



NIRJ
NKUMBA INTERNATIONAL
RESEARCH JOURNAL

Nkumba University Research Journal

2023

NIRJ Volume 3 Issue 1, May 2023





NKUMBA INTERNATIONAL **RESEARCH JOURNAL (NIRJ)**

NIRJ Volume 3 Issue 1, May 2023



Copyright © 2023 by author(s) and Nkumba International Research Journal. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0). <http://creativecommons.org/licenses/by/4.0/>

Disclaimer:

The Publisher, Nkumba International Research Journal and Editors cannot be held responsible for any consequences arising from the use of information contained in this journal; the views and opinions expressed do not necessarily reflect those of the Publisher, Nkumba International Research Journal and Editors.

Nkumba University
P.O.Box 237 Entebbe
Uganda

www.nirj.org/journal

TABLE OF CONTENTS

Word from Editor in Chief	5
Editorial Team and Board	6
Journal Articles	7 - 58
Factors associated with Home Child Delivery in Musanze sector, Rwanda	7
Nizeyimana Fidel, Jean Marie Vianney Nkurikiyintwali, Singirankabo Vital, Mutabazi Placide, Muhammad Akram, Walaa Fikry Elbossaty & Nderelimana Olivier	
Rupturing the veneer of sanity, testing the nation's conscience: A narrative of striking COVID-19 social stigma in the emergence of the pandemic in Uganda	21
Jude Kateete	
Duration of management of a malnourished child using cow milk	33
Nizeyimana Fidele, Dusabumuremyi Jean Claude, Muhammad Akram, Walaa Fikry Elbossaty, Singirankabo Vital, Yadufashije Callixte, Jean Marie Vianney Nkurikiyintwali & Nderelimana Olivier	
Factors Associated with discontinuing Four Antenatal Care Standard Visits in the Musanze Sector, Rwanda.	46
Nizeyimana Fidele, Jean Marie Vianney Nkurikiyintwali, Singirankabo Vital, Mutabazi Placide, Muhammad Akram, Walaa Fikry Elbossaty & Nderelimana Olivier	
Guidelines for Authors	59

Journal EDITORIAL

EDITORIAL (NIRJ, Vol. III Issue 1): FOCUS ON HEALTHY HUMAN LIVES

The Nkumba International Research Journal (NIRJ) is based at Nkumba University in Uganda. It is an online, open-access, fully referred, peer-reviewed academic journal. Its main objective is to provide a platform for presenting, discussing, and documenting research findings and other important academic concerns in a multi-disciplinary manner. Authors from different disciplines are invited to disseminate research findings, the latest discoveries and developments, and future research prospects to the public in a manner easily understood. Since its inception, the journal has been accepting original and high-quality research articles for publication. The articles include formal research reports, re-analyses of others' research, reviews of the literature in specific areas, proposals of new but untested theories, and opinion pieces.

This first issue of the third volume of the journal has articles that focus on human health questions. Putting their findings and recommendations into practice will greatly enhance the Global Goal of "ensuring healthy lives and promoting well-being for all at all ages." Nizeyimana et al. determined factors associated with low levels of attendance at the fourth standard antenatal care (ANC) visit. They discovered that modifiable factors like lack of knowledge on the role of doing ANC, thinking that one or three visits were enough, and delivery before the last ANC appointment were associated with not achieving four (4) standard ANC visits. In an uncontrolled quantitative experiment, the same team (Nizeyimana et al.) determined and established that the duration of managing a child from severe malnutrition to good nutrition using cow's milk as a supplement took approximately 7 months. After analyzing factors associated with home deliveries of babies and the risks involved, Nizeyimana's team found that sensitization on health-related risks to home delivery and high-risk pregnancy, as well as mobilization of pregnant mothers to use health facilities one week before the expected delivery dates, would be effective in reducing the risks associated with home deliveries. Using social stigma triggered by COVID-19 experiences in Uganda, Kateete evaluated the effects on some people who suffered blame for being carriers of the disease and on the nation as a whole. He opined that the experience provided a "better prospect of existential therapeutic interventions and collective care." The lessons learned from the experience may not be limited to Uganda but would inform wider conversations about stigma and infectious diseases generally.

The Journal will continue to publish submitted manuscripts after rigorous peer review, which will be free of charge to the authors and with open access to the readers while facilitating widespread dissemination of the articles and creating valuable impacts in the respective disciplines. Special issues will be devoted to papers presented at thematic conferences at Nkumba University. Finally, I would like to take this opportunity to thankfully appreciate and extend my gratitude to the editorial board members, my co-editors, reviewers, and publishers, as well as the contributing authors, for ensuring the publication of this issue.

Prof. F.L. Orach-Meza
Editor in Chief

Editorial Team

Editor-in-Chief

Prof. Faustino L. Orach-Meza
Nkumba University
P. O. Box 237 Entebbe, Uganda
E-mail: orachfl@nkumbauniversity.ac.ug

Managing editor

Assoc. Prof. Asiimwe Solomon Muchwa,
Nkumba University,
P. O. Box 237 Entebbe, Uganda,
E-mail: sasiimwe@nkumbauniversity.ac.ug

Copy editors

Dr. Simon Peter Ongodia
Nkumba University,
P. O. Box 237 Entebbe, Uganda
E-mail: songodia@nkumbauniversity.ac.ug

Mr. John Baptist Imokola
Nkumba University,
P. O. Box 237 Entebbe, Uganda
E-mail: jimokola@nkumbauniversity.ac.ug

Layout editor

Mr. Mukasa Allan Ntambi
Nkumba University,
P. O. Box 237 Entebbe, Uganda
E-mail: mlukodan@gmail.com
amukasa@nkumbauniversity.ac.ug

Content editor

Mr. Barasa Patrick
Nkumba University,
P. O. Box 237 Entebbe, Uganda
Email: pbarasa@nkumbauniversity.ac.ug

Webmaster

Mr. Hakim Mulinde
Nkumba University,
P. O. Box 237 Entebbe, Uganda
E-mail: hmulinde@nkumbauniversity.ac.ug

Editorial Board

- 1. Dr. Livingstone Sewanyana,**
Executive Director Foundation of Human Rights Initiative, Kampala Uganda
- 2. Prof. Wilson Muyinda Mande,**
Nkumba University
- 3. Prof. Kale Ewusi,**
Director University for Peace Africa Programme, Addis Ababa Ethiopia
- 4. Assoc. Prof. Michael Mawa,**
Chief Principal Quality Assurance & Qualifications Framework Officer
Inter University Council for East Africa
- 5. Dr. Fred Muhumuza,**
Development Economist,
Makerere University, Kampala Uganda
- 6. Dr. Norman Nsereko,** Senior lecturer
School of Education - Nkumba University
- 7. Dr. Charles Edaku,**
Nkumba University
- 8. Dr. Anne Abaho,**
Dean - School of Social Sciences
Nkumba University.
- 9. Dr. Frank Pio Kiyingi,**
Academic Registrar - Nkumba University.
- 10. Assoc. Prof. Catherine Gombe**
Nkumba University
- 11. Prof. Andrew Peters Yiga,**
Nkumba University

Factors associated with Home Child Delivery in Musanze sector, Rwanda

Nizeyimana Fidele^{1,2*}, Jean Marie Vianney Nkurikiyintwali⁷, Singirankabo Vital⁴, Mutabazi Placide^{2, 3}, Muhammad Akram⁵, Walaa Fikry Elbossaty⁶ & Nderelimana Olivier⁸

¹Ministry of Health Rwanda, Community Health Department.

²Department of Public Health Mount Kenya University Email: nizeyimanafidele37@gmail.com

³Save the Children Rwanda, Tel: +250 788 529 071, Email: muplacidus@gmail.com

⁴UNHCR Rwanda, Senior WASH assistant, Netherlands Institute for Housing and Urban Development Studies. P.O. Box 1935 3000 BX

Rotterdam-Netherlands, Tel: +250 783 324 399 Email: vitalsingi@gmail.com

⁵Department of Eastern Medicine, Government College University Faisalabad Pakistan, Email: makram_0451@hotmail.com
Email: ntwali2010@gmail.com

⁸Infectious Diseases Clinical Mentor and Supervisor, Ruhengeri RH, Tel: +250 788 679 9 250, Email: ndoliver7@gmail.com

Abstract

Background: Sub-Saharan Africa and South Asia together account for over 85% of maternal deaths. of which only half the deliveries occur at home. Various factors, including delays in providing adequate obstetric care and poor accessibility to maternal health care, have been implicated in increasing home deliveries in developing countries.

Objective: The objective of this study was to determine factors associated with home delivery in the Musanze sector.

Materials and methods: Adopting a cross-sectional research design, a sample of 38 women who delivered at home was selected using a purposive sampling method. Using IBM-SPSS, binary logistic regression analysis was used to identify factors associated with home delivery.

Results: Factors such as childbirth during the night (AOR, 1.3; 95% CI: 1.4, 3.35, $p < 0.001$), delivery during the rainfall (AOR, 2.9; 95% CI: 1.6, 3.7, $p < 0.001$), the habit of home delivery (AOR, 1.7; 95% CI: 0.8, 1.6, $p < 0.001$), multiparous women (AOR, 4.2; 95% CI: 1.7, 19.2, $p < 0.001$) and the lack of health insurance (AOR, 0.3; 95% CI: 0.02, 0.58, $p < 0.002$) were associated with home delivery.

Conclusion: Mobilization of pregnant mothers to come lodge at a health facility one week before the expected delivery date; mobilization on health risks related to home delivery and high-risk pregnancy.

Keywords: Home delivery, pregnancy, delivery, antenatal care, community health workers, and women

Background

Home delivery refers to childbirth taking place outside of a health facility, either at home or on the way to the facility, without the attendance of a skilled health service provider (Konje et al., 2020). Various factors, such as delays in providing adequate obstetric care and poor accessibility to maternal health care, have been implicated in increasing home deliveries and high maternal mortality in low- and middle-income countries (Konje et al., 2020).

Childbirth at home is one of the most important health problems facing governments, especially in developing countries; thus, the governments seek to motivate health sector workers to spread awareness of the dangers of childbirth at home and motivate pregnant women to join medical institutions and birth centers to find out the sick history of the mother and to assess the current situation and identify problems that may be exposed to the mother and the fetus, which will have the greatest effect on delivery without any side effects on the mother and fetus (Nazli et al., 2018).

Although childbirth is a natural phenomenon, it is associated with risk and unforeseen complications that may result in death. Home delivery may only be possible in uncomplicated labor; once there are complications, these mothers need to be referred immediately to a nearby health facility (WHO, 2018). In low- and middle-income countries, many deliveries still occur at home without the assistance of trained health providers. Women deliver in an unhygienic environment without a skilled birth attendant and lifesaving medications (Commissions UNE, 2013).

Very unfortunately, when complications arise, it is either too late or the mother is so weak that she cannot deliver safely. As a result, such mothers die before, during, or after delivery. If they happen to survive, they end up with the death of the baby or severe disabilities for the baby. Since it is difficult to predict complications that can arise during childbirth, home delivery is high-risk. There is a close relationship between a high maternal mortality ratio and home deliveries, delay in detecting pregnancy-related problems, and late seeking obstetrics care (Adhikari, 2006). It is also estimated that 800 women worldwide die each day because of pregnancy and delivery-related problems, and the highest proportion of these deaths occur in low- and middle-income countries (WHO, 2017).

In Africa, three-quarters of maternal mortalities are caused by direct obstetric causes. Moreover, in African countries, assisted delivery with a skilled health provider is rare, and home deliveries assisted by non-trained individuals in unhygienic conditions are highly practiced (Ethiopia DHS, 2012). In sub-Saharan Africa, one in 39 delivering women is at risk of dying during delivery, but in Sweden, that is one in 11,400 delivering women (World Press, 2017). However, a large proportion of these maternal mortalities could be prevented through timely and appropriate interventions, including the presence of a skilled health service provider at each birth (Fantu et al., 2008; Addis & Meaza, 2013; Folashade et al., 2015). In 2015, home delivery assisted by unskilled persons was 90% and health facility deliveries were 10% in Kaduna State, Nigeria. [9] The place of delivery and the hygienic condition are essential to reduce maternal morbidity and mortality as well as newborn illness (Fantu et al., 2008; Folashade et al., 2015).

The study by Blom et al. (2016) revealed that there are different factors associated with home delivery. Some of those factors include residence, inadequate knowledge of pregnancy-related problems, and the level of education of the mother (Fantu et al., 2008; Digambar et al., 2010;

Reuben & Mary-Margaret, 2014; MINISANTE, 2016; Blom et al., 2016); parity of the women; and distance from health facilities (Fantu et al., 2008; Digambar et al., 2010; Reuben & Mary Margaret, 2014; MINISANTE, 2016; Blom et al., 2016).

Most maternal deaths in sub-Saharan Africa are attributed to home delivery, with most births occurring at home (United Nations, 2016). It is estimated that 47% of global home delivery occurs in Africa, and the highest level is observed in sub-Saharan countries. 85% of maternal deaths in sub-Saharan Africa are attributed to home delivery and are direct results of complications arising during delivery or puerperium (Addis & Meaza, 2013). Since home deliveries are attended by unskilled healthcare professionals and occur in an unsafe environment, they lead to adverse neonatal and maternal outcomes such as an increased risk of infection, postpartum hemorrhage, and HIV transmission (Health FMO, 2017).

In sub-Saharan African countries, over 60% of home deliveries take place in rural areas and are assisted by unskilled people. About 35% of women in developing countries receive no antenatal care during pregnancy; almost 50% give birth without a skilled provider; and 70% receive no postpartum care (Mohan, 2005). Tanzania is among the sub-Saharan countries with a high maternal mortality ratio, ranging from 578 to 960 per 100,000 live births.

Of all deliveries, only 53% occur in health facilities; the rest are home deliveries without skilled providers (Mohan, 2005). In Ethiopia, 30% of all women's deaths are associated with pregnancy-related causes, and the study revealed that the maternal mortality ratio is 676 per 100,000 live births, home delivery attended by untrained personnel was high (75.2%), and the common factors associated with home delivery identified by the study were the level of education of the women, parity of the women, and travel time to the health facility provider (Konje et al., 2020).

The use of therapeutic institutions for childbirth is one of the ways to reduce death rates as a result of home births (Alkema et al., 2016). The number of mothers who die increases in countries that have a shortage of qualified cadres from the work team, such as a doctor, a nurse, and a midwife (Alkema et al., 2016).

In Rwanda, the maternal mortality ratio is 201 per 100,000 live births (Gistane et al., 2015). Rapid SMS is a Rwandan technology platform using mobile technology innovation for the tracking and follow-up of high-risk pregnancies, postnatal care, and newborn care. A rapid SMS system was introduced by the government of Rwanda with technical and financial support from UNICEF to address the high rate of maternal and newborn deaths as a national development priority. Rapid SMS is a community-based approach used by Community Health Workers (CHWs) to improve maternal and child health-related indicators (high-risk pregnancy identification, antenatal care, postnatal care, nutrition, immunization, and maternal and child mortalities report) (MINISANTE, 2016).

When a CHW sends a message, automated feedback generated by the national level server is sent to CHW and health providers to acknowledge the reception of an SMS sent and the corresponding relevant actions (RHMS, 2021). The rapid SMS system allows real-time interventions to save pregnant women's and children's lives (RHEA, 2011). As an outcome, the Rapid SMS system helped to decrease the number of home deliveries from 296 mothers in 2012 to 223 in 2013 and from 189 in 2014 to 152 in 2015 (Nguimfack, 2015).

Despite the high proportion of maternal mortality rate in sub-Saharan African countries primarily

attributed to home delivery (85%), the overall factors associated with home deliveries remain unclear. In addition, the pooled analysis among East African countries using Demographic and Health Survey (DHS) data that are nationally representative is crucial for understanding common factors associated with home deliveries across countries, which, in turn, helps to reduce the prevalence of home delivery. Therefore, the current study aimed to determine factors associated with home delivery in the Musanze sector.

Materials and method

Study design

The study was descriptive and applied a cross-sectional study design to assess factors associated with home delivery. The study was conducted on women who delivered at home from 2020 to 2021.

Population

The study participants were 38 women of reproductive age (15–49 years) (United Nations, 2019) living in the Musanze sector and delivered at home from 2020 to 2021. To know women who delivered at home, the researchers took a copy of the monthly reports of community health workers for each village at the health center and drew villages that reported home delivery.

Sampling method

The study respondents were recruited using a purposive sampling technique. All women who reported to community health workers that they delivered at home from 2020 to 2021 were enrolled in the research.

Sample size

Data were collected on 38 women who delivered at home. All women who delivered at home from 2020 to 2021 were employed in the study. A significance level of 0.05 with a 95% confidence interval and a maximum acceptable marginal error of 5% were used to obtain credible results.

Data collection and procedure

Data were collected by going from house to house using an interviewer-administered standard questionnaire. The questionnaire was adapted for the Rwanda Ministry of Health Services for the package of pregnancy and delivery and was prepared in English and then translated into the local language (Kinyarwanda). The study participants (women) were interviewed on socio-demographic characteristics such as their age, marital status, level of education, occupation, and monthly income. Other information collected included the hour of delivery, the weather at the time of delivery (sunny or rainy), the travel distance to the health facility, visits of a community health worker, visits of an ANC service, frequency of home delivery, gestations, parity, and possession of health insurance.

The questionnaire was pre-tested before the actual data collection to ensure its clarity and understandability. To know who was delivered at home, the researchers took a copy of the monthly reports of community health workers (CHWs) for each village at the health center and drew villages that had reported home delivery from January 2020 to December 2021. Then researchers went into the villages and asked a CHW to reach the woman at home, which had

a woman who delivered at home in the reported month. Before distributing the questionnaire, the researcher asked the mother if she delivered at home during the reported month. If she agrees, the researcher continues with the questionnaire distribution. The missing women were given an appointment to return when they would be available.

