are 18 or 19 years old.

The adherence to care of this group of girls is not relatively bad. Unfortunately, only 6.78% of the girls enrolled in the first trimester of their pregnancy. However, on the other hand, 345 (93.77%) girls had at least one ANC visit, which is the highest number of all three groups. Moreover, 46.85% of the teenage girls delivered their baby in a health care facility under the supervision of a professional.

Based on the knowledge from the literature, several hypotheses have been created:

1. *The older the girl is the more likely she is to enrol earlier, receive more ANCs and to have a skilled delivery.*
2. *The hypothesis is that a higher educational level of the household head will positively contribute to an early enrolment.*
3. *The hypothesis is that if girls do not have to travel longer than 30 minutes, they are more likely to seek care.*
4. *A mother is more likely to have a skilled delivery if she enrolled early in ANC and if she also has had multiple ANC visits.*
5. *Girls with the social support of more than one person are more likely to enrol earlier, receive more ANCs and have a skilled delivery.*

BOX 1.

The average age of the group is 18.2 years old.

Most of the girls are from Nairobi, closely followed by Kisumu.
There are no girls from Vihiga yet.

83.83% of the girls lives within 30 minutes traveling distance from the health clinic, and more than half of the 369 girls goes to the health facility on foot.

Two third of the 369 girls has multiple people she can count on in times of need.

Unfortunately, 40.34% of these girls or her family members has experienced hunger the past year.

Regression results based on the three dependent variables, early enrolment, ANC visits and skilled delivery (appendix 7), show several determinants that are related to the health care seeking behaviour of teenage girls.

Starting with early enrolment in the MomCare program (appendix 7.1), girls who are older (p= 0.010, β= -1.422768) are more likely to have an early enrolment compared to younger girls. Another determinant that positively contributes to early enrolment is the use of transportation, more specifically travelling by foot (p= 0.018, β= -2.904174). If the mother-to-be travels to the clinic by foot, she is more likely to enrol earlier.

What relatively makes sense is that the number of antenatal care visits is influenced by the week of enrolment, meaning that the later the mother enrols for her first visit, the lower the number of ANCs will be (p= 0.000, β= -0.13753). In contrary to early enrolment, the region where the teenage girls come from does influence the number of ANCs. In fact, mothers who are from Kisumu (p= 0.022, β= -1.422768) are more likely to have less antenatal care visits compared to the mothers who are from Kakamega, Nairobi or Vihiga. A determinant that positively contributes to the number of ANC visits is the education level of the household head. If the parents of the adolescent mother have completed secondary education (p= 0.044, β= 0.430745), they are more likely to have more antenatal care visits. In other words, education helps teaching the family about the possible dangers relating to teenage pregnancy and the usefulness of antenatal care visits and as a result they can help their children in stimulating to seek care.

Finally, the choice to have a skilled birth attendant by your side during delivery is influenced by the number of antenatal care visits (p= 0.086, β= 0.2707788).

What can be concluded based on the results based on the three outcome variables is that a domino effect is visible, and thus, the hypothesis is confirmed. If the teenage girl has her first ANC visit as early as possible, she will have more antenatal care visits, and the higher number of antenatal care visits will lead to an increase probability of having a skilled delivery. Moreover, age did not have an influence on the number of ANCs and skilled delivery but does contribute to early enrolment. Unexpectedly, did the travel distance to the clinic and the social support of the mother not influence the utilisation of care.

Transitioning from normal life to the COVID-19 restrictions

When looking at the patterns relating to the care seeking behaviour by adolescent girls in Kenya during the first months of COVID-19, it is noticeable that there is a decrease in early enrolment and ANC visits. On the other hand, figure 12 shows a significant increase in the percentage of teenage girls that have a skilled delivery. Compared to the other two study groups, the before COVID-19 and completely during COVID-19 groups, this study group has the most determinants that contribute or disrupt the utilisation of early enrolment, antenatal care visits and skilled delivery by adolescent girls.

To be able to grasp the changes during the transitioning period better, several hypotheses have been identified:

1. *The older the girl is the more likely she is to enrol earlier, receive more ANCs and to have a skilled delivery.*
2. *During the transition period into the COVID-19 measurements it is expected that the educational level of the household head positively contributes to the adherence to care.*
3. *The hypothesis is that if girls do not have to travel longer than 30 minutes, they are more likely to have more ANCs and also a skilled delivery.*
4. *Teenage girls are less likely to use maternal health care services if she has to travel by public transport.*
5. *Girls with social support of more than one person is more likely to enrol earlier, receive more ANCs and have a skilled delivery.*

BOX 2.

The average age of the group is 17.8 years old.

Almost 60% of the girls are from Kisumu and the girls who are from Nairobi has decreased.

71.03% of the girls lives within 30 minutes traveling distance from the health clinic, and almost as much girls travel by foot as by bodaboda to the health facility.

More than 70% of the 621 girls has multiple people she can count on in times of need.

The number of girls or her family members that has experienced hunger the past year decreased to 25.97%.

For an early initiation of antenatal care visits during the first months of COVID-19, many determinants were of influence. What stayed the same during these first months were the determinants age and if the mother travelled to clinic on foot. However, five new determinants became significant. Mothers-to-be who had to travel less than 30 minutes to the clinic (p= 0.020, β= 1.732648), who had experienced hunger during the last year (p= 0.027, β=-1.84232), and those who had no social support (p= 0.007, β=-7.422207) were more likely to have an earlier enrolment. The educational level of the household head, so the parent of the adolescent mothers, also plays a significant role in early enrolment. The higher the educational level of the household head (p= 0.044, β= -2.953151), the more likely teenage girls are to have an antenatal care visit in the earlier stages of their pregnancy. However, if the head of the household only has completed secondary education, the teenager will have a later enrolment (p= 0.020, β= 1.732648). What stood out is that teenage girls from Kisumu (p= 0.000, β= 5.881264) and Vihiga (p= 0.040, β= 16.29802) have a later enrolment compared to mothers who were from Kakamega or Nairobi.

The determinants for the utilisation of antenatal care visits changed much less compared to that of early enrolment. The week of enrolment remained significant, and the variable age (p= 0.042, β= 0.0963727) became significant. This meant that the older the mother is, the more ANC visits she will have. The region where the mother comes from remained significant during the first months of COVID-19, however, switched from Kisumu to Nairobi (p= 0.004, β= -0.5576918), meaning that during the transition period mothers from Nairobi had fewer ANC visits compared to mothers from Kakamega. Additionally to this change, the educational level of the household had no longer had an influence on the utilisation of antenatal care during the first months of COVID-19.

Just like for the other two outcome variables did also the number of determinants that influence the probability for a skilled delivery increase, with a total of four new variables. The number of ANC still positively contributes to the chances of a skilled delivery, and during the first months of COVID-19, a later week of enrolment (p= 0.000, β= 0.060803) also positively contributes to the probability of a skilled delivery. A high number of ANCs and a late enrolment into care does not match very well, and it is expected that the teenagers either enrol early, have more ANCs and as a result have a skilled delivery, or the girls enrol very late into the clinic because they only want a skilled delivery. Another variable that turned out to be significant during the transition period into COVID-19 is the teenagers who are from Nairobi (p= 0.009, β= 0.9147801), as they are more likely to have a skilled delivery compared to the other counties. There are two other variables that influence the chance of a skilled delivery, namely the travel distance to the clinic and the educational level of the household head. These two determinants stand out compared to the others. It turns out that teenage girls who have to travel more than 30 minutes to the clinic are more likely to have a skilled delivery than when the clinic is within a travel distance of 30 minutes (p= 0.044, β= -0.4905604). A similar situation is observed for the educational level of the household head. If the head of the household has completed university (p= 0.005, β= -1.140392), the mother is less likely to have a skilled delivery, while it is assumed that education stimulates the probability of a skilled delivery.

One of the most unexpected outcomes of these regression analyses was that during the first months of COVID-19 mothers were more willing to travel further to have a skilled delivery. A possible explanation could be that *''Most of these girls, so 88 per cent are first time mothers, and it is possible that they are willing to travel to the clinic for a longer period to ensure that they will be on time and can deliver safely. […] Moreover, it also depends on the facility and the location within the counties. The travel distance is further for the clients from Kisumu than for clients from Vihiga or Kakamega.''* (Participant expert panel, 24 June 2021). On the other hand, if mothers have a travel distance to the clinic that is below 30 minutes, they are more likely to initiate their first antenatal care visits earlier, than when the travel distance is higher. In other words, for earlier enrolment adolescent mothers want to travel less further than for having a skilled birth attendant nearby during delivery.

Social support and geographical locations are the tiebreakers during COVID-19

Since the COVID-19 outbreak, lots of changes have occurred in Kenya, for the teenage girls but also for their environment and the health care system. The question is if the pandemic also has changed the care seeking behaviour of teenage girls, and what exactly has changed then?

The patterns of utilisation of care during COVID-19, only show a minimum change in the week of enrolment compared to the group of the transitioning period (figure 10). However, these changes are still significant when comparing them to the week of enrolment before COVID-19 (10% later enrolment). The patterns relating to the number of antenatal care visits does also not differ greatly compared to the other two study groups, however, a small increase is seen in the girls who make use of one ANC compared to the transitioning group (see figure 12). The patterns in the utilisation of skilled delivery, however, has decreased again during the COVID-19 pandemic. Regardless of the observed decrease between the transitioning group and the during COVID-19 group, the skilled delivery is still 13.30% higher compared to the skilled delivery rate before COVID-19.

The regression analyses had the aim to unravel the possible changes and the in the outcomes can be observed that there are several changes in the patterns and determinants. The hypotheses related to determinants of the utilisation of care are as follows:

1. *The older the girl is the more likely she is to enrol earlier, receive more ANCs and to have a skilled delivery.*
2. *During the transition period into the COVID-19 measurements it is expected that the educational level of the household head positively contributes to the adherence to care.*
3. *The hypothesis is that if girls do not have to travel longer than 30 minutes, they are more likely to have more ANCs and also a skilled delivery.*
4. *Teenage girls are less likely to use maternal health care services if she has to travel by public transport.*
5. *Girls with social support of more than one person is more likely to enrol earlier, receive more ANCs and have a skilled delivery.*

BOX 3.

The average age of the group is 17.9 years old.

More than 63% of the girls are from Kisumu. The girls who are from Nairobi has decreased even further, and an increase is seen in mothers from Vihiga.

69.12% of the girls lives within 30 minutes traveling distance from the health clinic, and the use of bodaboda and matatu has increased significantly.

68% of the 1,212 girls has multiple people she can count on in times of need.

The number of girls or her family members that has experienced hunger the past year decreased to 17.99%.

The changes in the determinants of the utilisation of care during the COVID-19 outbreak can be seen in the use of transportation, the travel distance to the clinic, the educational level of the household head and how many people the girl can count on in times of need.

For early enrolment (appendix 7.1) the biggest change in factors influencing utilisation of care before COVID-19 to during COVID-19 is the change in the use of transportation. As shown in the regression analyses, the transportation use before COVID-19 and during the transitioning months were focused on travelling on foot or using other forms of transportation, meanwhile, during the COVID-19 outbreak the use of transportation switched towards that the use of the matatu ($p=0.011$, $\beta= 1.692896$). Using the matatu negatively contributes to the earlier enrolment into the MomCare program, meaning that teenagers enrol later into the MomCare program if they use the matatu as means of transportation. Additionally, having social support became more significant during the COVID-19 pandemic, especially if the teenagers have two to five ($p= 0.008$, $\beta= -1.598177$) or six to ten ($p= 0.000$, β= -4.447877) people she can rely on in times of need. Lastly, for the independent variables region and educational level of household head, the categories Kisumu and secondary education are no longer significant.

What is interesting to see is that the age of the mother only had an influence on the utilisation of antenatal care during the first months of COVID-19. The influence of the week of enrolment on the number of ANCs did also not change during the pandemic, and the same goes for mothers who are from Nairobi. However, if the mothers are from Vihiga, they will likely have fewer ANC visits during the COVID-19 outbreak. Finally, one new determinant became significant during the COVID-19 pandemic, namely: social support. If the mother has social support between two to five people (p= 0.001, β= 0.3311776) or six to ten persons (p= 0.001, β= 0.5410119), she will have more antenatal care visits during her pregnancy.

What was uncommon for the determinants of a skilled delivery during COVID-19 is that only two changes were integrated in comparison to the transitioning group. The educational level of the household head no longer played a role, and social support started to affect the chances of a skilled delivery. If the teenage girl has social support from her environment that consists out of two to five people, she has a higher probability of having a skilled delivery (p= 0.023, β= 0.3710855).

Compared to the before COVID-19 group of teenagers, an increase in the importance of social support can be noticed during the first months of the outbreak. Social support helps to reduce maternal mortality and is especially important for teenage mothers, as they still depend on their parents and often lack experience in knowing how to take care of the baby (Kabimba, Matheka & Wakasiaka, 2020).

What can we learn from this?

The results of the statistical analyses showed that there is a domino effect in place when it comes to adherence to care. This domino effect can be seen before the COVID-19 outbreak but also during the COVID-19 pandemic. If the mother enrols in the first trimester of her pregnancy, or otherwise before the 16th week of her pregnancy, she will have more antenatal care visits. A higher number of antenatal care visits leads to higher chances of having a skilled delivery. These three components ensure the health of the mother and baby during and after pregnancy. What was interesting to see for these three study groups, is that the most significant and influential determinants can be found in the transitioning into the COVID-19 pandemic period. The hypotheses did not change much for all three groups, with the most changes implemented for the girls who had their journey during COVID-19, but it was unexpected that the shift could already be seen so clearly in the second group instead of only in the third study group. Moreover, one peculiar outcome was that during COVID-19 social support became increasingly important for the adherence to care of teenage girls.

5.2 What influences the care seeking behaviour of adolescent girls?

This chapter will present the patterns and determinants of the utilisation of maternal health care based on the systematic literature review and the expert interviews. This process has been guided by the different levels that are used in the framework of Mekonnen, et al. (2019). Moreover, the determinants that contribute or delay maternal health care are identified with the assistance of the different individual determinants of the model of Andersen and Newman (1973). The focus is on the situation regarding the utilisation of antenatal care and skilled delivery before the COVID-19 outbreak in Kenya and what has changed during the COVID-19 outbreak.

The influence of the individual on adherence to care

‘’We hear a lot of the same stories about young girls who meet boys and do not have experience. It is always the same unfortunate story.’’

- Participant 1.

The patterns and determinants related to the utilisation of maternal health care by teenage girls is often focused on the characteristics and behaviour of the individual. These characteristics range from age and personality to education and knowledge. The characteristics of an individual play a large part in their drive to want to seek care. Deciding to seek care for adolescent girls frequently goes hand in hand with the perceived need of care and the connecting knowledge about the importance of maternal health care. Additionally, this is also seen as one of the most frequent delays in the decision to seek care (Thaddeus & Maine, 1994).

The patterns of the utilisation of maternal health care show that the gross of the pregnant adolescent girls initiate their first ANC in the second or third trimester of their pregnancy (Banke-Thomas, Banke-Thomas & Ameh, 2017). Only 15% of the mothers-to-be had their first ANC during the first trimester of their pregnancy. Banke-Thomas, et al. (2017), claim that more than 90 per cent of all the adolescent girls in Kenya have at least one antenatal care visit during their pregnancy and that around half of the teenage girls have more than four antenatal care visits. The study of Mulinge, Yusuf & Aimakhu (2017) contradicts this and discovered that, in fact, 91 per cent of the adolescent girls had less than four antenatal care visits during their pregnancy. A study carried out by Makii (2015) came to another outcome where one-third of the adolescent mothers adhered to a minimum of four antenatal care visits, and almost a quarter of the mothers did not have any ANC visits. All in all, barely any teenage girl in Kenya adheres to the advised number of eight antenatal care visits.

The patterns of skilled delivery are inconclusive as well, with Banke-Thomas, et al. (2017) suggesting that only 35 per cent of teenage girls do not have a skilled birth attendant present during delivery. The numbers of the demographic health survey show slightly different outcomes and argue that around half of the mothers have a skilled delivery in Kenya. Moreover, most of these skilled deliveries take place in urban areas and are chosen by the richer adolescent girls (Kenya National Bureau of Statistics, 2014). After giving birth, the gross of the mothers who deliver at a public or private health facility receive immediate postnatal care (Banke-Thomas, et al. 2017). What is remarkable is that only 25 per cent of the new mothers have a conversation with a health provider about family planning (Banke-Thomas, et al. 2017).

Is it true that with age comes wisdom?

Age is repeatedly mentioned as one of the most important determinants for the utilisation of care. The average age of a teenage mother in Kenya is between the age of 17 and 19 years old (Mulinge, et al. 2017). However, there are some discrepancies about the average age of a teenage mother in Kenya, as several studies conclude different outcomes. The study of Banke-Thomas, et al. (2017), argue that most mothers have their baby when they are around the age of 16, meanwhile the research of Mulinge, et al. (2017) conclude that the average age of the mothers is 18.10. Shockingly, the study from Oduor and Kithuka (2020) came with the revelation that most teenage pregnancies actually occurred when the girls reached the age of 13 and 14 years old. The different claims indicate that there is no conclusive answer in the literature on the average age of the mothers, however, it can be determined that most studies conclude that the largest group of adolescent mothers are above the age of 16. Makii (2015) reached the same conclusion and noted that most of the adolescent mothers, almost 70%, are 16 years or older.

Age is positively associated with the utilisation of maternal health care in a sense that the older the girl is the more likely she is to use certain maternal health care services. Adding to this, the younger the girls are the higher the threshold can be to take the decision to seek care (Hokororo, et al. 2015). Particularly for girls below the age of 16, the threshold can be particularly high, because they often are still in school, do not have much knowledge about sexual health and reproductive rights and there are too shy or ashamed to show themselves in public (Hokororo, et al. 2015).

A different point of view regarding the importance of age is provided by Makii (2015) and Mulinge, et al. (2017), who argue that age is not a relevant determinant for the utilisation of care. Instead, marital status and what kind of job the mother and father have influences the use of antenatal care (Mulinge, et al. 2017).

How much do location and money matter?

Two other determinants that reappear in many of the studies are the level of wealth and the place of living of the teenage girls. Mulinge, et al. (2017) argue that the travel distance to the clinic is not relevant for the adherence to care by adolescent girls in Kenya. On the other hand, the Kenya National Bureau of Statistics (2014) claim that wealth and location influence the adherence to care immensely. The further away the girls live from the clinic, the less likely they are to be willing to travel such a distance to the health clinic. Furthermore, girls who are from richer families are more likely to have more antenatal care visits and a skilled delivery in comparison to girls whose families do not have much to spend (Kenya National Bureau of Statistics, 2014).

Another factor relating to the distance to the clinic is if the girls live in rural or in urban areas. *''The boys and girls living in urban areas have better accessibility to commodities but also mostly to maternal services''* (Participant 2, 20 July 2021). Living in urban areas stimulates the use of antenatal care services, and girls are two times more likely to use maternal care services than girls from rural areas (Banke-Thomas, et al. 2017). Moreover, the richer the girl and her family are, the more likely she is to make use of antenatal care services and a skilled delivery (Banke-Thomas, et al. 2017). However, participant 2 mentioned that *''Even in urban areas, the not so well-off people can have hardships finding the right commodities or care from pharmacy.''*.

Knowledge is power

‘’I know it is a cliché, but in this situation, information about care is power’’

- Participant 1.

