ASSESSMENT OF THE RISK BEHAVIOURS AND PRACTICES TOWARDS DENTAL HEALTH AMONG SCHOOL CHILDREN IN RURAL AND URBAN PUBLIC PRIMARY SCHOOLS IN RWANDA

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DECLARATION

I do hereby declare that this dissertation entitles "**ASSESSMENT OF THE RISK BEHAVIOURS AND PRACTICES TOWARDS DENTAL HEALTH AMONG SCHOOL CHILDREN IN RURAL AND URBAN PUBLIC PRIMARY SCHOOLS IN RWANDA"**contains my own work except where specifically acknowledged,submitted in partial fulfillment of the requirements for the Master's degree in Pediatric Nursing, at University of Rwanda/College of Medicine and Health Sciences (UR/CMHS), School of Nursing and Midwifery. Also I do declare that a complete list of references is provided indicating all resources of information quoted or cited.

Name: Janviere MUKABIZIMANA Signature

DEDICATION

This work is dedicated to the almighty God source of knowledge and understanding,

To my beloved husband Emmanuel HAKIZIMANA and my daughter INEZA Anae Darlene for their emotional support, to my brothers and sisters for their encouragement, to all my family members, to my classmates and academic staffs for the nice moments we spent together sharing knowledge.

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I do thank God Almighty who gives me strength, knowledge and keeps
me in every single step through all my life.
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I finally express my thanks to the authorities and representatives of Kacyiru and Kibali primary schools for the facilitation of data collection procedure.

ABSTRACT

Background: Quality of life and overall health can be greatly influenced by changes in oral health. Oral diseases such as caries and gingivitis can produce discomfort, pain and also affect people's social life. These diseases' prevalence has been shown to be highly correlated to socioeconomic status and education.

Objectives: The purpose of this study was to assess the risk behaviors and practices towards dental health among children in rural and urban public primary schools.

Methodology: This study used quantitative approach and a cross-sectional design was utilized. The study was conducted in one urban primary public school (Kacyiru primary school) and one rural primary public school (Kibali primary school) in Rwanda among pupils attending primary level 1 to level 6 aged between 6 to 12 years. Target population was 400 and the minimum required sample size was 197 children calculated using Raosoft formula. Stratified random sampling has been used to recruit children referred to student list. Approval to conduct research was obtained from Institution Review Board of University of Rwanda, College of medicine and health sciences. Authorization to collect data was also obtained from the Headmasters of selected schools, parental permission was received and children signed the assent form..

Study results: The study recruited 197 school children, with a response rate of 100%.The results showed a statistically significant differences (p=0.002) between urban and rural children on the habit of sugar consumption. Higher proportions (25%) of children from urban area were drunk sugary drinks compare to children from rural (6%).Furthermore; the study reported that the majority (78%) of children from urban used toothbrushes and tooth pastes than of children from rural (57%).The results showed a statistically difference between children from urban and rural as far as frequency of dentist visit is concerned (P=0.026),where 48 % of the participants from rural had never visited a dentist in lifetime and among those who visited the dentist, 50% reported to have visited the dentist in 1 to 2 years ago. Time of changing the toothbrush between children of rural and urban areas showed statistical difference (p=0.011).

Conclusion: The risk behaviors identified were frequency in sugar consumption, time spent to brush, and the time to visit the dentist. Practices identified related to teeth brushing were tooth brushing materials, time to change them and the technique used to brush the teeth. Children from urban counted higher in sugar consumption frequency compared to children from rural area. Most of children from rural, have never visited a dentist and the majority of them reported to use other things than toothbrushes in cleaning their teeth.

Key words: dental health, periodontal disease, dental caries, risk behaviors, practice.

