



Rwanda

Public Health Bulletin

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In this issue

1. Family Planning & Fertility
2. Community Health
3. Occupational Health
4. Malaria
5. Ischemic Encephalopathy



Republic of Rwanda
Ministry of Health

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General Information

In 2019, the Rwandan Ministry of Health, through the Rwanda Biomedical Center (RBC) in collaboration with the Centers for Disease Control and Prevention Foundation and with support from Bloomberg Philanthropies Data for Health Initiative, established a national public health bulletin, The Rwanda Public Health Bulletin.

The Rwanda Public Health Bulletin - is a printed and an open access, peer-reviewed journal, published as the flagship scientific and technical periodical publication by the Rwanda Health Communication Center (RHCC).

Its mission is to serve as a scientific information dissemination platform of national and international significance, mainly in areas related to the Rwanda Ministry of Health's essential mission to strengthen national and local health systems and improve the health of the people of Rwanda.

The aims to bridge the gap in public health information sharing between policy-makers, researchers, health professionals, and practitioners.

The journal accepts articles in English.

Journal abbreviated title : Rw. Public Health Bul.

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Scope

The Rwanda Public Health Bulletin serves as an information sharing platform where public health reports and studies are collected and compiled to inform key policy making procedures. It insures that public health professionals have access to timely and updated research evidence necessary to control and minimize the effect of potential public health threats in the country.

The Rwanda Public Health Bulletin publishes different contents including disease surveillance summaries, public health response guidelines, public health notices, case reports, outbreak reports, original research papers, and policy briefs among others. It generally features issues of importance to its targeted audience.

The Rwanda Public Health Bulletin primarily targets all health professionals and researchers in Rwanda and those in the region at a larger scale.

A new issue is published every semester with supplements and special reports released in between when necessary.

Submission of manuscripts / Editorial process

Manuscripts must be submitted directly to the Manuscript Central, an online submission and peer review system, at: www.rwandapublichealthbulletin.org

Manuscripts may be rejected following rapid review of their compliance to the editorial scope and requirements of the journal. All manuscripts will be sent to three reviewers before being accepted for publication. Articles may be accepted with minor or major revisions. In cases where major changes are suggested, authors will be required to send revised versions of their manuscript as many times as needed to address all recommendations from reviewers and editors.

Under the supervision of the editor-in-chief, managing editors manage the peer-review process, and assess the pertinence as well as the relevance of reviewers' comments. Reviews mainly focus on methodological soundness, novelty, and applicability of results, among other aspects. Accepted manuscripts are subject to professional copy-editing and final PDF proofing. Final proofs are sent to authors for final approval.

Correction and retraction policies

Rwanda Health Communication Center (RHCC) - the publisher - holds fully responsibility to maintain the integrity and completeness of all published contents. Changes to articles after they have been published online may only be made and acceptable under certain circumstances.

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We expect authors to inform the journal of any errors they may notice (or have been informed of) in their published article. For errors in published articles, the publisher will consider correcting the actual article online (XML and PDF). The journal will add a correction notice at the end to explain what has been changed since it was first published and erratum will be made available.

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The Rwanda Public Health Bulletin may consider publishing an Editorial Expression of Concern notice if an article is under investigation. If the journal has a significant concern about the reliability of an article but not enough information to warrant a retraction until an institutional investigation is complete, it might use an expression of concern.

Rwanda

Public Health Bulletin

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CONTENT

FOREWORD

- » Rwanda, Minister of Health06

EDITORIAL

- » Editor-in-Chief07

ORIGINAL ARTICLES

- » Determinants and reasons for low coverage of modern family planning in the Mugonero District Hospital catchment area09
- » Factors associated with preventable hypoxic ischemic encephalopathy in term neonates at Kacyiru district hospital, Rwanda - a retrospective study15
- » Prevalence of occupational noise induced hearing loss among wood and metal workers of Gakiriro, Kigali city.20
- » Medical Citizen Outreach Programs as an RDF Homegrown Solution for Health Challenges in Rwanda26
- » National Study in Rwanda family planning barriers31

POLICY BRIEFS

- » Accelerating Fertility Decline to Trigger the Demographic Dividend in Rwanda33
- » Working with community malaria action teams (CMATs) contributes towards achievement of malaria elimination.37



Dear Readers,

Information sharing is key to successful implementation of public health programs: It is only through timely informed decisions that the health sector can guaranty efficiency and effectiveness of its interventions.

Previous evidences have shown that delays in health communications and lack of updated public health information have in many instances led to scientific baseless decisions, making it hard to address public health threats of big magnitude. Health professionals, researchers, academicians and policy makers therefore need an active information sharing platform, where timely findings are shared.

The Rwanda Public Health Bulletin is coming to serve this purpose, and I would not doubt that this platform will help support to knowledge based decision-making health sector in Rwanda.

On behalf of the Ministry of Health, I would like to commend all efforts behind this initiative and I call upon every member of the Rwanda health sector to contribute to its sustainability.

I look forward to a thriving and growing platform.

A handwritten signature in black ink, which appears to read 'Diane Gashumba'.

Dr. Diane GASHUMBA
Minister of Health, Rwanda

Dear Colleagues,

We are proud and honored to launch the inaugural issue of the Rwanda Public Health Bulletin (RPHB), available in printed and online formats. – Today marks the release of RPHB Vol.1, no.1.

The RPHB is a printed and open access, peer-reviewed journal, publishing scientific and technical periodic publications by Ministry of Health through Rwanda Biomedical Center (RBC). The journal's core mission is to foster information sharing between Rwanda's health professionals, and on the long run serve as a regional public health library. The aims are to contribute to knowledge dissemination and continued professional development of front liner health practitioners in Rwanda and in the region; to bridge the gap in public health information sharing between policy-makers, researchers, health professionals.

Currently, most public health institutions are constantly under pressure to increase the number of publications of their data, and demonstrate the value of their impact to the general public; the journal's efforts will focus on providing space for public health communication. Rwanda has a baggage of important unpublished public health program evaluation reports and research data. Often than not, evidence generation resources and efforts have been duplicated due to lack of public access to existing scientific information.

The RPHB is coming as an information research data sharing platform where, public health reports and studies will be collected and compiled to inform public health evaluators, academicians and researchers in the country. The platform will also serve as reference to health policy making procedures.

The bulletin will publish articles of public health attention These will include letter to editor, disease surveillance summaries, evaluation of public health interventions, public health notices or outbreak reports, case reports, case studies, opinion articles, commentaries, original research papers, review papers, research brief and policy briefs or notes.

Issues under this bulletin will be published twice a year with eventual publications of special issues and supplements. It will be available online at www.rbc.gov.rw/rwandapublichealthbulletin. Being an open access platform, there are no article processing charges.

The editorial policy of RPHB will be guided by the high standards of scientific quality and integrity, professional responsibility, and and human compassion that constitute the Rwanda public health scholarly and ethical legacy. Furthermore, the scientific standards and impact of open-access journals are no different from traditional subscription-based journals; RPHB will undergo the same peer-review process and quality control as would any other scholarly journal.

The RPHB has a strong team of editorial experts from different public health backgrounds. The experience in health research editorship and publication guarantees highly ethical standards and fair peer-review process.

In this first issue we have a range of articles focusing on issues of family planning and fertility, community health, occupational health, malaria, and ischemic encephalopathy among others.

We would like to take this opportunity to acknowledge all of the contributions from authors, reviewers, and the editorial team that have made this first issue possible. We are also grateful for the financial and technical support from CDC-Foundation/Bloomberg Philanthropies Data for Health Initiative.

I am very humbled to serve as the inaugural Editor-in-Chief. Together with editors, we are looking forward to working closely with the fantastic staff at RBC and all editorial board members to ensure a sustained continuation of the RPHB.

Sincerely Yours,

A handwritten signature in black ink, appearing to be 'L. Mutesa'.

Prof. Leon MUTESA, MD, PhD
Editor-in-Chief

Determinants and reasons for low coverage of modern family planning in the Mugonero District Hospital catchment area

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ABSTRACT

Introduction: Effective birth control is a key intervention in developing countries to achieve sustainable development goals. The United Nations (UN) reported that in 2015 the percentage of married couples using any form of contraceptive was 64.0%, and the average in Africa was 33.0%. This study aimed at assessing and determining factors associated with the low uptake of Modern Family Planning (MFP) Methods.

Methods: A mixed method population-based cross-sectional survey; quantitative and qualitative methods were applied. Villages and participants were randomly selected and ethical considerations were respected. Proportions and logistic regression were computed.

Results: Married or cohabitating women were the significant majority in our sample (72.7%). In total, 73.5% had used MFP methods in the past, and 61.3% of them were still using the MFP method. Among MFP methods users, 47.1% experienced side effects and 12.4% discontinued MFP. Over time, 11.8% got pregnant despite using the MFP method. A proportion of 8.5% among respondents missed MFP sessions and 53.0% reported that they would use MFP methods despite the unwillingness of their husbands. Women aged 25-34 years were highly likely to use MFP method (71.0%) and married women (70.5%) were also highly likely to use MFP. Not cohabiting with a partner (aOR=4.4[95% CI:3.855-5.071] was associated with using MFP. Ignorance, religion, unfaithfulness to marriage vow, side effects, poverty, and a lack of MFP for men were reported as the main reasons behind low uptake of MFP.

Conclusion: Side effects and faith are barriers to MFP. Unfaithfulness can jeopardize MFP use. Sensitization to MFP use is needed.

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INTRODUCTION

Birth control is a key intervention to achieve Sustainable Development Goals (SDGs). It can stabilize the discrepancy between demographic growth and natural resources. Failure of birth control is the main contributor to malnutrition and lack of education in large families in developing countries.

Family planning (FP) is a concerning issue worldwide. The United Nations (UN) in 2015, reported that, globally, the percentage of married or partnered women using contraceptive methods of any kind was 64.0% [1]. However, contraceptive use was lower in developing countries (40.0%) and was 33.0% in Africa [1]. Unmet needs of FP is still high. The World Health Organization (WHO) reported that, in 26 countries worldwide, contraceptive prevalence is below 20.0%, and it estimated that there are over 137 million women of reproductive age who do not wish to become

pregnant in the next two years, but are not using any form of FP [2]. Demographic growth is high in developing countries compared to developed countries. For this reason the fertility rates in developing countries is almost double (2.9 per woman) compared to those in developed countries (1.6 per woman) [3]. In some developing countries, the reported fertility rates are more than five births per woman [3].

Researchers reported that poverty could jeopardize the access to reproductive health and the use of MFP [3]. Most East African countries are in a similar situation i.e. there is low FP coverage. For instance, in Tanzania, the use of MFP by married women was 32.0% in 2016 [4]. In Kenya the use of any FP methods among women of reproductive age was 42.6% while the use of MFP was 39.1%; the use of any FP method by married women was 58.0% while the use of modern contraceptives by married women was 53.2% [5]. As coverage of FP is low in African countries in general, there are unmet needs.

Potential Conflicts of Interest: No potential conflicts of interest disclosed by all author. **Academic Integrity:** All authors confirm their substantial academic contributions to development of this manuscript as defined by the International Committee of Medical Journal Editors. **Originality:** All authors confirm this manuscript as original piece of work, and has not been published elsewhere. **Review:** All authors allow this manuscript to be peer-reviewed by independent reviewers in a double-blind review process. © **Copyright:** The Author(s). This is an Open Access article distributed under the terms of the Creative Commons Attribution License (CC BY-NC-ND), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. **Publisher:** Rwanda Health Communication Center, KG 302st., Kigali-Rwanda. Print ISSN: 2663 - 4651; Online ISSN: 2663 - 4653. **Website:** www.rwandapublichealthbulletin.org

In East Africa, a systematic review showed that the prevalence of unmet needs for family planning was 16.8% in Kenya, 23.3% in Rwanda, 33.2% in Uganda and 27.8% in Tanzania [4].

Reasons behind the low coverage of MFP in African countries were explored by many authors. Among other social determinants or barriers behind the low uptake of MFP, the fear of side effects, financial issues, socio-cultural norms influencing the family size and misconceptions about MFP were reported as the main causes [6, 7]. Other barriers were identified in different studies including: lack of proper communication between the wife and husband, lack of knowledge of MFP and low accessibility and availability, and religion [7].

In Rwanda, interventions and researches on FP is one of the top priorities. The coverage of FP among married women of reproductive age, using contraceptive methods of any kind, in 2015, was 53.2% while 47.5% were using just MFP methods [8]. In the Western Province, where the Karongi District and Mugonero Hospitals are located, the use of any FP method for spacing and limiting birth among married women in the same period was 50.3% and the percentage of FP satisfied demand of MFP methods in Karongi District was 56.4% [8].

There are identified barriers to MFP methods in Rwanda with side effects being the most important one. Women said that they were more afraid of using MFP methods than getting pregnant [9]. Others believed and reported that it was wrong to use contraceptive methods [10]. Others reported prior religious beliefs as reasons. However, many other reasons remain unknown and should be explored.

The aim of this study is to assess and determine factors associated with the low uptake of MFP methods in the Mugonero Catchment area.

METHODS

Study design: A cross-sectional, population-based survey conducted in the Mugonero DH catchment. Mixed methods (quantitative and qualitative) were applied.

Quantitative survey: A structured questionnaire was used by data collectors to interview participants in 30 selected villages representing Mugonero DH catchment area. Villages and participants were randomly selected.

Qualitative survey: Focus group discussions (FGDs) and in-depth interviews (IDI) were organized in confidential places. Three FGDs were conducted with females and one FGD with males. Three IDI were conducted, two with CHWs and another with a nurse from the health center. An electronic recorder was used for data collection.

Inclusion criteria: Participants in the survey were women (15-49 y/o) who voluntarily consented to be interviewed and who were living in the selected households.

Sample size for quantitative data: The minimum calculated sample size was 304 people. The primary sampling unit was the village. This sample size was distributed across 30 selected villages, using probability proportional to size methods.

Data collection process: Data collectors were trained to use tablets, to become familiar with the quantitative questionnaire, and to consider ethical considerations. Eligible participants were recruited in their household and requested to voluntarily participate in the study after signing the informed consent form.