There are many misconceptions about antenatal care and how to take care of your baby in general, which leads to less use of the antenatal care services (Mulinge, et al. 2017). Having knowledge about the recommended number of antenatal care visits, but above all the importance of receiving care, increases the likelihood of receiving maternal health care with three times compared to having no or poor knowledge about ANCs (Mulinge, et al. 2017). However, participant 1 does mention the following about this: *‘’Even if you have the information about care and why you need it. The stigma and threshold is still high.’’*.

Another interesting factor of influence is the exposure of the mothers to media and social media (Kenya National Bureau of Statistics, 2014). *‘’Social media is a big part of youngsters. We use social media to reach the adolescent girls’’* (Participant 1, 7 June 2021). The exposure of teenage girls to mass media increases the chances that teenage girls will have at least one ANC visit (Okedo-Alex, Akamike, Ezeanosike & Uneke, 2019).

The importance and barriers of education

Education is one of the key factors for the utilisation of antenatal care because education provides the opportunity to learn about sexual health and reproductive rights. Contrary to all the other studies included in this systematic literature review, Makii (2015) and Mulinge, et al. (2017) disagree with that education is an important determinant for the utilisation of maternal health care by adolescent girls in Kenya.

Even though research argues that education greatly contributes to transferring knowledge about teenage pregnancy and maternal health care, the educational system in Kenya experiences several flaws in how to educate youngsters about sexual health and reproductive rights. *‘’There is some forms of education about human family life, but it is never called sex education […] Yes, but now there are lots of taboos, many topics are not spoken about. What we have here is that talking about topics such as safe abortion is a big no no in Kenya. Many topics is not spoken of here. This makes it harder for girls and other young people to speak up and to talk about these topics.’’* (Participant 1, 7 June 2021).

What is noticeable is that of the adolescent girls who have been or are pregnant, almost 45% did not have any form of education (Kenya National Bureau of Statistics, 2014). The study of Banke-Thomas, et al. (2017) disagrees and claims that only approximately 10% of all adolescent mothers in Kenya did not completely any education. Mulinge, et al. (2017) confirm this number by noting that the majority of teenage girls in Kenya have had completed primary education. Moreover, Makii (2015) even comes to the conclusion that less than five per cent of adolescent girls have no education, and almost 60 per cent of the girls have completed primary education and 34 per cent completed secondary education. What can be concluded from this, is that most adolescent girls in Kenya did complete primary education, however, the number of girls who also completed secondary stagnated significantly.

Due to their pregnancy, many girls drop out of school to hide their pregnancy, they focus their attention elsewhere or hide from the public. Participant 3 said about this that: *‘’Also in schools these girls are stigmatised, even by their friends.’’*. Participant 2 added: *‘’You know, the thing is that when a girl gets pregnant and schools sees it, basically it was seen as something very wrong and they want to* *expel these girls because they are a bad example to other girls.''*. These views against teenage pregnancy in schools make it harder for girls to be in school while pregnant.

However, after giving birth, these girls often do not return to school. *''President now says that girls have to go back to school. He made announcements on TV and other platforms. Also after pregnancy girls should go back to school. Because education is important for girls and to teach them about family planning and also for their future. [...] Return to school policy is now for every child, but started for teenage pregnancy. But you see many pregnant girls do still not go back to school.''* (Participant 1, 7 June 2021). Participant 3 thought an explanation could be that *''The girls drop out of school once they are pregnant, even if they are allowed to go back to school [...] I mean they do not really have an option. Where do they leave their baby or how can they breastfeed in class? Schools do not facilitate much for teenage mothers.''*

In the end, it is important for girls to complete their education or to return back to school after giving birth. Teenage girls who have completed primary and secondary education are almost three times more likely to use antenatal care visits and skilled delivery compared to girls who did not have any form of education (Banke-Thomas, et al. 2017). The same goes for the partners and families of the teenage girls, if they have completed primary, secondary or tertiary education they are more likely to support the teenage girl and stimulate her to use maternal health care services (Banke-Thomas, et al. 2017).

Affect of COVID-19 on the care seeking behaviour by adolescent mothers

''There has been a big difference since COVID-19 arrived. You can clearly see a difference between before COVID-19 and during COVID-19. Due to the lockdown, many people lost their job in Kenya, and people are very scared.''

- Participant 1.

As mentioned, due to the COVID-19 pandemic, Kenya has seen a rise in teenage pregnancies (Shikuku, et al. 2020). An outcome of the COVID-19 outbreak in Kenya is the rise of violence amongst adults but also children (Rockowitz, et al. 2020). What stands out is that most of the teenagers are attacked at the homes of their perpetrators and that it was often only one perpetrator (Rockowitz, et al. 2020). The issues regarding teenage pregnancy and education have only been magnified during the COVID-19 pandemic: there are more risks of girls getting pregnant, the chances that the teenage girls drop out of school have increased and the stigma within school systems decreases the adherence to ANC visits and skilled delivery (Burzynska & Contreras, 2020). Participant 3 added to this: *''There is a chance that due to COVID-19 more babies are born amongst teenagers. Because of closure of schools, boys and girls were at home, unprotected.''* .

The COVID-19 pandemic has had a severe impact on the access to antenatal care for pregnant teenage girls in Kenya. Participant 1 mentioned: *''When we look at teenage girls, they are scared to go outside, and especially to go to the clinic. Because at the clinics there is COVID-19, and so they do not go to the clinics to receive care because they are afraid to get COVID-19''*. Many girls refuse to leave their homes to go to the clinic to receive care out of fear, or because many services were disrupted due to COVID-19 and the travel costs were too high or they had to go to private clinics, which they cannot afford (Tadesse, 2020). Participant 1 added: ''*But it is more than that (being afraid to get COVID-19 in clinics), they also get harassed on the street by police when they go outside, because of the lockdown the police will bother them if they want to seek care.''*. The measurements taken against COVID-19 increase the barriers for teenage girls to decide to seek care and decrease the accessibility to the health facilities.

The community: a safe haven or the downfall for pregnant teenagers

''What refrains girls from receiving care is maybe not necessarily the health system, the most problematic is the society. They are not accepting of teenage pregnancy, so the girls hide.''
- Participant 2.

In Kenya, teenage pregnancy is frequently considered to be something wrong and shameful (Erasmus, Knight & Dutton, 2020). When getting pregnant, teenage girls feel like they cannot tell anyone because they fear being judged or stigmatised (Kumar, et al. 2018). Participant 1 adds: *'' There is a stigma regarding teenage pregnancy. Definitely, especially for teenage girls. Girls try to hide their pregnancy and do not tell anyone. As a consequence they also do not want to go to school anymore, people will find out.''* Since they fear the judgement coming from their families and community, the girls go into hiding, which results in the negligence of their pregnancy and the amount of care they receive.

Their fear of rejection and the lack of support of their environment indicates that social support from the environment of the teenage girls is an important determinant for the adherence to care. Social support of the boyfriend, family and community appears to positively affect the view on maternal health care services for adolescent girls (Makii, 2015). Moreover, girls who are married are three times more likely to use maternal health care services compared to unmarried teenage girls (Mulinge, et al. 2017). However, on the other hand, child marriage is also one of the main causes why teenage girls get pregnant (Kiptoo-Tarus, 2020).

''The community has normalised violence against pregnant girls [...] not literal violence, but mentally.''
(Participant 3, 23 July 2021).

Friends of the girls laugh in their faces because she is pregnant and others avoid the company of girls because she is now considered to be different. As a result, many of these girls find themselves not worthy or even refuse to step outside to face others (Population Council, 2020).

Moreover, the lack of adherence to care is because in many communities in Kenya the power of antenatal care visits and skilled delivery is underestimated, and thus not seen as valuable or necessary to ensure the health of mother and baby. The community tends to put their faith and trust in traditional birth attendants over skilled health professionals because they are more trusted by the community (Ombere, 2021).

Is COVID-19 the catalysator for improvement for teenage girls?

Since the COVID-19 pandemic having support from the community only became more difficult since in Kenya gatherings were prohibited and due to other restrictions, the teenage girls had limited social contact.

''It is bad. We saw a 15-year-old girl who got pregnant during COVID-19, but her boyfriend rejected it, her and pregnancy. And the girl wanted to go back to school, you know. So she took an overdose

malaria pills and tried to have an abortion. It was dangerous and close call. She ended up in hospital with severe bleeding, really close call. [...] And we know that she is not the only girl.''.
(Participant 3, 23 July 2021).

Especially during the pandemic, having the social support of family and the community is a very important determinant for the utilisation of maternal health care services by adolescent girls (Population Council, 2020). Besides the importance of social support, a change in patterns of the utilisation of a skilled birth attendant was noticed. Because of COVID-19, many services were unavailable for teenage girls, as a result, more and more girls turned towards a traditional birth attendant compared to a skilled birth attendant (Ombere, 2021).

''The Kenyan health care system is not built for teenage pregnancy''

Health care facilities and their employees play a big role in the utilisation of the antenatal care for adolescent girls. The organisational level of the conceptual framework of Mekonnen, et al. (2019) includes the health facilities, health workers and the services that are offered by the clinic and workers. One of the biggest problems for pregnant girls in Kenya was not having the means to pay for their antenatal care visits. However, in 2013, the Kenyan government introduced Free Maternal Service (FMS) for all women in Kenya (Masaba, & Mmusi-Phetoe, 2020). Several years later the program had been transferred to the national insurance health fund, and renamed into Linda Mama. The Linda Mama program includes free antenatal care, deliveries, family planning, postnatal care, and other pregnancy related health problems. As a result, the number of women and girls making use of antenatal care visits increased in most counties in Kenya. Participant 1 confirmed this: ''*So yes, the World Health Organization says at least four antenatal care visits is necessary, I am aware. However, women give the reason that money is the problem, but, maternal care is free in Kenya, like, in certain health clinics, the government made sure pregnant women do not have to pay for care, or not too much.''*. Regardless of the efforts of the government, the number of adolescent girls using these antenatal care services remained shockingly low. Participant 3 added to this: *''Teenage girls are less likely to interact with the health system, most of them have less than four ANCs. They disappear between two and four ANCs.''*. There are several unforeseen downsides and obstacles that came to the surface as the cause for the low adherence to care, even though the antenatal care visits are free.

The first obstacle is that due to the increase of utilisation of antenatal care, many health facilities could no longer keep up with the demand and as a result the facilities faced new problems such as understaffing and inadequate resources for the pregnant adolescent girls (Masaba, & Mmusi-Phetoe, 2020).

The second being that even though in a lot of counties in Kenya the number of girls using ANC visits grew, another obstacle remained unsolved, namely accessibility (Masaba, & Mmusi-Phetoe, 2020). Accessibility to the clinic can be taken quite literally and mean that in some regions there are fewer clinics or the transportation use to the clinic or the travel distance to the clinic. Mothers perceive distance to the clinic as an important barrier to care, because the distance it sometimes too long to walk, however, they do not have the means to pay for the fare for bodaboda or matatu (Ochieng & Odhiambo, 2019). However, another obstacle for accessibility that is not quite literal, is the question are these maternal health services actually truly free? In most cases, the answer is no. For young girls, especially those who do not have much money or no money at all, maternal health services are not always completely free. They have to pay for travel costs to go the clinic, and even in the clinic, they can be expected to buy medicine or even pay for some of the services such as laboratory services (Ombere, 2021). So the definition of free services is actually a perception that can differ per person.

> *''Even young people are afraid to go to the services because you will be asked questions, you will be interrogated for the commodities you need. And then again, these commodities are not easily accessible by young people.''*
> (Participant 2, 20 July 2021).

A third obstacle that prevents adolescent girls from seeking care, is the lack of trust in the quality of the care in the health facilities in Kenya (Masaba, & Mmusi-Phetoe, 2020). Lack of trust in quality care does not only mean that the teenagers do not feel comfortable about receiving the care administered by the health care providers, but it has a lot to do with confidentially, stigma and negative attitudes from health workers (Ochieng & Odhiambo, 2019). Especially for young girls, the fear of embarrassment is visible when they have their first pregnancy and have to go to the clinic (Ochieng & Odhiambo, 2019). Participant 1 confirms that this obstacle is very accurate for adolescent girls, and mentions that: *'' There is stigma with confidentially of women and girls going to clinic and to sit in the same room with an auntie or person who knows someone in the family or who is a neighbour. They (the girls) are afraid that nurses or someone in clinic will talk to others about their visits. Or nurses can be rude to girls, and people can see the girls sitting in the waiting rooms. Waiting rooms are public areas, many people come.''* Participant 3 adds to this: *''Lot of mental violence against girls by nurses, but they accept it, because they just want to receive care. If the care is good they might come back anyways, if not, well..''.* Mulinge, et al. (2017) disagree with the claims made about that nurses or health care providers mentally abuse or insult teenage girls when they come to the clinic. Most of the times it is the misconception teenage girls have about what they can encounter that the health clinic than that any nurses actually insult or shame them for being pregnant.

To zoom out and think about why so many teenage girls do not receive care, based on the reasons called above, the core of the problem is most likely elsewhere. Participant 2 mentioned that: *''The ministry of health looks at the data, because they have to deal with pregnant girls. […] The thing is, they would like to address things such as abortion and care, but there is still a problem in terms of providing services to young people. It is problematic, it has not become normative.''*

A different point of view is provided by Mulinge, et al. (2017) as they argue that distance to health clinic do not have a significant impact on the utilisation of antenatal care for adolescent girls.

Health care facilities and health care providers during COVID-19

The pandemic has disrupted the available and essential services (Kimani, Maina, Shumba & Shaibu, 2020). Due to the pandemic, the focus has been redirected from providing care to pregnant teenage girls and all care is pointed towards COVID-19 patients, leaving many girls to care for themselves (Kimani, et al. 2020). Additionally, since the health care systems are so busy with handling COVID-19 patients, the systems get overheated more easily and the quality of care for maternal health services drops significantly (McDonald, Weckman, Wright, Conroy & Kain, 2020; Ombere, 2021). But that is not all, due to the COVID-19 restrictions on travelling and gatherings, it is harder for health facilities to keep their stocks high and for health workers to stick to their routines and working hours. As a result, many health facilities have limited supplies and a limited access to care for pregnant girls (Ombere, 2021). Participant 1: *''However, it affects both sides, the health seekers and the health givers, they both experience the effects of COVID-19 and the impact COVID-19 has.''*

Furthermore, besides the growing absence of adequate maternal health care, the number of pregnant teenage girls in Kenya is rising resulting in more complications for the girls and their babies (Partridge-Hicks, 2020). Several counties in Kenya are reporting increased maternal and neonatal deaths because girls, and also women, could not access transport to health facilities to give birth. It even goes so far that girls do not travel to the clinics because they are afraid of encountering and being held by the police (Ombere, 2021).

Adding to this is that due to the pandemic many women face an increase in financial barriers and transportation barriers while trying to make use of antenatal care, often preventing them from receiving the care they require (World Health Organization, 2020b).

Even when dismissing all the obstacles that prevent girls from seeking care, there was still one major fear for pregnant girls: COVID-19. Teenage girls, and pregnant women in general, were hesitant to go to public clinics in fear of contracting COVID-19 while being there. This resulted in that the skilled delivery rate declined, and the number of home deliveries with a traditional birth attendant increased (Ombere, 2021). Participant 3 confirmed this by saying: *''Girls were afraid to go to the clinics, you know. They were so afraid of COVID-19 they did not go to public health facilities anymore.''*. Pregnant teenage girls had to find their care elsewhere, but the question is where could they go?

Participant 2: *''Because girls did not want to go to public clinics anymore they had to go to other clinics, however, sometimes they had to pay, and even small money was too much for them. So they don't go.''*

Even after giving birth many girls were still too afraid to go to the clinic because of COVID-19 and as a result they miss their postnatal car visits, but also the immunizations and perhaps important medicine for their babies. Choosing for not to go to the clinics can have a lifelong impact on the health and life of their babies (Ombere, 2021).

An interesting outcome of the pandemic was that health officials were advised to provide training and integration of traditional birth attendants in the health emergency response so that they can help during health crises, because traditional birth attendants are trusted by many local communities (Ombere, 2021).

Religion and culture

To get the whole picture about the different patterns and determinants that contribute or disrupt the utilisation of maternal health care services by adolescent girls, it is important to zoom out and review the system that rules in Kenya. Religion and cultural beliefs play a big role in the utilisation of maternal health care services in Kenya (Kenya National Bureau of Statistics, 2014). Participant 2 confirms this by saying: *''Religion plays a big role in teenage pregnancy and care for teenagers.''* Religion and education are closely intertwined in Kenya, and *''Lots of schools have ties to the church and the church has a conservative view.''* (Participant 2, 20 July 2021).

The religious beliefs of certain communities stimulate certain barriers for the utilisation of maternal health care services, as some religious communities support prayer and home deliveries over the assistance of a skilled birth attendant during delivery (Makii, 2015).

Participant 2: *‘’Religious leaders tend to oppose certain things or information or sexual education. And the education system listens to what they want, you know.’’* Moreover, *‘’There is much reluctance by the community and church to provide people and girls with information on family planning. The ministry of health pushes a lot for more information, but the educational system, with the influence of the church does not want to cooperate.’’* (Participant 2, 20 July 2021).

A contrasting result came out of the research of Banke-Thomas, et al. (2017) where the results showed that girls without religion are five times less likely to use antenatal care services compared to Roman Catholic girls. Even if the girls are not Roman Catholic, the girls who have no religion at all are three times less likely to have a skilled delivery in comparison to girls who do have a religion (Banke-Thomas, et al. 2017). Additionally, another point of view is brought by the study Mulinge, et al. (2017) who argue that religion does not influence the utilisation of maternal care in Kenya.

6. Discussion of findings

The outcomes of the research bring several revelations to the light that can contribute to the current discourse on teenage pregnancy and the utilisation of maternal health care. Many perspectives, including the frameworks of Andersen and Newman (1973), and Thaddeus and Maine (1994), focus on the individual, their community, and the health care facility that needs to provide care to the teenage girl. However, the results indicate that the lack of adherence to care is not necessarily due to the direct environment of the girls, but also has to do with the educational system and the health care sector. Moreover, all these frameworks do not include anything about external shocks, such as COVID-19, or how other global health issues can influence the utilisation of maternal health care services. The inclusion of information about COVID-19 or other global health issues can help other low and middle income countries to better play into the needs of adolescent girls when it comes to maternal health care services.

When looking at this research from a Development Studies perspective, gaining insights into what determines health care seeking behaviour for pregnant young girls is very valuable. Even though this research is only focused on Kenya, there are many other low and middle income countries that also have high teenage pregnancy rates, including Niger, Mali, Angola and Malawi (Yakubu & Salisu, 2018). What this research specifically contributes are the factors that stimulate or disrupt the utilisation of maternal health care services by adolescent girls. For example, the outcomes showed that the younger the girl is, the less likely she is to receive care. This indicates the need to invest more time and effort in lowering the threshold for young girls to go to the clinic. Furthermore, another factor is the distance to the clinic: in many situations, the clinic is too far away for the girls. A solution for this could be to offer shuttle busses or mobile clinics to get closer to the girls that are difficult to reach. To shortly summarise, the outcomes of the research provide opportunities for countries, but also the clinics within the country to play into the needs of adolescent girls to achieve a better adherence to care. A better adherence to care will lead to healthier mothers and babies, and that will reduce the maternal mortality rate, just like the Sustainable Development Goals strive to do so.