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LIST OF SYMBOLS AND ACRONYMS/ABBREVIATION

%: Percent

AAPD: American Association for Pediatric Dentists

BPOC: Basic practices of oral care

CMHS: College of Medicine and Health Sciences

DALYs: Disability adjusted life-years

FDI: Food and Drug Agency

MOH: Ministry of Health

NCD: Non communicable Diseases

P: Primary

RDHS: Rwanda Demographic Health Survey

SOS: Save Our Souls

WHO: World Health Organization

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CHAPTER I.INTRODUCTION

This chapter will cover the background of the study, the problem statement, the objectives of the study as well as the research questions, the significance of the study, the operational definition of the concepts and the subdivision of the study.

1.1. INTRODUCTION

The World Health Organization (WHO, 2017) declared that dental caries are the most common non-communicable disease around the World; children and people with low socio-economic status are at risk of the disease. In the African Region, where 80% of the population has low socioeconomic status, dental diseases influence the health and well-being of millions of people and have an adverse economic impact on the population (WHO, 2016). Direct treatment expenses due to dental diseases worldwide were estimated at US$298 billion yearly, equivalent to an average of 4.6% of global health expenses and indirect costs due to dental diseases, worldwide amounted to US$144 billion yearly, corresponding to economic losses within the range of the 10 most frequent global causes of death (Listl *et al.*, 2015).

In Asia, the occurrence of dental caries among Indian children aged 11-13 years was as elevated as 59% (Suprabha *et al.*, 2013) and the same prevalence was found among children aged 12 years in one African Country; Zimbabwe (Mafuvadze, Mahachi and Mafuvadze, 2013). In East African countries, the occurrence of dental caries in children ranges from 23.9% in Uganda (Kutesa *et al.*, 2015) to 32.5% in Kenya(Kenya Ministry of Health, 2015).The magnitude of dental caries in Africa is high probably associated with the change in dietary lifestyle which is concentrated in sugar, low access and utilization of tooth brushes and toothpastes and difficulties related to the access of health facilities.

1.2. BACKGROUND TO THE STUDY

Oral diseases are among major public health problems and poor oral health has an important effect on general health and quality of life. Worldwide, more than 90% of the world's population develops a dental disease during their life time where 95% of children in low-income countries suffer from untreated dental issues (WHO, 2016). Direct treatment costs due to dental diseases international were estimated at US$298 billion yearly, equivalent to an average of 4.6% of universal health spending and indirect costs due to dental diseases worldwide amounted to US$144 billion yearly, corresponding to economic losses within the range of the 10 most frequent global causes of death (Listl *et al.*, 2015).

Dental caries is the most common childhood disease and NCD worldwide. Between 60 and 90% of children are affected but the majority of dental decay remains untreated due to inappropriate, unaffordable or unavailable oral health care services. Generally, rates are highest in low and middle-income countries where sugar consumption is increasing while access to prevention and care is low (Ska and Chambers, 2017).

The disability adjusted life-years (DALYs) which is the sum of years of life lost due to ill-health, disability or early death, oral conditions combined, accounted for 15 million DALYs globally (1.9% of all DALYs), implying an average health loss of 224 years *per* 100,000 population (Vos *et al.*, 2017).

Study conducted from Brazil showed that an increase in knowledge about risk factors for oral disease and strong knowledge of oral health demonstrates better oral care practices that aim to promote healthy habits; furthermore, school children with inadequate oral health knowledge are twice as likely to have caries as school children with adequate knowledge(Elawad et al, 2016).

Numerous studies evaluated dental health practices among children in other continents such as Asia where59.4%of children were affected by dental and oral diseases (Suprabha *et al.*, 2013; Khanal and Acharya, 2014), Europe (Wigen and Wang, 2014; Trubey, Moore and Chestnutt, 2015), America (Gharlipour *et al.*, 2016); and some studies have been conducted in African countries to assess dental health practices among children (Sirag, Ahmed and Elawad, 2016;Hartwig and Stüermer, 2017).