Statistical methods: STATA 13 software was used for quantitative data analysis and Nvivo10 for qualitative data analysis. Descriptive analysis and associated factors for not using FP were analyzed. We used svy set command, adjusted for recruitment venue, to help consider villages as clusters and, during regression, adjusted for it. Odds ratios (OR) for those currently using MFP were estimated using bivariate analyses. Currently using MFP and associated factors significant at the $p < 0.05$ level in bivariate analysis were included in a multivariable logistic regression model to determine the effect of independent variables to currently using MFP. Variables were retained in the final model when achieving $p < 0.05$ significance. The associated factors behind those currently using MFP were determined using co-variables fitted in the multivariable logistic regression analysis: age, marital status, level of education, occupation and social category. The associations of missing values were assessed by fitting indicator variables for missing values for each variable with the outcome. Understanding the reasons for low coverage by qualitative data.

Ethical considerations: Appropriate measures were taken to ensure survey participant protection, informed consent, voluntary participation in a private place and confidentiality. In addition, a formal review and approval of the instruments were obtained from the Ethics Committee.

RESULTS

Part I. Quantitative results

Table 1 displays social demographic characteristics of respondents. A proportion of 41.8% of participants were aged between 25 to 34 years old. Married or cohabitating women were represented highly (72.7%).

Among all respondents, 89.9% have given birth. By occupation, 87.5% among respondents are farmers/breeders. Most participants had medical insurance; 88.1% were covered by RSSB-Mutuelle de Santé. The median age of the first pregnancy was 20 years old.

The median number of children born, the median number of living children and the median number of preferred children in the household was the same: three.

Table 1: Social demographic characteristics of respondents (N=328)

Social demographic characteristics	N	%
Age group		
15-19	20	6.1
20-24	52	15.9
25-34	137	41.8
35-44	94	28.7
45-49	25	7.6
Marital status		
Single	66	20.1
Married/cohabitating	237	72.7
Divorced/separated	19	5.8
Widowed	6	1.9
Ever gave birth	292	89.9
Education level (Completed)		
None	161	49.1
Primary	126	38.4
Vocational	8	2.4
Secondary	25	7.6
High	8	2.4
Occupation		
Farmer/breeder	287	87.5
Small business	3	0.9
Public servant	14	4.3
Part time worker	9	2.7
Entrepreneur	1	0.3
Jobless	14	4.3
Religion		
Catholic	32	9.8
Protestant	122	37.2
Muslim	2	0.6
Adventist	156	47.6
No religion	1	0.3
Other religion	15	4.6
Medical insurance		
Mutuelle de santé	289	88.1
None	24	7.3
RAMA	15	4.6
Social category cluster		
1	39	12.0
2	112	34.7
3	173	53.1
4	2	0.6
	Median	IQR
Median age of first pregnancy	20	18-22
Median age of first delivery	21	19-23
Median number of born children	3	2-5
Median number of living children	3	2-5
Median number of preferred children	3	3-4

Table 2 displays the awareness and use of MFP among women. Those who have previously used MFP methods were estimated at 73.5%. Among these, 47.1% experienced side effects, 26.1% continued using the same family planning methods despite side effects, 15.9% shifted to another MFP method and 12.4% stopped using MFP method. Among respondents, 47.8% were aware of vasectomy, 44.8% among them would suggest vasectomy to their husbands, whereas 79.3% were aware of tubal ligation. In regards to the duration of MFP, 47.1% would chose to use methods with a duration of greater than 3 years whilst 39.7% would choose to use less than or equal to 3 years. It was estimated that 78.9% were planning to use MFP in the future. With regards to getting pregnant when using MFP over time, 11.8% reported that they got pregnant despite using MFP and 8.5% among respondents reported that they missed MFP products when they were needing them. A proportion of 53.0% reported that they would use MFP methods despite the unwillingness of their husbands.

Table 3 shows the coverage of MFP methods in the Mugonero catchment area. The overall coverage of MFP here was 61.3%.

Table 2: Awareness and use of MFP (N=328)

Characteristics	N	%
Ever heard MFP	315	96.0
Ever heard traditional FP method	112	35.2
Ever used traditional FP method (N=112)	51	45.5
Know that CHWs sensitize on FP	292	89.9
sensitized by Facility Health workers of FP	297	92.2
Ever used MFP	233	73.5
Currently using MFP	185	61.3
Experienced FP side effects	115	47.1
Action taken with FP side effects		
Stopped completely FP method (N=233)	29	12.4
Shifted to other medicines	37	15.9
Continued using the same medicines despite side effects	61	26.1
Experienced abortion	46	16.3
Aware about vasectomy	52	48.7
Can suggest vasectomy to husband	116	44.8
Aware about tubal ligation	253	79.3
Choice of duration of FP		
Less than 3 years duration of FP	129	39.7
More than 3 years duration of FP	153	47.1
None	43	13.2
Can encourage other to use MFP	296	91.1
Planning to use MFP in the future	221	78.9
Got pregnancy despite FP use	33	11.8
Experienced FP method shortage	25	8.5
Can use FP method despite husband willing	170	53.0

By age, 25-34 years old women were more likely to use MFP method (71.0%), whilst married women (70.5%) were more likely to use MFP than unmarried women.

In addition, table 4 describes factors associated with MFP uptake. Age, marital status, age at first delivery, education level, unexpected pregnancy, social cluster, FP side effects and "got pregnant while on MFP" were the variables used to perform a bivariate logistic regression model. In multivariate logistic regression, not living in union (aOR=4.4[95% CI:3.855-5.071] was positively associated with using MFP compared with living in union.

Table 3: Coverage of modern family planning

Characteristics	N	%
Total	185	61.3
Age group		
15-19	1	7.7
20-24	25	55.6
25-34	93	71.0
35-44	56	62.2
45-49	10	43.5
Marital status		
Living in union	160	70.5
Not living in union	25	33.3
Ever gave birth	183	65.6
Education		
Not attended school	97	63.4
Ever attended school	88	59.1
Occupation		
Farmer/breeder	171	64.5
Other occupation	14	37.8
Religion		
Catholic	18	56.3
Protestant	65	58.6
Adventist	90	63.4
Other religions	12	70.6
Medical insurance		
Mutuelle de santé	169	63.3
None	12	57.1
RAMA	4	28.6
UBUDEHE Social category		
1	23	60.6
2	71	70.3
3	90	56.6
Can use MFP without husband will	109	68.1

Table 4: Factors associated with family planning use in Mugonero catchment area

Characteristics	Bivariate			Multivariate		
	cOR	p-value	95%CI	aOR	p-value	95%CI
Age						
15-24	1					
25-49	2.3	0.006	1.274-4.161	1.2	0.455	0.701-2.210
Marital status						
Living in union	1					
Not living in union	4.8	0.000	2.404-9.488	4.4	0.000	3.855-5.071
Age at first delivery						
13-19						
20-32	0.8	0.395	0.457-1.363			
Education level						
Not attended school						
Attended school	0.8	0.418	0.535-1.296			
Unexpected pregnancy						
Yes	1					
No	1.7	0.143	0.837-3.444			
Social cluster						
1	1					
2	1.5	0.295	0.685-3.480			
3	0.8	0.687	0.387-1.868			
4	Omitted					
Experienced FP side effects						
Yes	1					
No	0.6	0.113	0.320-1.128			
Got pregnant while on contraception						
Yes	1					
No	1.5	0.198	0.796-3.008			

Part II. Qualitative results

Knowledge of MFP in the community

Males and females were aware of MFP methods as well as traditional methods.

“For women, there are injections for three months, counting to know fertility days, using five years injection; a common understanding between man and woman considering fertility period, the woman can inform her husband and avoid sexual intercourse to prevent pregnancy”.

Some women reported that if the traditional method is correctly used, the outcome is the same as MFP. It depends on the level of collaboration between man and woman.

Reasons for the MFP program

A disproportionate amount of economic resources versus demographic growth was cited as the main reason. One said:

“In Rwanda, having many children, and considering our small field, we would not have enough resources to nourish children. At the moment, I am sure that the government is guiding us as a responsible man can guide his family... The government is advising that, according to your income, you should have a number of children that you can take care of and plan saving for them”.

Advantages of MFP

Economic advantages: The mother will have enough strength and time to work for the household:

“MFP brings prosperity in the family. In my own experience, I spent six years on MFP, I started when the kid [was one year] old, I [next] gave birth while my previous kid was seven [years] old. The house we are living in we got it because I was in MFP. We achieved many things because I was on MFP. My husband was working on his side and me on my side because I had enough strength.”

Respondents added that a household with two children, will cover the needs of children. Even the country would benefit as welfare to such households would not be necessary as because malnutrition would not be an issue.

Social advantages: The community is aware that by adhering to MFP and controlling birth, they would be able to take care of them, pay school fees, pay for medical insurance, feed them and providing to any other need of their children. When they are still young they are sent off to be cowherds or as fishermen.

Reasons for not adhering to MFP

Ignorance was pointed out as a reason to refuse MFP. Some of the participants took extreme positions about MFP: One woman said:

“People with low income are resistant to MFP, also have low intelligence. They have a mental disorder. People with enough resources have a high level of management skills. But one without resources is unable to plan”.

Religion beliefs were one of the main reasons to prevent MFP. Some are saying that MFP is akin to killing children. They say that God commanded them to give birth and to multiply, and that using MFP is a sin. Pentecostal Church believers were the most common. If a believer is reported to be using MFP, the church leaders can take adverse decisions against her.

One woman was critical toward those who were using reasons of religion:

“Church believers [should also] change their mind and accept MFP. We are praying [to] the same God, I advise them to use MFP. They don't know that if you have many children you are calling the devil to yourself. How can you pray while your kid is suffering due to your bad behavior?”

Men thought that it was mostly women that need to be trained on advantages of MFP. They reported that there is no man who can be happy to have eight children, because the man is suffering alone to find subsistence of the household. As the woman is not suffering like a man, she wants to give birth because she is not working.

One woman reported that the first social category women are not willing to adhere to FP because they don't want to lose the support they are receiving from the government. she said:

“I should have many children, one will come to you, another to someone else, for sure they will survive”.

Side effects are among the most common obstacles to MFP. Side effects, like frequent menses, total absence of menses and coldness are common and prevent many women from using MFP. One said:

“When there is total absence of menses women get sick, sudden death, when she is dying she explodes and bleeds so much, or she vomits, in few minutes she dies, although it could be poisoning, they will say that the reason is the absence of menses.”

Some women ask to be tested first and then be given a FP method compatible with their bodies.

Other issues of MFP

Disrespect of a wife to her husband

In the community, it is thought that when people see a woman utilising MFP and putting on a short dress, she is no longer busy with children and that the husband will no longer have authority over her.

Suspicion of unfaithfulness for men/women when women accept MFP

Men reported that, when a wife is taking MFP, if she sees her husband talking with another woman, she can say that her husband requested her to take MFP to have other children out of the household. After the FP period, she can abandon FP methods, and continue having children. For example, when a woman is on MFP, she can go anywhere and come back at home when she wants. She can go to the market and come back at 7:00 pm. This situation leads to troubles. She can say that she has no child to take care of.

Another issue reported in the survey is vasectomy

Almost all men think that vasectomy is castration. After vasectomy a woman who wants a child can leave the household, whilst men are afraid of being sorrowful over not being able to have a child again.

Another issue of FP is for genocide survivors. They would want to replace former family members.

A particular issue was raised by a nurse is a reporting issue; many women start the FP method in the Health Centre, and the follow up is then done in the community by CHWs, but they are not reported.

She said:

“MFP service is provided in good conditions but the reason for low percentage coverage in our HF is not due to a lack of service but at my opinion is due to the incorrect reporting. I spent three months in this service, in this period I am challenged to write the report. In our registers, there are many enrolled but they are not in the follow up report. For example, in my village all women are using MFP, but none of them is appearing in the register”.

Attitudes of men toward MFP

A woman said that men agree that their wives take FP. She gave an example of a man who was requesting his wife to

uptake FP, the wife refused, she got a child, after that they called care providers to help solve the problem, he said that he is not understanding why his wife refuses FP.

Advice of women to others who resist use of MFP

Women advise their counterparts not using FP to use them because they are left behind. There are socio-economic advantages for the woman.

Using MFP for women in secret

In the case that the husband prevents his wife from following MFP, almost all men and women supported the idea for a woman to adopt MFP without informing her husband.

DISCUSSION

More than 70% of respondents were in the 25-44 age group. The vast majority of respondents were either married or cohabitating. Almost 90% of respondents had given birth. The MFP coverage in Mugonero catchment area was 61.3%. A big proportion of MFP users (47.1%) experienced side effects. Not living in the union was associated with a high proportion of MFP use. Almost all respondents were aware of MFP and know about its advantages and disadvantages.

The median number of born children, median number of living children and the median preferred number of children was the same (three children). This is slightly lower than the number reported as the fertility rate in Karongi District (3.9) where the Mugonero Hospital is located. The median age of first delivery (21) decreased a bit compared to the same indicator reported in Karongi District in 2015 (23.1); the desired number of children in our study was three compared to 3.2 for Karongi District [8]. The small difference could be the result of an effort to sensitize and to make use of MFP at the community level in the district. The proportion of women using MFP was greater than what was published in 2015 for Karongi District (39.7%). This difference is a result of efforts invested in the sensitization to the use of MFP. Community-Based Provision of FP was implemented as an initiative to increase the coverage of MFP [11]. Worldwide, 64% of married or in-union women of reproductive age were using at least one form of FP, but in African countries, this coverage was 33% [1]. Comparing to other countries in the region, the coverage of MFP in Mugonero catchment area is greater. For instance, it was 39.1% in Kenya in 2015 [5] and it was 27.3% in Uganda in 2016 [12]. This difference may result from campaigns organized in the country to sensitize women to adhere to MFP.

A woman not living in the union is associated with the use of MFP. Similarly, in Uganda the level of unmet needs of FP was highest among currently married women [13], whilst MFP side effects are factors for MFP discontinuation.

In our study, MFP side effects experienced over time have been reported at 47.1% and it was reported as a key factor of MFP discontinuation (12.4%).

At a national level, the discontinuation rate within 12 month was 28% [8]; it was 45% in Uganda [12] and 31% in Kenya [5]. Fear of side effects was mentioned as a barrier to use MFP. The same myth was reported in Kenya and DRC [7, 9, 14].