What is important to take into account is that for the statistical analyses only mothers within MomCare are being analysed, and thus the conclusions from these analyses cannot be generalised for the entire population. One outcome that resonates with this is that a large part of the girls in the MomCare program have social support and therefore are seeking care, meanwhile if they do not have much support they are also more likely to hide the pregnancy and as a result do not receive care.

It was already very difficult to find information and studies about the utilisation of maternal health care, but finding studies about care during COVID-19 was nearly impossible. A good example of this is the result section about religion and culture. Barely any information was made available about this, and as a result no results could be written about the changes regarding religion and culture, and the adherence to care during COVID-19. It was questioned if the systematic literature review would be a good research method, however, on the other hand, the systematic literature review did clarify a lot of patterns and determinants regarding the utilisation of maternal health care before the COVID-19 outbreak. Additionally, the statistical analyses did contain a lot of data about the changes in the patterns and determinants of the use of care, and the expert interviews provided more intel on the situation in the field. Overall, the combination of the three research methods made the research complete.

7. Conclusion

Teenage pregnancy remains a global health concern, and there is a big question mark surrounding the wicked problem of how pregnant teenage girls can make use of adequate antenatal care, skilled delivery and postnatal care. Adherence to care in low and middle income countries is challenging, and particularly for adolescent girls. These challenges can arise in different forms but ultimately result in the lack of adherence to maternal health care services. The most frequent barriers for pregnant teenagers are transportation to health clinics, financial factors, lack of support from family, cultural beliefs and the lack of adequate availability of care (Dahab & Sakellariou, 2020). What made these challenges even more difficult was the arrival of the COVID-19 virus at the beginning of 2020. The COVID-19 pandemic disrupted many health services, included travel restrictions, changed means of transportation, and many included many more consequences for people. In Kenya, one of the taken measurements was a lockdown, which meant a curfew, no allowance of gatherings, difficulties with travelling and the closure of schools (U.S. Embassy in Kenya, 2021). There were concerns about how this would affect the utilisation of maternal health care services in Kenya. This researched aimed to answer the question of what the patterns and determinants regarding the utilisation of antenatal care and skilled delivery were for adolescent girls in Kenya, and what changed during the outbreak of the COVID-19 virus.

The patterns of the utilisation of maternal health care in Kenya before COVID-19 showed that too few girls adhere to the recommended eight antenatal care visits. The statistical analyses show that most teenage girls only have one or two antenatal care visits, and while the other outcomes indicate that the adolescent girls have more ANC visits, almost none of them receives eight antenatal care visits. Connecting to this is the late enrolment of the teenage girls into ANC. Most of the teenage girls enrolled in their second or even third trimester, which means that they miss important check-ups to make sure the mother and baby are healthy. The outcomes show two different scenarios for girls who have a late enrolment in ANC, the first being that a late enrolment in ANC increases the probability of skilled delivery. The second scenario is that later enrolment decreases the probability of skilled delivery because early enrolment often equals more ANC visits, which then increases the chances of a skilled delivery. Based on this it can be concluded that late or early enrolment does not necessarily influence the chances of skilled delivery, but that enrolment in ANC, in general, is an important determinant for a skilled delivery. The utilisation of a skilled birth attendant appeared to have the highest adherence since more than half of the teenage mothers deliver in the presence of a skilled birth attendant.

Combining the results from the statistical analyses, systematic literature review and the expert interviews it can be concluded that there are multiple determinants on different levels that influence the adherence to maternal health care for adolescent girls in Kenya and that there is no one way to influence the utilisation of antenatal care and a skilled delivery. On an individual level the most influential determinants for adherence to care are their age, the education of the teenage girl and their knowledge about maternal health care services (Hokororo, et al. 2015; Kenya National Bureau of Statistics, 2014). The older the girl is, the more likely she is to have a higher level of education and more knowledge about the importance of care. Naturally, these determinants also each individually influence the utilisation of care. Zooming out to the direct environment of the teenage girls, the support of the boyfriend, family and the community is vital for stimulating the adherence to care (Kumar, et al. 2018; Makii, 2015). When the teenage girls feel like they are safe and supported by their family and environment, they are more likely to have more ANC visits and skilled delivery.

Moreover, not having access to maternal health care can be a physical barrier but also a mental barrier, meaning that some teenage girls are afraid of the stigma or running into familiar faces when visiting the clinics. An interesting determinant that decreases the utilisation of antenatal care and skilled delivery is that the value of antenatal care is still very undervalued in certain communities, mostly because people do not have the information and knowledge about the importance of ANCs (Ombere, 2021). The stigma that teenage girls are afraid of encountering is also very present in the health care sector. The stigma and lack of trust in quality care, a longer travelling distance to the clinic and the place of living are determinants that are negatively associated with the utilisation of antenatal care and a skilled delivery (Ochieng & Odhiambo, 2019). Teenage girls do not feel respected or treated equally by nurses in health facilities and often have to travel quite some time to reach the clinic. If the teenage girls live close to the clinic they are more likely to have more ANCs and a skilled delivery. On a systemic level, it can be concluded that maternal health care services are never entirely free, there is always a small or large cost relating to the free care that is provided, and it can for example include medicine, preparation, or scans (Ombere, 2021). Furthermore, an unexpected and contradicting result is that religion plays an important role in the utilisation of antenatal care and skilled delivery, whether it means that religion stimulates or delays the utilisation of care is still relatively undecided.

During COVID-19 these patterns of adherence changed significantly. The adolescent girls were more likely to have their first antenatal care visit in a later stadium of their pregnancy. This resulted in a lower number of ANC visits and a lower assurance of the health of the mother and baby. The reasons for this were mainly because of the determinants of societal stigma and the consequences of the COVID-19 pandemic. Teenage girls were afraid to get harassed by the police on their way to the clinic or they were even too afraid to go outside of the house (Tadesse, 2020). Many girls are not well informed about COVID-19 and are afraid to get COVID-19 when visiting the clinic, and as a result they stay home and miss their appointments (Ombere, 2021). Furthermore, social support plays even a bigger role in the adherence to care during COVID-19 in comparison to before COVID-19. Having social support increases the chances of having more ANCs and skilled delivery, and on the other hand, having no social support significantly decreases the adherence to care for teenage girls (Population Council, 2020).

The results of the study reveal what can be improved to stimulate the care seeking behaviour of pregnant teenagers in Kenya, but also for other countries with similar characteristics like Kenya. One key component for an increase in ANCs and skilled delivery for teenage mothers is having social support, particularly during the COVID-19 outbreak. Many teenage mothers do not have much social support, however raising awareness and educating mothers and family members about the importance of care can help stimulating adherence and help the mothers to receive more support. Moreover, the location of the health facilities should be relatively close by and accessible, lowering the threshold for teenage mothers to enrol. For example, through arranging more transportation options to go to the clinic or having pop-up clinics closer to the mothers.

To circle back to the research question: what are the patterns and determinants relating to the utilisation of antenatal care and a skilled delivery in Kenya? The answer is that many different determinants contribute or disrupt the utilisation of care, and there are not just one or two determinants that decide if a girl adheres to the recommended number of ANC visits and a skilled delivery. The stigma regarding teenage pregnancy and how girls are feeling and treated by health workers and the community are major components in the journey towards increasing the adherence to care by adolescent girls. Furthermore, due to COVID-19 the patterns in the care seeking behaviour have changed: girls enrolled later during COVID-19 and the number of ANCs decreased. However, this is no promise for the future.

7.1 Recommendations for future research

There is still much unknown about teenage pregnancy, their decision to seek care and their adherence to maternal health care services. This research shed a light on many of the difficult aspects of the utilisation of antenatal care visits and skilled delivery by adolescent girls, however, more research is required to be able to provide better assistance and care for pregnant teenage girls in Kenya, but also in other low and middle income countries. Teenage pregnancy and the low adherence to maternal care is partially caused by a lack of knowledge about its consequences and about the minimal information that is made available about sexual health and reproductive rights. The taboo on sexual relationships in Kenya prevents girls from knowing about the risks and consequences of teenage pregnancy. What needs to be researched further is how these taboos and lack of sexual education precisely influence the decrease in adherence to care and what can be done to improve the utilisation of antenatal care and skilled delivery. Furthermore, future research should look more at the flaws of the system, more specifically the health system and the educational system, instead of focusing on the individual.

Multiple outcomes provide inconclusive answers, such as how influential the determinant religion is or what the actual average age is of teenage mothers. A recommendation would be to dive deeper into the inconclusive outcomes of this study to better identify what determinants influence the adherence to maternal care for adolescent girls. During COVID-19 these patterns have changed but some parts remained the same. Future research should be conducted to further discover what the implications of the COVID-19 pandemic are on the adherence to care for adolescent girls because in this period of time only limited data was available.

8. References

African Institute for Development Policy. (2019). Teen pregnancy in Kenya: Verifying the data and the facts [Policy brief]. Retrieved from: https://www.afidep.org/news-release-teen-pregnancy-in-kenya-verifying-the-data-and-the-facts/

Agho, K. E., Ezeh, O. K., Issaka, A. I., Enoma, A. I., Baines, S., & Renzaho, A. M. (2016). Population attributable risk estimates for factors associated with non-use of postnatal care services among women in Nigeria. *BMJ open*, *6*(7), 1-8. https://bmjopen.bmj.com/content/6/7/e010493

Ahinkorah, B. O., Hagan, J. E., Jr, Seidu, A. A., Budu, E., Hormenu, T., Mintah, J. K., Sambah, F., & Schack, T. (2019). Access to adolescent pregnancy prevention information and services in Ghana: A community-based case-control study. *Frontiers in Public Health*, *7*. https://doi.org/10.3389/fpubh.2019.00382

Aluga, M. A. (2020). Coronavirus disease 2019 (COVID-19) in Kenya: Preparedness, response and transmissibility. *Journal of Microbiology Immonulogy and Infection, 53*(5), 671-673. https://doi.org/10.1016/j.jmii.2020.04.011

Ameyaw, E.K., Dickson, K.S. (2020). Skilled birth attendance in Sierra Leone, Niger, and Mali: analysis of demographic and health surveys. *BMC Public Health*, *20*, 1-10. https://doi.org/10.1186/s12889-020-8258-z

Andersen, R. M. & Newman, J. (1973). Societal and individual determinants of medical care utilization in the United States. *The Milbank Memorial Fund quarterly. Health and Society, 51*(1), 95-124. 10.1111/j.1468-0009.2005.00428.x.

Banke-Thomas, O. E., Banke-Thomas, A. O., & Ameh, C. A. (2017). Factors influencing utilisation of maternal health services by adolescent mothers in Low-and middle-income countries: a systematic review. *BMC pregnancy and childbirth*, *17*(1), 65. https://doi.org/10.1186/s12884-017-1246-3

Banke-thomas, A., Maua, J., Madaj, B., Ameh, C. & Broek, N van den. (2020). Perspective of stakeholders on emergency obstetric care training in Kenya: a qualitative study. *International Health, 12*(1), 11-18. https://doi.org/10.1093/inthealth/ihz007

Benova, L., Owolabi, O., Radovich, E., Wong, K. L. M., Macleod, D., Langlois, E.V. & Campbell, O. M.R. (2019). Provision of postpartum care to women giving birth in health facilities in sub-Saharan Africa: A cross-sectional study using Demographic and Health Survey data from 33 countries. *PLoS Medicine, 16*(10), 1-19. https://doi.org/10.1371/journal.pmed.1002943

Broccoli, M. C., Calvello, E. J. B., Twomey, M., Wachira, B. & Wallis, L. A. (2014). 203 Community-based perceptions of emergency care in communities lacking formalized emergency medicine systems. *Annals of Emergency Medicine, An International Journal, 64*(4), 73-74. https://doi.org/10.1016/j.annemergmed.2014.07.230

Burzynska, K. & Contreras, G. (2020). Gendered effects of school closures during COVID-19 pandemic. *The Lancet, 395*(10242), 1986. https://doi.org/10.1016/S0140-6736(20)31377-5

County government of Kakamega. (2019). Data on county economy 2019 [Budget brief]. Retrieved from: https://kakamega.go.ke/download/data-on-county-economy-2019/

Dahab, R. & Sakellariou, D. (2020). Barriers to accessing maternal care in low income countries in Africa: A systematic review. *International Journal of Environmental research and Public Health, 17*(12). https://dx.doi.org/10.3390%2Fijerph17124292

Erasmus, M. O., Knight, L. & Dutton, J. (2020). Barriers to accessing maternal health care amongst pregnant adolescents in South Africa: a qualitative study. *International Journal of Public Health, 65*, 469–476. https://doi.org/10.1007/s00038-020-01374-7

Frey, B. (2018). The SAGE encyclopedia of educational research, measurement, and evaluation (Vols. 1-4). Thousand Oaks, CA: SAGE Publications, Inc. https://dx-doi-org.proxy.library.uu.nl/10.4135/9781506326139.n251

Ganchimeg, T., Ota, E., Morisaki, N., Laopaiboon, M., Lumbiganon P., Zhang, J., Yamdamsuren, B., Temmerman, M., Say, L., Tunçalp, Ö, Vogel, J. P., Souza, J. P. & Mori, R. (2014). Pregnancy and childbirth outcomes among adolescent mothers: a World Health Organization multicountry study. *An International Journal of Obstretics and Gynaecology, 121*(1), 40-48. https://doi.org/10.1111/1471-0528.12630

Gitobu, C. M., Gichangi, P. B. & Mwanda, W. O. (2018). The effect of Kenya's free maternal health care policy on the utilization of health facility delivery services and maternal and neonatal mortality in public health facilities. *BMC Pregnancy and Childbirth, 18*, 2-11. https://doi.org/10.1186/s12884-018-1708-2

Govender, D., Taylor, M. & Naidoo, S. (2020). Adolescent pregnancy and parenting: Perceptions of healthcare providers. *Journal of Multidisciplinary Healthcare, 13*, 1607-1628. https://dx.doi.org/10.2147%2FJMDH.S258576

Gunawardena, N., Fantaye, A. W. & Yaya, S. (2019). Predictors of pregnancy among young people in sub-Saharan Africa: a systematic review and narrative synthesis. *BMJ Global Health, 4*, 1-8. doi:10.1136/ bmjgh-2019-001499

Hokororo, A., Kihunrwa, A. F., Kalluvya, S., Changalucha, J., Fitzgerald, D. W., & Downs, J. A. (2015). Barriers to access reproductive health care for pregnant adolescent girls: a qualitative study in Tanzania. *Acta Paediatrica*, *104*(12), 1291–1297. https://doi.org/10.1111/apa.12886

John, N., Roy, C., Mwangi, M., Raval, N. & McGovern, T. (2021). COVID-19 and gender-based violence (GBV): hard-to-reach women and girls, services, and programmes in Kenya. *Gender & Development, 29*(1), 55-71. https://doi.org/10.1080/13552074.2021.1885219

James, S., Rall, N., & Strümpher, J. (2012). Perceptions of pregnant teenagers with regard to the antenatal care clinic environment. *Curationis*, *35*(1), 43. https://doi.org/10.4102/curationis.v35i1.43

Johnson, W. & Moore, S. E. (2016). Adolescent pregnancy, nutrition, and health outcomes in low- and middle-income countries: what we know and what we don't know. *BJOG, 123*(10), 1589-1592. https://dx.doi.org/10.1111%2F1471-0528.13782

Kassa, G.M., Arowojolu, A.O., Odukogbe, A.A. & Yalew, A. W. (2018). Prevalence and determinants of adolescent pregnancy in Africa: a systematic review and Meta-analysis. *Reproductive Health, 15*, 1-17. https://doi.org/10.1186/s12978-018-0640-2

Kenya National Bureau of Statistics. (2014). Kenya – Kenya demographic and health survey 2014 [Policy brief]. Retrieved from: http://statistics.knbs.or.ke/nada/index.php/catalog/74

Kenya National Bureau of Statistics. (2019). 2019 Kenya population and housing census volume 1: Population by country and sub-county [Policy brief]. Retrieved from: https://www.knbs.or.ke/?wpdmpro=2019-kenya-population-and-housing-census-volume-i-population-by-county-and-sub-county

Kenya Open Data Project. (2012). Areas that are covered by Counties in the new Kenya constitution [Picture]. Retrieved from: https://en.wikipedia.org/wiki/Counties_of_Kenya#/media/File:Map_showing_Counties_underthe_new_kenyan_constitution..gif

Kenyatta, U. (2020). Address to the nation by H.E. Uhuru Kenyatta, C.G.H, president of the republic of Kenya and commander-in-chief of the defence forces on COVID-19, commonly known as coronavirus at Haharambee house, Nairobi on the 15th of March [Website]. Retrieved from: https://www.president.go.ke/2020/03/15/address-to-the-nation-by-h-e-uhuru-kenyatta-c-g-h-president-of-the-republic-of-kenya-and-commander-in-chief-of-the-defence-forces-on-covid-19-commonly-known-as-coronavirus/

Kilonzo, S. M., Kamaara, E. & Magak, K. (2017). Improving access to maternal health care through devolution in Western Kenya. *IDS Bulletin*, *48*, 91-108. 10.19088/1968-2017.118.

Kimani, R. W., Maina, R., Shumba, C., & Shaibu, S. (2020). Maternal and newborn care during the COVID-19 pandemic in Kenya: re-contextualising the community midwifery model. *Human resources for health*, *18*(1), 75. https://doi.org/10.1186/s12960-020-00518-3

Kiptoo-Tarus, P. (2020). Teenage pregnancy: A psychosocial burden on girlchild education in Kenya. *Research Journal in Advanced Humanities,1*(2), 64-76.

Kumar, M., Huang, K. Y., Othieno, C., Wamalwa, D., Madeghe, B., Osok, J., Kahonge, S. N., Nato, J., & McKay, M. M. (2018). Adolescent Pregnancy and Challenges in Kenyan Context: Perspectives from Multiple Community Stakeholders. *Global Social Welfare: research, policy & practice*, *5*(1), 11–27. https://doi.org/10.1007/s40609-017-0102-8

Lang'at, E., Mwanri, L., & Temmerman, M. (2019). Effects of implementing free maternity service policy in Kenya: an interrupted time series analysis. *BMC Health Services Research, 19*, 1-10. https://doi.org/10.1186/s12913-019-4462-x

Lincetto, O., Mothebesoane-Anoh, S., Gomez, P. & Munjanja, S. (2006). Antenatal Care [Policy brief]. Retrieved from: https://www.who.int/pmnch/media/publications/aonsectionIII_2.pdf

Makii, J. M. (2015). Utilization of antenatal care services among adolescent mothers in Mathare informal settlements, Nairobi country, Kenya [Master thesis]. School of public health of Kenyatta University, Kenya.