Variable and measurements

Home delivery was considered a dependent variable, while factors like the hour of delivery (night or day), the weather at the time of delivery (sunny or rainy), the travel distance to the health facility, the number of visits to a community health worker, the number of visits to an ANC service, the frequency of home delivery, the number of gestations, the number of parity, and possession of health insurance were independent variables.

Data Analysis

Data were exported in SPSS software version 16.0. Descriptive statistics, such as frequency, were used to describe the study population according to the relevant variables. Binary logistics regression analysis was used to evaluate the association between the dependent variable (home delivery) and independent variables (time of delivery, frequency of home delivery, the number of pregnancies, and health insurance) and to identify variables for multivariable analysis with a p-value <0.05 to assess the presence and the level of significance between home delivery and independent variables.

The multivariable logistic regression model was applied by the backward elimination stepwise method. The Crude and Adjusted Odds ratio (COR and AOR) results, together with their corresponding 95% confidence intervals and a computed p-value <0.05 were considered to be predictive candidate variables.

Results Presentation

The table1 shows that 76.3% of respondents were younger than 30 and 23.7% were older than 30 years. Concerning marital status, 63.1% were legally married and 36.9% were illegally married; none were single or widowers. Among the surveyed women, 26.3% were illiterate, 47.4% had not completed primary education, 26.3% had completed primary education, and none of them studied secondary education or higher education.

According to their occupation, 63.1% of the respondents were laborers (cultivators), 36.9% had occasional work, and none (0%) were salaried or self-employed on a monthly basis. Also, the table indicates that 63.1% of the respondents had a monthly income of less than 10,000 Rwandan Francs (< 10,000 Frws), 21.1% had a monthly income of 10,000-20,000 Rwandan Francs (10,000-20,000 Frws), 7.9% had a monthly income of 20,000-30,000 Rwandan Francs (20,000-30,000 Frws), 0% (none) had a monthly income of 30,000-40,000 Rwandan Francs (30,000-40,000 Frws), and 50,000 and above.

Table 1. Socio-demographic characteristics of respondents

Variable	Frequency	Percent
15-35	29	76.3%
≥36	9	23.7%
Mother's marital status		
Single	0	0%
Legally married	24	63.1%
Illegally married	14	36.9%
Divorced/widowed	0	0%
Mother's educational status		
Illiterate	10	26.3%
Not completed primary education	18	47.4%
Completed primary education	10	26.3%
Secondary education and above	0	0%
Mother's occupation		
Labourer (Cultivator)	24	63.1%
Occasional work	14	36.9%
Self-employee (seller, arts,...)	0	0%
Monthly salaried	0	0%
Monthly income		
<10,000 Frws	24	63.1%
10,000-20,000Frws	8	21.1%
20,000-30,000Frws	3	7.9%
30,000-40,000Frws	0	0%
50,000 and above	3	7.9%

The table below table 2 shows that 71% of the respondents reported that they were visited by a community health worker (ASM) and 29% did not visit, 89.4% have attended antenatal care (ANC), and 10.6% did not attend it. On the basis of registration in the rapid SMS system (the system designed for the follow-up of pregnant women), 76.3% of the surveyed mothers were registered in the rapid SMS system when they were pregnant, and 23.7% were not registered. Concerning assistance during the time of home delivery, Table 2 presents that 13.1% of the respondents were assisted by their husbands during home delivery; 47.5% were assisted by their mothers or their husband's mothers; 13.1% were assisted by their neighbors; and 26.3% were assisted by persons they met along the way when they went to the health facility for assisted delivery.

Table 2. Attendance of health services preparing delivery and the persons who assisted the study participants during home delivery

Variable	Frequency	Percent
Have visited by ASM		
Yes	27	71%
No	11	29%
Have attended an Ante-Natal Care(ANC)		
Yes	34	89.4%
No	4	10.6%
The mother was registered in rapid SMS		
Yes	29	76.3%
No	9	23.7%
Who assisted you during delivery		
My husband	5	13.1%
My mother or my husband's mother	18	47.5%
My neighbour	5	13.1%
Others	10	26.3%
Traditional midwifery	0	0%
Community health worker(ASM)	0	0%

Table 3 indicates that 100% of the respondents reported that they had not been delivered by the cesarean method. Concerning gestates and parity, 23.3% reported that they get less than five times of pregnancy (>5 times) against 76.3% who had more than five times of pregnancy (<5 times), and 10.6% of respondents answered that they gave birth less than five times (<5 births) against 89.4% who were multiparous (>5 births).

Table 3. Gynaecological history of respondents

Variable	Frequency	Percent
Previous gynaecological surgery		
No	38	100%
Yes	0	0
The number of pregnancy(gestate)		
>5 times	29	76.3%
<5 times	9	23.3%
The Number of birth (parity)		
< 5 births	4	10.6%
> 5 births	34	89.4%

Factors associated with home delivery

The multivariate analysis of this study showed four factors that were associated with home delivery. Those include the time of delivery, the frequency of home delivery, the number of pregnancies, and the possession of health insurance. The respondents who delivered during the rain were 2.9 times more likely to deliver at home (AOR, 2.9; 95% CI: 1.6, 3.7, $p < 0.001$) and the respondents who delivered during the night were 1.3 times more likely to deliver at

home (AOR, 1.3; 95% CI: 1.4, 3.35, $p<0.001$). The variable of frequent childbirth at home was 1.7 times more likely to be a factor associated with home delivery (AOR, 1.7; 95% CI: 0.8, 1.6, $p<0.001$). The factor of greater than 5 times of gravidity was 4.2 more likely to be associated with home delivery (AOR, 4.2; 95% CI: 1.7, 19.2, $p<0.001$). In this study, the respondents who have not paid for health insurance were 0.3 more likely to give birth at home (AOR, 0.3; 95% CI: 0.02, 0.58, $p<0.002$) (Table 4).

Table 4. Factors associated with home delivery (N=38)

Variables	Reason associated with home delivery	Yes	No	COR [95% CI]	AOR [95% CI]	p-Value
Time of delivery	Time of delivery	14	24	1	1	
	During the night	24	14	2.2(1.9, 2.5)*	1.3(1.4, 3.35)**	0.001
	Was delivered during the rainfall	29	9	2.5(2.1, 2.7)*	2.9(1.6, 3.7)**	0.001
Frequency of home delivery for the mother	It was the first time	4	34	1	1	
	It was not the first time	34	4	1.3(1.4, 1.6)*	1.7(0.8, 1.6)**	0.001
The number of pregnancy	Less than 5 times	9	29	1	1	
	Greater than 5 times	29	9	11(8.1, 12.0)*	4.2(1.7, 19.2)**	0.001
Possession of health insurance	Have paid health insurance	9	29	1	1	
	Have not paid health insurance	29	9	0.49(0.57, 0.83)*	0.3(0.02, 0.58)**	0.002

Key -*=Statistically significant at binary regression, 1=Reference group, CI= Confidence Interval, COR= Crude Odds Ratio, AOR=Adjusted Odds Ratio

Discussion

The study finds that 23.7% of mothers who delivered at home had a high-risk pregnancy (they got pregnant at an age greater than or equal to 36 years old). This shows that they had a high risk of losing their lives during delivery at home. In this research, 36.9% of mothers were illegally married or had unknown husbands. This is an issue because a mother may be ashamed of getting pregnant without a known husband, and thus the mother may desire to do an abortion that may lead to death. 73.7% of mothers were not literate (26.3% were not studied even in primary school combined with 47.4% who did not complete primary education). This means that their level of analysis of the risks that can result from home delivery is not sufficient.

In this study, we have found that 29% of study participants have not been visited by a community health worker, 10.6% have not attended any ANC visit and 23.7% were not registered in the Rapid SMS system. This shows a weakness that can lead to the loss of life of a pregnant woman because a community health worker is expected to visit a pregnant mother bringing her the message about the care of the pregnant woman, the preparation of delivery at the health facility, and newborn care. Rapid SMS system registration is expected to have a

significant impact on the follow-up of the pregnant mother by classifying pregnant women in high-risk pregnancy or pregnancy with no risk.

The study shows a difference of 13.1% between gestates and parity, both for the indicator of greater than five times of frequency ($89.4\% - 76.3\% = 13.1\%$). When a woman gets pregnant more than five times, she is in a high risk pregnancy. This figure shows that a big number of mothers experienced a problem of abortion during their pregnancies which then becomes a high-risk pregnancy when a woman gets pregnant again.

In this study, various factors such as the time of delivery, especially childbirth during the night ($p < 0.001$) and delivery during rainfall ($p < 0.001$), the frequency of home delivery, specifically women who gave birth at home more than one time ($p < 0.001$), the number of pregnancies greater than five times ($p < 0.001$) and the possession of health insurance for women who did not have valid health insurance ($p < 0.002$) were significantly associated with home delivery.

The results of this study were similar to the results of the previous study, which showed that in addition to the known factors associated with home delivery such as place of residence, socio-economic status, and possession of valid health insurance, this study identified one more factor associated with health facility delivery, which is the healthcare provider's influence. Ensuring the care providers' counseling of clients could improve the uptake of health facility delivery (Enuameh et al., 2016; Kalisa et al., 2018).

The study revealed that the decision to deliver in a health facility is affected by a complex interplay of socio-demographic, socio-cultural, and health service-related factors. Family decision-making roles and a husband's support for health facility delivery exert a particularly strong influence on the place of delivery, and this should be emphasized in health policy as well as the development and implementation of maternal health programs. The services provided by the concerned authorities—providing, advertising, and trying to communicate effectively with these pregnant women, especially in developing countries—have the greatest impact on reducing the risks of childbirth at home (Rajani et al., 2015).

In another study, Rahman showed that the educational status of women and their husbands, the household economic situation, and the number of ANC visits influenced the place of delivery. There is an urgent need to promote facility delivery by building more birthing facilities, training and deploying skilled birth attendants in rural and hard-to-reach areas, ensuring compulsory female education for all women, encouraging more ANC visits, and providing financial incentives for facility deliveries (Weatherspoon et al., 2019).

There is a need to promote facility delivery by encouraging visits to health facilities through the use of social networks and continuing mass media campaigns. Ensuring adequate government funding for free maternal and newborn healthcare and local community involvement is crucial for reducing maternal and neonatal mortality and achieving sustainable development goals in this region (Rahman et al., 2021).

This study's findings have not revealed significant similarity to previous studies where high socioeconomic status, a higher education level of the husband, urban residing women, and more ANC visits were proved to have a significant influence on women's decisions to utilize facility delivery (Yaya et al., 2019).

Conclusion

In this study, factors such as the time of home delivery (childbirth during the night and delivery in rainfall), the frequency of home delivery more than one time, the number of pregnancies (gestation) more than five times, and the lack of valid health insurance were associated with home delivery.

Recommendations

1. Sensitization of the pregnant women to come stay at the health facility during the last week of their expected delivery date (Tegereza program). This will serve as a response for those who miss the means of going to the health facility for delivery because it is raining or it is at midnight.
2. Reinforcing community awareness of health risks related to home delivery will solve the problem of multi-home delivery (more than one-time home delivery).
3. Based on the fact that 92.1% of women who delivered at home had a low monthly income, we recommend the Ministry of Health add the cost of travel from the home of a pregnant woman to the health facility to the cost insured by the health insurance in case of issues related to the pregnancy.
4. We recommend that the government of Rwanda strengthen the education of the girl child since it was found that almost every woman who delivered at home did not study. Hence, the level of education was proportional to the level of analyzing health risks related to home delivery and taking appropriate measures.
5. community awareness of high-risk pregnancies and their possible related health risks.

Limitations

As this study used the quantitative data collection method, it lacks the depth to identify the reasons behind the associated factors for home delivery. Another study is required to identify the reasons behind the associated factors for home delivery.

Acknowledgments

The present research work was undertaken by the authors in collaboration with the authority of Musanze, who facilitated the study; this is gratefully acknowledged. The opinions and conclusions presented in this article are those of the authors and do not necessarily reflect the views of the sponsoring organization.

Conflicts of interest

There are no conflicts of interest to declare.

Author contribution

NIZEYIMANA Fidele has made substantial contributions to the conception or design of the work and to the acquisition, analysis, and interpretation of data for the work. Nkurikiyintwali Jean Marie Vianney, Singirankabo Vital, Mutabazi Placide, and Nderelimana Olivier have participated in data collection and revised the draft for the final copy. Muhammad Akram and

Walaa Fikry Elbossaty have drafted the work or critically revised it for important intellectual content..

References

- Addis, A. F. & Meaza, D. (2013). Prevalence of institutional delivery and associated factors in Dodota Woreda (district), Oromia regional state, Ethiopia. *Am. J. Tropical Medicine* 12(9), 71-86.
- Adhikari, I. (2006). Maternal Mortality at alarming level in Nepal. Nepal: world disaster report.
- Alkema, L., Chou, D., Hogan, D., Zhang, S., Moller, A. B., Gemmill, A. & United Nations Maternal Mortality Estimation Inter-Agency Group collaborators and technical advisory group. (2016). Global, regional and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: A systematic analysis by the UN maternal mortality estimation inter-agency group. *Lancet* 387(10017), 462-474. doi:10.1016/S0140-6736(15)00838-7.
- Blom, A., Manandhar, D., S., Shrestha, P., Ellis, M., Malla, K. & Costello, A., M. (2016). Factors affecting home delivery in the Kathmandu Valley, Nepal. *International Journal of Gynaecology* 7(3), 98-123.
- Central Statistical Agency Addis Ababa, Ethiopia. (2012). Ethiopia Demographic and Health Survey. Maryland, USA: ICF International Calverton.
- Commissions UNE. (2013). Assessing progress in Africa towards the millennium development goals, <https://www.sdgfund.org/assessing-progress-africa-toward-millennium-development-goals>.
- Digambar, A. Chimankar, D. & Harihar, S. (2010). Factors influencing the Utilization of Maternal Health Care Services in Uttarakhand. *International Journal of Maternal Health* 11 (6), 459-472.
- Enuameh, Y., Okawa, S., Asante, K., Kikuchi, K., Mahama, E. & Ansah, E., et al. (2016). Factors Influencing Health Facility Delivery in Predominantly Rural Communities across the Three Ecological Zones in Ghana: A Cross-Sectional Study. *PLoS ONE* 11(3), e0152235.
- Ethiopia Demographic and Health Survey. (2012). Central Statistical Agency Addis Ababa Ethiopia. Maryland, USA: ICF International Calverton.
- Fantu, A., Yemane, B. & Belaineh, G. (2008). Factors associated with home delivery in Bahirdar, Ethiopia: A case control study. *Journal of Pregnancy*, 511-533.
- Folashade, B., Okeshola, C., Ismail, T., Sadi, Q. (2015). Determinants of Home Delivery among Hausa in Kaduna South Local Government Area of Kaduna State, Nigeria. Hausa/Kaduna: Ministry of Health Nigeria
- Gistane, A., Maralign, T., Behailu, M., Worku, A. & Wondimagegn, T. (2015). Prevalence and Associated Factors of Home Delivery in Arbaminch Zuria District, Southern Ethiopia: Community Based Cross Sectional Study. *Science Journal of Public Health* 3 (1), 66-79. doi: 10.11648/j.sjph.20150301.1.
- Health FMO. (2017). HSTP annual performance report EFY2016 (2015/2016), 2017.
- Kalisa, R., Smeele, P., van Elteren, M. et al. (2018). Facilitators and barriers to birth

preparedness and complication readiness in rural Rwanda among community health workers and community members: a qualitative study. *Matern health, neonatol and perinatol* 4 (11).

Konje, E.T., Hatfield, J., Kuhn, S. et al. . (2020). Is it home delivery or health facility? Community perceptions on place of childbirth in rural Northwest Tanzania using a qualitative approach. *BMC Pregnancy Childbirth* 20 (27), 52-78.

MINISANTE . (2016). Rwanda Interim Demographic and Health Survey . Kigali 2014-2015: Rwanda National Institute of statistics.

Mohan, N. . (2005). Maternal Mortality in Islamic and Arabic Countries . *Journal of health* 4 (1), 21-37.

Nazli, S., Yasemin, K., Selcuk, A., Mehmet, Y., Canan, T. (2018). Factors Affecting the Attitudes of Women toward Family Planning, Family Planning, Zouhair O. Amarin. IntechOpen, DOI: 10.5772/intechopen.73255 , Available from: <https://www.intechopen.com/books/family-planning/factors-affecting-the-attitudes-of-women-toward-family-planning>.

Nguimfack, J. . (2015). Designing and Implementing an Innovative SMS-Based Alert System (RapidSMS-MCH) to Monitor Pregnancy and Reduce Maternal and Child Deaths in Rwanda. Kigali: www.rbc.moh.gov.rw.

Rahman, M., Rahman, M., Rawal, L., Paudel, M., Howlader, M.& Khan, B. . (2021). Factors influencing place of delivery: Evidence from three south-Asian countries. *PLoS ONE* 16(4), e0250012.

Rajani, S., Eva, A., Mahesh, K. & Rainald, F. . (2015). Factors affecting institutional delivery in rural Chitwan district of Nepal: a community-based cross-sectional study. *J. Public Health* 13 (15), 15-27. Doi: 10.1186/s12884-015-0454-y.

Reuben, K., E.& Mary-Margaret, S. (2014). Factors Associated With The Utilization Of Skilled Delivery Services In The Ga East Municipality Of Ghana. *Journal of tropical Medicine* 4(7), 302-327.

RHEA. (2011). RapidSMS Integration Technical Design Document . Kigali: Pivot access Ltd.

RHMIS. (2021). Rwanda Health information System. Kigali/Rwanda: www.moh.gov.rw.

United Nations. (2016). The millennium development goals report in Time Glob. Action People Planet.

United Nations. (2019). Population Facts, No. 2019/3 Global progress in satisfying the need for family planning. New York: UN. Available on www.unpopulation.org.

Weatherspoon, D.D., Miller, S., Ngabitsinze & J.C. et al. . (2019). Stunting, food security, markets and food policy in Rwanda . *BMC Public Health* 19 (882), <https://doi.org/10.1186/s12889-019-7208-0>.