A study conducted in Kenya revealed that 31% of children were unable to chew hard food, 27.8% avoided smiling due to their teeth, while 18.9% missed school due to a tooth related problem (Kenya Ministry of Health, 2015)**.**

Dental health risk behaviors among children have been associated to oral hygiene including the frequency of tooth brushing, materials used to clean the teeth, nutritional habit especially sugar consumption and dental visit habit. Practices that have been associated to dental health include the time spent in brushing teeth, time for changing the toothbrush and the technique used to clean the teeth (Mulu *et al.*, 2014)

In Uganda the study conducted in 2015 has shown that the overall dental caries prevalence was 32.5% in children, with higher score in rural district than in urban. In parallel with evaluation of oral health knowledge, clearly documented that oral health information come from different sources such as parents, school teachers, dentist, media, or relatives, which have a direct influence on the oral health knowledge of school children, and in turn influences their caries occurrence (Kutesa *et al.*, 2015).

Considering the impact of poor oral health which cause serious complications on the life of the individuals, the risk behavioral assessment needs to be conducted every five years (Phipps *et al.*, 2013).Oral and dental health have to be integrated in the school preventive activities to promote good general health of children.

1.3. PROBLEM STATEMENT

Despite the efforts of government of Rwanda to achieve the 3rd sustainable development goal which is the promotion of health and well-being of the Rwandan population, tooth and gum diseases were number one cause of morbidity in hospitals accounting for 18.6% of all out patient consultations and 27.7% of all non-communicable diseases and 22,4% of children in Rwanda (Rwanda Ministry of Health, 2016).

Dental and oral diseases are among the risk factors of systemic diseases like endocarditis, arthritis, pneumonia and malnutrition which impact on general health of the person and socioeconomic status due to their cost of treatment.(Widström and Tillberg, 2017).
while they should be prevented through dental health practices including tooth brushing using fluoridated toothpastes, and avoiding risk behaviors to dental diseases such as irregular tooth brushing, eating sugary candies and beverages among others, they are still recognized as "neglected disease" by Rwandan researchers and the later further recommended caries prevention practice in communities (Mukashyaka *et al.*, 2015a).

While some studies have reported the occurrence of dental caries in sub-Saharan Africa, In Rwanda the study conducted in 2013 at Butaro district hospital reported that dental diseases are the important cause of all out-patient visits in hospitals in Rwanda accounting for 26% of all out-patient consultations (Mukashyaka *et al.*, 2015b) while the ministry of health in its annual report of 2016 reported 22,4% of children consulted for dental and gum diseases (Rwanda Ministry of Health, 2016)**.**

However little is known about the risk behaviors and dental health practices among Rwandan children in both rural and urban communities of Rwanda**,** reason why this study was set to assess the risk behaviors and dental health practices among Rwandan children in both urban and rural communities of Rwanda exposed to Basic practice of oral care (BPOC) in Gasabo and Gicumbi District for further recommendations on the improvement of dental health.

1.4. AIM OF THE STUDY

To assess the risk behaviors and practice towards dental health among children in rural and urban public primary schools.

1.5. RESEARCH OBJECTIVES

1.5.1. Main objective of the study

To assess the risk behaviors and practice towards dental health among children in rural and urban public primary schools.

1.5.2. Specific objectives

1. To identify the risk behaviors towards dental health among children in rural and urban public primary schools.
2. To determine tooth brushing practices among children in rural and urban public primary schools.
3. To compare dental health practices among children in rural and urban public primary schools

1.6. RESEARCH QUESTIONS

1. What are the risk behaviors towards dental health among children in rural and urban public primary schools?
2. What are the tooth brushing practices among children in rural and urban public primary schools?
3. What are differences among children in rural and urban public primary schools towards dental health practices?

1.7. SIGNIFICANCE OF THE STUDY

This study will contribute in generation of knowledge

To nursing education

The study findings will provide readers with knowledge about risk behaviors and practices in the context of dental health of children.

The study findings also will provide information on the priorities during community outreach of nursing students and hence, help to adjust the nursing curriculum according to community needs.