Masaba, B. B. & Mmusi-Phetoe, R. M. (2020). Free maternal health care policy in Kenya; Level of utilization and barriers. *International Journal of Africa Nursing Sciences, 13*. https://doi.org/10.1016/j.ijans.2020.100234

McDonald, C., Weckman, A., Wright, J., Conroy, A. & Kain, K. (2020). Pregnant women in Low- and middle-income countries require a special focus during the COVID-19 pandemic. *Frontiers in Global Women's Health, 1.* https://doi.org/10.3389/fgwh.2020.564560

Mekonnen, T., Dune, T. & Perz, J. (2019). Maternal health service utilisation of adolescent women in sub-Saharan Africa: a systematic scoping review. *BMC Pregnancy and Childbirth*, *19*, 1-16. https://doi.org/10.1186/s12884-019-2501-6

Mulinge, N. S. Yusuf, O. & Aimakhu, C. (2017). Factors influencing utilization of antenatal care services among teenage mothers in Malindi Sub-County Kenya - A cross sectional study. *Science Journal of Public Health, 5*, 61. https://doi.org/10.11648/J.SJPH.20170502.12

Muturi, G. N. (2021). Teenage Pregnancy In Kenya: gloom and doom in education, health [Online article]. Retrieved from: https://ncpd.go.ke/2021/02/26/teenage-pregnancy-in-kenya/

Mwanza, A., Mose, G. & Owano, A. (2019). Knowledge sharing spectrum of birth companions within maternal health in Kakamega County. *International Journal of Social Sciences and Information Technology, 4*(8), 24-43.

Ndambuki. S. M., Oyindamola, B. Y. & Chris O. A. (2017). Factors influencing utilization of antenatal care services among teenage mothers in Malindi Sub-County Kenya - A Cross Sectional Study. *Science Journal of Public Health*, *5*(2), 61-67. doi: 10.11648/j.sjph.20170502.12

Neal, S., Matthews, Z., Frost, M., Fogstad, H., Camacho, A. V. & Laski, L. (2012). Childbearing in adolescents aged 12–15 years in low resource countries: a neglected issue. New estimates from demographic and household surveys in 42 countries. *Acta Obstetricia et Gynecologica Scandinavica, 91*(9), 1114-1118. https://doi.org/10.1111/j.1600-0412.2012.01467.x

Negero, G. N., Mitike, Y. B., Worku, A. G. & Abota, T. L. (2018). Skilled delivery service utilization and its association with the establishment of women's health development army in Yeky district, South West Ethiopia: a multilevel analysis. *BMC Research Notes, 11*(1), 1-9. https://dx.doi.org/10.1186%2Fs13104-018-3140-0

Ochako, R. & Gichuhi, W. (2016). Pregnancy wantedness, frequency and timing of antenatal care visit among women of childbearing age in Kenya. *Reproductive Health, 13*. https://doi.org/10.1186/s12978-016-0168-2

Ochieng, C. A., & Odhiambo, A. S. (2019). Barriers to formal health care seeking during pregnancy, childbirth and postnatal period: a qualitative study in Siaya County in rural Kenya. *BMC pregnancy and childbirth*, *19*(1), 339. https://doi.org/10.1186/s12884-019-2485-2

Okedo-Alex, I. N., Akamike, I. C., Ezeanosike, O. B. & Uneke, C. J. (2019). Determinants of antenatal care utilisation in sub-Saharan Africa: a systematic review. *BMJ Open, 9*(10), 1-14. http://dx.doi.org.proxy.library.uu.nl/10.1136/bmjopen-2019-031890

Ombere, S. O. (2021). Access to maternal health services during the COVID-19 pandemic: experiences of indigent mothers and health care providers in Kilifi County, Kenya. *Frontiers in Sociology, 6*, 1-8. https://doi.org/10.3389/fsoc.2021.613042

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I. Hoffmann, T. C. & Mulrow, C. D. & Moher, D. (2020). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

Partridge-Hicks, S. (2020). Rise in teenage pregnancies in Kenya linked to COVID-19 lockdown [News article]. Retrieved from: https://www.globalcitizen.org/en/content/rise-in-teenage-pregnancies-during-kenya-lockdown/

Pathirana, J., Muñoz, F. M., Abbing-Karahagopian, V., Bhat, N., Harris, T., Kapoor, A., Keene, D. L., Mangili, A., Padula, M. A., Pande, S. L., Pool, V., Pourmalek, F., Varricchio, F., Kochhar, S., Cutland, C. L., & Brighton Collaboration Neonatal Death Working Group (2016). Neonatal death: Case definition & guidelines for data collection, analysis, and presentation of immunization safety data. *Vaccine*, *34*(49), 6027–6037. https://doi.org/10.1016/j.vaccine.2016.03.040

PharmAccess Foundation. (n.d.). Who we are. Pharmaccess. Retrieved from: https://www.pharmaccess.org/who-we-are/

PharmAccess. (2020). PharmAccess & MomCare: A digitally enabled MNCH model [PowerPoint slides]. PharmAccess Group.

PharmAccess. (2020b). *MomCare* [PowerPoint slides]. PharmAccess Group.

Population Council. (2020). Promises to keep [Policy brief]. Retrieved from: https://www.popcouncil.org/uploads/pdfs/2021PGY_ImpactCovidAdolKenya.pdf

Republic of Kenya. (2013). Kisumu county integrated development plan, 2013-2017 [Brief]. Kenya Property Developers Association.

Rockowitz, S., Rockey, J., Kanja, W., Kamau, C., Colloff, M., Kauldar, J., Woodhams, J., Davies, K. & Flowe, H., (2020). *Sexual and other forms of violence during the COVID-19 pandemic emergency in Kenya.* Retrieved from: https://psyarxiv.com/7wghn/download

Rossier, C., Muindi, K., Soura, A., Mberu, B., Lankoande, B., Kabiru, C. & Millogo, R. (2014). Maternal health care utilization in Nairobi and Ouagadougou: evidence from HDSS. *Global Health Action, 7*(1), 1-10. https://doi.org/10.3402/gha.v7.24351

Shikuku, D. N., Nyaoke, I., Gichuru, S., Maina, O., Eyinda, M., Godia, P., Nyaga, L. & Ameh, C. (2020). Early indirect impact of COVID-19 pandemic on utilization and outcomes of reproductive, maternal, newborn, child and adolescent health services in Kenya. https://doi.org/10.1101/2020.09.09.20191247

Tadesse E. (2020). Antenatal care service Utilization of pregnant women attending antenatal care in public hospitals during the COVID-19 pandemic period. *International Journal of Women's Health*, *12*, 1181–1188. https://doi.org/10.2147/IJWH.S287534

Terefe, A. N. & Gelaw, A. B. (2019). Determinants of antenatal care visit utilization of child-bearing mothers in Kaffa, Sheka, and Bench Maji Zones of SNNPR, Southwestern Ethiopia. *Health Services Research Managerial Epidemiology, 6*(1), 1-11. 10.1177/2333392819866620

Tessema, Z. T. & Tesema, G. A. (2020). Pooled prevalence and determinants of skilled birth attendant delivery in East Africa countries: a multilevel analysis of Demographic and Health Surveys. *Italian Journal of Pediatrics, 46*, 1-11. https://doi.org/10.1186/s13052-020-00943-z

Tessema, Z. T., Yazachew, L., Tesema, G. A. & Teshale, A. B. (2020). Determinants of postnatal care utilization in sub-Saharan Africa: a meta and multilevel analysis of data from 36 sub-Saharan countries. *Italian Journal Pediatrics, 46,* 1-11. https://doi.org/10.1186/s13052-020-00944-y

Thaddeus, S. & Maine, D. (1994). Too far to walk: maternal mortality in context. *Social Science and Medicine, 38* (8), 1091-1110.

Tsawe, M. & Susuman, A. S. (2014). Determinants of access to and use of maternal health care services in the Eastern Cape, South Africa: a quantitative and qualitative investigation. *BMC Research Notes, 7,* 1-10. 10.1186/1756-0500-7-723

UNFPA. (2018). World population dashboard Rwanda [Website] Retrieved from: https://www.unfpa.org/data/world-population/RW

UNFPA., World Health Organization., UNICEF., World Bank Group. & the United Nations Population Division. (2019). Trends in maternal mortality: 2000 to 2017: estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2019.

United Nations. (2015). Ensure healthy lives and promote well-being for all at all ages [Website]. Retrieved from: https://sdgs.un.org/goals/goal3

U.S. Embassy in Kenya. (2021). COVID-19 Information [Website]. Retrieved from: https://ke.usembassy.gov/covid-19-information/

Van den Boogaard, J., Arntzen, B., Chilwana, J., Liyungu, M., Mantingh, M. & Stekelenburg, J. (2008). Skilled or traditional birth attendant? Choices of communities in Lukulu district, rural Zambia. *World Health & Population, 10*(1), 35-43. 34-43.doi:10.12927/whp.2008.19736

Vihiga County. (2017). County's profile [Website]. Retrieved from: https://www.vihiga.go.ke/about.html

de Vocht, A. (2019). *Statistiek syllabus*. Faculteit Geowetenschappen. Utrecht University.

Western Sydney University. (2017). Literature review purpose [Online source]. Retrieved from: https://www.westernsydney.edu.au/__data/assets/pdf_file/0006/1254786/Literature_review_purpose.pdf

Woldegiorgis, M. A., Hiller, J., Mekonnen, W., Meyer, D. & Bhowmik, J. (2019). Determinants of antenatal care and skilled birth attendance in sub-Saharan Africa: A multilevel analysis. *Health Services Research, 54*(5), 1110-1118. https://doi.org/10.1111/1475-6773.13163

Wondemagegn, A.T., Alebel, A., Tesema, C. & Worku, A. (2018). The effect of antenatal care follow-up on neonatal health outcomes: a systematic review and meta-analysis. *Public Health Reviews, 39*(33), 1-11. https://doi.org/10.1186/s40985-018-0110-y

World Bank. (2019a). Population, total – Kenya [Statistical data]. Retrieved from: https://data.worldbank.org/indicator/SP.POP.TOTL?locations=KE

World Bank. (2019b). Population, female – Kenya [Statistical data]. Retrieved from: https://data.worldbank.org/indicator/SP.POP.TOTL.FE.IN?locations=KE

World Health Organization. (n.d.). Adolescent health: Adolescent health in the South-East Asia Region [Website]. Retrieved from: https://www.who.int/southeastasia/health-topics/adolescenthealth#:~:text=WHO%20defines%20'Adolescents'%20as%20individuals,age%20range%2010%2D24%20years.

World Health Organization. (2004a). *International statistical classification of diseases and related health problems: Tabular list.* World Health Organization.

World Health Organization. (2004b). Making pregnancy safer: the critical role of the skilled birth attendant, A joint statement by WHO, ICM, and FIGO. World Health Organization [Policy brief]. Retrieved from: http://apps.who.int/iris/bitstream/handle/10665/42955/9241591692.pdf;jsessionid=3DF382EA30BDD26A2AFABEF74779A273?sequence=1

World Health Organization. (2014). Adolescent pregnancy Factsheet [Internet]. World Health Organization. Retrieved from: http://www.who.int/mediacentre/factsheets/fs364/en/.

World Health Organization. (2015). Postnatal care for mothers and newborns highlights from the World Health Organization 2013 guidelines [Brief]. Retrieved from: https://www.who.int/docs/default-source/mca-documents/nbh/brief-postnatal-care-for-mothers-and-newborns-highlights-from-the-who-2013-guidelines.pdf?sfvrsn=33194d3c_1

World Health Organization. (2016a). WHO recommendation on antenatal care for a positive pregnancy experience [Brief]. Retrieved from: https://apps.who.int/iris/bitstream/handle/10665/250796/9789241549912-eng.pdf

World Health Organization. (2016b). New guidelines on antenatal care for a positive pregnancy experience [Report]. Retrieved from: https://www.who.int/news/item/07-11-2016-new-guidelines-on-antenatal-care-for-a-positive-pregnancy-experience

World Health Organization. (2017a). Primary health care systems (primasys): Case study from Kenya, abridged version [Report]. Geneva: World Health Organization. Licence: CC BY-NC-SA 3.0 IGO.

World Health Organization. (2017b). Factsheets on sustainable development goals: health targets: Maternal health [Internet]. World Health Organization. Retrieved from: https://www.euro.who.int/__data/assets/pdf_file/0006/354921/3.1-SDG-Fact-sheet-Maternal-Health.pdf

World Health Organization. (2018). Opportunities for Africa's newborns: practical data, policy and programmatic support for newborn care in Africa [Report]. Retrieved from: https://www.who.int/pmnch/media/publications/oanfullreport.pdf

World Health Organization. (2019a). Adolescent pregnancy: Evidence brief [Brief]. Retrieved from: https://apps.who.int/iris/bitstream/handle/10665/329883/WHO-RHR-19.15-eng.pdf

World Health Organization. (2019b). Maternal mortality [Website]. Retrieved from: https://www.who.int/news-room/fact-sheets/detail/maternal-mortality

World Health Organization . (2020a). Adolescent pregnancy [Website]. Retrieved from: https://www.who.int/news-room/fact-sheets/detail/adolescent-pregnancy

World Health Organization. (2020b). WHO recommendation on antenatal care contact schedules. Retrieved from: https://extranet.who.int/rhl/topics/improving-health-system-performance/who-recommendation-antenatal-care-contact-schedules

World Vision International. (2020). COVID-19 aftershocks: Access denied [Report]. Retrieved from: https://www.wvi.org/sites/default/files/2020-08/Covid19%20Aftershocks_Access%20Denied_small.pdf

Wudineh, K. G., Nigusie, A. A., Gesese, S. S., Tesu, A. A. & Beyene, F. Y. (2018). Postnatal care service utilization and associated factors among women who gave birth in Debretabour town, North West Ethiopia: a community- based cross-sectional study. *BMC Pregnancy and Childbirth*, *18*, 1-9. https://doi.org/10.1186/s12884-018-2138-x

Yakubu, I. & Salisu, W. J. (2018). Determinants of adolescent pregnancy in sub-Saharan Africa: a systematic review. *Reproductive Health*, *15.* Https://doi.org/10.1186/s12978-018-0460-4

Yusuf, M. (2020). Teenage pregnancies spike in Kenya as schools remain shuttered [News article]. Retrieved from: https://www.voanews.com/episode/teen-pregnancies-spike-kenya-schools-remain-shuttered-4344051

9. Appendices

Appendix I. Search terms and inclusion criteria

Appendix i. Search terms for studies

The search terms that have been used to identify the different articles that could be a match for the research topic, and thus for the literature review are:

Primary search terms	Combined search terms	Elaborated search terms
Maternal health care in Kenya OR antenatal care in Kenya	Patterns adolescent pregnancy Kenya	Frequency and quality of maternal health care visits to facilities in Kenya
Access to maternal health care in Kenya OR access to antenatal care in Kenya	Patterns access to maternal health care in Kenya	Utilisation of maternal health care for adolescent girls in Kenya
Adolescent pregnancy in Kenya OR teenage pregnancy in Kenya	Determinants adolescent pregnancy Kenya	Accessibility to antenatal services in Kenya
Maternal health facilities in Kenya OR antenatal care facilities in Kenya	Determinants access to maternal health care in Kenya	Skilled delivery and antenatal care in SSA

Appendix ii. Inclusion criteria

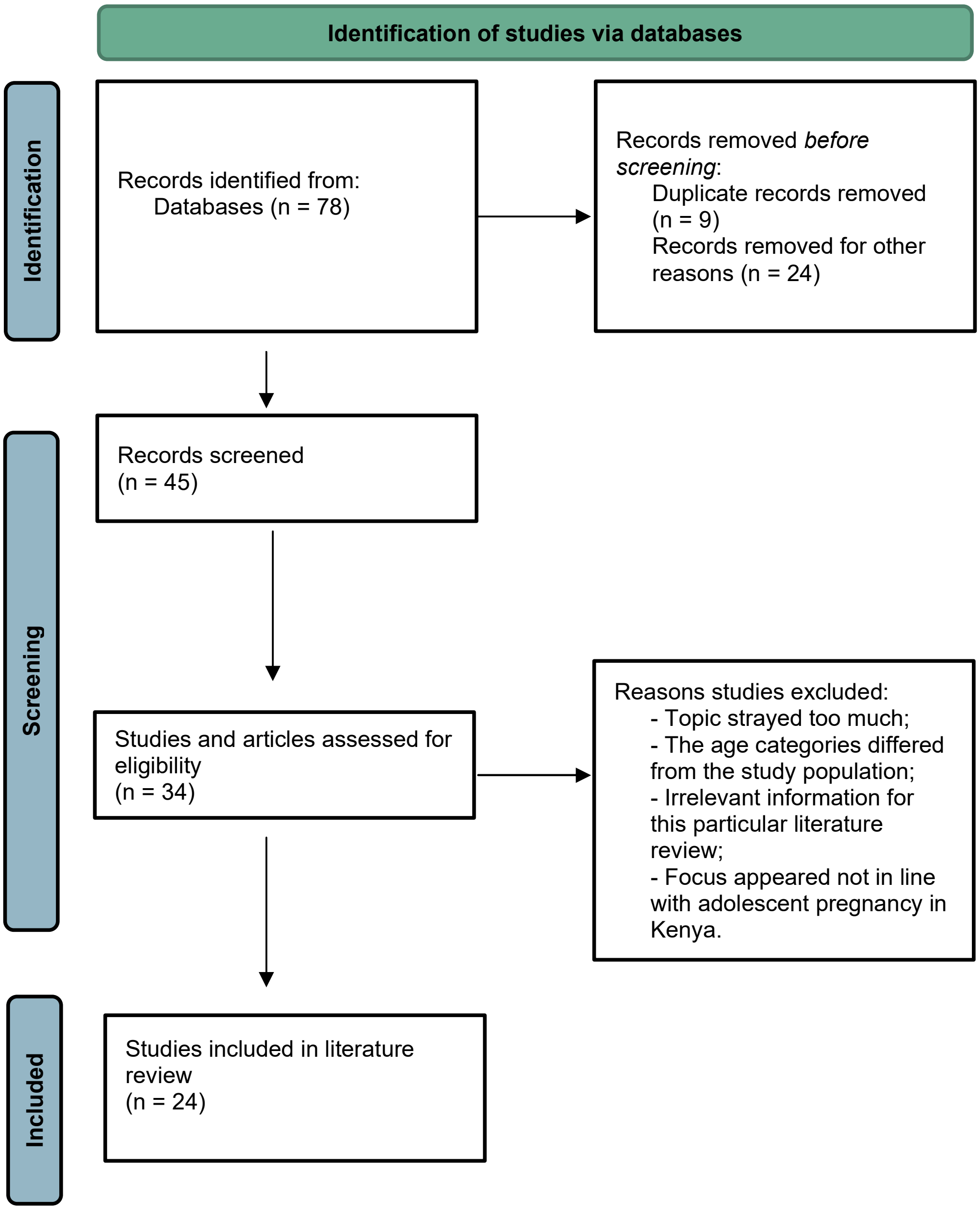
When publications are found with these search terms, the title, abstract, and conclusion is read to ensure that the articles do oblige to the inclusion criteria.

The inclusion criteria of the publications are as follows:

1. It needs to include academic and empirical research;
2. The publications need to be written in English;
3. The publications cannot be published before 2011, to ensure the relevance and accuracy;
4. The studies need to be focused on Kenya, or provide relevant information applicable to the regional framework;
5. The studies only include women up until the age of 19.

Appendix II. PRISMA flow diagram

The flow diagram is not finished yet, because the selection process is still very ongoing. It is expected that more articles will be eligible and used for the research. Furthermore, other reports from different resources still need to be added.


Identification of studies via databases
Identification
Records identified from:
Databases (n = 78)
Records removed *before screening*:
Duplicate records removed (n = 9)
Records removed for other reasons (n = 24)
Screening
Records screened
(n = 45)
Studies and articles assessed for eligibility
(n = 34)
Reasons studies excluded:
- Topic strayed too much;
- The age categories differed from the study population;
- Irrelevant information for this particular literature review;
- Focus appeared not in line with adolescent pregnancy in Kenya.
Included
Studies included in literature review
(n = 24)

(Page, McKenzie, Bossuyt, Boutron, Hoffmann, Mulrow, et al., 2020).