WHO . (2018). Safe childbirth checklist implementation guide. Geneva/ Switzerland: WHO.

WHO. (2017). Fact sheet N°348 Maternal mortality . Geneva: WHO. Available on <http://www.who.int/mediacentre/factsheets/fs348/en>.

World Press. (2017). Statistics on Maternal Mortality . New York.

Yaya, S., Bishwajit, G. & Gunawardena, N. . (2019). Socioeconomic factors associated with choice of delivery place among mothers: A population-based cross-sectional study in Guinea-Bissau. BMJ Glob Heal 4(6), 279-298.

Rupturing the veneer of sanity, testing the nation's conscience: A narrative of striking COVID-19 social stigma in the emergence of the pandemic in Uganda

Jude Kateete P.O.Box 305 Kampala Email: judekateete@hotmail.com Tel: +256-774-62 69 69

Abstract

The COVID-19 social stigma in Uganda which was overtly manifested in a number of ways revealed that the true image of a collective Ugandan ethic of care during a pandemic was still a work in progress. In this essay the discussion is concentrated on some of the striking cases of COVID-19 social stigma which some people experienced in Uganda from some of the following categories: Suspects of having symptoms similar to COVID-19; persons known to have travelled from abroad at that time; suspects of having been in contact with plausible COVID-19 victims; and, some of the persons who had recovered from COVID-19 and discharged to their homes, to their families, and to their communities. The discussion weaves together some concrete examples of the existential stigmatization especially during the measures to promote quarantine, isolation, and social and physical distancing in Uganda. This is an analysis of the underlying, visceral nature of where the anger that wounded but also tested the conscience of the nation during the mitigation of the spread of COVID-19 in the country was directed. Arguably, this social stigma developed from a systemic moral problem in the ethic of care in the nation's conscience to deal with the pandemic. In a broader perspective, from those particularly Ugandan cases there are lessons to be learned which may not be limited to Uganda but would inform wider conversations about stigma and infectious diseases.

Keywords: COVID-19; social stigma; Uganda; lockdown; pandemic

Introduction

A nation would demonstrate sanity during a pandemic such as COVID-19, when 'sanity' is taken to be the appropriate term in this context, plausibly if it takes measures that protect against social stigma. Such measures would include but not be limited to promoting moral strength in the fabric of the nation and an ethic of collective care for the populace while maintaining a human element and treating others decently and kindly. "Ethic of care" argues that "we [sic] need to focus on the particularities of day-to-day interactions and understand the need for care to be given and received in particular circumstances to enable human flourishing" (Barnes, 2012, p.17).

'Ethic of care' is value-laden and it was wanting in some of the interactions in the need for care featured in this discussion. However, the reality underlying that ethic of care which would map into the sanity of a nation is hardly known until it gets ruptured and reveals its true nature that was concealed by a veneer. That is exactly what happened in Uganda when the novel Coronavirus created fear in the country and triggered social stigma. That stigma was existential. Falk (2001) states: "[Existential stigma] derives from a condition which the target of the stigma either did not cause or over which he [or she] has little control" (p. 11). Arguably,

it put the conscience of Ugandan society to the test in the context of the stigma of testing positive for the novel Coronavirus when it emerged in the country.

In early March 2020, a person collapsed on a street in Kampala City. The local populace suspected it was a COVID-19 case and, with a seemingly ethic of care, they gathered around to see what a COVID-19 patient looked like and how the victim would be helped (Kateete, 2020). In Uganda, there was little knowledge about the pandemic at the time. What the local populace had known about the Coronavirus pandemic was based on media reports around the world about what was happening in real-time. Paradoxically, the crowd had not gathered to help the victim but it was rather spectating and the societal veneer of sanity during such a pandemic was yet to be tested. However, it turned out the patient was not a COVID-19-positive case.

In the weeks that were to follow when real cases of persons who tested positive for the disease or who were suspected of having contracted the disease were to be encountered in Uganda, there were cases of social stigma that the pandemic triggered in the country. "At the onset of Covid-19, there were reports of discriminatory behavior against people of certain nationalities where the virus was more widespread as well as people who displayed symptoms associated with the virus, such as coughing and sneezing in public" ("Address Social Stigma Triggered by Covid-19", 2020). In Uganda, citizen journalism was instrumental in bringing to light those reports, and the traditional media provided depth to the stories. Thus, the media mirrored what was happening in society as a result of the pandemic.

When the COVID-19 pandemic emerged in the country the populace quickly learned it was airborne, it was highly contagious, and deadly, and that it exponentially spread. There was a recollection in the country concerning infectious diseases which had traumatized the local populace most especially the HIV/AIDS pandemic and the Ebola virus. It set the stage for how the response of the population would be.

COVID-19 as a Test of Ugandan Moral Strength

On 18 March 2020, the President of the Republic of Uganda, Yoweri K. Museveni, announced a country-wide lockdown to manage the spread of COVID-19. It involved the following rubrics: Quarantine, stay-home orders, isolation, social and physical distancing, curfew, and several Standard Operating Procedures (SOPs) put out by the Ministry of Health as Public Health protocols to be followed during such a pandemic. At that time there had not been any official confirmation of a COVID-19-positive case in the country. It was a few days later, on 22 March 2020, when the first case of COVID-19 was confirmed in Uganda. It was a Ugandan who had returned from the United Arab Emirates. The public rallied behind the call for a lockdown and tried to adhere to the guidelines. The stay-home orders and the sanctioned limited movement for those who were regarded as essential workers meant that public places looked deserted.

The government mobilized the military, the police, and the Local Defense Units (LDUs) to enforce the presidential instructions in what were arguably some of the strictest measures of lockdowns in the world until 4 May 2020 when there was the first easing of the restrictions. On 21 July 2020 when Uganda registered its first official death from COVID-19 there were already 12 people who had died due to the brutality from security forces enforcing COVID-19 restrictions ("Uganda – Where Security Forces May be More Deadly than Coronavirus", 2020). Public health was on trial and so was public safety. President Museveni cautioned whoever

would make a gathering of people and in the event, they are infected with COVID-19 then that person would be charged with attempted murder, although there was no such a provision in the law.

There was trepidation in the country during the first weeks of the lockdown which created a seemingly apocalyptic environment. That fear was reminiscent of the plagues of the past in Uganda, such as bubonic plague and Smallpox as Roscoe (1911/2012) states: "Bubonic plague, which had been known for many years, was more feared than any other sickness. The inhabitants fled from the place at once when it appeared, and sought the aid of the god of plague to stay it" (p.102). In a similar vein, the threat from COVID-19 which also led to the closing of places of worship was quite humbling because in distress theists tend to look for divine succor usually through the cult of the holy place. "From the very beginning, religion had helped people to relate to the world and to root themselves in it.

The cult of the holy place had preceded all other reflection upon the world and helped men and women to find a focus in a terrifying universe" (Armstrong, 1998, p.353). The COVID-19 pandemic was very terrifying when it emerged. A good number of Ugandans are theists but there was no theological explanation that had been developed for them to deal with the pandemic.

The following verse from the Hebrew Scriptures which was shared on social media to reach the multitudes underscored the trepidation in the country: "Go inside and lock the doors my people. Hide there for a little while, until the LORD is no longer angry" (Isaiah 26: 20 [Contemporary English Version]). That verse was close to developing a Judeo-Christian theological explanation of the pandemic. The scientific approach took precedence. However, in the event of social stigma due to COVID-19 concerted effort was needed to address it, and organized religion and theism would arguably have been essential as a molding force for normative behavior in Ugandan society. When the pandemic triggered fear in the populace it required a collaborative response from all stakeholders in Ugandan civil society.

The Paranoia which Yielded Social Stigma in the Country

At the beginning of the lockdown, there was a general focus in the country on how to stay alive and to re-adjust lives to try to survive the pandemic. There was paranoia from media reports about the high rates of transmission of COVID-19 when it was disproportionately affecting communities, from the large numbers of victims around the world, from how the healthcare systems in more developed countries were overwhelmed, and from the predictions that the pandemic would devastatingly affect the less developed countries.

The local populace came to understand that COVID-19 was very dangerous and that it was not to be underestimated. It was well known in Uganda that the more developed countries had robust healthcare systems and were in a much better position to handle such a pandemic. But when those countries had large numbers of victims succumbing to COVID-19 it was existentially worrying to Ugandans, whose hospitals and healthcare economics were not as robust for a challenge of such a magnitude. "Hospitals face challenges related to changing patterns of disease and health care economics" (DeSpelder & Strickland, 1999, p.119). There was a lot to learn about the novel Coronavirus and its changing patterns.

When COVID-19 emerged the high mortality rate from other infectious diseases in Africa such as HIV/AIDS and Ebola, to mention but two were still fresh in the minds of Ugandans because of their life-threatening nature. DeSpelder and Strickland argue that: “Life-threatening diseases represent a confrontation with our mortality, exposing our anxiety about being separated from all that we love, our fear of pain, and the imagined horror of dying. They challenge our image of ourselves and threaten our plans for the future” (1999, p.153). In that context, COVID-19 not only created life-threatening situations but also the social stigma that exposed societal anxiety which ruptured Uganda’s veneer of sanity in confronting mortality.

Some sections of the local populace blamed the persons who had come from abroad at that time, the returnees, by accusing them of bringing COVID-19 to Uganda. The Ministry of Health requested those who had returned to the country at least two weeks before the lockdown was imposed to present themselves to the authorities for quarantine. There was fear that those returnees were in the community and therefore posed a danger to the population. In the rural areas, villagers hunted down any newcomer into the community and handed such a person to the authorities for isolation. In their duty of care, they tried to distort the description of carriers of the disease.

Through delegated legislation, the Ministry of Health promulgated statutory instruments to mitigate the spread of COVID-19 and interpreted carriers of the disease in the following terms in Section 12 (1) of the Public Health (Control of COVID-19) Rules, 2020: “In this rule, ‘carrier’ includes any person who, although he or she does not at the time present the clinical symptoms of COVID-19, has been proved, or is believed on reasonable grounds, to be harboring the infection and consequently to be liable to cause the spread of COVID-19”. That definition created a problem of hasty generalization and a plausible miscarriage of justice which would develop from a post hoc fallacy. The creation of the law through that statutory instrument has the proposition “is believed on reasonable grounds” as untestable, without obvious meaning.

In light of that ambiguity in the law, suspected carriers of the disease, including several returnees from abroad, were put in quarantine centers that the government had designated and some of those persons were susceptible to social stigma. Arguably, those quarantines were like prisons or detention centers where some people experienced psychological torture (“Uganda: Respect Rights in COVID-19 Response”, 2020). Thus, whenever there was a chance to evade the quarantine several people could readily take such a chance.

Running into the Pitfalls of Supposedly Individuated and Collective Care

Section 11 (1) of the Public Health (Control of COVID-19) Rules, 2020 proscribed the escape from isolation or quarantine as follows: “Where a person who is confined in a place designated for isolation or for quarantine for COVID-19 escapes from that place, a medical officer shall immediately notify the police and request the police to apprehend and return the person to the designated place.” The persons who were suspected of having returned from abroad at least some two weeks before the imposition of the lockdown and those who were reported to have escaped from institutional isolation or quarantine were hunted down. They were usually harassed when found, and sometimes they were beaten up by mobs. Some who tried to avoid being taken into quarantine at venues designated by the Ministry of Health were picked up from their homes or places of abode at gunpoint.

The following voice of conscience illustrates how the mismanagement of the quarantine was a betrayal of trust to the people and a vehicle of social stigma: “Our major concern was with the gross mismanagement of the quarantine exercise, which partly justifies the escapes. When you mismanage such a measure and make people feel like they must escape to protect their own lives or run from an injustice, you put society at risk” (Bigabo 2020). In light of ethical appeal, Bigabo (2020) states: “We’ve heard of cases of people escaping from Ebola camps in DRC [Democratic Republic of Congo]. Quarantine shouldn’t be made to feel like a punishment.” There was a danger of going underground out of fear of being in quarantine which would lead to psychosocial distress. It would subsequently become a public health crisis in the country.

In some communities, anger was also directed towards the families and individuals who had direct contact with persons who had tested COVID-19 positive. The narrative in the following example from Kibugubya Parish, Kyabigambire sub-county in Hoima district, Western Uganda, suffices: “There was panic in the community. The people were angry that Paul [a resident of that area who had been taken to the quarantine] had brought the disease to them. His family felt the immediate brunt of their anger. They were shunned by their community” (Kaboggoza 2020). An assault based on a straw man effect followed in this biosocial challenge: “In their anger, the people turned violent against Paul’s family and the 90 individuals who they said had direct contact with him. Paul’s family and the 90 people from Paul’s village were denied access to social services. Children were chased away from boreholes and community wells” (Kaboggoza 2020).

The above contemptuous treatment was at the backdrop of the Ministry of Health’s campaign of Tonsemerera, a Luganda expression meaning “Do not come close to me” or “keep a distance from me”. Although Tonsemerera denoted the call to keep social and physical distancing, its connotation was more likely to stigmatize those who have tested positive for COVID-19, those suspected of having contracted the disease, or even those who have recovered from it.

A Test Case of Trans-boundary Cargo Truck Drivers in Embodying COVID-19 Social Stigma Victimhood

One of the biggest tests of the nation’s conscience concerning social stigma in the emergence of COVID-19 in Uganda came from transboundary cargo truck drivers who were mostly from neighboring Kenya, Tanzania, and South Sudan. In an article published on 18 May 2020, in *The Independent*, the role of truck drivers in the spread of COVID-19 is discussed: “The meeting between the truckers and sex workers [was] once again proving to be the perfect combustible mixture for COVID-19 as it has been for other diseases such as HIV/AIDS in the past” (“Why Truck Drivers Spread COVID-19”, 2020). Uganda is a landlocked transit country and cargo trucks crisscross through. Some past research had established a correlation between long-distance truck drivers, commercial sex workers, and the rampant spread of HIV/AIDS in Uganda (Kribs-Zaleta et al., 2005; Gysels et al., 2001).

Similarly, that was true with the rampant spread of COVID-19 in the country. When the Ministry of Health reported increasing numbers of COVID-19-positive cases in April and May 2020 among transboundary cargo truck drivers it took a psychological toll, at the time, on the nation. The nation was weary of remaining under lockdown. There was animosity in the country

towards transboundary truck drivers and sex workers. They were subjected to social stigma.

On 15 April 2020, some Acholi leaders in Northern Uganda intercepted a transboundary cargo truck driver who had reportedly tested positive for COVID-19 and he was blocked from being taken in an ambulance to Gulu Regional Referral Hospital for treatment. "The driver of the truck registration number KCE 448E entered Uganda [from Kenya] through Malaba on 12 April [2020] en route to South Sudan. After his results were confirmed, he was stopped at Kamdini Trading Centre in Oyam District, about 65 km south of Gulu Town" ("Acholi Leaders Protest, COVID-19 Truck Driver Transferred to Kampala", 2020).

Arguably, in the Northern Uganda community there was a recollection of how they had experienced collective trauma from the following tragedies which had colored their lives and subsequently made them weary of the threat from a COVID-19 pandemic when it struck Uganda: The almost 20 years-long civil war between the Lord's Resistance Army (LRA) and the government forces which ended in 2006; The outbreak of Ebola in 2000 – 2006 which killed 224 people in that region; Poverty and several other diseases in the region such as River Blindness and the Nodding Syndrome, to mention but two. From the vantage point of such a complexity of societal distress based on the history of Northern Uganda, the community was weary of COVID-19, and seeds of social stigma had been sown by the prevalent disenfranchised grief.

The government defined the COVID-19 challenge in a way that affected the initial response to the pandemic in Northern Uganda. For example, President Yoweri K. Museveni made parallels between the fight against COVID-19 with an armed struggle. Although in this case, he used the metaphor of a fight against an invisible enemy. The collective trauma and psychological distress that embodied the memory of armed conflict re-imagined and which the Northern Uganda community went through over the years had a negative influence on individual and group behavior in face of the pandemic.

Arguably, it led some of the Acholi leaders to stigmatize the truck driver who tested positive for COVID-19, and whom they blocked from being taken for treatment to the Gulu Regional Referral Hospital. In light of how the President of the Republic of Uganda defined the fight against COVID-19, the local populace had a burden of responsibility to engage in that fight by being their own health workers. However, some of them lost the human element and created the social stigma of victimhood which wounded the conscience of the nation, subsequently eliciting moral anger to address such kind of victimhood.

The then Deputy Speaker of the Parliament of the Republic of Uganda, Jacob Oulanya, responded by making an appeal in the following excerpt demonstrating the voice of conscience against the social stigma that COVID-19 had triggered: "Fellow Ugandans let's have compassion and let us be our brothers' and sisters' [sic] keepers. At this time let's not ask 'for whom the bell tolls'; for it tolls for all of us" ("Acholi Leaders Protest, COVID-19 Truck Driver Transferred to Kampala", 2020). He used the contrast of the biblical analogy of Cain's response in denying responsibility over his brother's life, in the story of Cain and Abel (cf. Gn 4: 9). And, he ideally made an emotional appeal which would illuminate sobriety in context of the moral consequences of care ethics.

Thus, the Deputy Speaker at the time took a moral high ground and his standard of judgment demonstrated that he was attentive to the need to sensitize and educate the nation on

preventing social stigma in the Ugandan society. Barnes (2012) states: "Attentiveness to the circumstances of others involves recognition of issues of vulnerability and power and the necessity of giving voice to the perspectives and experiences of those who are often marginalized or stigmatized" (p. 102). The first support was accepting such victims.

By the end of April 2020, there was public fatigue over restrictions for the lockdown. It was generally thought that several people in Uganda wanted the restrictions to be eased. They argued that they had kept themselves safe from COVID-19 by adhering to the presidential orders for the lockdown and the Ministry of Health guidelines to mitigate the spread of the pandemic. They subsequently argued that they were let down when the powers that be allowed transboundary cargo truck drivers into and through the country while their COVID-19 status was not yet promptly ascertained after testing them at the points of entry.