To nursing research

The study finding will be a baseline for further researches for nursing and related field in terms generation of new knowledge.

To nursing practice

The study findings will provide clinicians, leaders, stakeholders and other health planners with orientation on exact causes of dental diseases in children and community needs so as to orient preventive and control strategies.

1.8. OPERATIONAL DEFINITIONS OF KEY TERMS

Dental health: "Dental health is the science and art of preventing and controlling dental diseases and promoting dental health through organized community efforts" (Medical Dictionary for the Dental Professions, 2012).In this study, dental health means the well being status of the teeth.

Dental caries:

"Localized, progressively destructive tooth disease that starts at the external surface (usually the enamel) with the apparent dissolution of the inorganic components by organic acids that are produced in immediate proximity to the tooth by the enzymatic action of masses of microorganisms (in the bacterial plaque) on carbohydrates" (Medical Dictionary for the Health

Professions and Nursing, 2012).For this study, dental caries means that the teeth has already been affected by the microorganisms, the teeth are no longer in normal status.

Periodontal diseases: Periodontal diseases are a group of diseases that affect the tissues that support and anchor the teeth; if left untreated, periodontal disease results in the destruction of the gums, alveolar bone (the part of the jaws where the teeth arise), and the outer layer of the tooth root (Gale Encyclopedia of Medicine, 2008).In this study, periondontal diseases means other diseases of the oral cavity than the teeth.

Risk behaviors: Risk behaviors are defined as behaviors associated with increased susceptibility to a specific cause of ill-health (WHO, 1998).For this study, risk behaviors are all negative actions which can lead to poor dental health.

Practice:"The regular, habitual, or expected procedure or way of doing of something" (Oxford Dictionaries, 2018). In this study, practice means the act of brushing the teeth.

1.9. STRUCTURE/ORGANIZATION OF THE STUDY

This dissertation has two main parts: The first part paged with roman numbers comprises the cover page, declaration, dedication, acknowledgment, Abstract, table of content, list of tables, list of figures, and acronyms/list of symbols.

The second part has six main chapters which include the introduction and background to the study, literature review, research methodology, and Results presentation, Discussion, Conclusion and Recommendations.

1.10. CONCLUSION

Considering their impact on the life and socioeconomic status of the population, dental diseases have to be identified early within the community through researches for better treatment and prevention**.**

CHAPTER II.LITERATURE REVIEW

2.1. Introduction

This chapter provides an insight to poor oral health causes and risk factors associated with it according to other researchers. It emphasizes on studies conducted in other societies and also comprises conceptual framework

2.2. Theoretical Literature

2.1.1. Oral infectious diseases

The majority of common oral infectious diseases are dental caries and periodontal diseases. Tooth erosion is not an infectious disease, but the resulting defects damage the integrity of the tooth. The cause of the diseases differs with the degree to which diet and nutrition are implicated. Although enamel defects may be associated to nutrition throughout tooth formation.

Tooth erosion is the progressive loss of dental hard tissue by acids in a process that does not engage bacteria or sugars. The intrinsic acids are from vomiting, gastro esophageal reflux, and regurgitation. The extrinsic acids are from the diet (eg: sports beverages and citrus products, together with citrus fruit, juices, soft drinks, and citrus-flavored from the occupational environment. Tooth erosion as a result of eating disorders (bulimia nervosa) and dietary practices involving regular intake of acidic foods and beverages can decline tooth integrity (Touger-Decker and Van Loveren, 2011).

2.1.2. Diet and nutrition

Diet has a local effect on oral health, primarily on the veracity of the teeth, pH, and composition of the saliva and plaque. Nutrition, however, has a systemic effect on the integrity of the oral cavity, including teeth, periodontium (supporting structure of the teeth), oral mucosa, and alveolar bone. Alterations in nutrient intake secondary to changes in diet intake, absorption, metabolism, or excretion can affect the integrity of the teeth, adjacent tissues, and bone as well as the response to wound healing (Tougher-Decker and Van Loveren, 2011).