Appendix III. Statistical analyses data selection process

Appendix i. Data set cleaning process

The first step was to merge the two data sets, the enrolment survey and the carepay utilisation information. To merge the two data sets correctly, there was one key variable chosen named beneficiaries_id_hash. This variable holds a unique code for every girl. In SPSS, several additional variables were selected for the merge, namely age, location, and region. Before the merge, there was a total of 3,603 girls. After the merge, 3,032 girls were matched, and 571 girls were not matched, of which 511 from the carepay utilisation and 60 girls from the enrolment survey. The girls who were included in the sample size were the mothers who had enrolled since the start of MomCare in November, 2017 and those who enrolled up until April, 2021.

The next step was to select the right population for the research. Since the goal of the research was to discover patterns and determinants in the care seeking behaviour of adolescent girls before and during the COVID-19 pandemic, it was key to select the teenagers who had completed their ANC journey and gave birth to their baby. As a result, it was important to drop the mothers who were below a current week of 45. The current week variable represents how many weeks the mothers have been enrolled in the MomCare program and it goes hand in hand with the journey of the mothers. Additionally, girls who had an enrolment week above week 45 needed to be excluded as well, since that indicated that these girls only gave birth at the clinic or were only receiving postnatal care. Furthermore, any inaccuracies such as an enrolment week of -11 or -32 were dropped. After the cleaning the errors in the data sets, the total number of eligible mothers stood at 2,202 teenage girls.

Appendix ii. Dropped variables for statistical analyses

The selection criteria included several indicators. The first one being that a variable required at least a response of 50% of the mothers included in the study. Secondly, some variables such as living in a rural or urban area appeared to be double in the data set, and thus, were removed. These criteria resulted in a drop of several variables, shown down below.

baby
Status of women
Dataprovider_id
IprovideID
Date finished
No_visits_with_oxygen
Biggest challenge

Last_visit_with_oxygen
Total_no_days_bed_charge_without
No_visits_with_blood
Last_blood_transfusion_date
Location
How many people depend on you
Complications previous pregnancy

Who referred you to this clinic
Have you been to this clinic before
Airtime
Toilet
Provider_id
Fuel HH
Rural or urban

Estimated date delivery
Functional TV
Material floor
Material extern wall
Material roof
Data provider
ANCs visits during previous pregnancy

Appendix IV. Descriptive statistics of independent and dependent variables

	GROUP 1			GROUP 2			GROUP 3			TOTAL	
	Prior: journey and EDD prior to COVID-19			In between: journey prior and during COVID-19, EDD during COVID-19			During: journey and EDD during COVID-19			All mothers	
	sample size: 369 mothers (16,76%)			sample size: 621 mothers (28,20%)			sample size: 1.212 mothers (55,04%)			2.202 mothers (100%)	
	Age			**Age**			**Age**			**Age**	
13	0	0,00%	*13*	3	0,48%	*13*	3	0,25%	*13*	6	0,27%
14	1	0,27%	*14*	5	0,81%	*14*	14	1,16%	*14*	20	0,91%
15	7	1,90%	*15*	20	3,22%	*15*	39	3,22%	*15*	66	3,00%
16	16	4,34%	*16*	55	8,86%	*16*	97	8,00%	*16*	168	7,63%
17	31	8,40%	*17*	128	20,61%	*17*	221	18,23%	*17*	380	17,26%
18	145	39,30%	*18*	175	28,18%	*18*	415	34,24%	*18*	735	33,38%
19	169	45,80%	*19*	235	37,84%	*19*	423	34,90%	*19*	827	37,56%
Total	369	100%	*Total*	621	100%	*Total*	1.212	100,00%	*Total*	2.202	100,00%
	Region			**Region**			**Region**			**Region**	
Kakamega	96	26,02%	*Kakamega*	130	20,93%	*Kakamega*	266	21,95%	*Kakamega*	492	22,34%
Kisumu	128	34,69%	*Kisumu*	366	58,94%	*Kisumu*	771	63,61%	*Kisumu*	1.265	57,45%
Nairobi	145	39,30%	*Nairobi*	124	19,97%	*Nairobi*	132	10,89%	*Nairobi*	401	18,21%
Vihiga	0	0,00%	*Vihiga*	1	0,16%	*Vihiga*	43	3,55%	*Vihiga*	44	2,00%
Total	369	100%	*Total*	621	100%	*Total*	1.212	100%	*Total*	2.202	100,00%
	Enrolment period			**Enrolment period**			**Enrolment period**			**Enrolment period**	
1st trimester	25	6,78%	*1st trimester*	32	5,15%	*1st trimester*	50	4,13%	*1st trimester*	107	4,86%
2nd trimester	169	45,80%	*2nd trimester*	227	36,55%	*2nd trimester*	462	38,12%	*2nd trimester*	858	38,96%
3rd trimester	175	47,43%	*3rd trimester*	362	58,29%	*3rd trimester*	700	57,76%	*3rd trimester*	1.237	56,18%
Total	369	100%	*Total*	621	100,00%	*Total*	1.212	100,00%	*Total*	2.202	100,00%
	ANCs			**ANCs**			**ANCs**			**ANCs**	
0	23	6,23%	*0*	110	17,71%	*0*	200	16,50%	*0*	333	15,12%
1	131	35,50%	*1*	197	31,72%	*1*	414	34,16%	*1*	742	33,70%
2	70	18,97%	*2*	111	17,87%	*2*	223	18,40%	*2*	404	18,35%
3	65	17,62%	*3*	92	14,81%	*3*	168	13,86%	*3*	325	14,76%
4	42	11,38%	*4*	65	10,47%	*4*	116	9,57%	*4*	223	10,13%
5	21	5,69%	*5*	28	4,51%	*5*	55	4,54%	*5*	104	4,72%
6	6	1,63%	*6*	15	2,42%	*6*	20	1,65%	*6*	41	1,86%
7	8	2,17%	*7*	2	0,32%	*7*	13	1,07%	*7*	23	1,04%
8	2	0,54%	*8*	1	0,16%	*8*	2	0,17%	*8*	5	0,23%
9	1	0,27%	*9*	0	0,00%	*9*	1	0,08%	*9*	2	0,09%
Total	369	100,00%	*Total*	621	100,00%	*Total*	1.212	100,00%	*Total*	2.202	100,00%
	Skilled delivery			**Skilled delivery**			**Skilled delivery**			**Skilled delivery**	
Yes	171	46,85%	*Yes*	415	66,83%	*Yes*	729	60,15%	*Yes*	1.315	59,83%
No	194	53,15%	*No*	206	33,17%	*No*	483	39,85%	*No*	883	40,17%
Total	365	98,92%	*Total*	621	100,00%	*Total*	1.212	100,00%	*Total*	2.198	99,82%
	Have been pregnant before			**Have been pregnant before**			**Have been pregnant before**			**Have been pregnant**	
Yes	63	17,07%	*Yes*	76	12,24%	*Yes*	123	10,15%	*Yes*	262	11,90%
No	306	82,93%	*No*	458	73,75%	*No*	1.021	84,24%	*No*	1.940	88,10%
Total	369	100,00%	*Total*	621	100,00%	*Total*	1.212	100,00%	*Total*	2.202	100,00%
	Times pregnant before			**Times pregnant before**			**Times pregnant before**			**Times pregnant before**	
0	313	84,82%	*0*	595	95,81%	*0*	1.175	96,95%	*0*	2.083	94,60%
1	42	11,38%	*1*	17	2,74%	*1*	33	2,72%	*1*	92	4,18%
2	5	1,36%	*2*	4	0,64%	*2*	3	0,25%	*2*	12	0,54%
3	2	0,54%	*3*	0	0,00%	*3*	1	0,08%	*3*	3	0,14%
4	6	1,63%	*4*	4	0,64%	*4*	0	0,00%	*4*	10	0,45%
5	1	0,27%	*5*	1	0,16%	*5*	0	0,00%	*5*	2	0,09%
Total	369	100,00%	*Total*	621	100,00%	*Total*	1.212	100,00%	*Total*	2.202	100%
	Travel to clinic in minutes			**Travel to clinic in minutes**			**Travel to clinic in minutes**			**Travel to clinic in min.**	
0 - 30	254	83,83%	*0 - 30*	380	71,03%	*0 - 30*	790	69,12%	*0 - 30*	1.424	71,88%
31 - 60	49	16,17%	*31 - 60*	133	24,86%	*31 - 60*	316	27,65%	*31 - 60*	498	25,14%
61 - 90	0	0,00%	*61 - 90*	16	2,99%	*61 - 90*	26	2,27%	*61 - 90*	42	2,12%
91 - 120	0	0,00%	*91 - 120*	4	0,75%	*91 - 120*	10	0,87%	*91 - 120*	14	0,71%
> 120	0	0,00%	*> 120*	2	0,37%	*> 120*	1	0,09%	*> 120*	3	0,15%
Total	303	82,11%	*Total*	535	86,15%	*Total*	1.143	94,31%	*Total*	1.981	89,96%
	Transport use			**Transport use**			**Transport use**			**Transport use**	
Bodaboda	123	39,68%	*Bodaboda*	213	39,30%	*Bodaboda*	551	48,16%	*Bodaboda*	887	44,44%
Foot	172	55,48%	*Foot*	243	44,83%	*Foot*	349	30,51%	*Foot*	764	38,28%
Matatu	14	4,52%	*Matatu*	74	13,65%	*Matatu*	220	19,23%	*Matatu*	308	15,43%
Other	1	0,32%	*Other*	12	2,21%	*Other*	24	2,10%	*Other*	37	1,85%
Total	310	84,01%	*Total*	542	87,28%	*Total*	1.144	94,39%	*Total*	1.996	90,64%
	How many can you count on in times of need			**How many people can you count on in times of need**			**How many people can you count on in times of need**			**Can count on**	
No one	1	0,61%	*No one*	9	1,67%	*No one*	1	0,09%	*No one*	11	0,59%
1 person	43	26,06%	*1 person*	109	20,19%	*1 person*	247	21,59%	*1 person*	399	21,58%
2-5	111	67,27%	*2-5*	386	71,48%	*2-5*	789	68,97%	*2-5*	1.286	69,55%
6-10	10	6,06%	*6-10*	36	6,67%	*6-10*	107	9,35%	*6-10*	153	8,27%
Total	165	44,72%	*Total*	540	86,96%	*Total*	1.144	94,39%	*Total*	1.849	83,97%
	Experienced hunger last 12 months			**Experienced hunger last 12 months**			**Experienced hunger last 12 months**			**Experienced hunger**	
Yes	119	40,34%	*Yes*	140	25,97%	*Yes*	206	17,99%	*Yes*	465	23,50%
No	176	59,66%	*No*	399	74,03%	*No*	939	82,01%	*No*	1.514	76,50%
Total	295	79,95%	*Total*	539	86,80%	*Total*	1.145	94,47%	*Total*	1.979	97,87%
	Educational level HHH			**Educational level HHH**			**Educational level HHH**			**Educational level HHH**	
Primary, other	123	40,86%	*Primary, other*	229	42,49%	*Primary, other*	454	39,69%	*Primary, other*	806	40,63%
Secondary	152	50,50%	*Secondary*	275	51,02%	*Secondary*	641	56,03%	*Secondary*	1.068	53,83%
Tertiary, University	26	8,64%	*Tertiary, University*	35	6,49%	*Tertiary, University*	49	4,28%	*Tertiary, University*	110	5,54%
Total	301	81,57%	*Total*	539	86,80%	*Total*	1.144	94,39%	*Total*	1.984	90,10%

Appendix V. Assumptions regression analyses per COVID-19 groups

Appendix i. Linear regression analysis – Early enrolment

1. **The dependent variable is continuous:**

The dependent variable is the week of enrolment, which is a continuous variable.

2. **The independent variables are continuous or categorical:**

The variables age and ANCs are continuous, the other variables are categorical or a dummy.

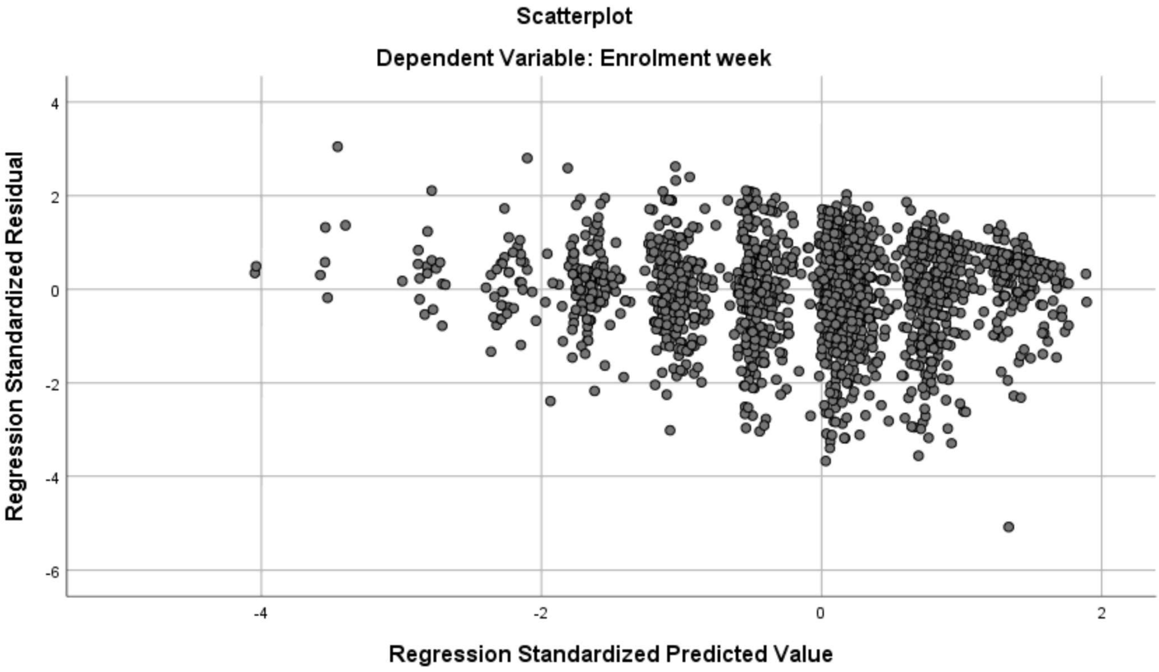
3. **The observations are independent:**

The data set consists out of independent variables and observations.

4. **A causal relation:**

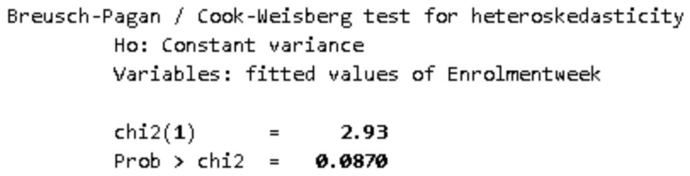
The independent variables are based on the theory present in the literature review and based on previous research conducted by MomCare. Thus, the independent variable is considered to be theoretically influenced by the included independent variables.

5. **There should be a linear relationship:**



6. **Homoscedasticity of residuals:**

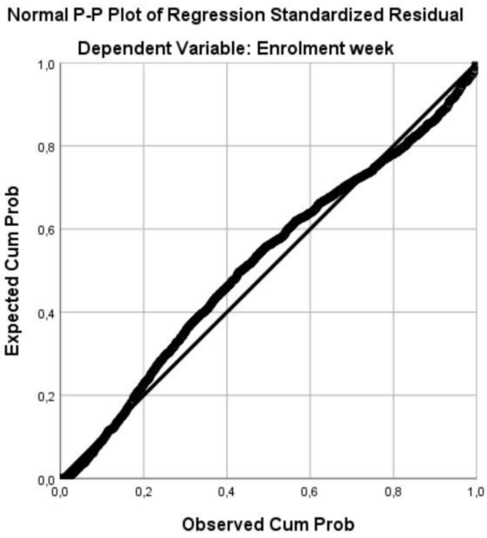
Based on the plot shown above and the conducted Breusch-Pagan / Cook-Weisberg test for heteroskedasticity (that works with the null-hypothesis that the model is heteroscedastic ($p<0.05$)), it can be concluded that the model is homoscedastic.

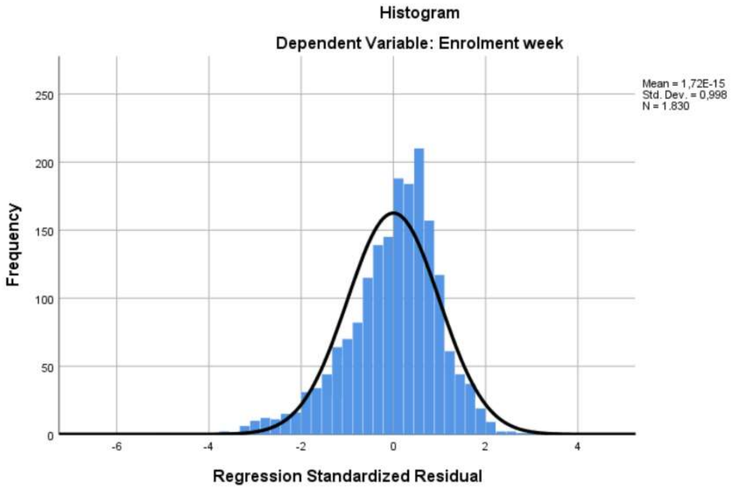


```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of Enrolmentweek

         chi2(1)      =     2.93
         Prob > chi2  =   0.0870
```

7. There should be a normal distribution of the residuals:

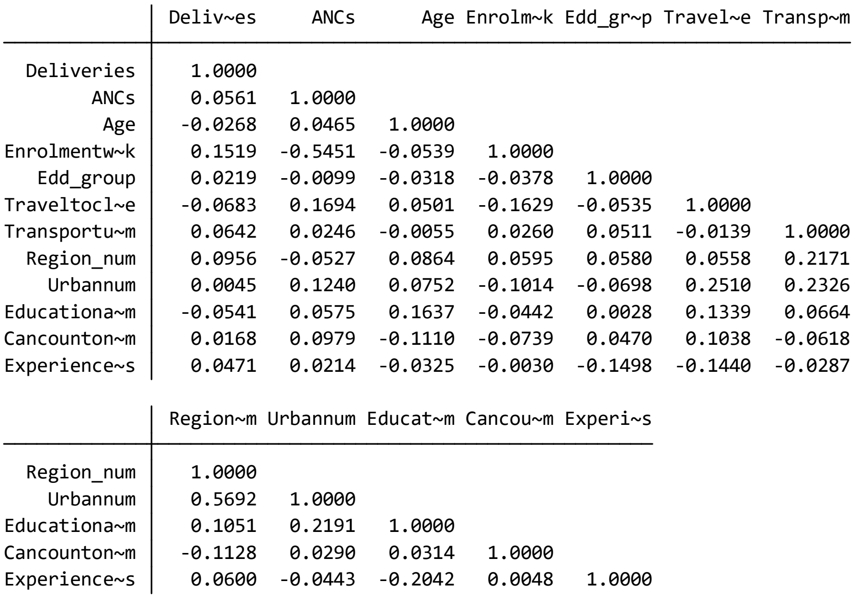




Based on the two normal probability plot and the histogram it can be concluded that the residuals are not perfectly distributed. There are several outliers that influence the outcomes of the graphs, however, since real world data is often not perfect, and there are no pressing reasons to delete the outliers, it had been decided with the research team of the partner organisation to leave the outliers in the analyses and to accept the deviation.