Shortage of MFP availability was only reported by 8.5%. Measures on this issue of accessibility and availability of MFP have been taken since some MFP methods are available at the community level. This is a common issue in many developing countries [1, 7, 10]. MFP discontinuation due to side effects was also reported in Kenya [14] and in China [15]. Another barrier to using FP reported by our respondents is a bad connotation in the community. They believe that a woman using MFP has the freedom to have many sexual partners because the woman could cheat on her husband without getting pregnant. Even a study conducted in Kenya found that some women and men believe that a young woman using MFP would want to live in promiscuity knowing that she will not get pregnant [14]. Some men consider themselves as heads of the household, with a responsibility to nourish household members. For this reason, they cannot accept MFP. This finding is shared with other men in other African countries. For example one study from the Democratic Republic of Congo (DRC) showed that men are responsible for the household; they support household members in everything including financial needs, therefore they are ones who tend to decide the number of children in the household [6, 14]. Religious beliefs were mentioned many times as a barrier for MFP uptake. This barrier was reported in a previous study conducted in the Kayonza District, Rwanda [9]. As we share the same religions with our neighboring countries, the same finding was reported in DRC [7]. Most of men and women surveyed in our study reported that having a lot of children is a burden to the household in terms of paying

school fees, feeding them and paying medical insurance. This kind of awareness was found even in DRC [7]. Despite the mentioned barriers to MFP, almost all woman were willing to consider use of MFP in the future. This was the same as with other women in neighboring countries [7].

The study was conducted at a small scale. Thus, its findings cannot be extrapolated at the country level. However, as we have the same culture across the country, these findings could help in other settings in Rwanda. Behavior and beliefs can evolve over time. The findings of our study were based on self-reports from participants, it was not easy to verify if it was true or false that those who reported using MFP were really using it.

It was very difficult to find studies conducted on the same scale as ours. Many in this kind of study were conducted at the national level.

In conclusion, MFP coverage in Mugonero catchment area was by default the MFP of Karongi District. Our study revealed that MFP in Mugonero catchment area is higher than expected; misconceptions mainly related to side effects and beliefs are common barriers of MFP. Suspicion of unfaithfulness between couples can jeopardize MFP use. In the future, what's needed is to organize an open discussion with church leaders (Pentecostal and Catholic Churches) that are against MFP in order to request them to remain silent and neutral on the matter instead of forbidding their members to use MFP. Training and sensitization to MFP use is needed for couples and proper side effect management is needed. Organize a mentorship in HFs to improve MFP delivery, recording and reporting, and train CHWs to provided accurate reports on MFP.

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Factors associated with preventable hypoxic ischemic encephalopathy in term neonates at Kacyiru hospital, Rwanda - a retrospective study

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ABSTRACT

Introduction: Hypoxic-ischemic encephalopathy (HIE) is a type of brain injury that occurs when the brain doesn't receive enough oxygen or blood flow occurring during pregnancy, labor and delivery or in the postnatal period. This study aimed at determining factors associated with preventable HIE at Kacyiru Hospital in Rwanda.

Methods: This is a case control study using quantitative analysis of data from patients records of all neonates admitted into the neonatology ward for HIE and their respective mothers from 1st January 2016 to 31st March 2018.

Results: This study showed that APGAR scores less than 7 at 1, 5 and 10 min were found in cases 79.9%, 88.8% and 100% respectively. Convulsions were mostly observed in cases (94.6%) while sucking reflex ability was more detected in controls (93.8%). The presence of Moro reflexes was also different in cases and controls, 18.1% and 81.9% respectively. Women with stained amniotic fluids were 6 times more likely to have babies with HIE. Women presenting abnormal fetal heart tracings on CTG during labor were 18 times more likely to have babies with HIE and women who attended 0 to 2 ANC visits were 2 times more at risk of delivering babies with HIE.

Conclusion: Preventable HIE in term neonates at Kacyiru Hospital was likely to be associated with meconium-stained amniotic fluid, abnormal fetal heart tracing, inappropriate ANC and male gender. Since HIE treatment is only limited to supportive care with no curative treatments, its prevention and case reduction is crucial.

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INTRODUCTION

Hypoxic ischemic encephalopathy (HIE) is a type of brain injury that occurs when the brain doesn't receive enough oxygen or blood flow and may occur during pregnancy, labor and delivery or in the postnatal period [1,2]. Hypoxic ischemic encephalopathy remains a global concern especially in developing countries [3].

A retrospective study on the incidence and prediction of hypoxic-ischemic encephalopathy in Japan showed that potential risk factors predicting poor outcome include out-born birth, low Apgar score at 5 min and use of epinephrine. Laboratory abnormalities such as serum lactate, aspartate aminotransferase and alanine aminotransferase as well as abnormal brain MRI findings were also associated with poor

health outcomes [4]. Findings from Nepal also revealed that maternal infections, low socioeconomic status and multiple births were important risk factors for HIE mortality in low-resource settings [5].

In Saudi Arabia, several risk factors of HIE in newborns were identified and comprised being a prim gravida woman, lack of antenatal care, pregnancy-induced hypertension, antepartum hemorrhage and emergency C-section [6].

A few studies were also conducted in Sub Saharan African and revealed that poor fetal heart monitoring was indirectly associated with over 40% of perinatal death and was a major cause of avoidable hypoxic-ischemic encephalopathy in Tanzania [7]. Good obstetrical care and immediate resuscitation of newborns were found critical in reducing

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cases of HIE and improving outcome on newborns. In Ethiopia, maternal illiteracy, low birth weight, preterm delivery and meconium-stained amniotic fluid were factors of HIE [8].

Rwanda, in particular, lacks evidence on HIE risk factors. It was previously observed that pregnant women in the country tend to delay their visits to professional medical staff and rather seek advice from traditional healers and take unspecified traditional medicines. Such practices have often been associated with abnormal fetal heart rate tracing during labor; risks factors traditionally believed to potentially affect neonates in Rwanda and in other developing countries. However, no scientific studies have this far been published on HIE even with the apparent / observed rise in HIE case in different hospitals in the country.

Based on knowledge gaps on actual risk factors associated with HIE, we believe this study will provide needed evidence to further strengthen maternal and child health promotion efforts across all health systems levels with the hope of reducing the case. Currently, since there is no known reversal HIE treatment available (treatment is only limited to supportive care, it is important for a health professional to maximise the reduction of HIE cases.

This study generally sought to determine factors associated with preventable hypoxic-ischemic encephalopathy. Specific objectives were:

- i. To describe clinical characteristics of cases of hypoxic-ischemic encephalopathy in term neonates at Kacyiru Hospital.
- ii. To determine risk factors associated with preventable HIE cases at Kacyiru Hospital.
- iii. To provide recommendations for effective preventable hypoxic-ischemic encephalopathy prevention.

METHODS

Study design

This study used an unmatched case control design to perform quantitative analysis of data extracted from patients' files.

Study Population

The study population included all neonates who were admitted in the neonatology ward for hypoxic-ischemic encephalopathy between 2016 and 2018 at Kacyiru district hospital. Mothers of all recruited neonates were also included in the study.

Selection criteria

• Inclusion criteria

- *Cases:* All term neonates and their mothers, admitted for HIE grade 2 and 3 in the neonatology- ward at Kacyiru hospital from 1st January 2016 to 31st March 2018.

- *Controls:* All term neonates and their mothers admitted without HIE in neonatology ward from 1st January 2016 to 31st March 2018.

• Exclusion criteria

Premature neonates with hypoxic-ischemic encephalopathy because prematurity itself is a risk factor for hypoxic-ischemic encephalopathy.

Study site

The study was conducted at Kacyiru hospital located in Gasabo district, City of Kigali. The hospital's monthly records report that out of 620 births, 40 ended up in neonatology and out of the 40 (6.5%) neonates, 7 neonates are admitted for HIE condition.

Study period

The study was conducted in 2018.

A sample size of 184 cases and 368 controls with a sample ratio of cases to controls 1:2 is needed to fit logistic regression of preventable hypoxic ischemic encephalopathy on different predictors to achieve 80% statistical power at a 5% significance level to detect a change in probability to preventable hypoxic ischemic encephalopathy from the baseline value of 0.30 to 0.42. This change corresponds to an odds ratio of 1.70.

The total number of study population becomes 1104.

Data collection methods

For both cases and controls, those meeting the inclusion criteria were recruited until the sample size was met.

A pre-designed questionnaire was used for both cases and controls using medical files of neonates and their respective mothers. Mothers' files were specifically checked to extract pregnancy and labour-related information.

All data were entered and stored in SPSS (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.).

Variables

Independent variables: This study considered exposures of interests already reported in previous studies to potentially be associated with the risk of HIE in Neonates. [4]–[6], [8]

This included: the numbers of antenatal care visits, duration of the active phase of labor, fetal heart tracing pattern, amniotic fluid color, maternal history of infection, anemia and preeclampsia.

Dependent variable/Outcome

Hypoxic-ischemic encephalopathy

Statistical data analysis

Data were analyzed using STATA.13. Variables were summarized using frequency tables in univariate analysis.

Bivariate analyses were performed using chi-squared test to compare cases and controls.

All variables that showed a statistically significant association were included in multivariate logistic regression model to adjust for potential confounders.

A backward selection method was used. All variables showing statistical significant associations in bivariate analyses were fitted in a multivariate model. Adjusted ratios with their corresponding 95% CI and P-values were reported. The statistical test was interpreted at a significance level of 5%.

Ethical consideration

Standards for data security, privacy and confidentiality were considered based on scientific and ethics guidelines of Kacyiru research department and the Rwandan National Ethical Committee.

RESULTS

A total of 1028 subjects were recruited. This reflects a total of 294 cases (147 neonates with HIE and 147 mothers) and 734 controls (367 neonates and 367 mothers). Description of clinical characteristics of cases of hypoxic-ischemic encephalopathy in term neonates at Kacyiru Hospital.

Comparative description of cases and controls vis-à-vis neonatal clinical features showed that APGAR scores less than 7 at 1,5 and 10 min were found in cases (79.9%, 88.8% and 100%) respectively (table 1). Convulsions were mostly observed in cases (94.6%) while sucking reflex ability was more detected in controls (93.8%). 72.3% of cases required aspirations compared to only 27.7% in controls. The presence of Moro reflexes was also different in cases and controls at 18.1 % and 81.9% respectively. Cyanosis was more present in cases at 81.5% than in controls in 18.5%. The normal tone was less present in cases at 2% while it was more present in controls at 98%.

Table 1. Descriptive Comparisons of clinical characteristics between HIE cases and Controls

	Arm		Case		Total		p-value
	Control	N	%	N	%	N	
APGAR score at 1 min							
7+ (n=346)	332	96	14	4	346	100	0.000
1-6 (n=164)	33	20.1	131	79.9	164	100	
Total (n=510)	365	71.6	145	28.4	510	100	
APGAR score at 5 min							
7+ (n=412)	354	85.9	58	14.1	412	100	0.000
1-6 (n=98)	11	11.2	87	88.8	98	100	
Total (n=510)	365	71.6	145	28.4	510	100	
APGAR score at 10 min							
7+ (n=413)	364	88.1	49	11.9	413	100	0.000
1-6 (n=42)	0	0	42	100	42	100	
Total (n=455)	364	80	91	20	455	100	
Required aspiration after birth							
Yes (n=184)	51	27.7	133	72.3	184	100	0.000
No (n=315)	309	98.1	6	1.9	315	100	
Total (n=499)	360	72.1	139	27.9	499	100	
Length of hospital stay							
Less than 1 week (n=390)	339	86.9	51	13.1	390	100	0.000
2 week + or died in hospital (n=119)	25	21	94	79	119	100	
Total (n=509)	364	71.5	145	28.5	509	100	
Convulsions							
Yes (n=149)	8	5.4	141	94.6	149	100	0.000
No (n=362)	358	98.9	4	1.1	362	100	
Total (n=511)	366	71.6	145	28.4	511	100	
Sucking reflex							
Present (n=386)	362	93.8	24	6.2	386	100	0.000
Absent (n=126)	4	3.2	122	96.8	126	100	
Total (n=512)	366	71.5	146	28.5	512	100	
Moro reflex							
Present (n=442)	362	81.9	80	18.1	442	100	0.000
Absent (n=67)	3	4.5	64	95.5	67	100	
Total (n=509)	365	71.7	144	28.3	509	100	
Cyanosis							
Yes (n=27)	5	18.5	22	81.5	27	100	0.000
No (n=483)	361	74.7	122	25.3	483	100	
Total (n=510)	366	71.8	144	28.2	510	100	
Tone							
Normal (n=357)	350	98	7	2	357	100	0.000
Decreased or flaccid (n=150)	14	9.3	16	90.7	10	10	
Total (n=507)	364	71.8	143	28.2	507	100	

Identification of risk factors associated with preventable hypoxic ischemic encephalopathy in term neonates at Kacyiru Hospital.

Seven risk factors were found to be statistically associated with HIE condition (appendix 2).

The association was highly observed with amniotic fluid color, where women with stained amniotic fluids were 6 times more likely to have babies with HIE than those with clear fluids (aOR =6.39, CI: 8.23, 24.19, P<0,001). Women presenting abnormal fetal heart tracings on CTG during labor

were 18 times more likely to have babies with HIE than women with normal fetal heart tracing (aOR =18.6, CI: 8.30, 41.77, P<0,001).

Women who attended 0 to 2 ANC visits were 2 times more at risk of delivering babies with HIE compared to women who

attended 3 to 4 ANC visits (aOR=2.53, CI: 1.14, 5.65, P-value =0.023). Male neonates were more than 2 times more at risk of developing HIE compared to female neonates (aOR= 2.63, CI: 1.30, 5.29, P=0.007), (Table 2).