2.1.3. Oral health and general health

Oral health and general health have close linkages. On the one hand, oral health can be compromised by a number of chronic and infectious diseases which show symptoms in the mouth. On the other hand, oral diseases can lead to infection, inflammation, and other serious impacts on overall health. like endocarditis,arthritis,etc Thus, maintaining good oral health is crucial to sustain general health and vice versa(World Health Organization, 2017)

2.1.4. Oral hygiene and fluoride

The role of fluoride toothpastes in the control of dental caries is well established and beyond dispute. Systematic reviews have shown that the use of standard fluoride toothpastes reduces approximately 24–29% the incidence of dental caries in children's permanent teeth (Dos Santos, Nadanovsky and De Oliveira, 2013).

However, higher rates of caries progression have been detected in primary teeth in comparison with young permanent teeth and this is probably due to the thinner enamel layer in primary teeth. Differences in carbonate contents between primary and permanent teeth may also contribute to the faster caries progression in primary. Although it would be reasonable to expect a similar effect of fluoride toothpaste in both dentitions.(Dos Santos, Nadanovsky and De Oliveira, 2013)

2.1.5. Low socio-economic status

As with general health, oral health deteriorates with decreasing socio-economic status. The disparities are visible as people along a decreasing social gradient visit the dentist less often, have fewer fillings, more missing teeth, higher tobacco consumption, higher rates of oral cancer, higher rates of caries and untreated decay, and higher rates of gum disease than those with higher socio-economic status. These differences are seen both within and between countries (Machry *et al.*, 2013).

2.3. Empirical Literature

2.3.1. Prevalence and factors associated with dental caries among children

Parental oral health knowledge influence the prevalence of dental caries in children, through their knowledge and attitudes, they are gaining increased attention in prevention and control of dental caries (Kato *et al.*, 2017).

The study conducted in Japanese children has shown that the occurrence of dental caries was 14.7%. Compared with having an unemployed father, having a father employed in professional and engineering, clerical, sales, security, or manufacturing process was significantly associated with a lower prevalence of dental caries. Compared with having an unemployed mother, having a mother employed in professional and engineering or service was significantly associated with the prevalence of dental caries.

They confirm that higher levels of parental education and household income decreased the prevalence of dental caries (Kato *et al.*, 2017).

Dental caries prevalence in India was as high as 59.4%and presence of dental caries was associated with low knowledge (Suprabha *et al.*, 2013). Similarly in Africa, a high prevalence of dental caries among children aged 12 years was revealed in Zimbabwe with 59.5% in Urban and 40.8% in rural children (Mafuvadze, Mahachi and Mafuvadze, 2013).

A study conducted among primary school children in Ethiopia stated that the prevalence of dental caries was 21.8% and poor habit of tooth cleaning as well as studying in grade one, two ,three and four were significant risk factor associated with dental caries (Mulu *et al.*, 2014).

In East Africa, the prevalence of dental caries was 27.8% in Kenya (Kenya Ministry of Health, 2015) and 32.5% in Uganda (Kutesa *et al.*, 2015). In one study conducted in urban primary school children in Rwanda, 55% of them had tooth decay/dental caries and 8.6% had missing teeth (Bugingo *et al.*, 2014).

2.3.2. Dental health risk behaviors and practices among children

Dental caries among children is associated with dental visit habit as well as dietary habit and poor oral hygiene (Mulu *et al.*, 2014).

Disparities in utilization of oral healthcare services have been attributed to socioeconomic and person behavioral factors. Parents' socioeconomic condition, demographics, schooling, and perceptions of oral health may influence their children's use of dental service (Machry *et a*2013). A study conducted on 478 children in Brazil revealed that only 112 (23.68%) was found to have visited a dentist; 67.77% of those had seen the dentist for preventive care.