8. There should be no multicollinearity:

In the image shown down below it is proven that there is no multicollinearity because no independent variable shows a strong correlation ($r < |0,9|^2$).



```
             | Deliv~es     ANCs      Age Enrolm~k Edd_gr~p Travel~e Transp~m
-------------+---------------------------------------------------------------
  Deliveries |   1.0000
        ANCs |   0.0561   1.0000
         Age |  -0.0268   0.0465   1.0000
Enrolmentw~k |   0.1519  -0.5451  -0.0539   1.0000
   Edd_group |   0.0219  -0.0099  -0.0318  -0.0378   1.0000
Traveltocl~e |  -0.0683   0.1694   0.0501  -0.1629  -0.0535   1.0000
Transportu~m |   0.0642   0.0246  -0.0055   0.0260   0.0511  -0.0139   1.0000
  Region_num |   0.0956  -0.0527   0.0864   0.0595   0.0580   0.0558   0.2171
    Urbannum |   0.0045   0.1240   0.0752  -0.1014  -0.0698   0.2510   0.2326
Educationa~m |  -0.0541   0.0575   0.1637  -0.0442   0.0028   0.1339   0.0664
Cancounton~m |   0.0168   0.0979  -0.1110  -0.0739   0.0470   0.1038  -0.0618
Experience~s |   0.0471   0.0214  -0.0325  -0.0030  -0.1498  -0.1440  -0.0287

             | Region~m Urbannum Educat~m Cancou~m Experi~s
-------------+---------------------------------------------
  Region_num |   1.0000
    Urbannum |   0.5692   1.0000
Educationa~m |   0.1051   0.2191   1.0000
Cancounton~m |  -0.1128   0.0290   0.0314   1.0000
Experience~s |   0.0600  -0.0443  -0.2042   0.0048   1.0000
```

Appendix ii. Linear regression analysis – ANCs

1. **The dependent variable is continuous:**

The dependent variable is the number of ANCs which is a continuous variable.

2. **The independent variables are continuous or categorical:**

The variables age and enrolment week are continuous, the other variables are categorical or a dummy.

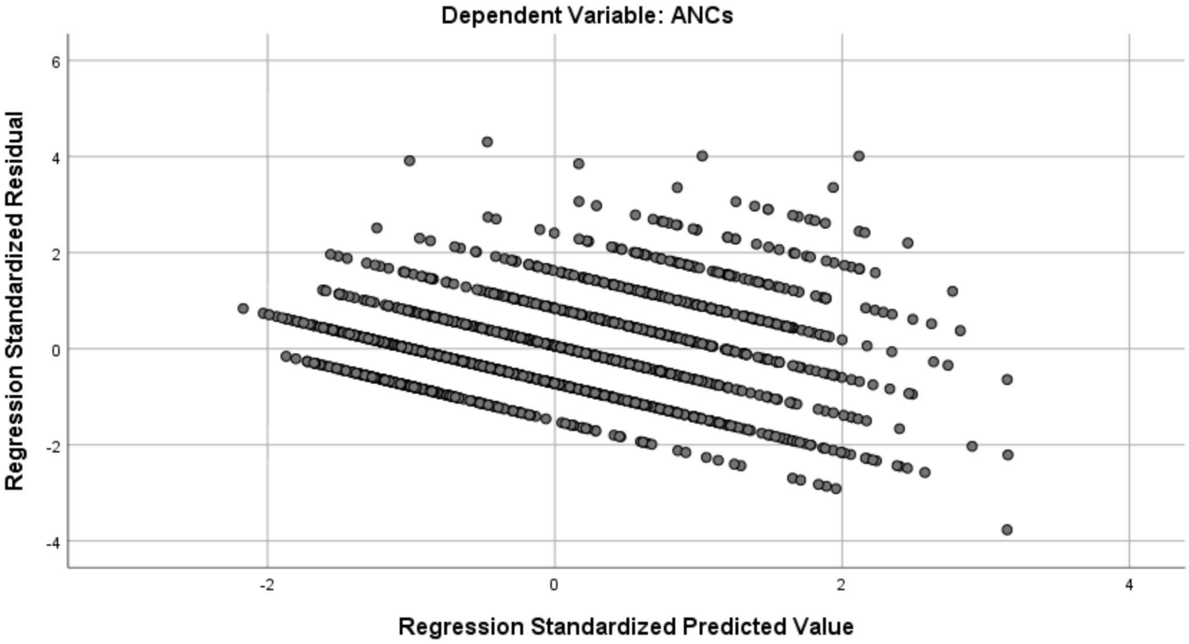
3. **The observations are independent:**

The data set consists out of independent variables and observations.

4. **A causal relation:**

The independent variables are based on the theory present in the literature review and based on previous research conducted by MomCare. Thus, the independent variable is considered to be theoretically influenced by the included independent variables.

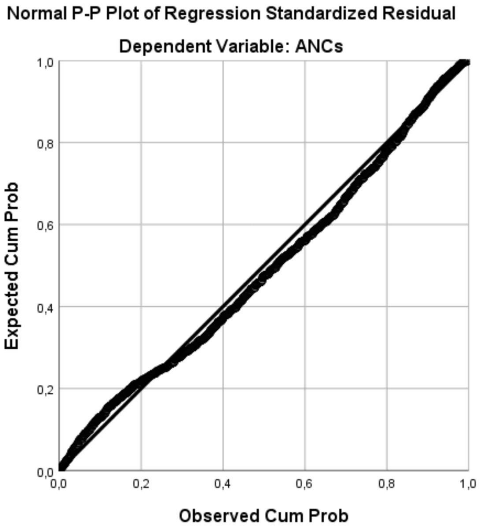
5. **There should be a linear relationship:**

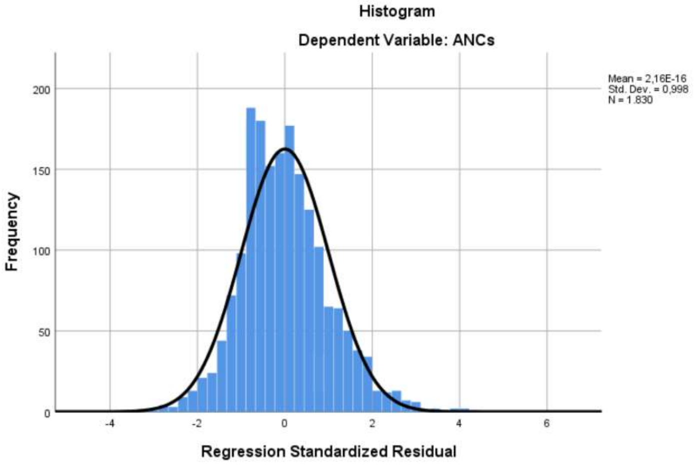


6. **Homoscedasticity of residuals:**

Based on the plot shown above, it can be concluded that there is sense of a slight heteroskedasticity.

7. There should be a normal distribution of the residuals:





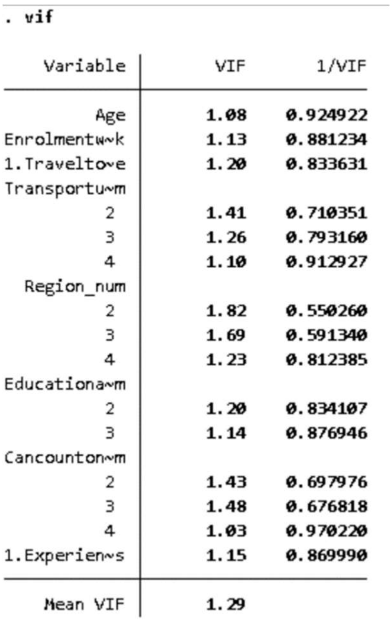
In the histogram it is noticeable that there are some outliers that show that the residuals are not perfectly distributed.

8. There should be no multicollinearity:

In the image shown down below it is proven that there is no multicollinearity because no independent variable shows a strong correlation (r < |0,9|^2).

```
             |  Deliv~es     ANCs      Age Enrolm~k Edd_gr~p Travel~e Transp~m
-------------+---------------------------------------------------------------
  Deliveries |   1.0000
        ANCs |   0.0561   1.0000
         Age |  -0.0268   0.0465   1.0000
Enrolmentw~k |   0.1519  -0.5451  -0.0539   1.0000
   Edd_group |   0.0219  -0.0099  -0.0318  -0.0378   1.0000
Traveltocl~e |  -0.0683   0.1694   0.0501  -0.1629  -0.0535   1.0000
Transportu~m |   0.0642   0.0246  -0.0055   0.0260   0.0511  -0.0139   1.0000
  Region_num |   0.0956  -0.0527   0.0864   0.0595   0.0580   0.0558   0.2171
    Urbannum |   0.0045   0.1240   0.0752  -0.1014  -0.0698   0.2510   0.2326
Educationa~m |  -0.0541   0.0575   0.1637  -0.0442   0.0028   0.1339   0.0664
Cancounton~m |   0.0168   0.0979  -0.1110  -0.0739   0.0470   0.1038  -0.0618
Experience~s |   0.0471   0.0214  -0.0325  -0.0030  -0.1498  -0.1440  -0.0287

             | Region~m Urbannum Educat~m Cancou~m Experi~s
-------------+---------------------------------------------
  Region_num |   1.0000
    Urbannum |   0.5692   1.0000
Educationa~m |   0.1051   0.2191   1.0000
Cancounton~m |  -0.1128   0.0290   0.0314   1.0000
Experience~s |   0.0600  -0.0443  -0.2042   0.0048   1.0000
```



```
. vif

    Variable |       VIF       1/VIF  
-------------+----------------------
         Age |      1.08    0.924922
Enrolmentw~k |      1.13    0.881234
1.Traveltov~e|      1.20    0.833631
Transportu~m |
          2  |      1.41    0.710351
          3  |      1.26    0.793160
          4  |      1.10    0.912927
  Region_num |
          2  |      1.82    0.550260
          3  |      1.69    0.591340
          4  |      1.23    0.812385
Educationa~m |
          2  |      1.20    0.834107
          3  |      1.14    0.876946
Cancounton~m |
          2  |      1.43    0.697976
          3  |      1.48    0.676818
          4  |      1.03    0.970220
1.Experien~s |      1.15    0.869990
-------------+----------------------
    Mean VIF |      1.29
```

Appendix iii. Logistic regression analysis – Skilled delivery

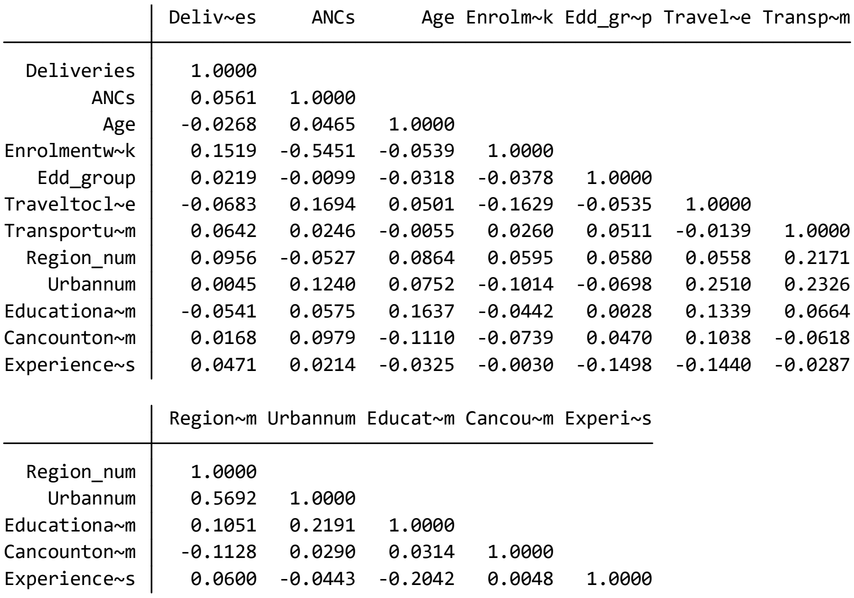
1. **The dependent variable is binary:**
   Dependent variable is Deliveries, which is a binary variable with the option no (0) and yes (1).

2. **The observations are independent:**
   The data set consists out of independent variables and observations.

3. **The independent variables are continuous or categorical:**
   The variables age, ANCs and enrolment week are continuous, the other variables are categorical or a dummy.

4. **A causal relation:**
   The independent variables are based on the theory present in the literature review and based on previous research conducted by MomCare. Thus, the independent variable is considered to be theoretically influenced by the included independent variables.

5. **There should be no multicollinearity:**
   In the image shown down below it is proven that there is no multicollinearity because no independent variable shows a strong correlation ($r < |0,9|^2$).



```
             |  Deliv~es     ANCs      Age Enrolm~k Edd_gr~p Travel~e Transp~m
-------------+---------------------------------------------------------------
  Deliveries |   1.0000
        ANCs |   0.0561   1.0000
         Age |  -0.0268   0.0465   1.0000
Enrolmentw~k |   0.1519  -0.5451  -0.0539   1.0000
   Edd_group |   0.0219  -0.0099  -0.0318  -0.0378   1.0000
Traveltocl~e |  -0.0683   0.1694   0.0501  -0.1629  -0.0535   1.0000
Transportu~m |   0.0642   0.0246  -0.0055   0.0260   0.0511  -0.0139   1.0000
  Region_num |   0.0956  -0.0527   0.0864   0.0595   0.0580   0.0558   0.2171
    Urbannum |   0.0045   0.1240   0.0752  -0.1014  -0.0698   0.2510   0.2326
Educationa~m |  -0.0541   0.0575   0.1637  -0.0442   0.0028   0.1339   0.0664
Cancounton~m |   0.0168   0.0979  -0.1110  -0.0739   0.0470   0.1038  -0.0618
Experience~s |   0.0471   0.0214  -0.0325  -0.0030  -0.1498  -0.1440  -0.0287

             |  Region~m Urbannum Educat~m Cancou~m Experi~s
-------------+---------------------------------------------
  Region_num |   1.0000
    Urbannum |   0.5692   1.0000
Educationa~m |   0.1051   0.2191   1.0000
Cancounton~m |  -0.1128   0.0290   0.0314   1.0000
Experience~s |   0.0600  -0.0443  -0.2042   0.0048   1.0000
```

Appendix VI. Interview guide

Introduction
Hello, my name is Robin Geerts and I am currently enrolled in the Master International Development Studies at Utrecht University. For my Master thesis, I am researching the patterns and determinants surrounding the utilisation of antenatal care for adolescent girls in Kenya, prior and during the COVID-19 pandemic. If it is no problem for you, I would like to ask you some questions regarding this topic. The interview will take approximately 30 minutes. Do you agree that this conversation will be recorded? The recordings are confidential, and thus, will not be shared with anyone and will be deleted after transcribing the interview. I also would like to inform you that your information will be processed anonymously. Do you have any questions or remarks before we begin?

Background information
- No. of the interview:
- Date:
- Time:
- City of residence:
- Profession:

Semi-opening questions
- How long have you been working for the organisation you are currently working for?

- Could you tell me a bit more about the goal of the organisation and activities?

- I am researching four different areas: Kakamega, Kisumu, Nairobi and Vihiga. Could you tell me a bit about the differences between these four areas?

Key questions
- Sexual health and productive rights, is that something young girls are taught in school or in the community?
    - *Probes: Sexual education, family planning, preparation, protection*

- What is the situation regarding to pregnant adolescent girls in Kenya?
    - *Probes: Numbers, treatment, acceptance, family, friends, community, stigma*

- So the World Health Organization argues that women should have at least four antenatal care, and preferably eight visits when they are pregnant, however what I can see from the data and the literature, most women do not adhere to this, especially not teenagers. Why do you think this is?
    - *Probes: differences per region, educational level household, rural/urban, poor or richer girls, community*

- What are different characteristics that can determine how important antenatal care is for adolescent girls?
    - *Probes: family, morals and beliefs, community*

- I read an article that mentioned that education of the girl and partner are very important on how many antenatal care visits a mother will have during her pregnancy. I ran an analysis regarding the number ANCs and the educational level of the household head but it not turned out to be of much importance. To what extent do you think that education of the family impacts the amount of ANC visits a girl receive?
    - *Probes: important / not important, why? Next steps, community, beliefs*

- Research also showed that most mothers have their first ANC visit in their second or third trimester, why is that?
    - *Probes: Stigma, being afraid, lack of knowledge*

- I would like to ask you some questions regarding the COVID-19 outbreak in Kenya. Because since the 15th of March 2020, several measurements have been taken to fight the COVID-19 pandemic. In what ways has the COVID-19 outbreak impacted the lives of people in Kenya, more particularly that of adolescent girls?
    - *Probes: Increase in teenage pregnancy, health workers, transportation, accessibility, safety*

- In what ways do you think that COVID-19 has affected the use of antenatal care by adolescent girls?
    - *Probes: more or less care, COVID-19 restrictions, accessibility, transportation.*

Closing questions

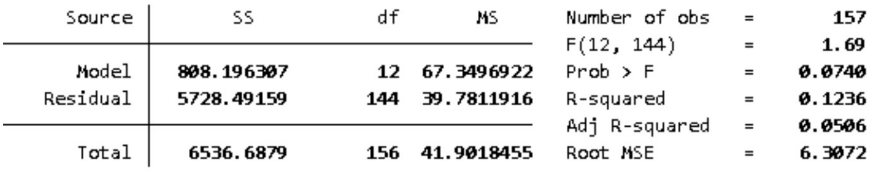
- What do you think needs to be done to ensure that more girls will receive antenatal care and skilled delivery?

Thank you for your participation.