Table 2: Multivariate analyses using Logistic Regression computing unadjusted and adjusted OR between exposures and the outcome of interest

	Unadjusted OR		p-value	Adjusted OR		p-value
	OR	95% CI		OR	95% CI	
Sex						
Female (n=219)	1			1		
Male (n=295)	1.88	[1.25,2.81]	0.002	2.63	[1.30,5.29]	0.007
Amniotic fluid color						
Clear (n=409)	1			1		
Stained (n=90)	14.1	[8.23,24.19]	0.000	6.39	[2.88,14.20]	0.000
Abnormal fetal heart tracing						
No (n=278)	1			1		
Yes (n=194)	22.3	[12.66,39.44]	0.000	18.6	[8.30,41.77]	0.000
Duration of active phase of labor						
< 20 hours (n=366)	1			1		
20 - 30 hours (n=8)	18.6	[2.26,153.25]	0.007	27.0	[1.60,457.74]	0.022
ANC						
3-4 ANC (n=407)	1			1		
0-2 ANC (n=97)	3.09	[1.95,4.90]	0.000	2.53	[1.14,5.65]	0.023
Taken iron during pregnancy						
Yes (n=410)	1					
No (n=87)	2.04	[1.26,3.32]	0.004			
History of preeclampsia						
Yes (n=17)	1					
No (n=487)	6.26	[0.82,47.68]	0.076			

DISCUSSION

Neonates with HIE were most frequently found with APGAR scores less than 7 at all intervals of 1, 5 and 10 minutes. This is similar to findings from Aliyu et al. who found that all cases with Stage 3 HIE had a score lower than 7 (Fisher's exact test = 49.024; P = 0.00) [9]. Normally lower APGAR scores are an indication of possible poor labor monitoring or lack of timely resuscitation of a neonate.

Convulsions were found as a common clinical feature in neonates with HIE, similar findings in a study completed in India where abnormal neonatal reflex and convulsions were the most frequent clinical features in babies with HIE [10]. Similar results were also reported in Saudi Arabia and in Southern Nepal [5,11]. Such scenarios also imply potential deterioration of the brain and an urgent necessity to initiate resuscitation to save neonates. Weak Sucking, poor Moro reflexes and decreased tone were predominantly present in neonates with HIE, which closely compares with the findings from Uganda revealing that weak sucking reflex, poor Moro reflex and hypotonia were the most common clinical features in neonates with HIE [12]. In a study exclusively involving neonates with HIE in Tanzania, weak/absent reflexes were also the most present accounted for 46.0% [3]. In this study, the majority of neonates with HIE stayed in a hospital for more than two weeks or even died in the hospital, which aligns with a study done in the United States of America revealing that average length of hospitalization was in a range of 6 to 36 days in neonates with HIE [13]. This means that neonates with HIE are critically ill and need urgent intervention to reduce long term complications.

Amniotic fluid color and the duration of the second stage of labor were significantly associated with HIE in this study. Similar to a study done in Indonesia and Pakistan [14,15]. This means that adequate labor monitoring would save many neonates from having hypoxic-ischemic encephalopathy. Improvement in the monitoring of mothers in labor and of the newborns with HIE should be strengthened.

Statistically significant associations were observed between abnormal fetal heart tracing during labor and hypoxic-ischemic encephalopathy group in our study. This shows a similarity to a case-control study conducted on intrapartum factors associated with neonatal hypoxic-ischemic encephalopathy in the United States of America that showed the presence of a category 3 fetal heart rate tracing in any of the four 15-min segments during the hour prior to delivery (28.0% versus 4.0%, p = 0.002) to be more common among hypoxic-ischemic encephalopathy cases [16]. This could be explained by limited skills on CTG interpretation or the insufficient number of CTG machines with regards to the demand during labor monitoring.

In this study, inadequate antenatal care (ANC) was found to be associated with a higher risk for HIE (Table 2). Similar to a study conducted in Pakistan, on risk factors of hypoxic-ischemic encephalopathy reporting that pregnant women who did not attend antenatal visits had high chances of hypoxic-ischemic encephalopathy due to a high likelihood of home and unattended delivery practices [16]. This already known information, thus health education programs to encourage women to attend at least 4ANC visits.

Male neonates were twice more likely at risk of developing HIE than females, though the results were not conclusive. This finding is compared with a study in Nepal where male gender was conclusively found as a risk factor for HIE [5]. However, Simiyu et al. found that the majority of severe HIE cases was composed of female neonates [3].

This aligns with findings of a preclinical study that showed that gender differences in anti-inflammatory response underlie the sex-specific chronic HIE outcomes, and enhanced neurogenesis in females contribute to the sex differences [17].

Evidence presented in this study cannot be generalized. Being a retrospective study, we largely relied on patients' files as the primary source of information and some patients's files had incomplete information recorded. This led to difficulties in assessing several known factors associated with preventable hypoxic-ischemic encephalopathy. Since effects reported in this study might therefore suffer the effect of potential confounders.

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In conclusion, results in this study demonstrated that factors associated with preventable hypoxic-ischemic encephalopathy in term neonates at Kacyiru Hospital were meconium-stained amniotic fluid, abnormal fetal heart tracing, inappropriate ANC and male gender. Since HIE treatment is only limited to supportive care and no curative treatment is available, its prevention and case reduction is very important.

Health providers need to appropriately offer a full package of ANC services during pregnancies and encourage women to attend all recommended ANC visits. They must ensure that abnormal fetal heart tracings are timely handled during labor monitoring and introduce real-time monitoring system to check such difficulties that could lead to hypoxic-ischemic encephalopathy. We recommend studies in larger maternity hospitals in Rwanda to further validate our findings.

Prevalence of occupational noise induced hearing loss among wood and metal workers of Gakiriro, Kigali city

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ABSTRACT

Introduction: Occupational noise-induced hearing loss (ONIHL) is described as an acquired hearing deficiency caused by excessive workplace noise exposure. Little is known about cases of SNHL in our developing country where excessive noise working areas are more prominent.

Objectives: The study aims to assess the prevalence of noise-induced hearing loss among workers in the metal and wood manufacturing sector of Gakiriro, Kigali.

Methods: This was a cross-sectional and descriptive study conducted on 200 workers including wood and metal industrial workers. It's a The age, the noise intensity levels per each category of occupation, duration of exposure, and category of occupation and measurement of hearing loss were correlated.

Results: The overall prevalence of hearing induced was 36 % (72/200), and 35, 5 % (71/200) had NIHL. The mean age was 31.6 years with predominance of male workers. The age group between 30-39 years was more affected compared to other age groups. 99.5% of all participants were not protected during worktime. 47,7% had worked for 10 years and above with an average working time of 9 hours/day for five consecutive days. Noise level average assessed were 99.4dB (range 97-105 in woodworkers and 105.4dB 99-115 in metalworkers on regular daily basis for five consecutive days. Metal workers were more affected than wood workers.

Conclusion: Working in excessive noise workplaces could be a high risk for developing sensorineural hearing loss among young adults active in the wood and metal manufacturing enterprises. Lack of ear protection during working time and longer durations of exposure may increase the risk to develop ONIHL. Protective measures are needed for workers in these conditions and regular audiometric assessments should be conducted.

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INTRODUCTION

Occupational noise-induced hearing loss (ONIHL) is described as an acquired hearing loss caused by excessive workplace noise exposure. Kurmis et al (2007) reported that approximately 37% of hearing loss among adults is attributed to excessive noise. This is an important cause of occupation-related morbidity worldwide [1].

Noise-induced hearing loss is characterized by high frequency hearing loss between 3 and 6 kHz on audiometric assessment. With continued exposure, a wider range of frequencies may be affected, thereby increasing human hearing impairment [2]. Noise-induced hearing loss is a work related disability that has a great effect on the employees' quality of life. People living with Noise Induced Hearing Loss (NIHL) have problems with communication, depression, poor performance, fear to

lose their job, stigmatization and social isolation, to name but a few. Furthermore, this disability may impact employers if they are held responsible for the disability.

Two characteristics of NIHL have been established through various studies.

Normally, there is increasing hearing impairment with noise intensity and duration of exposure, such that more intense and longer duration noise exposures cause more severe impairment of hearing. Also, a susceptibility of an individual to noise-induced hearing loss is varying [3].

According to a World Health Organization report, 16% of disabling hearing loss in adults is attributable to occupational noise exposure. Since the 18th century, it has been recognized that NIHL is an occupational disease among copper workers who suffered hearing loss as a result of hammering on

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metal. In the 1800s, Fosbroke mentioned how black smiths were suffering from hearing impairment due to continued excessive noise exposure [3,4].

In 2000, 4.1 million disability adjusted life years were lost due to occupational NIHL [4]. Majority of these cases were found in developing countries. Social and economic burdens due to loss of hearing, including reduced earnings, limitations in career choice, stigmatization, abuse, and depression, all compounded by lack of access to appropriate healthcare facilities were also observed [5,6].

Occupational risk of NIHL in industries that expose workers to continuously high levels of noise is reported in the literature. Hong et al, reported that more than 30 million U.S workers were exposed to hazardous noise levels and nine million others were prone to other ototoxic agents [3]. According to Irwin et al, Hearing loss tends to be most rapid at 4 kHz during the first 10–15 years of noise exposure before spreading to surrounding frequencies.

In normal adults, human speech is heard between 0.25 and 6 kHz, with lower frequencies corresponding to vowels and higher frequencies representing consonants. Robinowitz and Robinson (2015) reported difficulty with a clarity of speech and words discrimination among people with NIHL [7,8].

There are wide consequences resulting from such a handicap which include impaired communication, social isolation, anxiety, and poorer job performance (9,10). On an audiogram, this is characterized by a dip or notch between 3 and 6 kHz with immediate recovery at 8 kHz [11].

METHODS

A cross-sectional and descriptive study of subjects aged between 18 and 50 years working in metal and wood manufacturing sector of Gakiriro, Kigali. The audiological tests were conducted at the audiology center of Rwanda Military Hospital. Subjects were enrolled from September 2014 up to January 2015.

All workers between 18 and 50 years working in the metal and wood manufacturing sector of Gakiriro-Kigali were recruited.

A sound level meter type DT 1350A was used to measure noise levels in the wood and metal industries. Also, the average of duration of exposure in hours was calculated for the five consecutive working days. All participants were then surveyed using a questionnaire to collect their socio-demographic information, duration of exposure, and category of occupation.

Otosopic examination and the initial screening audiometry were performed at the site of work in a free field from the noise source, using a GSI 18 screening audiometer. Thereafter, a diagnostic pure tone audiometry was conducted for bone and air conduction audiograms at Rwanda military hospital audiology center using a clinical audiometer, type GSI 61, with an updated certificate of calibration from H.A.S.S of South Africa.

Noise readings were taken from wood industry and metal industry, using a sound level meter DT1350 device (Gaotek Co., China).

Hearing impairment was defined as subjects having threshold levels of 26 dB and above according to World Health Organization standards. Participants who had hearing impairment at high frequencies: i.e: 3000-6000Hz with a specific notch at 4000 Hz were defined as having NIHL as per Dobie's criteria for NIHL.

Data entry and statistical analyses were performed using SPSS (version 16). Comparisons of variables were performed using chi-square test and the limit of significance was established at $P < 0.05$.

Tools used for hearing assessment were not invasive and reassurance was given on data confidentiality. All participants consented for hearing assessment.

RESULTS

200 participants were recruited and underwent audiometrical screening. 92% of participants were males, reflecting a low number of females employed in hazardous noisy workplaces in Rwanda. (Table 1).

Table 1. Age Distribution

Age	Frequency	Percent
18-29	53	26.5%
30-39	130	65%
40-50	13	6.5%
>50	4	2%
Total	200	100%

The mean age was 31.6 years, and was similar in both occupational categories; the predominant age group was between 30-39 years (65%), and 4% were above 50 years, this may be due to superimposed presbycusis on NIHL.

Table 2. Exposure time (years) and Hearing Status

Duration of exposure	HI	Normal
<12 months	2(28%)	5(72%)
1-5 years	11(23%)	38(77%)
6-10 years	16(33%)	33(67%)
11-15 years	22(40.7%)	32(59.3%)
16-20 years	15(47%)	17(53%)
21-30 years	4(57%)	3(43%)
31-40 years	2(100%)	0(0%)
Total	72	128

72(36%) had HI, where 71(35.5%) had NIHL. Among participants with NIHL, 34.6% were aged between 30-39 years, This table shows that the progression of hearing loss as per increase of years of exposure (Table 2).

Metal workers were more affected by H.I (62%) compared to other occupation categories (P=0.002) (Table 3,4).

Table 3. Hearing status per occupation category

Occupation	HI	normal
Metalworker	23(62%)	14(38 %)
Woodworker	49(30%)	114(70%)
Total	72(36%)	128(64%)

Table 4. NIHL and occupation category

NIHL	Metalworker	Woodworker
No	15(40.5%)	114(88. %)
Yes	22(40. %)	49(30%)

The wood workshop noise levels ranged between 97-105dB on a daily basis for 5 consecutive days, with an average noise level of 99.4dB.Noise levels measured in metal workshop were 99-115dB on a daily basis for 5 consecutive days and the average was 105.4dB.The mean noise level exceeded 85dB at both workplaces (Table 5).

Table 5. Noise levels in wood and metal industries

Days	Noise levels/Metal industry	Noise levels/Wood industry
Day1	99dB	97dB
Day2	115dB	99.6dB
Day3	99.8dB	105dB
Day4	111.4dB	97.7dB
Day5	102dB	97.8dB
Average noise level	105.4dB	99.4dB

There was no significant statistical difference (P=0.7). Among all participants with high frequency notch at 4000 Hz, 32.6% were aged between 30-39 years, showing a high number of youth at high risk of NIHL.

Figure 1. shows that, 99.7% of metalworkers with NIHL and 97.2% of woodworkers with NIHL had a frequency notch at 3000-4000 Hz.

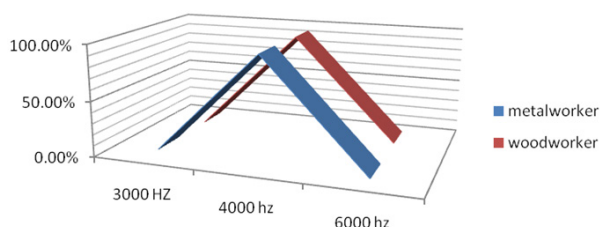


Figure 1. Occupation category and HL frequency

Among participants with hearing loss, the degree of severity was associated with the duration of exposure (P=0.002) (Figure 2).