The majority (63.11%) used public rather than private services. The use of dental services varied according to parental socioeconomic status where children from low socioeconomic backgrounds and those whose parents rated their oral health as "poor" used dental services less frequently.
The rationale for visiting the dentist also varied with socioeconomic status, in that children of parents with poor socioeconomic status and who reported their child's oral health as "fair/poor" were less probable to have visited the dentist for preventive care (Machry *et al.*, 2013).

One study conducted in Madagascar among school children revealed that 4.3% drink soft drink every day, 11.6% drink soft drink four to five times per week, 13% drink soft drink two to three times per week, 26.1% drink soft drink one time per week and only 44.9% never drink soft drink (Scaglia and Niknamdeh, 2017) (Scaglia and Niknamdeh (2017) also found that sweet foods were taken two to three times per day by 16.2% of school children, once per day by 11.8%, less than one time per day by 54.4% and only 17.6% never eat sweet food.

Tooth brushing is the main oral hygiene behavior, and even though it is widely associated to good oral health, most people do not perform it thoroughly enough to prevent accumulation of dental plaque. Most oral hygiene interventions are based on motivation and development of aptitude. This approach is widely used, and can be further improved if the interventions are tailored at assessing each individual's risk, needs and diagnosis, and developing personal skills and motivation (Jönsson et al., 2013).

One research conducted in Sudan among 398 randomly selected pupils found that around 79% of pupils brush their teeth in the morning and evening, and the use of toothbrush and toothpaste was reported by 93.7% of the respondents (Sirag, Ahmed and Elawad, 2016). In India, more than 95% used toothbrush and paste and, 77.6% of respondents brush their teeth morning and night

while 19.6 and 0.3% brush their teeth during morning only and night only respectively (Suprabha *et al.*, 2013). Similarly in Rwanda, one cross-sectional study was conducted in urban primary school children and found that 80.5% used toothbrush and toothpaste and 70.8% brush their teeth at least twice a day (Bugingo *et al.*, 2014).

Different findings were found in Madagascar in 12-year old school children where only 8.6% reported cleaning their teeth twice per a day and more with 55.1% cleaning their teeth once per day and 36.2% reporting cleaning their teeth less than once per day (Scaglia and Niknamdeh, 2017). Scaglia and Niknamdeh (2017) also revealed that only 65.7% used toothbrush to clean their teeth and others used other items such as charcoal, miswak, fingers and others while only 68.6% used toothpaste while cleaning their teeth.

Toothbrush was not commonly used in Ethiopian children where one study revealed that 67.6% of children clean their teeth using small stick of wood (Mulu *et al.*, 2014).

Regarding the time spent during tooth brushing, Suprabha and collaborators found that more than a half (63.8%) of the respondents reported brushing their teeth for more than 3 minutes and 34.8% reported brushing teeth for less than 3 minutes (Suprabha *et al.*, 2013). In Madagascar, only 5.7% schoolchildren clean their teeth for more than 2 minutes and 38.6% used 2 minutes to clean their teeth (Scaglia and Niknamdeh, 2017).

Various studies revealed the methods of brushing teeth used by children. In India, different methods of tooth brushing were reported by respondents including horizontal strokes (26.1%), up and down strokes (55.5%) and no systematic method (24%) (Suprabha *et al.*, 2013).In Soudan, 40.4% respondents reported brushing their teeth from all direction while 39.6% reported brushing their teeth from top to down and down to top (Sirag, Ahmed and Elawad, 2016).