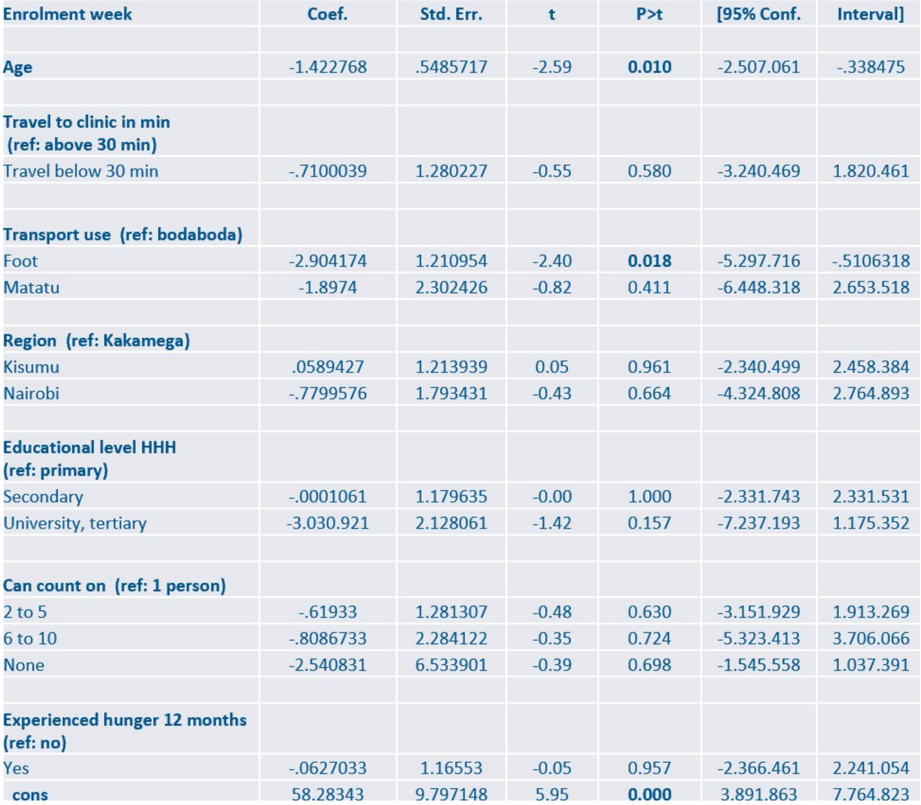
Appendix VII. Outcomes regression analyses per COVID-19 groups

Appendix i. Linear regression analysis – Early enrolment

Before COVID-19

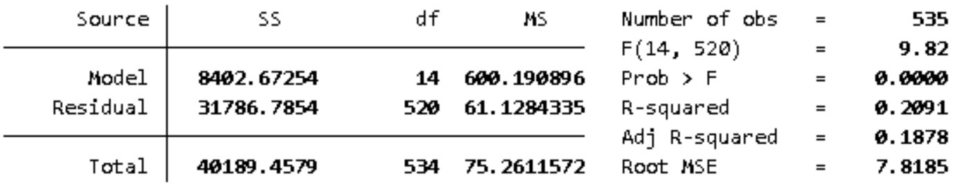


```
      Source |       SS           df       MS      Number of obs   =       157
-------------+----------------------------------   F(12, 144)      =      1.69
       Model |  808.196307        12  67.3496922   Prob > F        =    0.0740
    Residual |  5728.49159       144  39.7811916   R-squared       =    0.1236
-------------+----------------------------------   Adj R-squared   =    0.0506
       Total |   6536.6879       156  41.9018455   Root MSE        =    6.3072
```



Enrolment week	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
Age	-1.422768	.5485717	-2.59	**0.010**	-2.507.061	-.338475
Travel to clinic in min (ref: above 30 min)						
Travel below 30 min	-.7100039	1.280227	-0.55	0.580	-3.240.469	1.820.461
Transport use (ref: bodaboda)						
Foot	-2.904174	1.210954	-2.40	**0.018**	-5.297.716	-.5106318
Matatu	-1.8974	2.302426	-0.82	0.411	-6.448.318	2.653.518
Region (ref: Kakamega)						
Kisumu	.0589427	1.213939	0.05	0.961	-2.340.499	2.458.384
Nairobi	-.7799576	1.793431	-0.43	0.664	-4.324.808	2.764.893
Educational level HHH (ref: primary)						
Secondary	-.0001061	1.179635	-0.00	1.000	-2.331.743	2.331.531
University, tertiary	-3.030.921	2.128061	-1.42	0.157	-7.237.193	1.175.352
Can count on (ref: 1 person)						
2 to 5	-.61933	1.281307	-0.48	0.630	-3.151.929	1.913.269
6 to 10	-.8086733	2.284122	-0.35	0.724	-5.323.413	3.706.066
None	-2.540831	6.533901	-0.39	0.698	-1.545.558	1.037.391
Experienced hunger 12 months (ref: no)						
Yes	-.0627033	1.16553	-0.05	0.957	-2.366.461	2.241.054
cons	58.28343	9.797148	5.95	**0.000**	3.891.863	7.764.823

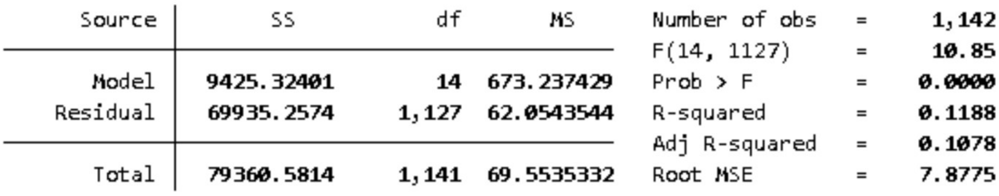
Transitioning into COVID-19



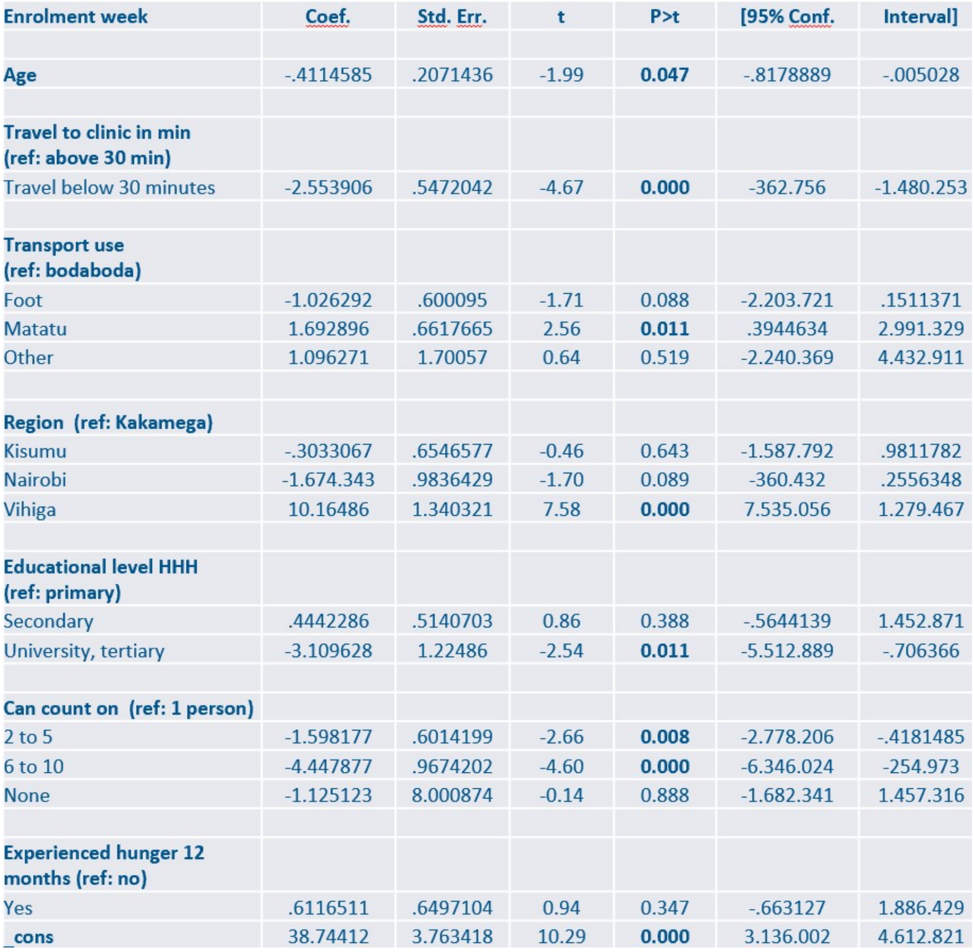
```
      Source |       SS           df       MS      Number of obs   =       535
-------------+----------------------------------   F(14, 520)      =      9.82
       Model |  8402.67254        14  600.190896   Prob > F        =    0.0000
    Residual |  31786.7854       520  61.1284335   R-squared       =    0.2091
-------------+----------------------------------   Adj R-squared   =    0.1878
       Total |  40189.4579       534  75.2611572   Root MSE        =    7.8185
```

Enrolmentweek	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
Age	-.9293093	.2905737	-3.20	**0.001**	-1.500.152	-.3584666
Travel to clinic in min (ref: above 30 min)						
Travel below 30 min	-2.146881	.8161403	-2.63	**0.009**	-3.750.219	-.543544
Transport use (ref: bodaboda)						
Foot	-2.43854	.8188762	-2.98	**0.003**	-4.047.252	-.8298273
Matatu	.7072825	1.132671	0.62	0.533	-151.789	2.932.455
Other	5.536941	2.380914	2.33	**0.020**	.8595488	1.021.433
Region (ref: Kakamega)						
Kisumu	5.881264	.9346294	6.29	**0.000**	404.515	7.717.378
Nairobi	1.524095	1.207007	1.26	0.207	-.8471142	3.895.304
Vihiga	16.29802	7.909708	2.06	**0.040**	.7591053	3.183.692
Educational level HHH (ref: primary)						
Secondary	1.732648	.7453397	2.32	**0.020**	.2684013	3.196.895
University, tertiary	-2.953151	1.46263	-2.02	**0.044**	-582.654	-.0797621
Can count on (ref: 1 person)						
2 to 5	.5004156	.8681496	0.58	0.565	-1.205.096	2.205.927
6 to 10	.4680731	1.528224	0.31	0.760	-2.534.179	3.470.325
None	-7.422207	2.738235	-2.71	**0.007**	-1.280.157	-2.042.844
Experienced hunger 12 months (ref: no)						
Yes	-1.84232	.8314869	-2.22	**0.027**	-3.475.807	-.2088338
cons	43.115	5.292425	8.15	**0.000**	3.271.784	5.351.216

Entirely during COVID-19



```
      Source |       SS           df       MS      Number of obs   =     1,142
-------------+----------------------------------   F(14, 1127)     =     10.85
       Model |  9425.32401        14  673.237429   Prob > F        =    0.0000
    Residual |  69935.2574     1,127  62.0543544   R-squared       =    0.1188
-------------+----------------------------------   Adj R-squared   =    0.1078
       Total |  79360.5814     1,141  69.5535332   Root MSE        =    7.8775
```



Enrolment week	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
Age	-.4114585	.2071436	-1.99	**0.047**	-.8178889	-.005028
Travel to clinic in min (ref: above 30 min)						
Travel below 30 minutes	-2.553906	.5472042	-4.67	**0.000**	-362.756	-1.480.253
Transport use (ref: bodaboda)						
Foot	-1.026292	.600095	-1.71	0.088	-2.203.721	.1511371
Matatu	1.692896	.6617665	2.56	**0.011**	.3944634	2.991.329
Other	1.096271	1.70057	0.64	0.519	-2.240.369	4.432.911
Region (ref: Kakamega)						
Kisumu	-.3033067	.6546577	-0.46	0.643	-1.587.792	.9811782
Nairobi	-1.674.343	.9836429	-1.70	0.089	-360.432	.2556348
Vihiga	10.16486	1.340321	7.58	**0.000**	7.535.056	1.279.467
Educational level HHH (ref: primary)						
Secondary	.4442286	.5140703	0.86	0.388	-.5644139	1.452.871
University, tertiary	-3.109628	1.22486	-2.54	**0.011**	-5.512.889	-.706366
Can count on (ref: 1 person)						
2 to 5	-1.598177	.6014199	-2.66	**0.008**	-2.778.206	-.4181485
6 to 10	-4.447877	.9674202	-4.60	**0.000**	-6.346.024	-254.973
None	-1.125123	8.000874	-0.14	0.888	-1.682.341	1.457.316
Experienced hunger 12 months (ref: no)						
Yes	.6116511	.6497104	0.94	0.347	-.663127	1.886.429
_cons	38.74412	3.763418	10.29	**0.000**	3.136.002	4.612.821

Appendix ii. Linear regression analysis – ANCs

Prior to COVID-19

```
      Source |       SS           df       MS      Number of obs   =       157
-------------+----------------------------------   F(13, 143)      =      9.11
       Model |  151.607425        13  11.6621096   Prob > F        =    0.0000
    Residual |  183.080473       143  1.28028303   R-squared       =    0.4530
-------------+----------------------------------   Adj R-squared   =    0.4033
       Total |  334.687898       156  2.14543524   Root MSE        =    1.1315
```

ANCs	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95 Conf. Interval]**	
Age	.047579	.1006842	0.47	0.637	-.1514426	.2466007
Enrolment week	-.137531	.0149497	-9.20	**0.000**	-.167082	-.1079801
Travel to clinic in min (ref: above 30 min)						
Travel below 30 min	.2105698	.2299135	0.92	0.361	-.2438984	.665038
Transport use (ref: bodaboda)						
Foot	-.0129087	.221537	-0.06	0.954	-.4508192	.4250019
Matatu	.6241598	.4140201	1.51	0.134	-.1942306	1.44255
Region (ref: Kakamega)						
Kisumu	-.5037294	.2177783	-2.31	**0.022**	-.93421	-.0732488
Nairobi	-.6210865	.3219465	-1.93	0.056	-1.257476	.0153027
Educational level HHH (ref: primary)						
Secondary	.430745	.2116224	2.04	**0.044**	.0124326	.8490574
University, tertiary	.432869	.3844464	1.13	0.262	-.3270632	1.192801
Can count on (ref: 1 person)						
2 to 5	.1664091	.2300485	0.72	0.471	-.2883258	.6211441
6 to 10	-.1250731	.409942	-0.31	0.761	-.9354023	.685256
None	.6990654	1.172.775	0.60	0.552	-1.619149	3.01728
Experienced hunger 12 months (ref: no)						
Yes	.0900262	.2090942	0.43	0.667	-.3232886	.503341
_cons	5.037.232	19.617	2.57	**0.011**	1.159554	8.91491

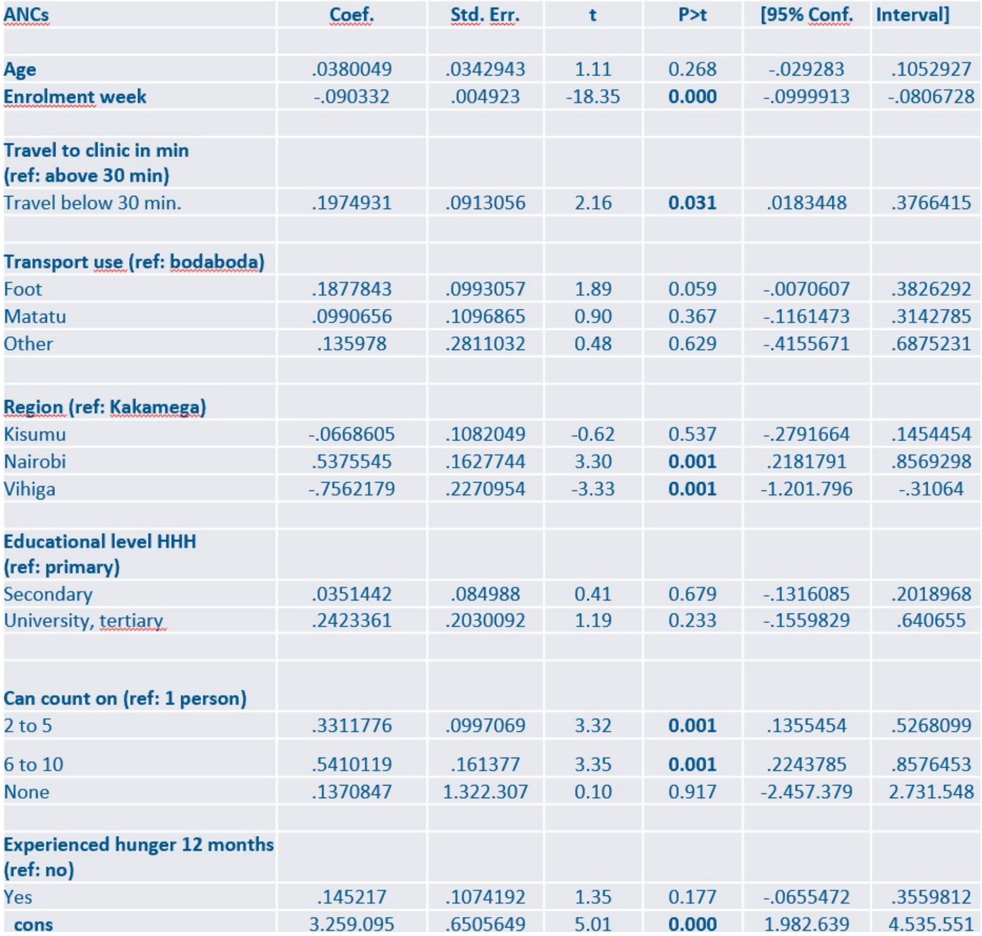
Transitioning into COVID-19

```
      Source |       SS           df       MS      Number of obs   =       535
-------------+----------------------------------   F(15, 519)      =     21.64
       Model |  512.570361        15  34.1713574   Prob > F        =    0.0000
    Residual |  819.567956       519  1.57912901   R-squared       =    0.3848
-------------+----------------------------------   Adj R-squared   =    0.3670
       Total |  1332.13832       534  2.49464104   Root MSE        =    1.2566
```

ANCs	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
Age	.0963727	.0471599	2.04	**0.042**	.0037248	.1890205
Enrolment week	-.1041888	.0070483	-14.78	**0.000**	-.1180355	-.090342
Travel to clinic in min (ref: above 30 min)						
Travel below 30 min.	.1828621	.1320452	1.38	0.167	-.0765467	.4422708
Transport use (ref: bodaboda)						
Foot	.2536163	.1327325	1.91	0.057	-.0071428	.5143754
Matatu	.297563	.1821183	1.63	0.103	-.0602166	.6553426
Other	.0006661	.3846605	0.00	0.999	-.7550169	.7563492
Region (ref: Kakamega)						
Kisumu	-.2607291	.1558341	-1.67	0.095	-.5668723	.0454142
Nairobi	-.5576918	.194295	-2.87	**0.004**	-.9393932	-.1759903
Vihiga	-1.080.163	1.276.478	-0.85	0.398	-3.587.862	1.427.536
Educational level HHH (ref: primary)						
Secondary	-.0128996	.1204166	-0.11	0.915	-.2494635	.2236643
University, tertiary	-.3707913	.2360028	-1.57	0.117	-.8344296	.092847
Can count on (ref: 1 person)						
2 to 5	.2225774	.1395791	1.59	0.111	-.0516321	.4967869
6 to 10	.1865551	.2456481	0.76	0.448	-.2960317	.669142
None	.6911917	.4432049	1.56	0.119	-.1795045	1.561.888
Experienced hunger 12 months (ref: no)						
Yes	.0584271	.1342713	0.44	0.664	-.2053549	.3222091
_cons	2.965.667	.9032849	3.28	**0.001**	1.191.123	4.740.211

Entirely during COVID-19

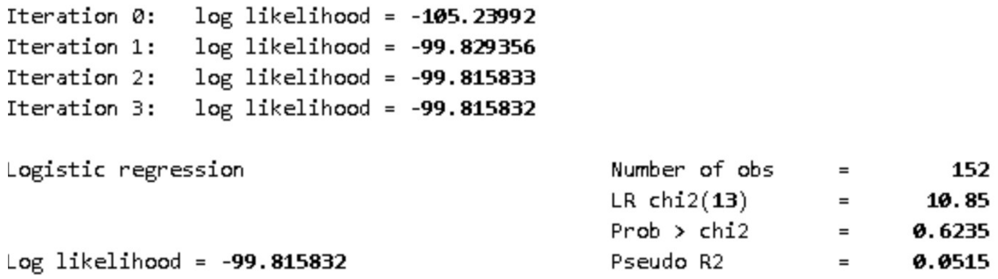
```
      Source |       SS           df       MS      Number of obs   =     1,142
-------------+----------------------------------   F(15, 1126)     =     37.58
       Model |  955.563579        15  63.7042386   Prob > F        =    0.0000
    Residual |  1908.50385     1,126  1.69494125   R-squared       =    0.3336
-------------+----------------------------------   Adj R-squared   =    0.3248
       Total |  2864.06743     1,141  2.51013797   Root MSE        =    1.3019
```