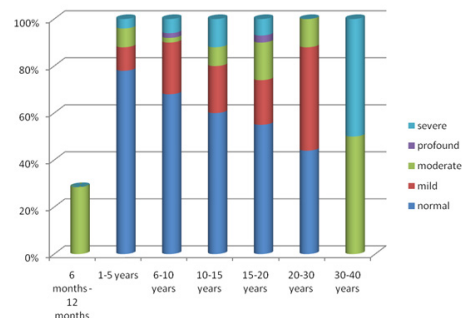


Figure 2. Degree of hearing loss vs duration of exposure

There is tendency to have more mild hearing impairment in woodworkers (57%). Metalworkers with moderate Hearing Loss (34%), severe Hearing Loss(26%) (P=0.009) (Figure 3).

Hearing loss severity per occupation

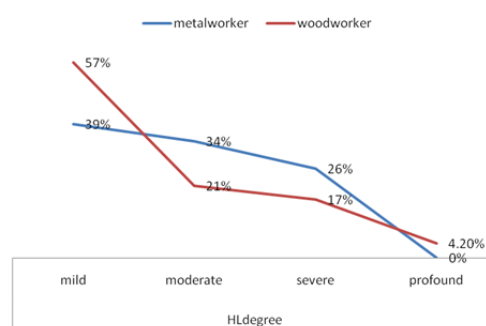


Figure 3. Degree of hearing loss occupational category

Metal and wood workers were compared on other possible contributing factors (age, duration of years of exposure). The only factor showing a statistically significant association with hearing impairment was occupational exposure (P=0.002), and this is explained by the high intensity of noise in metal workers on daily basis (99-115dB, with the average of 105.4dB).

Participants with 30-39 age group are 54% and 67% in metal and woodworkers respectively, but no significant statistical difference of age in both groups (P=0.2) (Table 6).

Table 6. Age and Occupation

Age	Occupation	
	Metalworker	Woodworker
18-29	11(29.7%)	42(25.7%)
30-39	20(54%)	110(67.4%)
40-50	3(8.1%)	10(6.1%)
>50	3(7.8%)	1(0.6%)
Total	37	163

Source: Primary data, 2015

There is no significant statistical difference in the duration of exposure (years) in both categories of occupation ($P=0.36$) (Table 7).

Table 7. Duration of exposure in years and occupation

Duration years of exposure	Occupation	
	Metalworkers	Woodworkers
6 months - 12 months	0(0%)	3(1.8%)
1-5 years	7(18.9%)	44(26.9%)
6-10 years	5(13.5%)	44(26.9%)
10-15 years	12(32.4%)	45(27.6%)
15-20 years	5(13.5%)	26(15.9%)
20-30 years	6(16.2%)	1(0.6%)
30-40 years	2(5.4%)	0(0%)
Total	37	163

The table below also shows that 99.5% of workers in both wood and metal factories worked without ear protective devices.

Table 8. Protection during worktime

Protection	Frequency	Percent
No	199	99.5%
Yes	1	0.5%

DISCUSSION

Results from this study showed a high prevalence of HI and NIHL in the wood and metal industry workers of Gakiriro-Kigali. This is likely due to high noise levels identified since the mean sound level was of 99.4dB in woodworkers and mean of 105.4 dB in metal workers in the area. These findings showed similar results with a Kenyan study by C. Mburu et al [29] in metalworkers which found 35,2% of the workers with H.I from noise levels exposure ranging between 72.0dB to 113.8dB with a working time of more than 8hrs daily [19].

A review study conducted by David et al, in South Africa, showed also similar findings to our study [30].

Male workers were predominant in this study. And this could be due to the fact that males commonly tend to be involved in hazardous activities. The public health concern in this study is that these males were of a younger age group. This could be the result of several factors: according to National institute of statistics of Rwanda (NISR), majority of the Rwandan population is young. (50% of the total population is below 16 years) [31]. Another explaining factor could be young people migrating from rural areas to urban cities looking for jobs, mainly in small scale industries, making metal and wood factories their likelihood place employment.

Increased duration of exposure (<10 years) in the metal and wood industry was also reported by Kamalesh et al. [32]. This could also explain our overall HI prevalence in this study. Thus the duration of exposure could be a contributing factor to hearing impairment.

In a study conducted by Mburu et al. [19], it was reported that 97.1% of workers in metal industry were unprotected. In this study, a 99.5% proportion of all participants were also found not wearing ear protection devices.

This study did not find an increasing rate of hearing impairment over progressing duration of exposure. This is different to the study findings by Kamalesh et al. [32] where increasing hearing loss was associated with duration of exposure with 90% of HI for an increased duration over 10 years, This may be due to the fact that workers have gradual progress of years of exposure on high intensity noise levels with no protection.

In this study majority of the study population didn't have HI despite being exposed to high noise levels in their workplaces. We think this may be due to the susceptibility differences for noise damage on cochlear outer hair cells and the variations in acoustic signal transmission by the external auditory canal [3,4].

In this study, we also found that metal workers were more affected with HI. In Nepal, Robinson et al. found a lower prevalence of HI in metal workers. This difference could be explained by the difference in duration exposure per day in both countries. In our setting, metal workers were continuously exposed to high levels of noise (105dB) for an average of 9 hours/day, while in Nepal, metal workers had scheduled power cuts off that varied between 4 to 6 hours with a noise level exposure of 86.1 to 103 dB [2], offering them some time period of noise relief during working time.

There was also high frequency hearing loss varying between 3000-4000 hz in 99.7% of metal workers and 97.2% of wood workers, a study done by Kumar et al(33), found that 48% of tractor drivers had high frequency hearing loss (3000-4000dB) with noise levels of 88-90dB, these disparities are likely to be due to high exposure noise levels in metal and wood workers (105.4dB and 99.4dB).

In this study, 57% of woodworkers had mild hearing impairment whereby metal workers had 34% with moderate hearing loss and 26% had severe hearing loss. Omokhodion et al [33] in his study done in Nigerian mill enterprise found 49% of workers with mild hearing loss, and Nilson et al. [13] found 20.4% of shipbuilders with severe hearing loss. This is likely due to prolonged duration of exposure.

According to the WHO disability weighting system, which assigns a disability weight to each disease state [27], given that the average life expectancy of a Rwandan is 64years, this means that the average worker will live with this disability for 32.4 years. For our cohort of 200 workers, this totals 2,300.4 years of living with NIHL. The cost to prevent these years of disability is \$668, which is extremely low.

The cost to prevent one year of NIHL is \$0.29, or 240.7 Rwandese francs.

This study furthermore demonstrated that the intensity of noise levels in both categories of occupation was significantly correlated with hearing impairment ($P=0.002$), this is similar to Singh et al's study done in India, which showed a significant correlation ($P=0.05$) of hearing impairment with a high intensity of noise (34).

In conclusion, this study observed a high prevalence of HI and NIHL among all participants according to the WHO acceptable standards within both the wood and metal industries.

However, there may be other unknown factors associated with this hearing handicap within our participants not explored in this study.

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Medical citizen outreach programs as Rwanda Defense Force homegrown solution for health challenges in Rwanda

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ABSTRACT

Introduction: Rwanda Defense Force (RDF) Medical Citizen Outreach Program (COP) is a product of a longterm cordial relationship between the Rwandan population and its army from the early 1990s in the liberation struggle to now. This was part of a long plan of social economic development agenda of the government of national unity to deal with complications of genocide and a very low healthcare provider-to-population ratio and the need to take medical services to the disadvantaged. A yearly intervention has been on, and its effects in uplifting the healthcare of the population are being investigated.

Methods: The data on 1015 patients were collected from 5 sites (Rubavu, Nyanza, Rulindo, Kayonza and Bugesera) on Survivors of 1994 genocide against Tutsi. The specialists from 9 departments of RMH (Internal Medicine, Orthopedics and General Surgery, Dental, Ophthalmology, Dermatology, Ears, Nose and Throat (ENT), Obstetrics and Gynecology, Urology and Clinical Psychology) carried out data collection. This study was an analytical cross-sectional survey. For data analysis, descriptive statistics, bivariate analysis, logistic regression model and proportion test were used.

Result: A total number of 1015 of patients was enrolled with elderly patients (53.7 %) compared to other age categories. This study showed that 60% of treated patients were cured or had their disease recurrent after sometimes. The department of General Surgery and Orthopedics had the highest number of consultations (20.3 %), and Dermatology had the lowest number (2.3 %).

Conclusion: This study showed that being treated or more generally visiting RMH specialized doctors during RDF medical COP permanently or temporally healed genocide survivors. However, further studies regarding the importance of RDF medical COP for the general population and on specific diseases would be an excellent supplement to this study.

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INTRODUCTION

The idea of Rwanda Defense Force (RDF) medical Citizen Outreach Program (COP); formerly known as Medical Army Week, is a product of the long term cordial relationship between the Rwandan population, Rwanda diaspora and the Army from the early 1990s to today. This relationship was one of the conditions that helped the RDF formerly Rwanda Patriotic Army (RPA) win the war of liberation. In fact, RPA did not understand liberation in a narrow sense of overthrowing a genocidal regime but in a broad sense of socio-economic transformation of Rwanda [1]. Armed struggle was successfully ended and RDF with the total support of the population invested many efforts in sustainable development of Rwanda.

RDF in partnership with other Government Institutions namely the Ministry of Health (MoH), FARG (Assistance funds for genocide survivors), hospitals and local administration has launched the Army Week activities in 2009 [1] for the general population and 2012 for the survivors of the 1994 genocide against Tutsi. Globally 438,371 patients benefitted from specialized healthcare between 2009 and 2018 [2]. Generally medical COP aimed at uplifting the welfare of Rwandans and contributing to national sustainable development.

Specifically, the medical COP is intended to bring multidisciplinary specialized care at the doorsteps of the population in the remotest part of the country.

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These yearly interventions have helped in treating physical and psychological health problems of the Rwandan population and especially the genocide survivors as some of the most vulnerable. This was done in all districts of the country to give a chance to those deprived communities. Every medical COP round includes free or low cost specialized medical services offered to the Rwandan Population. Rwanda Military Hospital (RMH) delivered its various specialized services to low-income population, inaccessible communities living in remote rural areas. Medical COP is a strategy to bridge the gap by removing barriers for people to benefit from specialized medical care. Particularly, Medical COP yearly intervenes in treating mental and physical cases hurting genocide survivors in all districts of the country.

This initiative generally lacks scientific documentation to serve future generation or mostly to be used as a model for other limited resource countries with community health challenges. Therefore, the objective of this study is to investigate the usefulness and document RDF's medical COP for survivors of genocide against Tutsi who faced mental and physical atrocities in 1994 [3].

METHODS

The data were collected from 5 sites (Rubavu, Nyanza, Rulindo, Kayonza and Bugesera) on Survivors of the 1994 genocide against Tutsi. Patients who at least had participated in one of the previous Medical COP were included in this study to investigate the current health conditions with regard to the treatment received. The study included also patients who participated in the previous Medical COP but didn't receive any known treatment due to either personal or medical reasons; and the patients were labeled "Not Treated" during statistical analysis.

Specialists from 9 departments of RMH (Internal Medicine, Orthopedics and General Surgery, Dental, Ophthalmology, Dermatology, Ears, Nose and Throat (ENT), gynecology, Urology and Clinical Psychology) carried out data collection.

Patients who didn't recover and patients with comorbidities received immediate treatment.

There were limited financial resources to allow home to home visits to identify patients who will participate in either one or both activities. 1015 patients were selected from an estimated population of 62134 patients treated during Medical COP from 2012 to 2016, giving a power of 80% [4]. Radio announcements, local and religious communication channels were used to inform genocide survivors who previously participated in medical COP to reiterate the purpose of the survey.

The data were collected using Case Report Form (CRF) after receiving informed consent.

This is an analytical cross-sectional study where data on health conditions of patients treated during previous medical

COP sessions were collected from 5 sites (Nyamasheke, Nyanza, Burera, Bugesera and Kayonza) purposively selected from districts covered by all Medical Army Week sessions between 2012 and 2016.

The main outcome was health status; qualitatively measured according to the health conditions treated during the previous Medical COP.

For data analysis, descriptive summaries and graphs were used to identify significant differences in health status conditions. Further analyses were carried out using bivariate analysis, logistic regression model and proportion test.

The multiple logistic regression was used to investigate the magnitude and direction of the relationship between health status and study covariates. This model was considered to investigate other factors that would be linked with health status related to Medical COP other than treatment. The full model having all study variables was included and contrasted with reduced model containing only significant variables. The backward stepwise regression was used to confine the full model into reduced model. The appropriateness of the model was checked using Hosmer-Lemeshow test. Stata version 13 and SPSS version 23 was used.

RESULTS

The demographic characteristics such as gender, age, Ubudehe category, education level, and residential districts were described using graphs, frequencies and proportions to provide an exploratory view of the population under survey.

A total number of 1015 patients in all sites participated in the study; among them 84% were women and 16 % were men (Table 1).

There was a higher proportion of elderly patients (53.7 %) compared to other age categories and a lower number of young patients (7.3 %) participated in the study. Obese and underweight patients were 6.29 % and 20.2 % respectively compared to normal weight patients 54.77 %. Tobacco Smokers were 3.97 %, drug abuse 0.54 % and patients with multiple sexual partners were 2.53 %.

Most of the patients that participated in this study were widows (47.43 %) belonging to the second category of Ubudehe (41.3 %). The fourth category of Ubudehe was less common among participants (only 0.8 %). Primary education level was most frequent 51.4 %, subsistence farming profession with 69.8 %, and civil servants 1.4 %

The main outcome was health status (Figure 1). It was shown that 60% of treated patients were cured or had their disease recurrent after sometimes. This reflects the effect of previous Medical Army visits.