It would take a couple of days before their conclusive results from the tests would be obtained so that they would be notified wherever they would be. When the results came out then the positive case truck drivers would be traced, followed up, and intercepted by security forces wherever they would be found. They would then be taken to the hospital, a healthcare facility for COVID-19 patients, or quarantine. Occasionally, some people attacked those transboundary truck drivers by denying them food at rest points in the country, pelting them with rotten eggs or stones, and hurling insults at them. They based that rancorous attitude on their stereotyping of the drivers as carriers of COVID-19.

The Paradoxical Reception of Some COVID-19 Patients' Recovery

At the beginning of the lockdown in Uganda, the reality of COVID-19 in the country seemingly began to sink in for some local populace. When the first recovered patients were discharged in the second week of April 2020 there was a beacon of hope. The general population moved away from the fear of the pandemic because they did not see the worst situation in the country. There was no officially confirmed death from COVID-19 until 21 July 2020. Videos of singing, dancing, and clapping frontline healthcare workers were shown when they discharged the first score or so of patients. Paradoxically, that applause was to be contrasted with the social stigma some of those patients' recovery was to subsequently experience in their communities.

The Ministry of Health issued a discharge certificate to each of the recovered patients so that they would be confidently received back in their families and communities. It also issued such certificates to those who had completed their time in quarantine centers. Those patients' recovery was a portrait of optimism that obscured the realities of the social stigma some of them were to experience. On 18 May 2020, the Daily Monitor illuminated the following narrative of victimhood: "After recovery, many of them [were] shunned by neighbors and the communities. This kind of discrimination and labeling [they were labeled as 'disease carriers'] has a negative impact on the victims". There was a rupture in the veneer of sanity when a number of those who had recovered from COVID-19 were subjected to social stigma.

Paradoxically, some of the local populace tended to commiserate with the wealthy discharged patients than with those living on life's margins. This is because, in traditional Ugandan society, commiserating with the wealthy would be an assurance of being well-regarded by such persons or their families through plain folk appeal. Roscoe (1911/2012) states: "[F]or it was considered an unfriendly act not to send to inquire after a sick. Hence from morning to night,

the house was never free from friends and relatives, who talked freely, and again and again, uttered some words of sympathy with the sufferer" (p. 103). Sometimes a sympathizer would receive a token of appreciation from a wealthy person for overcoming the latter's distressing situation of illness.

The well-to-do were less prone to social stigma than the less privileged, and the latter were shunned and stereotyped as scapegoats because of their constitutive otherness. Some patterns of taboo developed around accommodating COVID-19 recovery of the less privileged patients in society and some of them became silent victims. DeSpelder and Strickland (1999) argued about similar pattern in the following way: "A pattern of taboo and avoidance can cause friends and relatives, as well as caregivers, to abandon the patient, creating a kind of 'social death', with the patient feeling 'walled off' from the rest of society" (p. 153).

Some victims of COVID-19 social stigma who were 'walled off' and experienced 'social death' were chased away from food markets where they needed to shop for groceries, their money was rejected in some financial transactions they tried to engage in, and, for some their children were chased away either from community playgrounds or community-managed water supply points. "They [were] treated like outcasts because even after recovery, they [were] perceived to still possess a link with Covid-19, and possibly spread it to those they came into contact with" ("Address Social Stigma Triggered by Covid-19", 2020). Such was the anecdotal perspective behind some of the COVID-19 social stigma in Uganda which was congenial to the victimizers.

The Social Role of the Stigmatized in Redefining their Inviolability in the Ugandan Society

In spite of the universality of suffering during a pandemic such as COVID-19, social stigma as one aspect of such suffering is, arguably, an indication of moral failure in the conscience of a nation. That stigma tends to deny the social role of the sick. "[T]he role of the 'person who is sick' includes rights and responsibilities. When we are ill, we are exempt from our usual tasks. We may stay home from work, and someone else may take our share of domestic or social commitments. We are granted the right to be sick" (DeSpelder & Strickland, 1999, p. 186).

Victimhood from COVID-19 created inviolability as a social trammel which denied some people in Uganda the right to be sick and subsequently return to their jobs or communal life when they recovered. The following narrative of victimhood from COVID-19 social stigma as expressed by Rebecca Mirembe to the Sunday Vision, on 30 August 2020, suffices: "I used to get milk from different farms around the village since there are many cattle-keepers here [Bbaale Village in Kayunga district], but after recovering from COVID-19, I am now jobless. They fear that I will infect them with the virus, yet I recovered" (Bugembe, 2020, p. 27).

Mirembe's experience of victimhood is quite telling. It redefined her new role in community service education to find strength in her courage for redemptive participation in civil society. She attracted selective attention and carved out her space to share her story in an instructive way as Bugembe (2020) continues the following narrative about her experience: "Whenever I get time, I go to the trading center at the local council offices and get loudspeakers, which I use to educate people about COVID-19 with my experience from Entebbe [General Referral] hospital, which I wrote down in a book I usually move with" (p. 27).

Mirembe's self-awareness and scope of work to educate her community on the duty of care

against social stigma at the time was immense and relevant to society. It gave some breath to the struggle against social stigma from COVID-19 in the country by using her victimhood to capture the attention of her community and redirecting it to self-regulatory learning for socio-emotional support.

In contracting COVID-19 the sick person has a right of being a patient with a responsibility to cooperate in receiving treatment, or the recovered person with the right of having been a patient and would count on care from the community. "Care ethics is primarily response-focused. It is the other who calls for care. Thus care ethics is linked to the attitude and gestures of 'turning to' somebody and necessitates the capacity to approach the other"(Maio 2018). Such a person whose otherness is in terms of having contracted COVID-19 and also recovered from it has an obligation and right of engaging in the life of the community without being stigmatized.

Proposition for Social Change and Practice in the Society

When the global need to cautiously learn to live with COVID-19 emerged, the prospect of reconceiving the stories of the existential stigmatization which some people went through in Uganda should enable to shed light on the psychosocial and biosocial challenges the pandemic posed in the country. By thinking about the COVID-19 social stigma in terms of narrativizing the stories of victims, a way of coping with such vulnerability should conceivably emerge. Simply put, rethinking their stories so that they are incorporated into the social history of public health in Uganda in the COVID-19 era in a way that re-establishes wholeness gives meaning to empathizing with the victims of social stigma in society. In the context of care ethics, such stories should speak to the conscience of the Ugandan society in terms of an existential approach to recovery.

The existential approach should be applied to confront the experience of existential stigma with an awareness of the essentiality of collective care. "Existentialism is important in recovery because of the strong emphasis it places on the individual. In psychiatry, clinicians should pay more attention to each individual's unique existential experiences" (Moore & Goldner-Vukov, 2009). In existential therapeutic interventions, "[the] essential elements of recovery revolve around the individual reclaiming and redefining their identity and defining the values important to their retaining ownership of their own lives" (Moore & Goldner-Vukov, 2009). In light of the COVID-19 pandemic, existential-humanistic therapy has been advanced as an effective intervention measure. "Existential-Humanistic (E-H) therapy can provide effective therapeutic interventions to aid vulnerable populations in optimizing adjustment, coping, and quality of life during the COVID-19 pandemic" (Gordon 2020). Such an approach offers a

prospect that should also be considered in the Ugandan situation of the social stigma this exposition illuminates.

The therapeutic needs of the stigmatized and the psychosocial functions of the society to treat the vulnerable COVID-19 victims with respect so that they would bank on the happy outcome advances care ethics in the cult of the responsive caregiver. Care ethics as would be directed towards the COVID-19 positive and those who recovered from the disease is comparable to the ministrations in the morality of the allegorical biblical Good Samaritan (cf. Luke 10: 25 – 37). The Samaritan in that genre was an exemplum of collective care, and of a good neighbor who deals with the chinks in the moral fabric of society. The victims of social stigma due to COVID-19 have the connotation of wounded societal pride and a pitch of compassion to human suffering because of the pandemic. They embody the custodianship of optimism in their rights and responsibilities and pose a moral challenge to the nation to fix the veneer of sanity in the conscience of Ugandan society.

Conclusion

Social stigma is a negative aspect of any society's moral fabric. Therefore, the emergence of the COVID-19 pandemic in Uganda put the nation's conscience to the test when it triggered social stigma which was subjected to some of the people who suffered blame for being carriers of the disease. Although that stigma arguably ruptured the veneer of sanity of the Ugandan society, however, it does not necessarily provide a basis for heaping collective guilt on the nation. Nevertheless, on looking in the mirror, one must have the candor to believe what it reveals. That would enable us to deal better with the consequences of living with pandemics. It would also enable us to deal better with the status quo of the veneer of sanity in the conscience of the nation. In the case of Uganda, the mirror revealed a rupture in the nation's veneer of sanity in the context of the social stigma that COVID-19 triggered when the pandemic emerged in the country. This is so whatever view one takes on the meaning of 'sanity'. And such chinks in the moral fabric of the nation did not remain unattended to. They provide the prospect of existential therapeutic interventions and collective care.

References

- Armstrong, K. (1998). *A history of God*. London: Vintage Books.
- Barnes, M. (2012). *Care in everyday life: An ethic of care in practice*. Bristol: The Policy Press.
- BBC News. (23 July 2020). Uganda – where security forces may be deadly than Coronavirus. Retrieved from <https://www.bbc.com/news/world-africa-53450850>
- Bigabo, P. (2020). Inside Uganda's Coronavirus 'quarantine prison hotel'. Taarifa, Retrieved from <https://www.taarifa.rw/inside-ugandas-coronavirus-quarantine-prison-hotel/>
- Bugembe, V. N., (30 August 2020). How COVID-19 left Kayunga family dependants. Sunday Vision. pp. 26 – 27.
- Daily Monitor. (18 May 2020). Address social stigma triggered by Covid-19. Retrieved from <https://www.monitor.co.ug/OpEd/Editorial/Address-social-stigma-triggered-by-Covid19/689360-5555962-format-xhtml-yjpqukz/index.html>
- Falk, G. J. (2001). *Stigma: How we treat outsiders*. Amherst, N Y: Prometheus Books.
- Gordon, R. (2020). Existential-Humanistic therapy in the age of COVID-19 in vulnerable populations, News Letter, Retrieved from <https://www.psychotherapy.net/article/existential-therapy-covid>
- DeSpelder, L. A., & Strickland, A. L. (1999). *The last dance: Encountering death and dying*. California: Mayfield Publishing Company.
- Gysels, M., Pool, R., & Bwanika, K. (2001). Truck drivers, middlemen and commercial sex workers: AIDS and the mediation of sex in south west Uganda. *AIDS Care*, 13(3), 373-385. <https://doi.org/10.1080/09540120120044026>
- Human Rights Watch. (2 April 2020). Uganda: Respect rights in COVID-19 response. Retrieved from <https://www.hrw.org/news/2020/04/02/uganda-respect-rights-covid-19-response>
- Kaboggoza, C. (1 May 2020). Fighting the stigma of testing positive for COVID-19. World Vision Uganda. Retrieved from <https://www.wvi.org/stories/uganda/fighting-stigma-testing-positive-covid-19>
- Kateete, J. (9 March 2020). Eyewitness testimony.
- Kribs-Zaleta, C. M., Lee M., Roman C., Wiley S., & Suarez C. M. H. 2005. The effect of the HIV/AIDS epidemic on Africa's truck drivers. *Mathematical Biosciences and Engineering*, 2 (4), 771 – 88.
- Maio, G. (2018). Fundamentals of an ethics of care. In F. Krause & J. Boldt (Eds.), *Care in healthcare*. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-319-61291-1_4
- Moore, L. J., & Goldner-Vukov, M. (2009). The existential way to recovery, *Psychiatria Danubina*,

21 (4), 453 - 462.

Public Health (Control of COVID-19) Rules (SI 2020/52). (2020). Retrieved from <https://ulii.org/ug/legislation/statutory-instrument/2020/52>

Roscoe, J. (2012). *The Baganda: An account of their native customs and beliefs*. London: Forgotten Books. (Original work published 1911).

The Independent. (18 May 2020). Why truck drivers spread COVID-19. Retrieved from <https://www.independent.co.ug/why-truck-drivers-spread-covid-19/>

The Independent. (16 April 2020). Acholi leaders protest, COVID-19 truck driver transferred to Kampala. Retrieved from <https://www.independent.co.ug/acholi-leaders-block-ambulance-from-evacuating-covid-19-patient-in-gulu>.

Duration of management of a malnourished child using cow milk

Nizeyimana Fidele^{1*}, Dusabumuremyi Jean Claude², Muhammad Akram³, Walaa Fikry Elbossaty⁴, Singirankabo Vital⁵, Yadufashije Callixte⁶, Jean Marie Vianney Nkurikiyintwali⁷ & Nderelimana Olivier⁷

¹PhD student at Nkumba University, Entebbe-Uganda, Email: nizeyimanafidele37@gmail.com

²Food Biotechnology department, Institut d'Enseignement Supérieur de Ruhengeri, P.O. Box 155 Ruhengeri-Rwanda, Tel: +250788957370, email: dusabe2010@gmail.com

³Department of Eastern Medicine, Government College University Faisalabad Pakistan, Email: makram_0451@hotmail.com

⁴Department of Biochemistry, Damietta University, Egypt, Email: walaafikry1985@gmail.com

⁵UNHCR Rwanda, Senior WASH assistant, Netherlands Institute for Housing and Urban Development Studies. P.O. Box 1935 3000 BX Rotterdam-Netherlands, Tel: +250 783 324 399 Email: vitalsingi@gmail.com

⁶Biomedical Laboratory Science department, Institut d'Enseignement Supérieur de Ruhengeri, P.O. Box 155 Ruhengeri-Rwanda, Tel: +250 788 259 005 Email: cyadufashije@gmail.com

⁴Monitoring and Evaluation, Learning Department, Quality Improvement Advisor, Intrahealth International/USAID Ingobyi Activity, Email: ntwli2010@gmail.com

⁷Infectious Diseases Clinical Mentor and Supervisor, Ruhengeri RH, Tel: +250 788 679 9 250, Email: ndoliver7@gmail.com

Abstract

The objective of the study was to determine the duration of managing a malnourished child using cow's milk as a supplement. The study was uncontrolled before and after the study. The study was quantitative and was conducted in the Musanze health center radiation zone. The study evaluated children who were in a nutrition study follow-up commissioned by UNICEF and the Access to Health Project in 2016. The follow-up was created under the UNICEF and Access to Health Project fund for the study of their duration in management.

The quantitative method was used. Non-probability sampling was used, and the purposive technique was adopted. Data were collected on 57 malnourished children admitted to the nutrition service at the Musanze health center, where 21 were in severe malnutrition and 36 were in moderate malnutrition. During their follow-up period, all malnourished children were given seven liters of cow milk per week per child. The weight-for-age and the mid-upper arm circumference were used to screen children.

The study showed that when cow milk is used as the only supplement for the treatment of a malnourished child, the duration of taking a child from severe malnutrition to good nutrition took approximately double (7 months) compared to the World Health Organization (WHO)

nutrition care protocol (4 months). Many children showed positive nutritional status evolutions, but some showed a negative evolution by staying in severe or moderate malnutrition.

Family conflict and chronic illness are among the main causes of a negative evolution in nutritional status. The other underlying cause is the situation of hunger in families with malnourished children. The supplement of cow milk is not enough, as it takes a longer period than the period expected by the WHO. Therefore, a balanced diet together with the supplements of cow milk, SOSOMA, and RTUF can change nutrition status.

Keywords: Malnutrition, Severe malnutrition, moderate malnutrition, malnutrition management

Introduction

In 2016, Rwanda wished to move from the very expensive malnutrition care protocol, which is mainly composed of the SOSOMA supplement and RTUF, to milk, which is abundant in the country. In light of this, UNICEF and Access to Health Project called for a proposal to do an uncontrolled before and after-study research to evaluate the duration of management of a malnourished child using cow milk in a bid to find recommendations for changing the national malnutrition management care protocol.

Background

Severe acute malnutrition (SAM) is defined as a ratio between weight and height of less than 3, and a middle upper arm circumference of less than 115 mm. Since 2000, the efforts of the World Health Organization (WHO) and UNICEF have made it possible to standardize the management of acute malnutrition, which has contributed to reducing infection rates and preventing complications where the use of nutritional supplements and consumption of cow's milk improved conditions.

Severe acute malnutrition and diarrhea are the leading causes of death in children. Diarrhea reduces the absorption of nutrients and fluids, while severe acute malnutrition creates weak fluids and disrupts homeostasis.

Malnutrition includes a broad spectrum of nutritional impairments, including intrauterine growth restriction, stunting, wasting, suboptimal breastfeeding, and deficiencies of micronutrients such as vitamin A and zinc (Black et al., 2013). In addition, malnutrition is associated with many factors in the community and is highly observed in people of different lifestyles. These include children under five years of age, pregnant women, and the elderly (WHO, WFP, UNSCN, & UNICEF, 2007). Malnourishment is observed when a person has inadequate protein, energy, and micronutrient intake, as well as frequent infections and diseases. In this regard, bad nutrition is more about quality than quantity of food (WHO, 2009; Institute of Medicine, 1995).

Even if people eat enough, they will become malnourished if the food does not provide the proper amounts of micronutrients (vitamins and minerals) to meet their daily nutritional requirements. This study focused on the malnutrition status of children under five years. This form of malnutrition is manifested when using anthropometric methods. One among others is mid-up arm circumference (MUAC). The method indicates different malnutrition statuses as follows: severe, moderate, those who are at risk of malnutrition, and adequately nourished as reported (Onis, Yip, & Mei, 1997).

There are several measures in place in both the developed and developing worlds that are used to manage any form of malnutrition. Some of them include zinc supplementation, vaccination against measles for children, supplementary food of maternal milk for a child of fewer than 24 months, and supplementary food for a child less than 6 months when the mother died during delivery or in the case of a complete lack of breast milk for the mother, as approved by the World Health Organization (WHO, 2015).