ANCs	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
Age	.0380049	.0342943	1.11	0.268	-.029283	.1052927
Enrolment week	-.090332	.004923	-18.35	**0.000**	-.0999913	-.0806728
Travel to clinic in min (ref: above 30 min)						
Travel below 30 min.	.1974931	.0913056	2.16	**0.031**	.0183448	.3766415
Transport use (ref: bodaboda)						
Foot	.1877843	.0993057	1.89	0.059	-.0070607	.3826292
Matatu	.0990656	.1096865	0.90	0.367	-.1161473	.3142785
Other	.135978	.2811032	0.48	0.629	-.4155671	.6875231
Region (ref: Kakamega)						
Kisumu	-.0668605	.1082049	-0.62	0.537	-.2791664	.1454454
Nairobi	.5375545	.1627744	3.30	**0.001**	.2181791	.8569298
Vihiga	-.7562179	.2270954	-3.33	**0.001**	-1.201.796	-.31064
Educational level HHH (ref: primary)						
Secondary	.0351442	.084988	0.41	0.679	-.1316085	.2018968
University, tertiary	.2423361	.2030092	1.19	0.233	-.1559829	.640655
Can count on (ref: 1 person)						
2 to 5	.3311776	.0997069	3.32	**0.001**	.1355454	.5268099
6 to 10	.5410119	.161377	3.35	**0.001**	.2243785	.8576453
None	.1370847	1.322.307	0.10	0.917	-2.457.379	2.731.548
Experienced hunger 12 months (ref: no)						
Yes	.145217	.1074192	1.35	0.177	-.0655472	.3559812
cons	3.259.095	.6505649	5.01	**0.000**	1.982.639	4.535.551

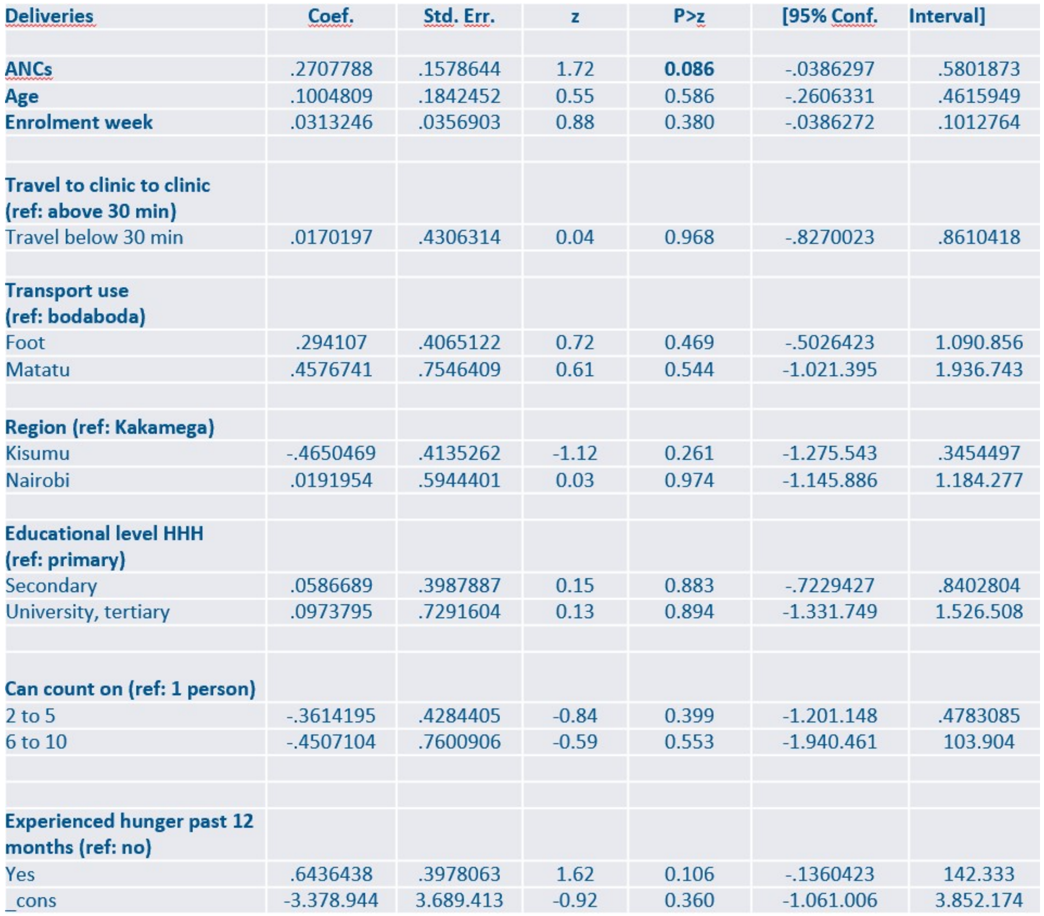
Appendix iii. Binary regression analysis – Skilled delivery

Before COVID-19



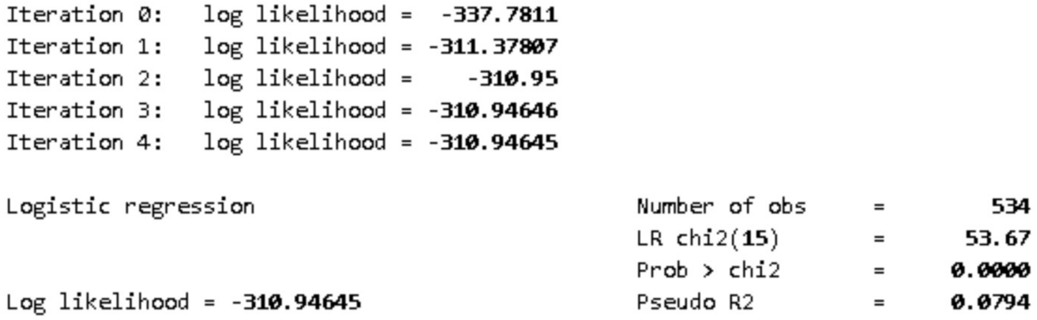
```
Iteration 0:   log likelihood = -105.23992
Iteration 1:   log likelihood = -99.829356
Iteration 2:   log likelihood = -99.815833
Iteration 3:   log likelihood = -99.815832

Logistic regression                             Number of obs     =        152
                                                LR chi2(13)       =      10.85
                                                Prob > chi2       =     0.6235
Log likelihood = -99.815832                     Pseudo R2         =     0.0515
```



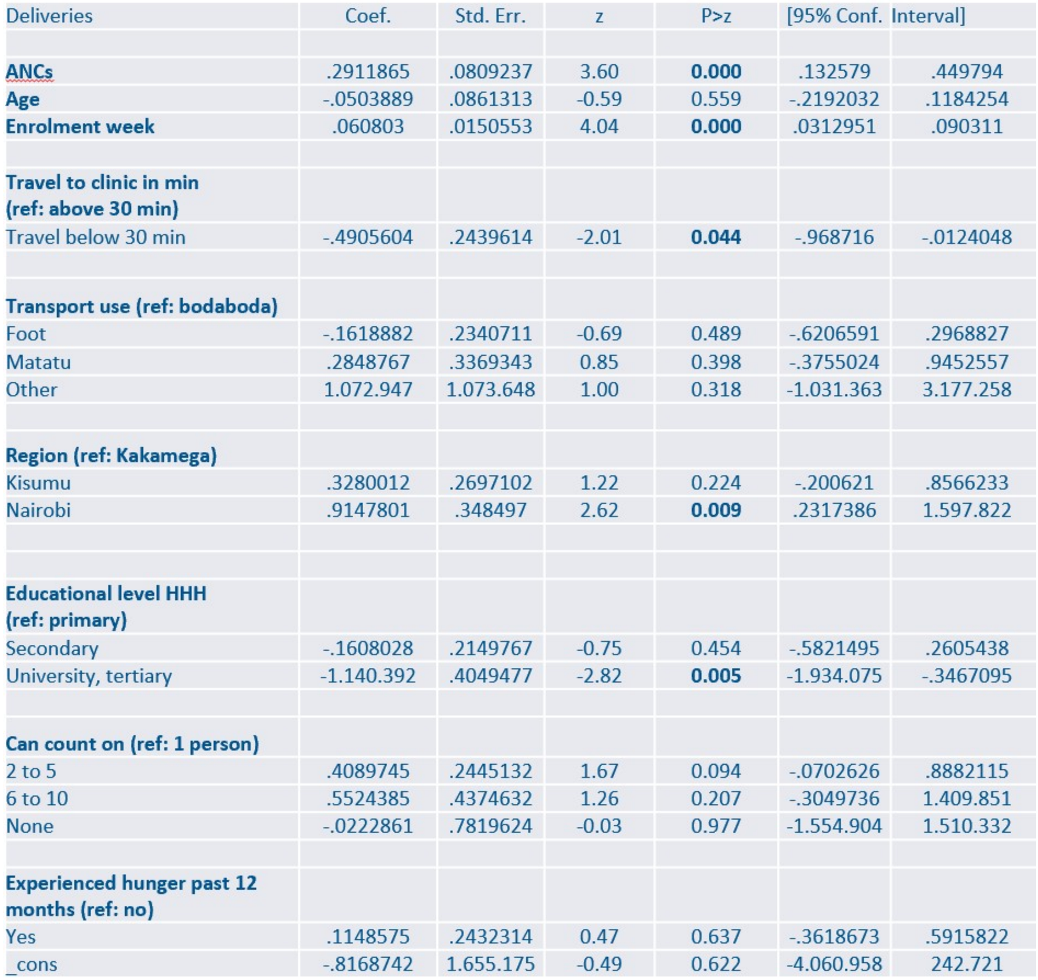
Deliveries	**Coef.**	**Std. Err.**	**z**	**P>z**	**[95% Conf.**	**Interval]**
ANCs	.2707788	.1578644	1.72	**0.086**	-.0386297	.5801873
Age	.1004809	.1842452	0.55	0.586	-.2606331	.4615949
Enrolment week	.0313246	.0356903	0.88	0.380	-.0386272	.1012764
Travel to clinic to clinic (ref: above 30 min)						
Travel below 30 min	.0170197	.4306314	0.04	0.968	-.8270023	.8610418
Transport use (ref: bodaboda)						
Foot	.294107	.4065122	0.72	0.469	-.5026423	1.090.856
Matatu	.4576741	.7546409	0.61	0.544	-1.021.395	1.936.743
Region (ref: Kakamega)						
Kisumu	-.4650469	.4135262	-1.12	0.261	-1.275.543	.3454497
Nairobi	.0191954	.5944401	0.03	0.974	-1.145.886	1.184.277
Educational level HHH (ref: primary)						
Secondary	.0586689	.3987887	0.15	0.883	-.7229427	.8402804
University, tertiary	.0973795	.7291604	0.13	0.894	-1.331.749	1.526.508
Can count on (ref: 1 person)						
2 to 5	-.3614195	.4284405	-0.84	0.399	-1.201.148	.4783085
6 to 10	-.4507104	.7600906	-0.59	0.553	-1.940.461	103.904
Experienced hunger past 12 months (ref: no)						
Yes	.6436438	.3978063	1.62	0.106	-.1360423	142.333
_cons	-3.378.944	3.689.413	-0.92	0.360	-1.061.006	3.852.174

Transitioning into COVID-19



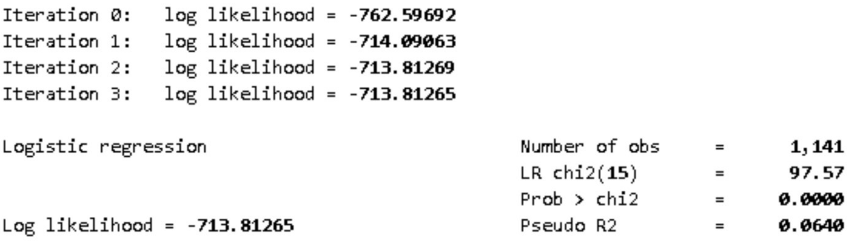
```
Iteration 0:   log likelihood =  -337.7811
Iteration 1:   log likelihood = -311.37807
Iteration 2:   log likelihood =    -310.95
Iteration 3:   log likelihood = -310.94646
Iteration 4:   log likelihood = -310.94645

Logistic regression                             Number of obs     =        534
                                                LR chi2(15)       =      53.67
                                                Prob > chi2       =     0.0000
Log likelihood = -310.94645                     Pseudo R2         =     0.0794
```



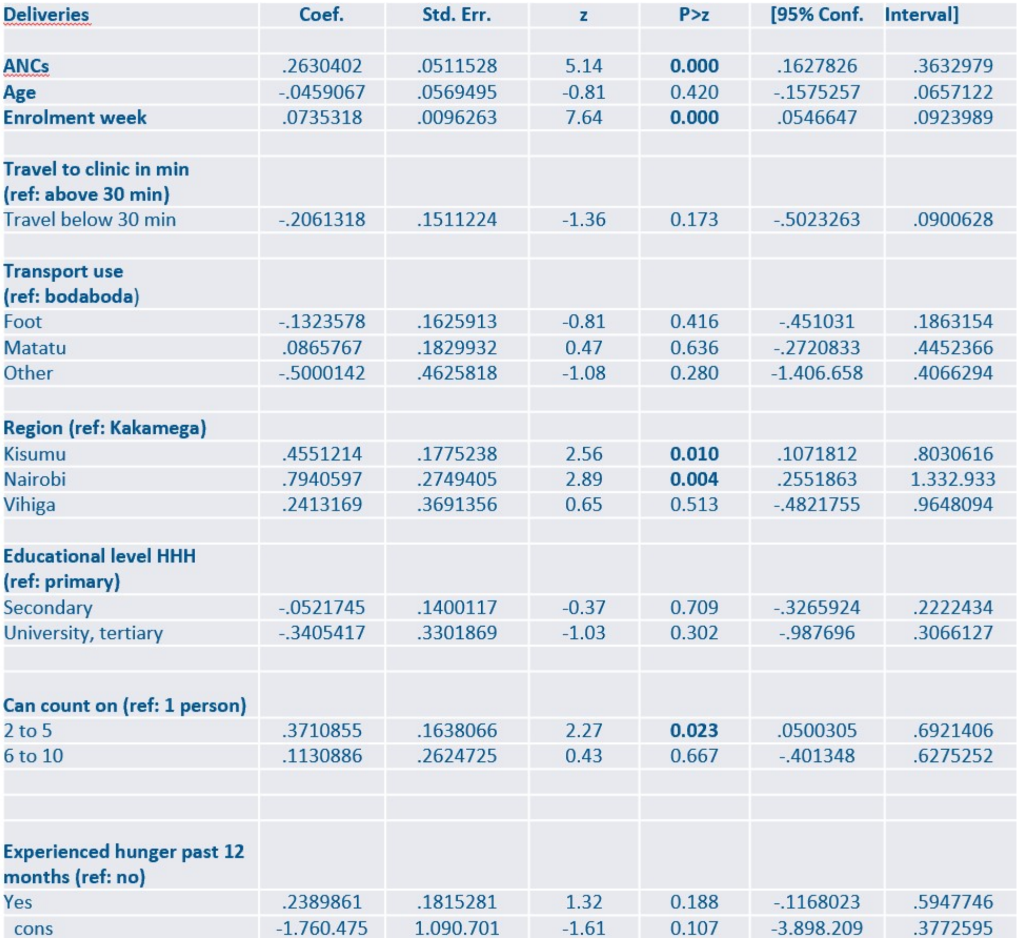
Deliveries	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
ANCs	.2911865	.0809237	3.60	**0.000**	.132579	.449794
Age	-.0503889	.0861313	-0.59	0.559	-.2192032	.1184254
Enrolment week	.060803	.0150553	4.04	**0.000**	.0312951	.090311
Travel to clinic in min (ref: above 30 min)						
Travel below 30 min	-.4905604	.2439614	-2.01	**0.044**	-.968716	-.0124048
Transport use (ref: bodaboda)						
Foot	-.1618882	.2340711	-0.69	0.489	-.6206591	.2968827
Matatu	.2848767	.3369343	0.85	0.398	-.3755024	.9452557
Other	1.072.947	1.073.648	1.00	0.318	-1.031.363	3.177.258
Region (ref: Kakamega)						
Kisumu	.3280012	.2697102	1.22	0.224	-.200621	.8566233
Nairobi	.9147801	.348497	2.62	**0.009**	.2317386	1.597.822
Educational level HHH (ref: primary)						
Secondary	-.1608028	.2149767	-0.75	0.454	-.5821495	.2605438
University, tertiary	-1.140.392	.4049477	-2.82	**0.005**	-1.934.075	-.3467095
Can count on (ref: 1 person)						
2 to 5	.4089745	.2445132	1.67	0.094	-.0702626	.8882115
6 to 10	.5524385	.4374632	1.26	0.207	-.3049736	1.409.851
None	-.0222861	.7819624	-0.03	0.977	-1.554.904	1.510.332
Experienced hunger past 12 months (ref: no)						
Yes	.1148575	.2432314	0.47	0.637	-.3618673	.5915822
_cons	-.8168742	1.655.175	-0.49	0.622	-4.060.958	242.721

Entirely during COVID-19



```
Iteration 0:   log likelihood = -762.59692
Iteration 1:   log likelihood = -714.09063
Iteration 2:   log likelihood = -713.81269
Iteration 3:   log likelihood = -713.81265

Logistic regression                             Number of obs     =      1,141
                                                LR chi2(15)       =      97.57
                                                Prob > chi2       =     0.0000
Log likelihood = -713.81265                     Pseudo R2         =     0.0640
```



Deliveries	**Coef.**	**Std. Err.**	**z**	**P>z**	**[95% Conf.**	**Interval]**
ANCs	.2630402	.0511528	5.14	**0.000**	.1627826	.3632979
Age	-.0459067	.0569495	-0.81	0.420	-.1575257	.0657122
Enrolment week	.0735318	.0096263	7.64	**0.000**	.0546647	.0923989
Travel to clinic in min (ref: above 30 min)						
Travel below 30 min	-.2061318	.1511224	-1.36	0.173	-.5023263	.0900628
Transport use (ref: bodaboda)						
Foot	-.1323578	.1625913	-0.81	0.416	-.451031	.1863154
Matatu	.0865767	.1829932	0.47	0.636	-.2720833	.4452366
Other	-.5000142	.4625818	-1.08	0.280	-1.406.658	.4066294
Region (ref: Kakamega)						
Kisumu	.4551214	.1775238	2.56	**0.010**	.1071812	.8030616
Nairobi	.7940597	.2749405	2.89	**0.004**	.2551863	1.332.933
Vihiga	.2413169	.3691356	0.65	0.513	-.4821755	.9648094
Educational level HHH (ref: primary)						
Secondary	-.0521745	.1400117	-0.37	0.709	-.3265924	.2222434
University, tertiary	-.3405417	.3301869	-1.03	0.302	-.987696	.3066127
Can count on (ref: 1 person)						
2 to 5	.3710855	.1638066	2.27	**0.023**	.0500305	.6921406
6 to 10	.1130886	.2624725	0.43	0.667	-.401348	.6275252
Experienced hunger past 12 months (ref: no)						
Yes	.2389861	.1815281	1.32	0.188	-.1168023	.5947746
cons	-1.760.475	1.090.701	-1.61	0.107	-3.898.209	.3772595