Table 1. Patients descriptions

Variable	Patients	%
Gender		
Male	159	15.7
Female	856	84.3
Age category		
Young (≤ 35 years)	74	7.3
Adult (≥ 36 years and ≤ 55 years)	381	37.5
Old (≥ 56 years)	545	53.7
Ubudehe category		
Category I	265	26.1
Category II	419	41.3
Category III	311	30.6
Category IV	8	0.8
Education level		
University	17	1.7
Secondary	113	11.1
Vocational Training (TVET)	50	4.9
Primary	522	51.4
None	304	30
Missing	9	0.9
Profession		
Subsistence Farming	708	69.8
Civil servant	14	1.4
Business	24	2.4
Other	260	25.6
Marital Status		
Single	74	7.45
Married	408	41.09
Divorced	10	1.01
Separated	30	3.02
Widowed	471	47.43
Religion		
Catholic	423	43.52
Protestant	356	36.63
Muslim	38	3.91
Other	155	15.95
BMI category		
Underweight	180	20.2
Normal	488	54.77
Overweight	167	18.74
Obese	56	6.29
Smoking Status		
Yes	37	3.97
No	894	96.03
Multiple sexual partners		
Yes	23	2.53
No	887	97.47
Drug Abuse		
Yes	5	0.54
No	913	99.46

Table 2. Clinical departments and frequent disease treated

Department	Patients	%	Frequent Disease
Internal medicine	178	17.5	Hypertension
General Surgery and Orthopedics	206	20.3	Degenerative Disc Disease
ENT	98	9.7	Allergic rhinitis
Clinical psychology	88	8.7	PTSD
Gynecology	34	3.3	Urogenital Infection
Urology	65	6.4	Benign Prostate Hyperplasia
Ophthalmology	194	19.1	Presbyopia
Dermatology	28	2.8	Keloids
Dental	103	10.1	Periodontitis
Missing	21	2.1	
Total	994	100.0	

Source: Own primary data analysis, 2018

The bivariate analysis of clinical data was guided by the study objective to investigate the usefulness of previous Medical COP. The health status related to the previous treatment in Medical COP was cross-tabulated with other characteristics in relationship between health status and each individual variable.

The significance and magnitude of association was respectively measured by p-value and Cramer's V statistic.

In general, 25.6 % of all patients participated in this study were cured, 33.3 % slightly improved, few of them were not cured (11.1 %), but 30.1% patients had their sickness recurrent.

This health status was associated with age categories (P-value=0.044, Cramer's V= 0.081). It was also associated with clinical department attended by patients - (P-value< 0.001, Cramer's V=0.410); it is therefore reported that the treatment influenced the health status (P-value=0.043, Cramer's V=0.053) (Table 3).

The association between health status after being treated during Medical COP and other covariates was analyzed using a multiple logistic regression model including all covariates (full model). The results in Table 4 show that the reduced model only includes the significant variables (p-value<0.05) sequentially obtained after removing non-significant variables according to the magnitude of their p-values.

It comprised the visited clinical department (at least one department was having a p-value<0.05) and treatment status (p-value=0.041) during the past Medical COP. The goodness-of-fit for the reduced model was tested using Hosmer-Lemeshow test; the model was found to be a good fit (N: 915, Number of group: 9, Hosmer- Lemeshow Chi2 (7): 0.89 and P-value: 0.991).

A special attention was taken for treatment status since it was highly unbalanced in terms of being treated (95 %) or not treated (5%). This was suggesting that the majority of patients who had consultations during Medical COP had been treated (Table 3); meaning that almost all patients were treated or in other words visited a clinical department for treatment.

The Table 2 shows that the department of General Surgery and Orthopedics had the higher number of consultations (20.3 %), and Dermatology had the lower number (2.3 %) (Table 2).

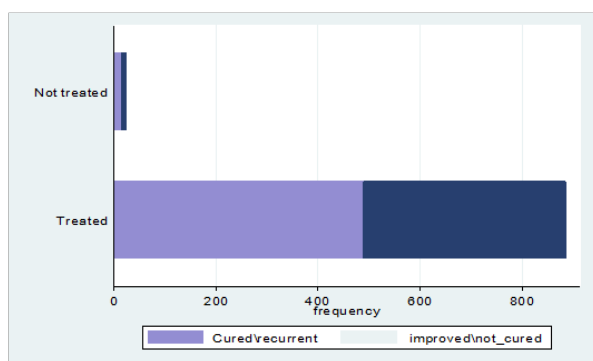


Figure 1. Health status and treatment status

Table 3. Bivariate relationship between covariates and health status

Variable	Improved/Not cured	Cured/recurrent	P-value	Cramer's V
Gender			0.101	0.053
Male	72	70		
Female	356	466		
Age category			0.044	0.081
Young	21	47		
Adult	157	209		
Old	240	276		
Marital status			0.253	0.075
Single	26	42		
Married	175	208		
Divorced	6	2		
Separated	15	15		
Religion			0.378	0.061
Catholic	229	178		
Protestant	181	158		
Muslim	20	16		
Other	93	56		
Profession			0.33	0.084
Farmer	286	387		
Civil servant	5	7		
Business	7	16		
Other	126	123		
Education			0.196	0.080
University	3	12		
Secondary	41	65		
Vocational Training	24	25		
Primary	229	268		
None	127	163		
Ubudehe category			0.169	0.073
Category I	106	146		
Category II	175	224		
Category III	141	156		
Category IV	1	7		
Clinical Department			<0.001	0.410
Internal medicine	112	66		
Surgery	116	80		
ENT	37	55		
Clinical psychology	22	59		
Gynecology	22	11		
Urology	38	16		
Ophthalmology	58	135		
Dermatology	15	10		
Dental	4	98		
Smoking Status			0.253	-0.038
Yes	12	23		
No	379	481		
Multiple sexual Partners			0.099	0.056
Yes	14	9		
No	371	481		
Treatment Status			0.043	0.067
Not Treated	27	19		
Treated	382	497		
BMI categories			0.699	0.041
Underweight	74	89		
Normal	215	258		
Overweight	75	84		
Obese	28	24		
Drug abuse			0.845	-0.007
Yes	2	3		
No	390	489		

To be more confident of these results and answer the research question about the usefulness of medical COP; we ignored treatment status and other covariates to perform the proportion test on the main outcome. Having the hypothesis that more than 50 % of patients were cured permanently or temporarily (P-value<0.001).

DISCUSSION

The exploratory data analysis showed that the department of general surgery and orthopedics were the most visited. For almost all demographic characteristics without distinction of

disease, the number of patients cured was higher than the number of patients not cured which explains the importance of medical COP for survivors of the 1994 Genocide against Tutsi.

Table 4. logistic regression for health status

Health Status	Full Model			Reduced Model		
	OR	P-value	95% CI	OR	P-value	95% CI
Clinical Department						
Orthopedics and General Surgery	REF					
Surgery	1.34	0.249	0.81 2.22	1.172161	0.463	0.77 1.96
ENT	2.66	0.005	1.34 5.31	2.494666	0.001	1.46 4.27
Clinical psychology	8.47	0.000	2.97 24.17	4.207171	<0.001	2.35 7.54
Gynecology	0.84	0.696	0.35 2.00	0.887489	0.768	0.40 1.96
Urology	1.27	0.618	0.50 3.23	0.853497	0.658	0.42 1.72
Ophthalmology	3.34	0.000	1.94 5.74	3.924476	<0.001	2.52 6.10
Dermatology	0.83	0.696	0.31 2.17	0.980379	0.965	0.41 2.37
Dental	60.30	0.000	17.40 209.02	56.71824	<0.001	17.10 188.17
Gender						
Male	REF					
Female	1.12	0.714	0.61 2.06			
Religion						
Catholic	REF					
Protestant	0.77	0.211	0.52 1.16			
Muslim	0.80	0.686	0.27 2.36			
Other	1.28	0.368	0.75 2.17			
Profession						
Substance farming	REF					
Civil servant	0.64	0.598	0.12 3.37			
Business	2.38	0.132	0.77 7.39			
Other	0.78	0.249	0.52 1.18			
Education						
University						
Secondary	0.43	0.380	0.06 2.86			
Vocational Training (TVET)	0.25	0.185	0.03 1.93			
Primary	0.40	0.343	0.06 2.66			
None	0.50	0.473	0.07 3.37			
Ubudehe Category						
Category I	REF					
Category II	0.74	0.180	0.48 1.15			
Category III	0.77	0.267	0.48 1.23			
Category IV	1.00					
BMI Category						
Underweight						
Normal	0.93	0.774	0.57 1.52			
Overweight	0.87	0.648	0.48 1.59			
Obese	0.45	0.073	0.19 1.08			
Treatment						
Not Treated	REF					
Treated	2.42	0.051	1.00 5.86	2.20	0.041	1.03 4.68
Age Category						
Young	REF					
Adult	0.62	0.321	0.25 1.58			
Old	0.58	0.257	0.23 1.49			
Smoking						
Yes	REF					
No	0.55	0.21	0.22 1.40			
Multiple Sexual Partners						
Yes	REF					
No	2.01	0.189	0.71 5.73			
Drug Abuse						
Yes	REF					
No	1.06	0.956	0.14 7.98			
Intercept	1.18	0.923	0.04 34.10	0.278498	0.002	0.12 0.63

The multivariable analysis showed that the treatment status and clinical department were significantly associated with health status. Having reference category of “General Surgery and Orthopedics” for clinical departments and “Not treated” for treatment status; these variables were associated with the increase in odds of being cured permanently or temporarily. This model fitted well the data according to Hosmer-Lemeshow (P-value=0.741).

Other social economic variables such as Ubudehe category, age category and life-style (Alcohol, drug abuse, and having multiple sexual partners) were not associated

with the increase or decrease of being cured temporally or permanently. This may indicate a predominance of the role of visiting a clinical service for treatment. However, this might partially answer the research question about the usefulness of Medical COP regarded that the treatment was highly unbalanced considering complete cure or failure of cure, All independent variables were ignored and a single proportion test was used, and it was found that more than half of patients were cured permanently or temporally.

It is also important to note that the discussion of results was limited to findings of this study because Medical COP is a national initiative for the treatment of mental and physical conditions resulting from the 1994 Genocide against Tutsi and associated health challenges for the general population hindering sustainable development for Rwanda.

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In conclusion, visiting clinical services compared to visiting orthopedics and general surgery, and the complete healing versus failure of healing were associated with the increase in odds of permanent or temporary cure. These findings confirmed the importance of Medical COP in treating genocide survivors of the diseases that mostly resulted from the genocide and its direct consequences. Using single proportion test by ignoring all covariates, it was found that more than half of patients were cured permanently or temporally.

The results show that the consultations with RMH specialized doctors during RDF medical COP permanently or temporally cured genocide survivors. Further qualitative surveys are needed to evaluate the importance and extent of RDF medical COP for the general population and for specific diseases.

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National Study in Rwanda Family planning barriers

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INTRODUCTION

Over the last two decades, Rwanda has registered tremendous improvement in family planning (FP). The contraceptive prevalence rate (CPR) in the country has tripled from 17% in 2005 to 53% in 2014-15. However, the 2014-15 Rwanda demographic and health survey (RDHS) showed a slow increase in the use of modern FP methods compared to the previous five years (only around a 3% increase), and the unmet need for contraception remains unchanged at 19% compared to the previous five years. The drop-out rate of FP users is high for unknown reasons, and yet, over the years, many strategies have been put in place to speed up FP uptake in order to reap the “demographic dividend.”

Therefore, there is a need to generate evidence to inform new strategies to address the challenges affecting the FP program, including the identification of the barriers to FP uptake and exploration of the factors associated with the low increase in the modern CPR.

METHODS

A cross-sectional analytical design was used to identify the barriers to FP uptake among women aged 15–49 years in Rwanda. A sample size of 3,365 women was estimated, and a two-stage clustersampling technique was used, with 128 randomly selected clusters from six randomly selected districts (three with high CPRs and three with low CPRs).

At the household level, married or cohabiting women were interviewed using a structured questionnaire with questions about possible barriers to FP uptake. Focus group discussions were used to obtain insights from these women, their husbands/partners, community health workers (CHWs), and young adolescents about the FP barriers in those districts. Key informant interviews were conducted with other FP stakeholders such as health-service providers, district officials, development partners, and central-level officials, so as to have a global picture of the FP barriers in Rwanda.

Data were collected at the household level by trained staff from the School of Public Health, College of Medicine and Health Sciences, University of Rwanda, who used electronic tablets and field notetaking with voice recorders for qualitative data analysis. Quantitative data were cleaned and analyzed using Stata v13, whereas qualitative data were manually analyzed through the thematic analysis of content.

The frequencies of all variables were plotted, and bivariate analyses of key variables were performed across two categories of outcomes (FP discontinuation and FP uptake); finally, multivariate logistic regression was performed to identify the factors associated with FP discontinuation and uptake. Qualitative data were triangulated with the quantitative findings to capture a comprehensive snapshot of the FP situation in Rwanda and strengthen the evidence required for key actions to increase the CPR. The study was ethically approved by the institutional review board of the College of Medicine and Health Sciences, the Ministry of Health, the National Institute of Statistics, and the Ministry of Local Governance.

RESULTS

This study reached 3,459 married or cohabiting women against the estimated sample size of 3,365, yielding a response rate of 102.8%. The majority of these women were between 30 and 34 years of age, and 74.6% of them were living in rural areas. More than half (61.1%) had received at least primary-level education, more than three-fourths were covered by health insurance (78%), and almost half belonged to Ubudehe category 3 (49.7%).

The study found that 74.6% of the 2,889 women who had ever used FP methods had stopped using them at some point in their lives. Injectables were the most prevalent method that was last stopped (62.1%), followed by oral contraceptive pills

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(22.7%, n = 489); the distribution of the last-stopped method did not vary across different categories of sociodemographic characteristics.

Compared with Nyarugenge District, Rusizi (adjusted odds ratio [aOR] = 2.20, $p < 0.001$) and Bugesera Districts (aOR = 1.82, $p = 0.003$) were statistically associated with FP discontinuation. As the number of pregnancies increased, the likelihood of FP discontinuation also increased (women with 2 or 3 pregnancies: aOR = 4.91, $p < 0.001$ and women with 4 or 5 pregnancies: aOR = 5.67, $p < 0.001$, compared to women with 0 or 1 pregnancy: aOR = 5.98, $p < 0.001$).

Women who wanted more children in less than two years had an 88% increased chance of stopping FP when compared with women who did not want any more children.