Scientific evidence points to a link between dairy products and growth in children, and many scientists and policy groups are now calling for the inclusion of dairy products in these foods specifically designed to treat child malnutrition. For the former measure, the WHO suggested the supplementation doses of zinc based on ages: 10 mg/day during 10 days for children under 6 months and 20 mg/day during 10-14 days for children greater than 6 months of age. However, the optimal dose of zinc for children affected by malnutrition is still not clearly defined as it was suggested by the WHO recommends 2-4 mg/kg of zinc per day while the international consultative group recommends 10 mg per day (Izing, 2004; Lazzerini & Ronfani, 2012).

A study conducted on the strategies of zinc supplementation revealed that the stronger dose of 6 mg/kg/day in relation to 1.5 mg/kg/day was found to be associated with high mortality with a risk ratio of 4:53 (Doherty et al., 1998). In addition, zinc can also be provided in therapeutic foods as follows: food with F-75: 2, 0 mg zinc per 100 mL, and food with F-100: 2, 3 mg zinc per 100 mL (WHO, 2007). This dose contained in therapeutic food conforms to WHO specifications, which allow the ingestion of zinc at a rate of 2–3 mg/kg/day.

The supplementation of zinc can vary or be suggested based on other diseases associated with malnutrition. For instance, 20 mg/kg/day is given to children with diarrhea, and a child weighing six kilograms receiving 130 ml/kg/day of F-75 is receiving a total of 15 mg/day of zinc (WHO, 2017). Even though the bioavailability of zinc can be modified by concomitants through the administration of other trace elements, it is not easy to manage zinc in children living with acute malnutrition. Furthermore, the zinc supplemented during normal nutritional rehabilitation can lead to high doses that may negatively affect the child under consideration, so it is not advised (Sommer, 2015).

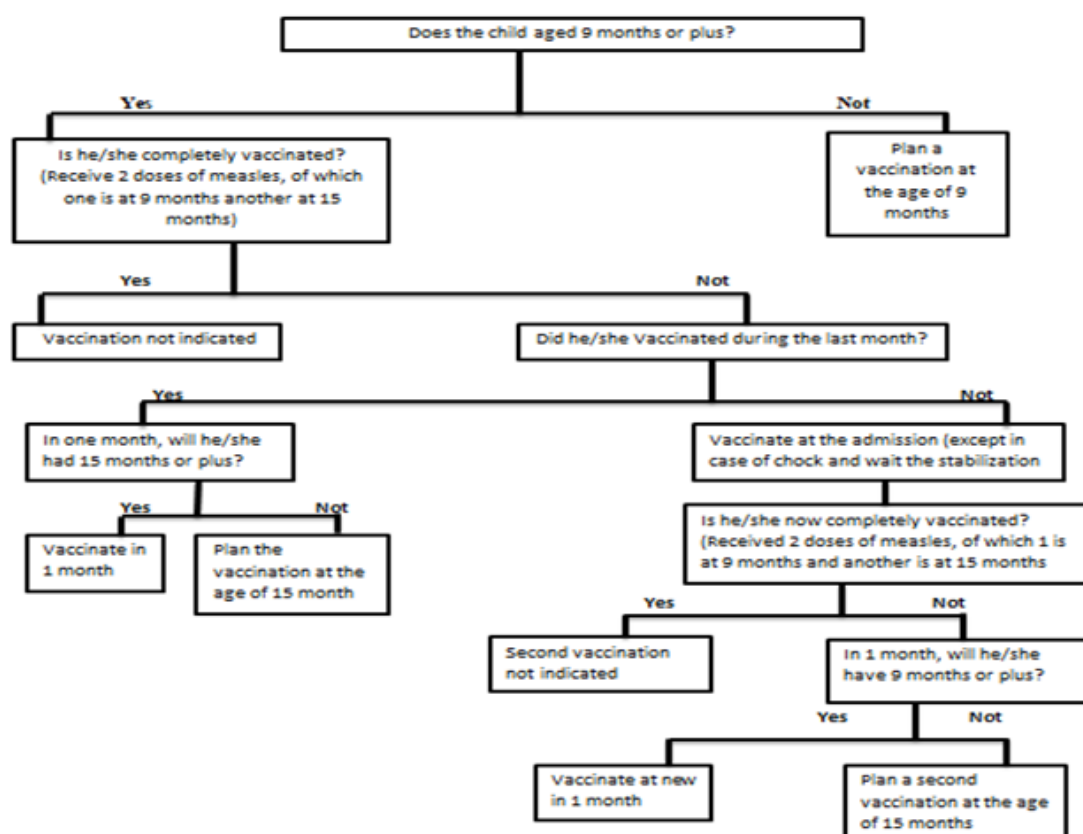
Apart from zinc supplementation, vaccination against measles for children with severe malnutrition during nutritional rehabilitation is next. This vaccine is provided for different ages of children, as was highlighted by WHO (2005), where the vaccine is only given to children 9–15 months old when they have not been already immunized and to those greater than 15 months when they have been immunized in less than 15 months of age. In addition, when the vaccination is recommended, it should be given at the time of admission to the nutrition care center with a second dose at the exit to save time during the period of incubation of the measles and to partially protect against nosocomial measles, among others (Ministry of Health Republic of Kenya, 2009; Health E-FMo, 2007).

For the children treated as outpatients, the initial dose can be omitted, and only one vaccination must be managed after a nutritional rehabilitation of one month (WHO, 2013). Many studies were conducted on the interaction between nutritional status and vaccine response in children and revealed the positive impact of vaccination against measles, especially in severe malnutrition (Wesley et al., 1979; Ekunwe, 1985; Greenwood et al., 1986; Kizito et al., 2013).

Contrarily, some studies did not show the interaction between malnutrition and the immune response in the vaccination of measles, especially in the children who were affected by the kwashiorkor and marasmus of different degrees defined by weight-for-age (Savy, Edmond, & Fine, 2009).

In addition, the vaccination of measles is indicated, as was observed in the study conducted by Kurubi et al. (2009) and Mahomva, Moyo, and Mbengeranwa (1997). For the management of malnutrition using vaccination, the WHO recommends two doses of measles vaccination to all children, and the minimal length of time between the vaccinations could be 1 month (WHO, 2009). In this regard, at least one of the vaccinations must be managed after 9 months, and its efficiency is measured from the intake time onward. Fig. 1 shows the summarized WHO instructions for vaccination against measles.

Fig. 1: Flow chart of vaccination against measles for children living with malnutrition in hospitalization or management at the community level (WHO, 2005)



Malnutrition in children under five years was found to be managed by supplementary feeding of maternal milk for the child younger than 24 months. This approach is also based on a child's age. For example, a child 6 months old receives 2-3 spoons of porridge. 2-3 times per day, a child of 6–9 months receives 2-3 spoons of a simple meal. 1/2 of the cup of porridge 2-3 times per day, a child of 9–12 months receives 1/2 of a cup of porridge and a simple meal. 3–4 times per day, while one of 12–24 months receives 3/4 of a cup of porridge and a simple meal 3–4 times per day (WHO, 2005).

The latter approach is food supplementation for a child younger than 6 months when the

mother dies during delivery or in the case of a complete lack of breast milk for the mother. If a mother dies during delivery, a child is fed an infant formula reserved for both children younger than 6 months and those whose mothers completely lack breast milk. To feed those children under this approach, the formulas below are in place and used based on the quantity of milk required by a child per day. For a child of 0–7 days, $Q = (ND - 1) * 10 \text{ gr}$. Where Q is the quantity of milk required by a child, ND is the number of days of life. For a child one week to four months old, $Q = (CW + 200 \text{ g}) / 10$. where CW is the child's weight in grams. When a child is over 4 months old, ordinary cow's milk can be given (WHO, 2005).

This study also indicates the treatment of malnourished children based on their ages. When a child is 0 to 5 months old and is screened for malnutrition based on information related to properly nursing a child, loss of weight, and sufficient maternal milk of the mother for the child and is classified as moderate or severe malnutrition, the mother of the child is advised or recommended to nurse the child many times as required and to eat a balanced diet by also focusing on food rich in vitamin A as it stimulates the milk production (WHO, 2007).

In addition, depending on the severity of malnutrition, a child can be referred to pediatrics services at the hospital because the child cannot be treated at the health center level (Ministry of Health, Republic of Rwanda, 2009). For children aged 6–59 months, depending on their malnutrition status, such as moderate or severe, among others, nutrition intervention and medical intervention are needed to treat malnutrition. In Rwanda, the child with moderate malnutrition is provided SOSOMA or a combination of porridge flour (3,5 kg/week), cow milk (7 liters/week), or therapeutic milk (F-75: 1st Phase, F-100: 2nd Phase), while for medical interventions, vaccination against measles, mebendazole, and vitamin A are provided to the child.

For severe malnutrition, the child is nutritionally given Plumpy Nut as therapeutic food ready to consume (RUTF F-100), while medically, a child is given vaccinations against measles, mebendazole, vitamin A, amoxicillin, and folic acid (WHO, 2009). Finally, a child with severe or moderate chronic malnutrition (a child late in growth: stunted) is therapeutically given SOSOMA or a combination of porridge flour (3,5 kg/week) while medically given a vaccination against measles (WHO Multicentre Growth Reference Study Group, 2009).

Moreover, for children under 2 years, the interventions mentioned above are combined with the recommendation given to the mother to breastfeed their children as many times as possible and at every moment the child wants to be breastfed. In addition, a breastfeeding mother is obliged to prepare a balanced diet for her child to prevent any type of malnutrition disease. Similarly to children of 2–5 years of age, the child is only given a balanced diet (Ministry of Health, Republic of Rwanda, 2009).

Cow's dairy products play an important role in treating malnutrition, and this has led to the introduction of these products that contain a large amount of milk (F-100) to improve weight by increasing it and reduce the mortality rate. Cow's milk contains a protein known as PDCAAS, many peptides, and other bioactive substances. Milk is an important source of minerals that support growth (type II nutrients), such as potassium, magnesium, phosphorous, and zinc, and the high lactose content also appears to support growth due to the effect of prebiotics and improved mineral absorption.

Scientific evidence indicates that there is a relationship between the consumption of dairy

products and the growth of children, leading to advocacy for the inclusion of dairy products in the diets of malnourished children (Choudhury & Headey, 2018). The nutritional composition of milk is very complex, as it contains almost all the nutrients that the body needs. Where one cup of full-fat cow's milk provides 3.25% of fat and contains:

Calories: 149%

Water: 88%

Protein: 7.7 grams

Carbs: 11.7 grams

Sugar: 12.3 grams

Fiber: 0 grams

Fat: 8 grams

In addition, milk contains minerals and vitamins that the child needs during the growth process, including vitamin B12, calcium, phosphorus, and vitamin B2, in addition to vitamin D.

Materials and Methods

The study adopted an objective and positive philosophy. The study used the survey strategy and the quantitative method. The non-probability sampling method and a purposive technique were used to select the study, which comprised 57 malnourished children. The study was uncontrolled before and after the study. The study was uncontrolled because all the participants were given milk supplements and followed for 11 months to see if they improved. Data was collected on 57 malnourished children admitted to the nutrition follow-up, which was created under UNICEF and the Access to Health Project fund, for the study of their duration in management at the Musanze Health Center in January 2016.

Data collection procedure

All parents and guardians of malnourished children admitted to the studies signed a consent form to participate in the study, respecting the recommendation regarding malnutrition management taken from the health center. All enrolled children adhered to the follow-up regularly, and they were warned not to miss any follow-up.

All parents and guardians were asked if a child met a problem of illness in the home care week to avoid bias from a lack of primary health care. During the follow-up, a child was screened using anthropometric methods, mainly weight-for-age and the mid-upper arm circumference (MUAC). When the screening put a child in a good nutrition status or a child moved from one nutrition status to another, the duration of the transition was noted. Home visits to see if the parent or guardian implemented the acquired advice were regularly done. Every child was visited at home at least once every two weeks.

Statistical analysis

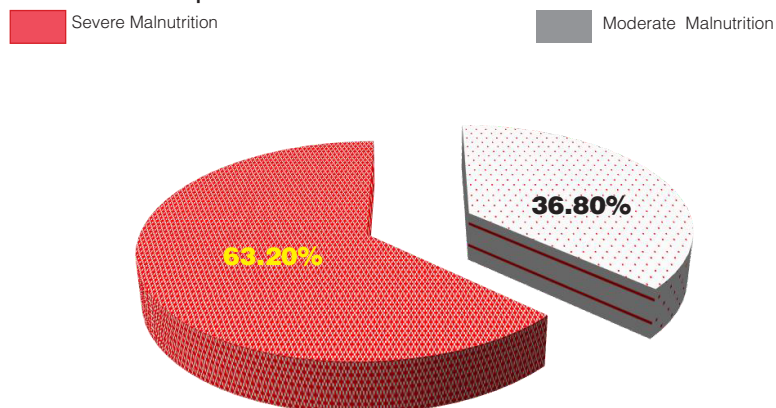
All data were recorded using Microsoft Excel and analyzed using descriptive statistics with frequencies using statistical software (SPSS).

Results Discussion

A total of 57 malnourished children were admitted to the study proposed by UNICEF and the Access to Health Project at the Musanze health center in January 2016. Of these, 21 (36.8%) had severe malnutrition, and 36 (63.2%) had moderate malnutrition (Fig. 2).

Fig.2. Distribution of malnutrition between cases

a) Severe cases followed up



The results showed that 38.1% of the followed-up children moved from severe to moderate nutrition. It is not easy to step from severe malnutrition directly to good nutrition (9.5%) when a child is regularly screened as indicated in the follow-up table. Also, it takes a long time to bring a child from severe malnutrition to good nutrition.

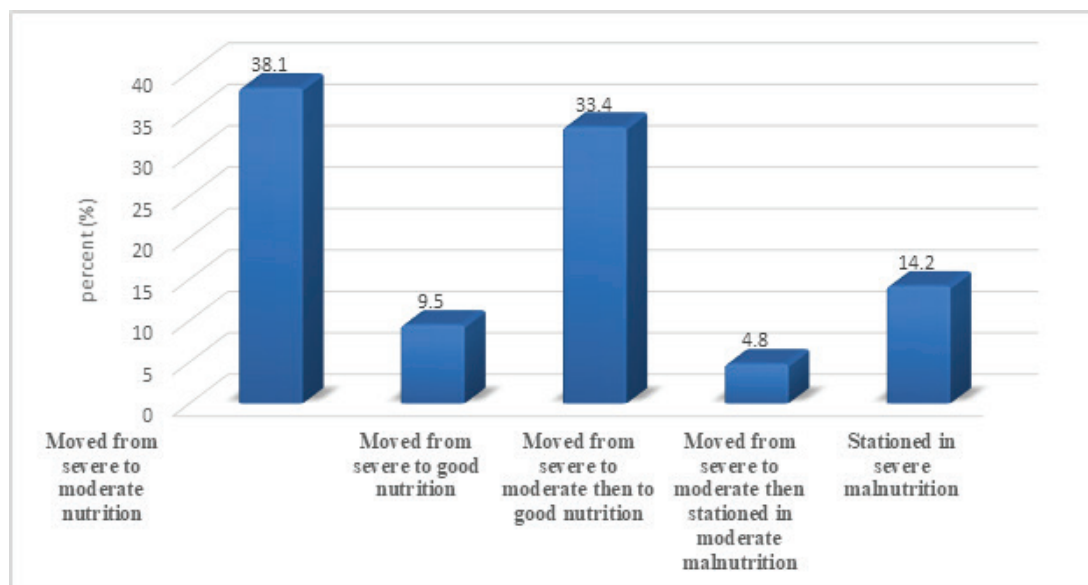
Among the 21 severe cases followed up, only 17 healed, whereas three remained in severe malnutrition during the intervention period of 11 months. Only 1 child stepped from severe malnutrition to moderate malnutrition and was stationed in moderate malnutrition. Most of them had chronic illnesses, including mental disability and HIV, and others lived in families with conflict between the husband and wife (Table 1, Fig. 3).

Table.1. Status of healing from severely malnourished children

Fig.3. Status of healing for severely malnourished children

The study shows that, generally, a child cannot exceed 5 months in a nutrition care center

Status of healing for severe malnourished children	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Moved from severe to moderate nutrition	8	38.1	38.1	38.1
Moved from severe to good nutrition	2	9.5	9.5	47.6
Moved from severe to moderate then to good nutrition	7	33.4	33.4	81.0
Moved from severe to moderate then stationed in moderate malnutrition	1	4.8	4.8	85.8
Stationed in severe malnutrition	3	14.2	14.2	100.0
Total	21	100.0	100.0	



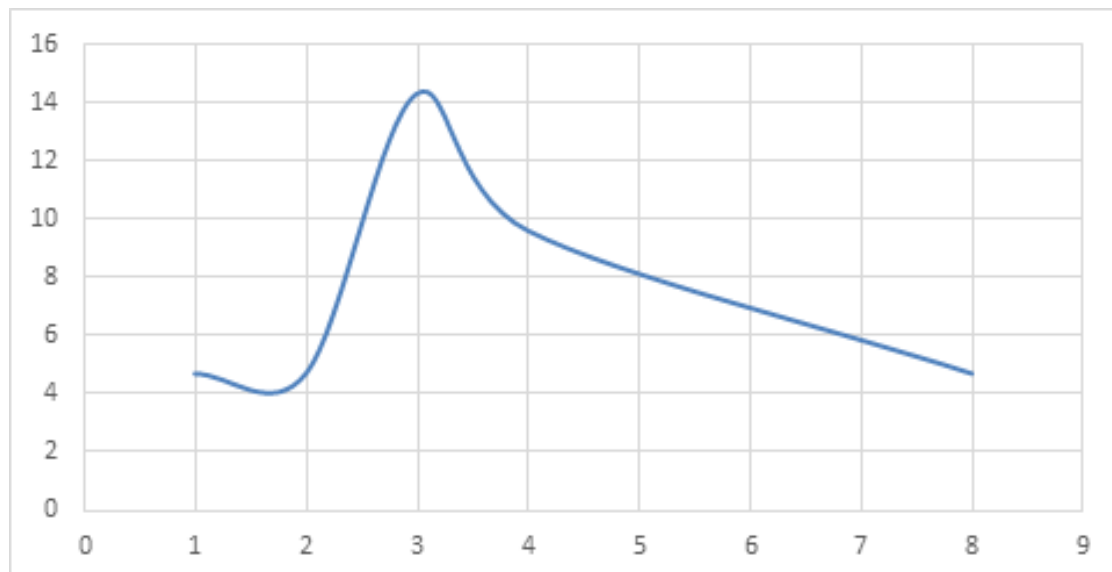
when he or she has no underlying serious causes. Most children who were followed up for moderate malnutrition healed within 3 months. Only 30 of the 36 children who were followed up on healed, and 6 remained malnourished. Of them, 4 fell from moderate malnutrition to severe malnutrition and returned to moderate malnutrition where they were stationed. Two children fell from moderate malnutrition to severe malnutrition and stayed there. Most of those unhealed children had serious health problems (Table 2.A; Fig. 4).