Through focus group discussions and key informant interviews, other barriers to FP uptake were reported in addition to those identified through the multivariate analysis: side effects/health concerns related to FP methods (also descriptively stated by 45.2% of women who had ever stopped using FP), the need to have another child (also descriptively stated by 35.9% of women who had ever stopped using FP), FP method failure, geographical inaccessibility (i.e., a long distance between the user's residence and the nearest FP service-delivery point), the need to change the FP method used, rumors in the community about contraceptives, cultural beliefs such as considering many children a sign of wealth, religious beliefs, lack of communication among couples, lack of trained staff to offer long-acting reversible contraceptives (LARCs) and permanent methods of contraception, poor FP counselling, and the inability of CHWs to provide counselling and adequately manage of the side effects of FP methods.

The CPR for any FP method was 58%; this rate was low in Rusizi, Nyaruguru, and Bugesera Districts, and among women aged less than 25 years, those without health insurance, illiterate women, and Methodists, Baptists, and Pentecostals.

The most prevalent FP methods were injectables, implants, and oral contraceptive pills. Descriptive barriers to FP uptake were the same as those identified for FP discontinuation, and additionally included being pregnant at the time of the survey and a distance of more than 1.5 hours between the women's residence and the FP service-delivery point.

Focus group discussions and key informants also highlighted the lack of information on FP, lack of CHWs who can provide LARCs, and lack of confidentiality when consulting CHWs as factors impeding FP uptake.

Among the youth (15–24 years), FP uptake was more likely among women in Musanze District, those who wanted children in more than two years, and those who had more than one child. Refusal by service providers to offer the preferred method of contraception, lack of information about FP, and lack of parental support were reported by the youth as key barriers to the utilization of FP services.

An insufficient number of functional youthfriendly services and youth centers throughout the country, lack of parental support, and the cost of FP services were also reported as big hindrances towards the effective utilization of FP services by the youth.

In conclusion, the current speed of increase in the CPR is not promising if Rwanda is to achieve its FP-related targets and sustainable development goals. Efforts to increase the awareness of the population with regard to FP and to address the rumors regarding its side effects and complications as well as cultural beliefs are required to increase FP uptake and reduce FP discontinuation. Key strategies for increasing FP uptake are the community-based provision of FP services, approaching the leaders of the Methodist, Baptist, and Pentecostal churches to discuss their role in the utilization of FP services, using all opportunities for integrating other health services with messaging on FP, and increasing FP resources in Adolescent Sexual and Reproduction Health and Rights facilities.

Accelerating Fertility Decline to Trigger the Demographic Dividend in Rwanda

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KEY MESSAGES

1. Accelerating fertility decline from the current level of 4.2 births per woman will lower the dependency burden and open the window of opportunity for the country to harness the demographic dividend.
2. Rwanda can build on its exceptional success in reducing birth rates between 2005 and 2010 with a focus on:
 - Improving quality, outreach and impact of family planning services by increasing uptake of long-acting contraceptives and reaching young people.
 - Keeping girls in school by improving progression to secondary school, and ensuring universal access to age-appropriate sexuality education and contraception.
 - Stepping up interventions to reduce child mortality with a focus on reducing new-born mortality.

CONTEXT

Rwanda's fertility rate declined slowly up to 2005 when the country initiated one of the fastest fertility declines in human history over a five year period. The total fertility rate fell markedly from 6.3 to 4.6 children per woman between 2005 and 2010, buoyed by an impressive increase in contraceptive use. However, the rate of decline decelerated between 2010 and 2015, with the fertility rate dropping by less than half a child to 4.2 births per woman¹. The infant mortality rate declined from 86 per 1000 live births to 32 per 1000 live births, while under five mortality rate declined from 152 to 50 deaths per 1,000 live births between 2005 and 2015.

The longstanding gap between birth and death rates has led to rapid population growth, with the population size more than doubling from 4.8 million to 10.5 million people between 1978 and 2012². The population is projected to reach 23 million by 2050 and 27 million by 2070³ even if birth rates continue to decline. With about 40% of the population being below 15 years, the country harbours high child dependency burden, which is a major bottleneck to the attainment of its long term development goals. High fertility increases the costs of taking care of children and undermines capacity of families and governments to save and invest for the future.

A rapid decline in the total fertility rate will change Rwanda's age structure to one with more working age people and open a window of opportunity for accelerated economic growth called the Demographic Dividend (DD)⁴. Countries can

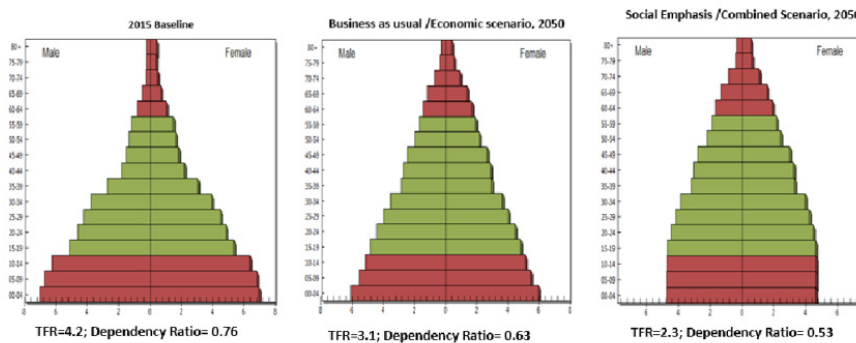
enhance the magnitude of the DD if the fertility decline is accompanied by sustained investments in education and skills development, health, job creation and good governance. This brief highlights key policy and programme opportunities that would enable Rwanda accelerate sustained fertility decline and harness the DD.

This brief is derived from the Rwanda DD study⁵, which showed that reducing birth rates from 4.2 to 2.3 births per woman by 2050 would produce an age structure with more working age people than dependents (Figure 1). This would propel the country to upper income status with GDP per capita of US\$ 12,555 by 2050. This would be made possible if Rwanda follows an integrated investment framework that accelerates fertility decline and concurrently focuses on human capital development, creation of decent jobs and ensures efficiency and accountability in use of public resources and service delivery.

Key Priorities for Accelerating Fertility Decline in Rwanda

Based on experiences of Asian countries like Thailand, Malaysia and Indonesia and African countries like Botswana, Tunisia and Mauritius that have experienced sustained rapid fertility decline, Rwanda can accelerate its own decline by reinforcing investments in family planning (FP), child survival and female education. There are sizable socioeconomic variations in contraceptive use based on 2015 data.

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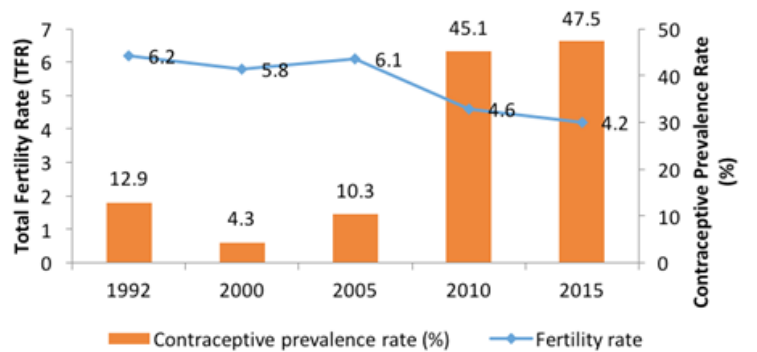
Source: NISR, UNFPA, AFIDER, 2017

Figure 1: Projected population age structure in Rwanda under various scenarios by 2050

Women residing in rural areas, in the West province, those from poor households and without formal education have relatively low levels of contraceptive use.

Contraceptive use also varied by age, with teenage girls having the lowest prevalence rates at 32.8%, compared to

a high of about 51% among women aged 25-39 years. In addition, about 19% of all women have unmet need for FP because they were not using an effective method of FP, yet they wanted to delay or avoid pregnancy.



Source: NISR, Demographic and Health Survey, 2014/15

Figure 2: Trends in use of modern methods of contraception among married women and the total fertility rate, Rwanda 1992-2015

Improving access and effectiveness of family planning

Between 2005 and 2010, Rwanda recorded one of the fastest increases in the contraceptive prevalence rate globally, from 10.3% to 45.1% (Figure 2). However, the progress stalled between 2010 and 2015, with the percentage of married women using modern contraception increasing slightly from 45.1% to 47.5%. Consequently, the country did not achieve its 2012 target of increasing contraceptive use to 70% as set in the FP strategic plan 2012-2016.

There is, therefore, need to reinforce and reposition the FP programme to ensure that women and men have access to their contraceptive methods of choice to avoid unplanned pregnancies. Key focus should be on expanding method choice; enhancing community-based distribution of FP; training of health care providers on promotion and provision of long-acting and permanent methods including IUD, implants, and sterilization; integrating FP in HIV, maternal, and child health services; improving supply chain management; improving educational campaigns to increase demand for FP among underserved groups, particularly youth, the poor and less educated; and increasing government funding towards procurement of contraceptives.

Keeping girls in school and addressing factors driving early childbearing

Increasing school attendance and progression for girls and ensuring that in-school and out-of-school girls have access to comprehensive reproductive health information and services is critical in preventing teenage pregnancies and enhancing their productivity in future.

Ensuring that girls have access to comprehensive age-appropriate sexuality education and contraceptives when they need them is a human rights and a development issue.

In 2016 about 98% of Rwandese girls of primary school age were enrolled in school while only 34.6% of those of secondary school age were enrolled in secondary school⁸. This implies a high dropout rate, of which teenage pregnancy and early marriage could be contributing to⁹.

Although Rwanda education centres have been established and health facilities are increasingly delivering youth-friendly services, more needs to be done to entrench comprehensive sexuality education in schools and for out of school youth.

Although youth child bearing by 5 years can slow population growth by 15-20%⁶. In addition, keeping girls in primary school for one extra year increases their future earnings by 10-20%⁷. It is estimated that delaying marriage and has among the lowest levels of teenage fertility in the region, it is disturbing that the teenage fertility rate increased from 40 to

44 births per 1000 girls aged 15-19 years and the proportion of women aged 15-19 who had started child bearing increased from 6% to 7.3%. Similarly, although the legal minimum age of marriage in Rwanda is 21 years, about 2% and 14% of women aged 25-49 years were married by 15 and 18 years, respectively.



Figure 3: Child bearing among teenage girls, Rwanda, 2010 and 2015

Improving child survival to give parents the confidence to have fewer children

Decline in child mortality is a critical precondition for fertility rate decline because parents want to be assured that their few children have a decent chance to survive to adolescence and adulthood. Through implementation of various interventions such as immunization through community-based services,

community-based insurance, integration of maternal and child health services, and improved data collection and utilisation in decision-making, Rwanda has made impeccable progress in reducing overall child mortality rates over the past two decades (Figure 4). However, deaths in the first month of life (neonatal mortality) are not declining at the same rate, and represent about 40% of all deaths occurring among children aged below five years.

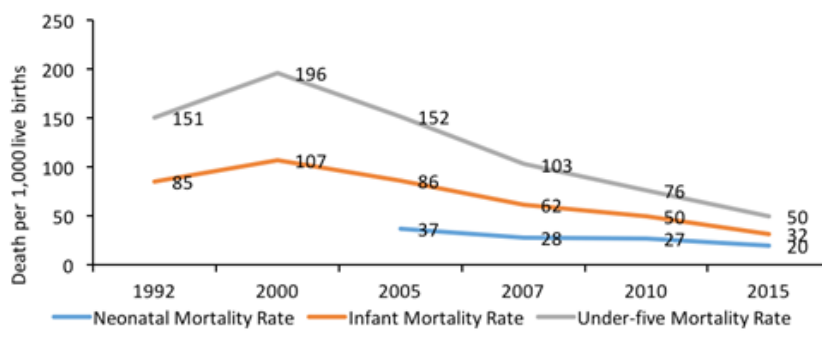


Figure 4: Child bearing among teenage girls, Rwanda, 2010 and 2015

A key underlying cause of child mortality where limited progress is being made is child malnutrition; 38% of Rwandese children are stunted and 9% are underweight. Improving nutritional status of children also helps to improve cognitive capacity and learning outcomes of children. Stepping up the interventions that have propelled Rwanda’s reduction in child mortality, with particular focus on scaling up interventions that would help lower neonatal mortality rates, including improving the quality of antenatal care, delivery care, and postpartum care of new born children will contribute to lower fertility rates.

Key policy recommendations to facilitate fertility decline

Short-term policy options for accelerating fertility decline include:

- Review and operationalize the FP2020 commitments and the FP Strategic Plan, and address programme bottlenecks identified in the mid-term review of the Health Sector strategic plan, with a focus on enhancing the role of the private sector in delivering and resourcing family planning and scaling the community-based distribution of family planning.
- Improve contraceptive method mix and promote use of long-acting and permanent methods of family planning to satisfy the reproductive needs of women who want to stop childbearing or delay births for several years.

- Advocate for revision of Article 7, Chapter II (Rights in terms of human reproductive health) of the 2016 Reproductive Health Law that states that “subject to provisions of other laws, every person having attained the majority age has the right to decide for oneself in relation to human reproductive health issues”, which might be used to restrict access of reproductive health services to adolescents below age 18.
- Ensure implementation of the comprehensive sexuality education programme in schools and enhance access to youth friendly SRH services by training facility and community-based service providers.
- Scale up mass education campaigns for the empowerment of women, including community education on the benefits of educating girls beyond primary and secondary school levels. This will help address the increasing teenage fertility and early marriage incidences.
- Strengthen management of post-partum health complications and intensify interventions to improve breastfeeding to reduce neonatal mortality.
- Strengthen multi-sectoral collaboration in implementing the integrated nutrition policy and the child nutritional programme, involving all relevant government sectors, the private sector, and the communities.

Medium to the long term policy options for accelerating fertility decline include:



“Keeping girls in primary school for one extra year increases their future earnings by 10-20%.”

Acknowledgements



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“Improving the quality of antenatal care, delivery care, and post-partum care of newborn children will contribute to lower fertility rate.”

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Working with community malaria action teams (CMATs) contributes to malaria control

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INTRODUCTION

Maximization of existing malaria preventive measures through active community participation is a high priority for malaria control and elimination [1-3]. Elimination of malaria should not be the responsibility of health professionals alone. Rather health professionals should work with the community to promote their participation in malaria elimination initiatives [4, 5]. This brief shares findings from the Malaria Elimination Program for Ruhuha (MEPR). This program was funded by WOTRO (Netherlands Organization for Scientific Research/NWO Science for Global Development). It aims at showing the multifactorial conditions of malaria in a community and the role of community participation in the elimination of malaria. Specifically, the program worked with community malaria action teams (CMATs) to sensitize the community about malaria elimination and to identify and facilitate community-based solutions for malaria elimination.