Fig.4. Duration of healing for malnourished children from severe to moderate

Table.2.B. Duration of healing for malnourished children directly from severe malnutrition to

Duration of healing for malnourished children from severe to moderate malnutrition		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	8 months	1	4.7	12.5	12.5
	4 months	2	9.6	25	37.5
	3 months	3	14.3	37	75
	2 months	11	4.7	12.5	87.5
	1 month	8	4.7	12.5	100.5
	Total	13	38.0	100.0	
Missing	999		62.0		
Total		21	100.0		

good nutrition.



After 8 months malnourished children directly moved from severe malnutrition to good nutrition (Table.2.B). Total 21 100.0

Duration of healing for malnourished children directly from severe malnutrition to good nutrition		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	8 months	2	9.5	100.0	100.0
Missing	999	19	90.5		
Total		21	100.0		

Most children who were followed up for moderate malnutrition healed within 8 months. 19% were seen to have good nutrition after 8 months, while 9.6% took 5 months, and after 4 Total 21 100.0

Table.3. Duration of healing for malnourished children from severe to moderate then to good nutrition.

Duration of healing for malnourished children from severe to moderate then to good nutrition		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	8 months	4	19.0	57.1	57.1
	5 months	2	9.6	28.6	85.7
	4 month	1	4.8	14.3	100.0
	Total	7	33.4	100.0	
Missing	999	14	66.6		
Total		21	100.0		

b) Moderate cases followed up

Among the 36 moderate cases followed up, only 30 healed, whereas 4 remained in moderate malnutrition during the intervention period of 11 months. Only 2 children stepped from moderate malnutrition to severe malnutrition (Table 4).

Table.4. Status of healing for moderately malnourished children to good nutrition Conclusion

Status of healing for moderately malnourished children to good nutrition		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Recovered	30	83.3	83.3	83.3
	Complicated from moderate to severe and returned to stay in moderate malnutrition	4	11.1	11.1	94.4
	Complicated from moderate to severe and stayed in severe malnutrition	2	5.6	5.6	100.0
Total		36	100.0	100.0	

Many children showed positive nutritional status evolutions, but some showed a negative evolution by staying in severe or moderate malnutrition. Family conflict and chronic illness are among the main causes of a negative evolution in nutritional status.

The other underlying cause is the situation of hunger in families with malnourished children. It requires a period of 3 to 4 months to take a child from severe malnutrition to moderate malnutrition and a period of 2 to 3 months to take a child from moderate malnutrition to good nutrition. By comparing the effort required, it requires much effort for a child in severe nutrition to move him/her to the other nutritional status. In general, the management of a child using cow milk as supplementary food is not sufficient because it requires an average of 7 months to take a child from severe malnutrition to good nutritional status, which is beyond the predicted 4 months in the WHO nutrition management protocol. Based on

the study findings that it requires double the time for malnutrition healing in comparison with the time proposed by WHO, and based on the comparison of the nutrition value labeled on the package of cow milk with the nutrition value of Ready-To-Use Therapeutic Food (RUTF), it can be concluded that using cow milk together with RUTF for malnutrition management is appropriate. The longer a child remains malnourished, the more it is affected by the consequences of malnutrition.

There is a consensus that children suffering from malnutrition should be provided with dairy products that contain large amounts of milk protein. Given the high prices of these products, which are difficult to provide, especially in developing countries where the disease is spread, more studies are required to try to provide alternatives that are within the reach of everyone and have the ability to increase growth in addition to weight gain.

Recommendations

Based on the study findings, the researchers generated the following recommendations:

To the community:

Adhere to the community-based nutrition program for malnutrition screening.

Prioritize feeding a balanced diet for under five years children.

Adhere to family planning services for spacing birth.

Adhere to prenatal consultation when pregnant to avoid chronic illness that could be avoided.

To the nutrition care centers:

Do home visits for all children in nutrition care in order to see the specific problem in each child's family.

Undertake multisectoral collaboration in order to succeed in the problem of malnutrition.

Support families with different diet products than supplementing cow milk.

Reinforce nutrition education in communities.

Conflicts of interest

There are no conflicts of interest to declare.

Acknowledgments

The present research work was undertaken by authors in collaboration with the authority of Musanze, who facilitated the study; the authority provided approval to conduct a study and guaranteed researchers any required assistance related to the study. This is gratefully acknowledged. The opinions and conclusions presented in this paper are those of the authors and do not necessarily reflect the views of the sponsoring organization.

Funding statement

The respondents were given a small financial incentive to take part in the study. The motivational expenses for research participants and other study-related expenses like the transportation of researchers and the printing of questionnaires were contributed by UNICEF and the Access to Health Project.

References

- Doherty, C.P., Sarkar, M.A., Shakur, M.S., Ling, S.C., Elton, R.A. & Cutting, W.A. (1998). Zinc and rehabilitation from severe protein-energy malnutrition: higher-dose regimens are associated with increased mortality. *The American journal of clinical nutrition*, 68(3), 742-748.
- Health E-FMo. (2007). Protocol for the management of severe Acute Malnutrition. *International Journal of Health and Nutrition*, 41-48.
- Izing, G. (2004). Developing Zinc Intervention Programmes. http://www.izincg.org/publications/files/IZiNCGTechDoc_FNB_chapter3.pdf.
- Kurubi, J., Vince, J., Ripa, P., Tefuarani, N., Riddell, M. & Duke, T. (2009). Immune response to measles vaccine in 6 month old infants in Papua New Guinea. *Tropical medicine & international health : TM & IH*.14(2) , 167-173.
- Lazzerini, M. & Ronfani, L. . (2012). Oral zinc for treating diarrhoea in children. . *Cochrane Database Syst Rev*.(6), CD005436.
- Mahomva, A.I., Moyo, I.M., Mbengeranwa, L.O. (1997). Evaluation of a measles vaccine efficacy during a measles outbreak in Mbare, City of Harare Zimbabwe. *The Central African journal of medicine* 43(9) , 254-256.
- Ministry of Health Republic of Kenya. (2009). National Guideline for Integrated Management of Acute Malnutrition. Nairobi, Kenya: Available at <http://www.cmamforum.org/>.
- Ministry of Health Republic of Rwanda. (2009). National Guideline for Management of Acute and moderate malnutrition. Kigali, Rwanda: Available at <http://www.moh.gov.rw>.
- Onis, M., Yip, R. & Mei, Z. (1997). The development of MUAC-for-age reference data recommended by WHO expert committee. *Bulletin of the World Health Organization*, 75, 11-18.
- Savy, M., Edmond, K. & Fine, P.E. (2009). Landscape analysis of interactions between nutrition and vaccine responses in children . *The Journal of nutrition*139(11), 2154S-2218S.
- Sommer, A. (2015). Zinc deficiency and its consequences. A field guide to detection and control, 3rd ed. Geneva, Switzerland: World Health Organization.
- WHO. (2005). Pocket book of hospital care for children. Geneva, Switzerland: World Health Organization.
- WHO. (2007). Vit A supplement: A guide to their use in the treatment and prevention of Vit A deficiency and xerophthalmia, 2nd ed. Geneva, Switzerland: World Health Organization.
- WHO. (2009). Child growth standards and the identification of severe acute malnutrition in infants and children. A joint statement by the World Health Organization and the United Nations Children's Fund. Geneva, Switzerland: World Health Organization; (http://www.who.int/maternal_child_adolescent/documents/9789241598163/en/).
- WHO. (2009). Management of severe malnutrition: a manual for physicians and other senior health workers. Geneva, Switzerland: World Health Organization available on <http://www.who.int/nutrition/publications/severemalnutrition/9241545119/en/>.
- WHO. (2009). Position on measles vaccines . *Vaccine* 27(52), 7217-7219.
- WHO. (2013). Guideline: Updates on the management of severe acute malnutrition in infants and children. Geneva, Switzerland: World Health Organization available on http://www.who.int/nutrition/publications/guidelines/updates_management_SAM_infantandchildren/en/.
- WHO. (2015). Nutrition supplement and nutrient deficiency; assessment, prevention and control. Geneva 27, Switzerland: Unpublishe document WHO/NUT/98.6: available on request from program of nutrition, World Health Organization, 1211.

WHO. (2017). The management of malnutrition in major emergencies, 2nd ed. Geneva, Switzerland: World Health Organization, in Press.

WHO Multicentre Growth Reference Study Group. (2009). WHO child growth standards: methods and development. Growth velocity based on weight, length and head circumference. Geneva, Switzerland: World Health Organization available on (www.who.int/childgrowth/standards/velocity/technical_report/en/index.html).

WHO, WFP, UNSCN, UNICEF. (2007). Community-based management of severe acute malnutrition. A joint statement by the World Health Organization, World Food Programme, United Nations Standing Committee on Nutrition, United Nations Children's Fund. Geneva, Switzerland: World Health Organization; (<http://www.who.int/nutrition/publications/severemalnutrition/9789280641479/en/>).

Factors Associated with discontinuing Four Antenatal Care Standard Visits in the Musanze Sector, Rwanda

Nizeyimana Fidele^{1,2*}, Jean Marie Vianney Nkurikiyintwali⁷, Singirankabo Vital⁴, Mutabazi Placide^{2, 3}, Muhammad Akram⁵, Walaa Fikry Elbossaty⁶ & Nderelimana Olivier⁸

¹Ministry of Health Rwanda, Community Health Department.

²Department of Public Health Mount Kenya University Email: nizeyimanafidele37@gmail.com

³Save the Children Rwanda, Tel: +250 788 529 071, Email: muplacidus@gmail.com

⁴UNHCR Rwanda, Senior WASH assistant, Netherlands Institute for Housing and Urban Development Studies. P.O. Box 1935 3000 BX

Rotterdam-Netherlands, Tel: +250 783 324 399 Email: vitalsingi@gmail.com

⁵Department of Eastern Medicine, Government College University Faisalbad Pakistan, Email: makram_0451@hotmail.com
Email: ntawali2010@gmail.com

⁸ Infectious Diseases Clinical Mentor and Supervisor, Ruhengeri RH, Tel: +250 788 679 9 250, Email: ndoliver7@gmail.com

Abstract

Background: In Rwanda, a total of 98% of women attend at least one ANC visit; however, only 47% complete all four standard ANC visits, and 56% of women go for their first visit before the 4th month of pregnancy.

Objective: to determine factors associated with low levels of attendance at the fourth standard antenatal care visit.

Materials and methods: Applying a cross-sectional study design, a sample of 8 health providers and 67 pregnant women who completed 4 ANC standard visits or who failed to attend the 4th ANC visit was selected through a purposive sampling method approach. Using IBM-SPSS, binary logistic regression analysis was used to identify factors associated with discontinuing four ANC standard visits.

Findings: Factors such as lack of knowledge about the role of attending ANC services ($p < 0.001$), thinking that one or two visits is enough ($p < 0.001$) and delivery before the last ANC appointment ($p < 0.002$) were significantly associated with discontinuing four standard ANC visits.

Conclusion: Modifiable factors like lack of knowledge on the role of doing ANC, thinking that one or three visits were enough, and delivery before the last ANC appointment were associated with not achieving 4 standard ANC visits.

Keywords: Antenatal care, visits, delivery, factors, ANC study, complete standard ANC

Background

Antenatal care (ANC) is the care provided by skilled healthcare professionals to women throughout their pregnancy. It includes risk identification and screening, prevention and management of pregnancy-related or concurrent diseases, and health education and promotion (Nasloon et al., 2020). Globally, maternal deaths have been reduced by 44% since being included in the Millennium Development Goals (MDGs) in 1990.

However, low-income countries still have a big proportion of the global burden of maternal health problems. Sub-Saharan Africa alone reported 66.3% of world maternal deaths in 2015, and 12 countries in the region still count more than 500 deaths per 100,000 live births, compared to less than 5 deaths per 100,000 live births in the ten countries with the lowest maternal mortality rate (Alkema et al., 2015).

ANC is considered one of the safest maternal interventions (Prata et al., 2010). It consists of routine check-up services for most healthy pregnant women to identify signs and risks of disease and provide an early response (Carroli et al., 2001). At the beginning of the 1900s, ANC was introduced in high-income countries and later spread to other countries without strong proof of evidence as to its effectiveness with regard to content, number, and timing of visits (Carroli et al., 2001). However, during the last few decades, there has been a growing interest in documenting the effectiveness of ANC, especially in low-income countries (Alkema et al., 2015).

Antenatal Care (ANC) services for pregnant women by trained health professionals improve maternal and newborn health outcomes. It is one of the most significant means taken by the state to reduce deaths in mothers and fetuses. Therefore, these women must attend prenatal care visits. At an ANC visit, a pregnant mother receives a tetanus vaccine, deworming tablets, iron, and folic acid supplements. In addition, the mother receives counseling related to childbirth and emergencies (Nasloon et al., 2020).

Therefore, the World Health Organization recommends that women who do not suffer from complicated matters in pregnancy make antenatal care visits not later than the third month, at the sixth, eighth, and ninth months (Jo et al., 2019). It is also recommended to increase these visits in the case of problems during pregnancy. The number of visits varies for countries, as it increases in countries with a high income rate, as in Norway, where it is recommended to increase the number of visits to eight visits (Jo et al., 2019).

In 2003, WHO recommended that the number of ANC visits in developing countries should be four, but in 2016, it raised that number to eight visits to raise the health awareness of pregnant women and provide consultations and solutions to the corresponding health and psychological problems (WHO, 2016). Studies have proven that one of the most important factors that reduces the rates of those visits is the low level of education of the mother, her ethnicity, and her low standard of living (Hijazi et al., 2018). It has been noticed that those women who have decreased their visits have been exposed to a number of problems, such as low fetal weight and premature labor (Hijazi et al., 2018).

Rwanda has followed the 2001 WHO model of four focused ANC visits for pregnant women without past or current complications (Munjanja et al., 1996). The country has made enormous progress in maternal and child health and is considered among the few countries that have

achieved the 5th maternal health-related MDGs (Munjanja et al., 1996), although the maternal mortality ratio is still high at 203 deaths per 100,000 live births (National Institute of Statistics of Rwanda, 2021). Improved access and coverage of antenatal care have almost certainly played an important role in improving maternal and newborn health in Rwanda. A total of 98% of women attend at least one ANC visit. However, only 47% of women complete the 4 ANC standard visits, and 56% of women go for their first visit before the 4th month of pregnancy (National Institute of Statistics of Rwanda, 2021).

In November 2016, the WHO published a new Antenatal Care guideline that recommends 8 visits or contacts with a trained health professional during pregnancy (WHO, 2016). The national guideline for ANC in Rwanda is based on the 2001 WHO model of 4 focused Antenatal Care visits for normal pregnancies. Standard ANC visits are provided at the health center level. District hospitals are concerned with gynecological consultations for women with diagnosed complications and referrals from health centers. Rwanda Demographic and Health Survey have consistently shown that there are no major geographical differences in key reproductive health indicators apart from rural-urban patterns ((National Institute of Statistics of Rwanda, 2006; National Institute of Statistics of Rwanda, 2011; Rwabufigiri et al., 2016).

Although Rwanda has followed the previous WHO model of ANC, which recommends one visit during each trimester of gestation and a final visit immediately preceding delivery for women without pregnancy-related complications or risk factors, still only a few proportions of pregnant women make all 4 recommended visits during pregnancy (Hitimana et al., 2018). The 2019-2020 RDHS results showed that practically all the Rwandan women (98%) who gave birth in the 5 years preceding the survey received ANC from a trained health professional at least once for their last birth. Only 47% of women had four or more ANC visits (National Institute of Statistics of Rwanda, 2021).

At Musanze health center, 178 pregnant women attended an ANC visit for the first time. Of the 67 women who started their ANC before 12 weeks of pregnancy (1st ANC standard visit) from January 2021 to December 2021, only 29 (43.2%) have completed their 4th ANC standard visit (Ministry of Health Rwanda, 2019). Therefore, the current study aimed to determine factors associated with discontinuing four standard antenatal care visits in the Musanze sector.

Materials and Methods

Study design and period

The cross-sectional study design was employed to assess factors associated with discontinuing four standard antenatal care visits. The study was conducted in December 2021.

Population

The population was all pregnant women who attended Antenatal Care (ANC) services at Musanze health center, while the study population was pregnant women who attended ANC services in the 1st trimester of pregnancy at Musanze health center and were supposed to complete the 4th ANC standard visit from January 2021 to December 2021. The population was all pregnant women who attended Antenatal Care (ANC) services at Musanze health center, while the study population was pregnant women who attended ANC services in the 1st trimester of pregnancy at Musanze health center and were supposed to complete the 4th

ANC standard visit from January 2021 to December 2021.