KEY MESSAGES

CMATs contribute to malaria elimination by sensitizing communities about malaria control, identifying and facilitating community-based solutions and fostering a sense of community ownership.

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Key Findings

- » Youth involvement in CMATs allowed peer dissemination of health information to high risk groups.
- » Involvement of local leaders strengthened the delivery of health messages to sector population.
- » Contribution to the health system via capacity building of a large group of community.

CMATs activities contributed to

- » The increase of community awareness on malaria transmission, treatment and prevention.
- » The increase of community acceptance of preventive measures (100 % coverage of indoor residual spraying conducted in April 2015).
- » The reduction of fever/malaria experience from 68% to 21.4% in 2013 and 2014 respectively.
- » The increase in health insurance ownership from 66.31% to 91% in 2013 and 2014 respectively.

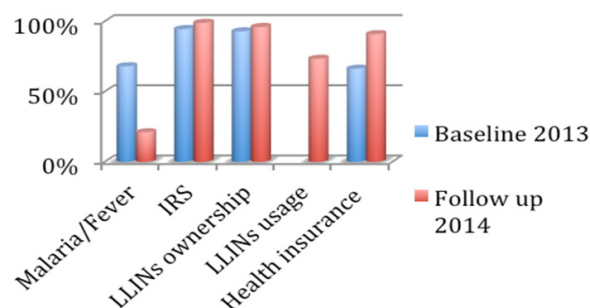


Figure 1. IRS: Indoor Residual Spraying; LLINs: Long-Lasting Insecticidal Nets

How CMATs were established

Ruhuha sector is divided into five cells with a total number of 35 villages. Each village had a CMAT, which was composed of three individuals: a village local leader, youth representative and community health worker. The total number was 105.

A meeting was held with CMATs to discuss their terms of reference, communication strategies, their initial plan of

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actions as well as the monitoring and evaluation strategy.

This section summarizes the key activities that were implemented as part of the community malaria elimination activities.

Selection and Training of CMATs

CMATs were selected in collaboration with MEPR team, Ruhuha health centre and Ruhuha sector and trained on malaria treatment and prevention including bed net use, Indoor Residual Spraying (IRS), elimination of mosquito breeding sites (rice fields and peri-domestic), larval and adults mosquito monitoring.

What CMATs did?

- » Identified local malaria related issues
- » Worked with the community to suggest solutions to the issues identified during community meetings
- » Organized home visits to promote the use of nets, acceptance of indoor residual spraying, clearance of breeding sites and ownership of a health insurance.
- » Participated in spraying against mosquito larvae in marshlands and across households.
- » Participated in mosquito monitoring
- » Tracked monthly activities and provided feedback to communities, health centers, health sector and research team.

Persistent barriers towards malaria elimination with community engagement

- » The perception that bed nets in households increased the risk of bedbug infestation
- » Specific groups (low socio economic status, males and children 6-15 years) less likely to use malaria preventive measures such as bed nets.
- » Malaria symptoms recognition and health insurance as strong predictors of prompt care seeking
- » CMATs required continued incentives to facilitate their work.

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Image 1. CMATs, KTNeT and MEPR Teams after MEPR research findings dissemination. Ready to share with respective communities.

“I learnt from them the benefits of sleeping under bed nets always; before I was not minding about using bed nets, and as a result my children were often having malaria; but when CMAT explained to me and emphasized proper use of bed nets, my children are no longer suffering from malaria” community member, Ruhuha

Policy recommendations

- » Scale up malaria related activities using open-wide community participation through engagement of village leaders and youth in addition to community health workers, to foster the sense of ownership and empowerment through collaborative efforts.
- » Adopt locally meaningful solutions in relation to the use of malaria preventive measures, e.g. targeting specific high-risk groups with specific messages such as recreational activities among youth in which malaria messages will be embedded.
- » Provide trainings and basic materials to enable the platforms to perform.
- » Implement a monitoring and evaluation strategy to inform effective implementation.
- » Adopt multiple strategies towards malaria elimination including community based larval source management among others.

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It is divided into 4 paragraphs with the following headings:

- » **Objectives:** stating the purposes/aims of the work; the research undergone, the hypothesis tested or the procedure evaluated.
- » **Materials and methods:** briefly stating what was done and what materials were used, including the number of subjects, the methods to assess the data and to control bias.
- » **Results:** Providing key findings of the study, including indicators of statistical significance, actual numbers, as well as percentages.
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- » Methods
- » Results
- » Discussion
- » Conclusion

Long articles may need subheadings within some sections to clarify their content. Different articles may be adapted according to their type. Abbreviations should be spelled out the first time a term is given in the text.

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A full statement of the complete reasoning of the article must appear in the methods section of the manuscript.

A complete and explicitly process for registration of required trials to the suitable public registry is mandatory. The publication of unregistered scientific work is possible but may require rigorous selection; however, the entitled process register will be clearly stated to the article. Thereof, accepted registration should be in any of the existing registries: www.rnec.gov.rw and/or www.icmje.org/faq.html and/or in the WHO International Clinical Trials Registry Platform. The trial registration number should be included as the last line of the manuscript abstract.

All Informed consent must be documented.

The involvement of scientific (medical) writers not listed among authors - or anyone else who assisted with the preparation of the manuscript content with their role respectively, should be acknowledged, along with their source of funding.

Authors are required to declare that any competing financial or other interests are not linked to their work and it must be stated as following: “The author(s) declare that they have no competing interests.” Otherwise, all competing interests should be declared and listed at the end of the manuscript. The editor declines all responsibilities; which in fact, go legally to concerned authors.

Any related or discovered plagiarism disrupts the credibility of the article, and leads to its rejection. However, in case, the article was already published, this bulletin has the obligation of stating it in the next publication with all prejudices and modifications required.

Authors who wish to appeal a rejection or any third person who wishes to make a complaint, should, in the first instance,

contact the Editor-in-Chief (lmutesa@gmail.com); he will ensure provision of all details concerning the bulletin's complaints procedure.

Scope of the Journal

Mission and Scope

The Rwanda Public Health Bulletin will serve as a platform where public health reports and studies are collected and compiled to inform key policy-making procedures. It will ensure that policy-makers, researchers, health professionals, and practitioners have access to timely and updated research evidence and recommendations necessary to control and minimize the effect of potential public health threats in the country.

Journal publication contents

Type: Not-For-Profit Public Health Journal

Publication: Printed format, Online, Open access

Category: Scientific

Main Language: English

Topics: Disease surveillance summaries, evaluation of public health interventions, Public health notices/ or outbreak reports, case reports, case studies, opinion articles, commentaries, original research papers, policy briefs/notes.

Content:

All works submitted to this bulletin will have to belong to types of articles stated below :

1. Original Research:

Referred to as "Primary Research" pioneer in a determined domain. It can be from various aspects:

Clinical features, pathophysiology, biochemistry, molecular biology

Case management: complication, unexpectancies

Therapy: treatment, drug development, drug resistance

Immunology, immunogenetics & vaccine development

Genetics: genomes and transcriptomes

Epidemiology: transmission dynamics, vector control chain (of the disease and its management)

Health system: policy & planning issues to prevention, treatment

Health Economic: Efficiency and Effectiveness of health intervention

Sociological, anthropological issues, poverty, gender issues

Global environment

Inter-sectoral issues, intervention studies and operational research

Control policy & planning & guidelines & recommendations

Disease surveillance summaries

Disease surveillance summaries are critical information sharing tools on diseases per population affected, time and place. They serve as entry points for health professionals to estimate the magnitude (disease burdens and occurrence frequencies) and disease trends.

These summaries serve as decision-making tools for public health actions.

These reports are 2,000-2,500 words in length in addition to an abstract, tables and references.

2. Checklist for surveillance reports

Disease surveillance summaries are reported following the checklist below:

Title: Compose a title that includes the name of the health condition, population, time and place.

Abstract

Provide a structured abstract including the following sub-headings: Background; Objectives; Methods; Results; and Conclusion.

Introduction

Context: Summarize the current situation regarding the health condition under surveillance and identify why it is important.

Objectives: State the objective of the surveillance report.

Methods

Setting: Describe the setting, locations and dates of the surveillance period.

Population: Describe the population under surveillance.

Definitions: Provide definitions for each health event under surveillance, including case definitions and any public health interventions.

Information sources: Describe all data sources, including the objective of any surveillance systems, what data were collected and how data were gathered, transferred and stored.

Supplementary data: If appropriate, note where to access supplemental material (e.g., www.opendata.gc.ca).

Data quality, missing data and reporting delays: Describe how the data quality was assessed. Explain how missing data were addressed. If data is reported by date of diagnosis or symptom onset, include a statement about whether the data for the most recent periods may be revised.

Data analysis: Describe any analytical methods used providing sufficient detail to enable a knowledgeable reader with access to the original data to judge its appropriateness and to assess the reported results.

Results

Descriptive: Provide a summary of the descriptive data, including demographics.

Data Quality: Report on data quality (e.g., completeness, missing data, under reporting)

Analytic data: Provide a summary of the analysis including (when indicated) estimates of trends. When applicable, point estimates should include appropriate indicators of measurement error such as 95% confidence intervals (e.g., average annual percentage change used to describe trends or odds ratios used to describe subgroup differences).

Figures: Create the minimum number of figures to highlight key results. Create a title that includes person, time and place.

Discussion

Key results: Summarise key results with reference to study objectives

Comparison: Consider these findings in relation to the current literature.

Strengths and weaknesses: Discuss the strengths and weaknesses of the study (data quality, completeness, sources of potential bias).

Interpretation and generalizability: Provide a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies and other relevant evidence.

Conclusion: Ensure conclusions address objective and follow from the results.

3. Public health notices / Outbreak reports

Following the Center for Disease Control recommendations, for PH notices and outbreak reports to be published they need to cover all four components as stated below:

Introduction: Generally, the introductory paragraph should begin with 1 to 3 sentences establishing the existence of the outbreak or underlying public health problem (e.g., “On January 2, 2008, the Nevada State Health Division contacted CDC concerning surveillance reports received regarding two persons recently diagnosed with acute hepatitis C.”). The introductory paragraph also usually contains: a) a statement that an investigation was conducted, when and by whom; b) the most important finding(s); c) the actions taken to stem the outbreak; and d) a statement of the public health implications and actions that should be taken in response to the investigation.

Investigation and results: First, present the initial investigation and its findings. This might include: 1) a description of the setting and a statement of how the outbreak came to the attention of health authorities; 2) a clinical description of the index case or initial cases; 3) initial key test results; and 4) hypothesis generation activities and results.

Next, summarize the full investigation, including: case definition, case-finding activities, method of investigation, and results. Cases should be counted and described by clinical characteristics, treatment, and outcome, as well as time, place, and person descriptive results.

Next, present the methods and results of any analytic epidemiologic studies (e.g., cohort or case-control studies).

Finally, provide the results of any relevant microbiologic, genetic, or toxicologic results, followed by the results of any testing of environmental samples.

Public health response: When appropriate, a brief description summarizing any public health interventions taken and the results of the interventions follows.

Discussion: Same as for a Full Report, except that a Limitations paragraph might not be required for an Outbreak Report.

4. Policy briefs

This bulletin will use guidelines on reporting/publishing policy notes as they are suggested by the Center for Disease Control (CDC). As the CDC defines them; Policy Notes are intended to announce new official policies or recommendations (e.g., from ACIP or CDC). These reports can be thought of as briefs. Maximum word count at submission is 1,400 words. Up to three tables, figures, or boxes may be included. Policy Notes contain no Discussion or Limitations, and a summary box is not required. Although policy notes or brief might vary, following is a rough guide of what basic notes should have:

Introduction: The introductory paragraph should be limited to 150–200 words. It might contain all or some of the following components: a brief introductory statement orienting the reader to the topic and placing it in context, a brief description of the public health problem, a brief statement of the rationale for the policy or recommendation, mention of the most important parts of the policy or recommendations, and one or two sentences stating the conclusions and the public health implications of the new policy or recommendations.

Background: The Policy Note should include a paragraph after the introduction that summarizes background information relevant to the policy or recommendation that can help the reader understand the context and need for the policy or recommendation.

Methods: Should include a summary of the methods used to establish the policy or recommendation, including answers to some or all of these questions:

Who was involved in the production of the guidelines or recommendations, and how?

What evidence base was considered?

What was the rationale for considering this evidence base? Was other evidence excluded from consideration and, if so, why?

Rationale and evidence: The Policy Note should provide a concise review of the rationale for the policy or recommendation and a descriptive review of the scientific evidence used to establish it. It should include an explanation of how the policy or recommendation adds to, or differs from, relevant policies or recommendations established previously.

Presentation of the policy or recommendation: The policy or recommendation should state clearly when it takes effect and to whom and under what circumstances it applies.

Discussion or comment: The Policy Note should comment on the likely impact of the new policy or recommendation and plans for assessment of the policy or recommendation

5. Case reports

These are reports of an individual patient on their symptoms, treatment reactions on a disease or condition of interest. These reports normally focus on unusual reactions or occurrences. Similar to other research reports, case reports might include a literature review of previous similar.

Case reports might also address positive patient outcome on particular treatment guidelines or individual impact of a particular intervention. These are mainly used for educational and decision-making purposes.

Case reports are normally reported following a checklist found at the “ CARE Guidelines ”.

6. Case studies

They have to be well-described case studies on health care interventions of public health concern. These could be:

- i. Rigorous assessments of processes and program interventions.
- ii. Recommendations on possible health interventions.
- iii. Never on individual patient (= case report)

7. Commentaries / Opinion / Methodology articles

We recommend authors to follow the “EQUATOR Network” for ample explanations and guidelines in the writing of such articles. Though these articles are moderated, they should be:

- i. Short, focused, opinionated to previous articles or any subject related to the journal entirely.
- ii. Contemporary and focusing on specific issues.
- iii. Franc critics to the journal are bravely motivated and would be as much as possible published.
- iv. Are normally up to 800 words.

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