Inclusion and exclusion criteria

Pregnant women who attended ANC in the 1st trimester of pregnancy (less than 3 months of gestational age) and who were expected to complete the 4th standard ANC visit from January 2021 to December 2021 were enrolled in the study. Pregnant women who completed 4 ANC standard visits and those who did not complete 4 ANC standard visits but who were supposed to complete the 4th ANC standard visit from January 2021 to December 2021 were recruited to participate in the study. Pregnant women who visited an ANC service having more than 3 months of gestational age and pregnant women who were not supposed to complete 4 standard ANC visits from January 2021 to December 2021 were excluded from the study.

Sampling methods

Nurses working at Musanze health center and pregnant women who completed 4 ANC standard visits from January 2021 to December 2021 and those who were supposed to complete 4 ANC standard visits from January 2021 to December 2021 but who failed to attend the 4th ANC visit in the study period were enrolled in the study. The study respondents were recruited using a purposive sampling technique. Pregnant women who met the study criteria during the study period were recruited for the study.

Sample size

The study enrolled all nurses working at Musanze health center and all pregnant women who completed 4 ANC standard visits from January 2021 to December 2021, as well as pregnant women who were supposed to complete 4 ANC standard visits from January 2021 to December 2021 but failed to attend the 4th ANC visit in the study period. Data were collected on 67 pregnant women and 8 nurses at the Musanze health center. A significant level of 0.05 with a 95% confidence interval (CI), a maximum acceptable marginal error of 5%, and a non-response rate of 10% were used to obtain credible results.

Study tools

Data were collected using an interview-administered questionnaire that was standardized and pretested. Data collection tools were prepared in English and then translated into Kinyarwanda. Data were collected by the researchers themselves. Questionnaires were distributed to pregnant women at their homes. Nurses were given a questionnaire during pause time. The ANC register was used to identify the names and residences of women fulfilling the study enrollment criteria. The researchers made a list of women who fulfilled the study criteria. The list helped reach all study participants. Arriving at the home of the study participant, the client card was reviewed to verify important information regarding the study's enrollment criteria. The enrolled mothers were physically reached with the help of a community health worker. The pregnant mothers who were missed at home were given an appointment to return when they would be available.

Variable and measurements

Dependent Variable

Discontinuing four Antenatal Care (ANC) standard visits

Independent Variables:

The number of ANC visits

One visit, two visits, three visits, and four visits

Visit of a community health worker to the pregnant women

The community health worker (CHW) is expected to visit every pregnant woman in her village to deliver a message related to the health of pregnant women, including nutrition, the well-being of the pregnant woman, and birth preparation activities. The CHW is expected to visit the pregnant mother once in every trimester of pregnancy or more; at least three visits are required during the nine-month pregnancy period.

Community health worker to remind the pregnant mother to attend the next ANC appointment

When the pregnant woman is registered in the rapid SMS system, the community health worker gets an SMS on the telephone indicating the mother should remind the date of the next ANC appointment. It is with this information that the CHW visits the pregnant woman to remind her about the next ANC appointment.

Reason for not completing 4 ANC standard visits

Forgot the next appointment; was busy with daily activities; delivered before the last appointment; and lacked knowledge on the role of each visit.

Perception of health providers on the reason for discontinuing 4 standard ANC visits

Poor design of ANC visit appointments, CHWs who do not visit mothers to remind them to attend the next appointment, mothers who lie about the date of the last amenorrhea, neglect to use a gravimeter for estimating the gestational age, and a lack of information on the role of ANC visits

Data Analysis

Data were entered in SPSS statistical software version 25 for analysis. The descriptive statistics of numerical variables were presented using frequency and percentage and displayed in tables. Binary logistic regression analysis was used to evaluate the association between dependent and independent variables and to identify variables for multivariable analysis with a p-value <0.05 to predict the association of explanatory variables. The multivariable logistic regression model was applied by the backward elimination stepwise method. The crude and Adjusted Odds Ratio (COR and AOR) results together with their corresponding 95% confidence intervals and a computed p-value <0.05 were considered to be predictive candidate variables.

Results

Age of the interviewed women

The results show that age has a significant impact on four antenatal care completions. Despite the fact that pregnant women visit an ANC service in the first trimester of pregnancy, the older the mother gets (43%), the greater the chance of failing to complete four rounds of antenatal care (Table 1).

Table.1. Age distribution of study participants.

Age, 5 year groups	Frequency	Percentages
15-19	2	3%
20-24	7	11%
25-29	13	19%
30-34	16	24%
35-39	29	43%
40-44	0	0%
45-49	0	0%

The number of antenatal care visits attended by the study participants.

Table 2 shows that almost all mothers had at least two antenatal care (ANC) visits. Of the total, 51% did two visits and 40% did three visits. The number of ANC visits attended could be associated with the number of visits by a Community Health Worker (CHW) aiming to deliver the message related to ANC profits for pregnant women. The study shows that 27% of respondents declared that they were visited by a CHW one or two times, whereas 54% responded that they were visited by a CHW three or more times.

Table.2. Frequency of antenatal care visit

Total antenatal care visit done by a mother	Frequency	Percentages
1 visit	6	9%
2 visits	34	51%
3 visits	27	40%
How many times have you been visited by a CHW		
Any visit	13	19%
Less or equal to 2 visits	18	27%

3 or more	36	54%
45-49	0	0%

Suggested reasons for discontinuing 4 Antenatal Care standard visits

The study showed that 36% of the respondents thought that 2 or 3 antenatal care (ANC) visits are enough for a pregnant mother, compared to 6% and 21% who forgot to attend the next ANC appointment and delivered before the last ANC appointment, respectively. Among the respondents, 57% said that they had been reminded by a CHW to attend the next ANC visit appointment (Table 3).

Table.3. Proposed reasons of not achieving 4 antenatal care standard visits

Reasons of not completing 4 antenatal care visits	Frequency	Percentage		
I forgotten the next appointment	4	6%	6%	
I thought 2 or 3 visits are enough		36%	24	
I was busy at the day of ANC appointment	8	12%		
I delivered before the last ANC appointment	14	21%	19%	
Have you been reminded by a CHW to attend the next ANC visit appointment			Frequency	Percentage
Yes			38	57%
No			29	43%

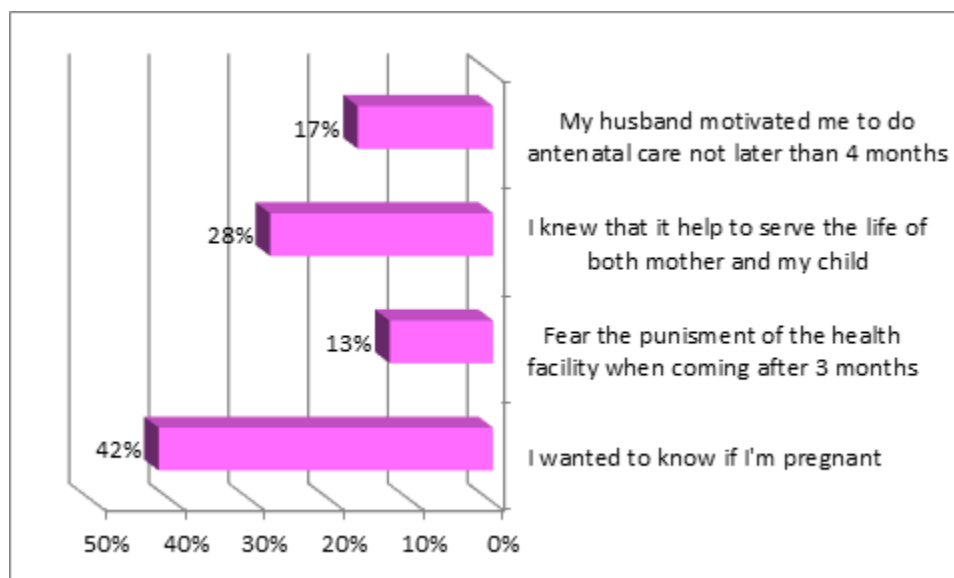
The study shows that 42% of respondents were interested to know if they are pregnant when they visited ANC service for the first time whereas 13% said that they went for ANC service because they feared the punishment imposed on the mother who visit ANC service after 3 months of pregnancy. 17% of respondents answered that they attended ANC in the 1st trimester of pregnancy because they were motivated by their husbands to attend ANC early in the first trimester of pregnancy (Fig.1). Fig.1. Fig.1. Suggested reasons for attending antenatal care service before 3 months of pregnancy

The study revealed that 37% of nurses responded that the cause of discontinuing four ANC is due to mothers who lie ANC service provider at the gestational age; 13% suggested that the issue of not achieving four standard ANC visits is due to the poor design of ANC visit appointments, a lack of knowledge on the role of four standard ANC visits, and CHWs who do not remind mothers to attend the next ANC visit appointments (Fig. 2).

Fig.2. Perception of health providers on the reasons for not achieving 4 ANC standard visits

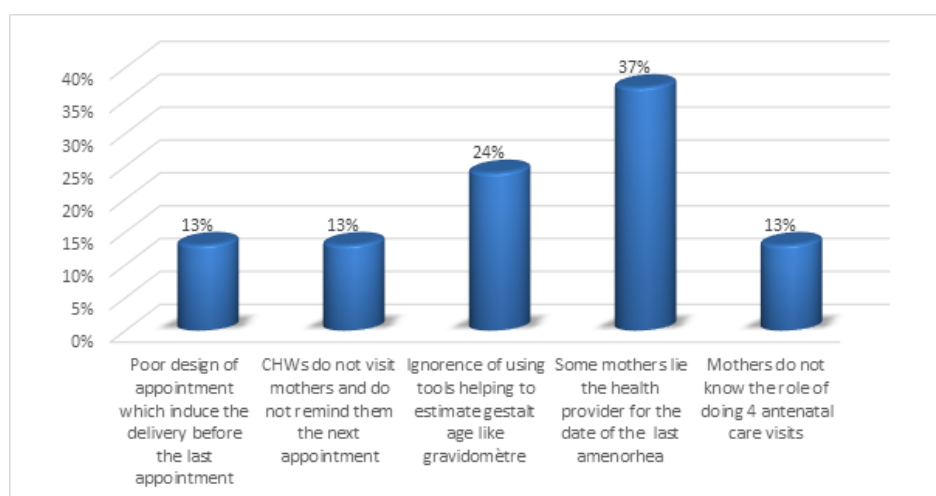
Factors associated with discontinuing four standard Antenatal Care standard visits

The multivariable analysis of this study showed seven factors associated with discontinuing four standard antenatal care (ANC) visits. The respondents who were not visited by a community health worker (CHW) were 2.6 times more likely to not complete four standard ANC visits as compared with



their counterparts (AOR, 2.6; 95% CI: 1.4, 4.7, $p < 0.001$). The variable of being visited by a CHW was a statistically significant variable associated with discontinuing 4 standard ANC visits (AOR=2.6, 95% CI, 1.4, 4.7, $p < 0.001$) for respondents who were not visited and (OAR=1.9, 95% CI, 1.12, 3.33, $p < 0.002$) for respondents who reported to be visited one or two times.

The variable outlining the reasons for not completing four ANC standard visits reported two factors that are strongly associated with discontinuing four ANC standard visits. Those include the respondents



who reported a lack of knowledge on the role of attending ANC services (OAR=1.9, 95% CI, 1.1, 3.1, $p < 0.001$) and the respondents who thought that doing one or two visits is enough (AOR=1.2, 95% CI, 0.7, 1.6, $p < 0.001$). Also, delivery before the last ANC appointment (AOR=0.1, 95% CI, 0.02, 0.48, $p < 0.002$) and thinking that two or three visits are enough (AOR=0.6, 95% CI, 0.3, 0.8, $p < 0.003$) were found as factors significantly associated with discontinuing four ANC standard visits. In this study, the variable of reminding the pregnant women to attend the next ANC appointment was 4.4 times more likely to be a factor associated with discontinuing 4 ANC standard visits (AOR=4.4, 95% CI, 1.1, 17.2, $p < 0.001$) (Table 4)

Table 4 Factors associated with discontinuing four Antenatal Care standard visits in Musanze health center in 2021 (N=67).

Variables		Discontinuing 4 ANC standard visits	COR[95% CI]	AOR [95% CI]	p-Value	
		Yes	No			
Pregnant women visited by CHW	Visited ≥ 3 times	54	13	1	1	
	Visited ≤2 times	49	18	2.3(2.0, 2.6)*	1.9(1.12, 3.33)**	0.002
	Not visited	31	36	2.4(2.1, 2.7)*	2.6(1.4, 4.7)**	0.001
Reason of not completing 4 standard ANC visits	Forgotten appointment	63	4	1	1	
	Think 1 or 2 visits are enough	17	50	1.4(1.2, 1.5)*	1.2(0.7, 1.6)**	0.001
	Think 2 or 3 visits are enough	43	24	0.39(0.33, 0.34)*	0.6(0.3, 0.8)**	0.003
	Busy at the day of appointment	59	8	0.52(0.47, 0.56)*	0.7(0.4, 1.1)	
	Delivered before the last appointment	53	14	0.39(0.27, 0.53)*	0.1(0.02, 0.48)**	0.002
	Lack of knowledge on the role of ANC	11	56	2.2(1.8, 2.9)*	1.9(1.1, 3.1)**	0.001
Have been reminded by CHW to attend ANC appointment	Yes	38	29	1	1	
	No	16	51	10(7.1, 14.0)*	4.4(1.1, 17.2)**	0.001

Key -*=Statistically significant at binary regression, 1=Reference group, CI= Confidence Interval, COR= Crude Odds Ratio, AOR= Adjusted Odds Ratio, CHW=Community Health Worker, ANC= Antenatal Care. DISCUSSION

Using the opinion of service providers to find out the reasons for the reluctance of women to complete the fourth Antenatal Care (ANC) standard visit, it was found that 37% of health providers responded that the cause of discontinuing the four ANC standard visits is due to mothers who lie to the ANC service provider on the gestational age, and 13% suggested that the issue is due to poor design of the ANC appointment, a lack of knowledge on the role of the four ANC standard visits, and CHWs who do not remind mothers to attend the next ANC appointments (Lucia et al., 202).

The study found that one of the biggest reasons for women's reluctance to complete the four standard ANC visits is due to their ignorance of the role of these visits. This is explained by some of them who responded that they believe that one or two ANC visits are sufficient and others who need to be reminded of the date of the ANC visit appointment because they are busy. The study showed that the husband should play an important role in motivating and reminding the wife to attend different ANC appointments (Teasdale et al., 2021). In this study, it was shown that it is necessary to raise awareness among pregnant women about the importance of doing 4 ANC standard visits for the health of the mother and the fetus. The awareness of the health benefits of 4 standard ANC should be created for the husband as well, not just for the wife. It is the role of health providers and health professionals in the community to mobilize the population on the importance of attending 4 standard ANC visits (Manyeh et al., 2020).

In this study, 36% of the respondents thought that 2 or 3 visits are enough for a pregnant mother, 6% said that they forgot to attend the next ANC visit appointment, and 21% said that they gave birth before the last ANC visit appointment. Among the respondents, 57% confirmed that they have been reminded by a CHW to attend the next ANC visit appointment. These results are similar to Frumence's study, which showed that several cultural factors, including religion, might negatively affect the early attendance of ANC visits and the identification of pregnant women by community health workers in the community (Frumence et al., 2019).

Regarding the reasons which pushed the pregnant women to attend ANC visits in the first trimester of pregnancy, 42% of the respondents reported that they wanted to know if they were pregnant; 13% attended early because they feared the punishment imposed on pregnant women who attend ANC services for the first time having a pregnancy of more than three months; and 17% declared that they attended ANC early because they were motivated by their husband to attend ANC not later than 3 months of pregnancy. This finding is in agreement with Warri and George's study, which showed that pregnant women lack information on the purpose of early attendance at ANC. In their study, Warri and George said that health facility barriers as well as socio-cultural beliefs have significant influences on the timing of antenatal care initiation (Warri & George, 2020).

On the level of the number of ANC visits attended by respondents, 51% of the respondents said that they attended two ANC visits, and 40% reported that they attended three ANC visits. This study showed that the number of ANC visits attended by respondents increased for pregnant women who were reminded by a community health worker (CHW) to attend the next ANC visit. Therefore, the reminder message of the CHW has a significant effect on increasing the number of ANC visits for pregnant women. This study's results are similar to the findings of the study conducted by Javanparast et al. (2018), which indicated that CHWs have a role in improving the level of access to health services (Javanparast et al., 2018).

Regarding the factors associated with discontinuing 4 standard ANC visits, it was shown that the number of Community Health Worker (CHW) visits negatively affects the achievement of 4 standard ANC visits.

The factor of not having been visited by CHW at any time was significantly associated with arriving at the 4th ANC standard visits $p < 0.001$. The factor of being visited by a CHW less than two times was found to be associated with a low level of 4th ANC standard visit attendance $p < 0.002$ whereas pregnant women who were visited regularly (3 or more times) have shown a positive association for achieving four ANC standard visits.

In this study, the factor of thinking that one or two ANC visits $p < 0.001$ and the factor of lacking the knowledge $p < 0.001$ are associated with discontinuing four standard ANC visits. Also, delivery before the date of the next ANC visit appointment $p < 0.002$ and pregnant women who thought that doing two or three ANC visits $p < 0.003$ were approved as factors associated with a negative impact on completing 4 standard ANC visits. However, being busy on the day of the ANC visit was not associated with a low level of attendance at the 4th ANC standard visit. According to these findings, reminding pregnant women to attend the next ANC visit appointment was a factor statistically associated with discontinuing 4 ANC standard visits $p < 0.001$.

Conclusion

In this study, health providers responded that the problem of not achieving 4 standard antenatal care (ANC) visits is due to mothers who lie about the date of their last amenorrhea (37%), poor design of the next ANC appointment (13%), lack of knowledge on the role of doing 4 standard ANC (13%), and Community Health Workers (CHW) who do not remind pregnant mothers of the day of their ANC appointment (13%). Modifiable factors like pregnant mothers who do not get visited by CHW, pregnant women who are not reminded on the day of their ANC visit appointment, a lack of knowledge on the role of ANC, thinking that one or three visits are enough, and mothers who deliver before their last ANC appointment were significantly associated with not achieving 4 standard ANC visits.

Limitations

As this study used the quantitative data collection method, it lacks the depth to identify the reasons behind associated factors for not attending 4 Antenatal care standard visits.

Acknowledgments

The present research work was undertaken by authors in collaboration with the authority of Musanze who facilitated the study; this is gratefully acknowledged. The opinions and conclusions presented in this paper are those of the authors and do not necessarily reflect the views of the sponsoring organization.

Author contribution

NIZEYIMANA Fidele has made substantial contributions to the conception or design of the work and to the acquisition, analysis, and interpretation of data for the work. Nkurikiyintwali Jean Marie Vianney, Singirankabo Vital, Mutabazi Placide, and Nderelimana Olivier have participated in data collection and revised the draft for the final copy. Muhammad Akram and Walaa Fikry Elbossaty have drafted the work or critically revised it for important intellectual content.

Conflicts of interest

There are no conflicts of interest to declare.

References

- Nasloon, A., Iffat, E., Souha, A. & Fatima, A. (2020). Antenatal Care Initiation Among Pregnant Women in the United Arab Emirates: The Mutaba'ah Study. *Front. Public Health* 8:211. doi: 10.3389/fpubh.2020.00211, 50-62.
- Alkema, L., Chou, D., Hogan, D., Zhang, S., Moller A-b., Gemmill, A., Fat, D.M. & Boerma, T. . (2015). Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: a systematic analysis by the UN maternal mortality estimation inter-agency Group . *Lancet* 67(36), 1-13.
- Prata, N., Sreenivas, A., Greig, F., Walsh, J.& Potts, M. . (2010). Setting priorities for safe motherhood interventions in resource-scarce settings. *Health Policy* 9(4), 1-13.
- Carroli, G., Rooney, C. & Villar, J. . (2001). How effective is antenatal care in preventing maternal mortality and serious morbidity? An overview of the evidence . *Paediatric Perinatal Epidemiology*;15 (1), 1-42.
- Carroli, G., Villar, J., Piaggio, G., Khan-Neelofur, D., Gulmezoglu. M., Mugford, M.,Lumbiganon, P., Farnot, U. & Bersgjo, P. . (2001). Group WHO Antenatal Care Trial Reasrach Group. WHO systematic review of randomised controlled trials of routine antenatal care. *Lancet* 357(9268), 156-170.
- Jo, Y., Alland, K. & Ali, H. et al. . (2019). Antenatal care in rural Bangladesh: current state of costs, content and recommendations for effective service delivery. *BMC Health Serv Res* 19(861). <https://doi.org/10.1186/s12913-019-4696-7>, 307-321.
- WHO. (2016). WHO guidelines for the treatment of *Treponema pallidum* (syphilis) . Geneva: World Health Organization. (<http://www.who.int/reproductivehealth/publications/rtis/syphilistreatment-guidelines/>).
- Hijazi, H. H., Alyahya, M. S., Sindiani, A. M., Saqan, R. S. & Okour, A. M. . (2018). Determinants of antenatal care attendance among women residing in highly disadvantaged communities in northern Jordan: a cross-sectional study. *Reproductive health*; 15(1). <https://doi.org/10.1186/s12978-018-0542-3>, 106-127.
- Munjanja, S.P., Lindmark, G. & Nyström, L. . (1996). Randomised controlled trial of a reduced visits programme of antenatal care in Harare, Zimbabwe. . *Lancet* 34(8), 364–369.
- National Institute of Statistics of Rwanda (NISR) [Rwanda] Ministry of Health (MoH) [Rwanda] and ICF International. (2021). Rwanda Demographic and Health Survey 2019/2020. Kigali: NISR.
- WHO. (2016). WHO Recommendations on Antenatal Care for a positive pregnancy experience . Geneva, Switzerland: WHO.
- National Institute of Statistics (NISR) [Rwanda] and ORC Macro . (2006). Rwanda Demographic and Health Survey 2005. Kigali: NISR.
- National Institute of Statistics of Rwanda (NISR) [Rwanda] Ministry of Health (MoH) [Rwanda]. (2011). Rwanda Demographic and Health Survey 2010. 2011. Kigali: NISR.
- Rwabufigiri, B.N., Mukamurigo, J., Thomson, D.R., Hedt-Gautier, B.L. & Semasaka, J.P.S. . (2016). Factors Associated with Postnatal Care Utilization in Rwanda: A Secondary Analysis of 2010 Demographic and Health Survey Data. *Biomed Central Pregnancy and Childbirth* 16(1), 1-8.
- Hitimana, R., Lindholm, L., Krantz, G., Nzayirambaho, M. & Pulkki-Brännström, A.M. . (2018). Cost of antenatal care for the health sector and for households in Rwanda . *BMC Health Services Research*, 18(1), 262. doi:10.1186/s12913-018-3013-1, 262-288.
- Ministry of Health Rwanda: Rwanda Integrated Health Management Information System (HMIS) . (2019). Maternal health. Kigali: <https://hmis.moh.gov.rw/hmis/>.

Lucia ,D., Masane, L., Rachel, T. & Lufuno, M. (2021). Attitudes of Pregnant Women Towards Antenatal Care Services Provided in Primary Health Care Facilities of Mbombela Municipality, Mpumalanga Province, South Africa. *The Open Public Health Journal* 13 (21), 569-575.

Teasdale, C., Geller, A., Shongwe, S., Mafukidze, A., Choy, M. & Magaula, B, et al. (2021). Patient feedback surveys among pregnant women in Eswatini to improve antenatal care retention. *PLoS ONE* 16(3), 130-151. e0248685. <https://doi.org/10.1371/journal.pone.0248685>.

Manyeh, K., Amu, A., Williams, J.& Gyapong, M. . (2020). Factors associated with the timing of antenatal clinic attendance among first-time mothers in rural southern Ghana. *BMC pregnancy and childbirth* 20(1), 47-66. <https://doi.org/10.1186/s12884-020-2738-0>.

Frumence, G., Goodman, M. & Chebet, J.J. et al. (2019). Factors affecting early identification of pregnant women by community health workers in Morogoro, Tanzania. *BMC Public Health* 19 (895), 231-254. <https://doi.org/10.1186/s12889-019-7179-1>.

Warri, D.& George, A. (2020). Perceptions of pregnant women of reasons for late initiation of antenatal care: a qualitative interview study. *BMC Pregnancy Childbirth* 20 (70) , 178-192. <https://doi.org/10.1186/s12884-020-2746-0>.

Javanparast, S., Windle, A., Freeman, T. & Baum, F. (2018). Community Health Worker Programs to Improve Healthcare Access and Equity: Are They Only Relevant to Low- and Middle-Income Countries? *International journal of health policy and management* 7(10), 943–954. <https://doi.org/10.15171/ijhpm.2018.53>.

Guidelines FOR AUTHORS

Editorial Policy and Copyright

The Nkumba International Research Journal (NIRJ) aims at disseminating research findings and is open to original manuscripts that are in any discipline of research ranging from biophysical to psychosocial. It is, therefore, unrestricted and unlimited to any reader and contributor. All materials submitted must be original unpublished work and should not be under consideration for publication elsewhere. All manuscripts shall undergo a stringent peer-review process and only papers deemed to be of the required quality and relevance will be published.

Types of Paper for Publication

- a. Research Papers are fully documented and interpreted accounts of significant findings of original research, and should not normally exceed 5000 words (less 350 words for each normal-sized figure or table included). Manuscripts exceeding 6000 words will not be accepted for review.
- b. Practical Papers provide new information on subjects of interest to professionals in practice, and should not normally exceed 2500 words. Manuscripts exceeding 3500 words will not be accepted for review.
- c. Brief Communications are fully documented, interpreted accounts of significant findings of original research. As compared to research papers they normally reflect a tightly defined piece of work or works confined to a single point or issue of progress, such as an unusual occurrence, an interesting observation, or a topical and timely finding. No sub-headings or subdivisions are necessary. They should not normally exceed 2500 words. Manuscripts exceeding 3500 words will not be accepted for review. An abstract of not more than here lines is required.
- d. Review Papers are critical and comprehensive reviews that provide new insights or interpretation of the subject through thorough and systematic evaluation of available evidence. They should not normally exceed 8000 words. Manuscripts exceeding 10,000 words will not be accepted for review.
- e. Discussions should normally take the form of a 'letter' and present significant comments or questions about a work published in the Journal. A discussion would normally include substantiated disagreement with, or alternative interpretation of, one or more aspects of a paper. It would also normally discuss associated implications for the conclusions reached. Authors of potential discussions are encouraged to enter into communication with the Editor-in-Chief before preparation or submission of text. While there is no word limit, discussions should be brief and tightly focused. A discussion, if accepted, will normally be shared with the authors of the paper concerned who will be provided opportunity to respond.

- f. Book reviews provide information for its readers on a recently-published book that is within the scope of the journal. They normally provide both an overview and critical commentary, to assist readers in determining the relevance of the book to them. Book reviews should not exceed 3000 words. Authors of book reviews should have no conflict of interest, such as recent collaboration with or authorship with, the authors or editors of the book they are reviewing.
- g. Editorials provide commentary, by an editor or a recognized authority, on an issue of wide interest. They may precede an event (such as an international development policy conference); or be in response to a development (for example to a major international policy change or pandemic disease). Authors of potential Editorials are encouraged to enter into communication with the Editor-in-Chief before preparation or submission of text. Editorials should not normally exceed 700 words and are limited to a maximum of 1500 words.

Preparation and Submission of Manuscripts

a. The Article

All manuscripts are to be in English, and should be submitted in electronic form to the web-site that will be updated from time to time. The preferred format for electronic versions is Microsoft Word, though other word-processing packages in PC or Macintosh formats may be accepted. Do not supply the typescript as a PDF. Authors should not add their own macros. Please supply only the final version of the file (with no hidden text), to avoid any risk of old versions of the text being used in error.

b. Preparation of Typescripts

Authors are strongly advised to submit manuscripts online which will permit quicker and efficient processing of the manuscript. Typing should be on a word processor with all material double-spaced throughout the text, one side of letter-sized paper, with suitably wide margins. All pages should be numbered consecutively beginning with page 1, the title page. Include tables, figures legends, footnotes, and references lists.

The first page should bear the title with a concise running headline of not more than 35 characters inclusive of spaces, and names and academic contact(s) of the author(s). If the resent contact of any author is different, it should be added as a footnote. Telephone and facsimile numbers and e-mail address for the corresponding author should also be provided as a footnote.

Full papers should generally be arranged in the following sequence: Title; Authors; Abstract; Key Words; Introduction; Materials and Methods; Results with Tables and Figures; Discussion; Conclusion and Recommendations; Acknowledgements; and References Cited. The Introduction should describe the background of the work and its aims. The Materials and Methods should provide a brief description of the methods/techniques used (the principles of these methods should not be described if readers can be directed to easily accessible references or standard texts). Results and Discussion should made clear presentation of experimental results obtained, highlighting any trends or points of interest in the discussion. The Conclusion should present a brief explanation of the significance and implications of the work reported. Recommendations should focus on the usefulness and applicability of the findings.

Within sections, subdivision should not normally exceed three grades; a decimal number classification of headings and subheadings should not be used. Alphabet, Arabic, and Roman numerals should be used. All pages should be numbers. Footnotes should be used only if essential. Scientific names of animals and plants should be given in full, i.e. common name (Nile Perch) and Latin name (*Latesniloticus*) with authority (P). Italics are required for species names that are written in full the first time they appear in the text (e.g. *Latesniloticus* P.) but abbreviated at subsequent mention (e.g. *L. niloticus*). Spelling should be in English (as distinct from American English) throughout except in quotations and references.

Information in tables should not be duplicated in figures, and vice-versa. Repetition of table headings and figure legends in the text should be avoided.

c. The Abstract

The abstract should be concise and a summary of the significant findings of the paper. It should contain approximately 200 words, and should accompany each article. Lastly, it should be followed by a list of not more than six key words.

d. Figures (Graphics)

All figures should be embedded correctly positioned within the Word files, and should also be supplied as separate graphics files in their original formats. JPEG, PNG, EPS, TIFF or PSD formats are preferred. Use a minimum of 300dpi. Figures should appear in numerical order, be described in the body of the text and be positioned close to where they are first cited. Each figure should have a caption which describes the illustration, and that can be understood independently of the main text. The caption should be given in the text, and not on the figure itself.

Make sure all figures and tables will fit inside the text area. Because figures may be resized in the course of production please use scale bars and not magnification factors. The journal is printed in black and white, with colour graphics in the online version.

e. Tables

The tables should be submitted as editable text and not as images. Number tables consecutively in accordance with their appearance in the text and place any table notes below the table body. Be sparing in the use of tables and ensure that the data presented in them do not duplicate results described elsewhere in the article. Please avoid using vertical rules. Footnotes to the tables should be indicated by superscripts and typed at the bottom of the tables.

f. Metric Units and Symbols Metric units should be used.

Symbols for physical measurements should be in accordance with the System International d'Unites (SI), e.g. mm, mm², mg l⁻¹, etc. In mathematical expression, please use a single letters for variables, qualifying them with subscripts if required, e.g. length L, fork length L₁, standard length L_s, etc. The 24-hour clock should be used for time of day, e.g.

1545 hours not 3:45 p.m. Calendar dates should be as e.g. 20 October 2019. In the text, one-digit numbers should be spelt out unless they are used with units of measure, e.g. six boxes and 6 cm. Numerals should be used for all number of two or more digits, e.g. 29 boxes.

g. Statistics

Statistics should be presented as follows: name of test, number of observations or degree of freedom, and probability level. Values of text statistics are not required.

h. Citations in text

Use surname of author and year of publication: Jones (2002) or (Jones 2002). Insert initials only if there are two different authors with the same surname and same year of publication. Two or more years in parentheses following an author's name are cited in ascending order of year, and two or more references published in the same year by the same author are differentiated by letters a, b, c, etc. For example: Brown (1999, 2002, 2003a, b). Different references cited together should be in date order, for example: (Smith 1959; Thomson & Jones 2008; Green 2015). The abbreviation "et al." should be used in the text when there are more than two co-authors of a cited paper. If a paper has been accepted for publication but has not been published the term "(in press)" should be used instead of a date. If a paper has been submitted but not definitely accepted the term "(submitted)" should be used. If the paper is still being prepared the term "(in preparation)" should be used.

Ensure that surnames, journal/book titles, publication year and pagination are all correct. Please include Digital Object Identifiers (DOIs) where available to link references to the source material. References should be listed alphabetically at the end of the paper. Although "et al." is preferable in the text, in the list of references all authors should be given as in the following list:

i. List of References

Journal reference style - Note that to unambiguously identify articles published in a journal, the issue number, the volume number, and the pages are needed.

Zeng R. J., Lemaire R., Yuan Z. & Keller J. (2004). A novel wastewater treatment process: simultaneous nitrification, denitrification and phosphorus removal. *Water Science and Technology*, 50 (10), 163-170.

Book reference styles:

(i) Article in compilation; (ii) Multi-author work; (iii) Standard reference; (iv) Report; (v) Thesis:

- i. McInerney M. J. (1999). Anaerobic metabolism and its regulation. In: *Biotechnology*, J. Winter (ed.), 2nd edn, Wiley-VCH Verlag, Weinheim, Germany, pp. 455-478.
- ii. Henze M., Harremoës P., LaCour Jansen J. & Arvin E. (1995) *Wastewater Treatment: Biological and Chemical Processes*. Springer, Heidelberg.
- iii. *Standard Methods for the Examination of Water and Wastewater* (1998). 20th edn, American Public Health Association/American Water Works Association/Water Environment Federation, Washington DC, USA.
- iv. Sobsey M. D. & Pfaender F. K. (2002). *Evaluation of the H₂S method for Detection of Fecal Contamination of Drinking Water*, Report WHO/SDE/WSH/02.08, Water Sanitation and Health Programme, WHO, Geneva, Switzerland.
- v. Bell J. (2002) *Treatment of Dye Wastewaters in the Anaerobic Baffled Reactor and Characterisation of the Associated Microbial Populations*. PhD thesis, Pollution Research Group, University of Natal, Durban, South Africa.

Online references - These should specify the full URL for the reference and give the date on which it was consulted. Please check again to confirm that the work being cited is still accessible:

Alcock S. J. & Branston L. (2000). SENSPOL: Sensors for Monitoring Water Pollution from Contaminated Land, Landfills and Sediment. Retrieved 22nd July 2005 from: <http://www.cranfield.ac.uk/biotech/senspol/>

References in languages other than English - These should be accompanied by an English translation of the article title:

Barjenbruch M., Erler C & Steinke M. (2003). *Untersuchungen an Abwasserteichanlagen in Sachsen-Anhalt im Jahr 2003 (Investigation on wastewater lagoons in Saxony-Anhalt in 2003)*, Report for the Environment Ministry of Saxony-Anhalt, Magdeburg, Germany.

Acceptance of Manuscripts

The DOI is assigned to your paper when the first proof is generated, and it will not change, meaning you can cite an Uncorrected Proof immediately using the DOI.

Procedure for Proofreading

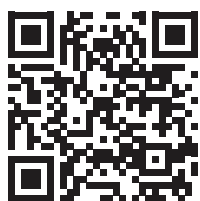
Proofs will be sent by e-mail to the listed corresponding author. Any corrections must be returned within one week of receipt and should only cover typesetting errors. All corrections must be returned to us in one communication. Proofreading is the sole responsibility of the authors.

Circulation of Offprints

Upon publication, the corresponding author will receive an electronic file of the paper.



Nkumba University



27 km along K'la Entebbe Highway, P. O. Box 237 Entebbe (U)
+256 782 485058, +256 701 350389 +256 200 906086
info@nkumbauniversity.ac.ug | www.nkumbauniversity.ac.ug

Kabaka Anjagala Rd, Mengo - Kampala (U)
+256 702 007091, +256 789 073809, +256 200 906086
nu.kampala@nkumbauniversity.ac.ug | www.nkumbauniversity.ac.ug