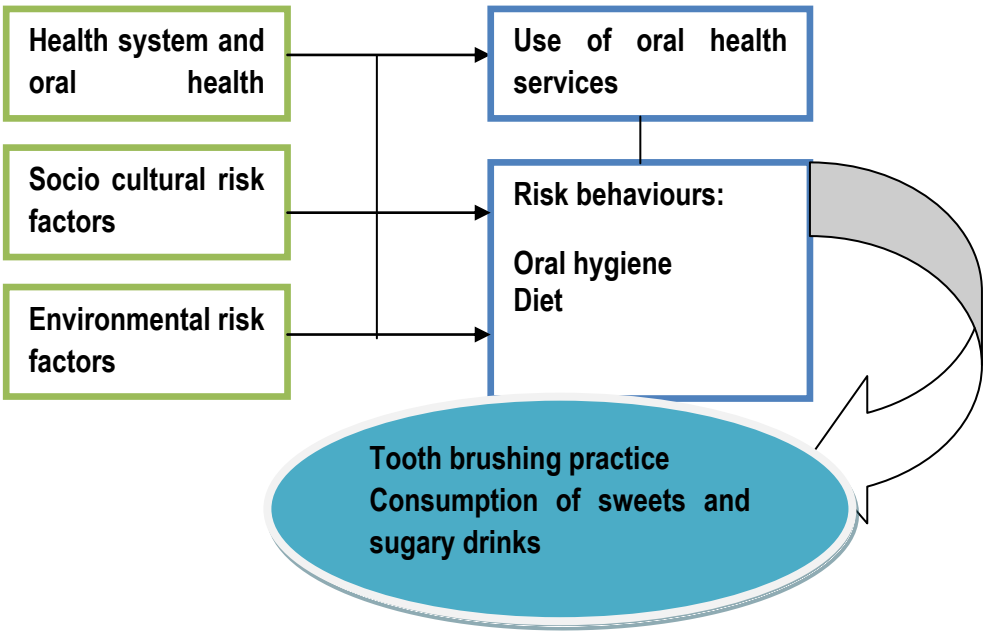
The use of fluoridated toothpaste was also highlighted in different studies. In India, the study revealed that only 17.2% used fluoridated toothpaste (Suprabha *et al.*, 2013), the same percentage was also found in China(Zhu *et al.*, 2003). Differently a recent study conducted in Sudan found that 89.8% using fluoridated tooth paste (Sirag, Ahmed and Elawad, 2016).

Suprabha and others revealed the frequency of changing the toothbrush among children in India: only 60% change their tooth brush every 1-3 month.

2.4. Research gap identification

Numerous studies were conducted in different countries around the world regarding dental health practices and risk behaviors among school children. One study was conducted in Rwanda assessing factors associated with oral health status and treatment needs among urban primary school children with much more focus on awareness, knowledge and some highlights on oral health practices. No study was conducted in rural school children to assess their risk behaviors and dental health practices and there is a need of current data on risk behaviors and dental health practice in urban and rural public school children exposed to basic practice of oral care (BPOC). Therefore, this study will assess risk behaviors and dental health practices among children in both urban and rural public schools in Rwanda.

2.5. Conceptual framework



Risk factor model for the promotion of oral health. Adapted from Petersen,(WHO, 2016)**.**

Risk factor model for promotion of oral health shows that high relative risk of oral disease relates to socio-cultural determinants such as poor living conditions; low education; lack of the society background, beliefs and culture are in support of oral health. Communities and countries with inappropriate exposure to fluorides involve higher risk of dental caries and settings with poor access to safe water or sanitary facilities are environmental risk factors to oral health as well as general health.

Furthermore, control of oral disease depends on availability and accessibility of oral health systems but reduction of risks to disease is only possible if services are oriented towards primary health care and prevention. In addition to the distal socio-environmental factors, the model emphasizes the role of intermediate, modifiable risk behaviors, i.e. oral hygiene practices, sugar consumption (amount, frequency of intake, types) as well as tobacco use and excessive alcohol consumption. Such behaviors may not only affect oral health status negatively as expressed by clinical measures but also impact on quality of life(WHO, 2016)**.**

CHAPITER .III.METHODOLOGY

3.1. Introduction

This chapter describes how, where and when the study will be conducted. It indicates the study design, area, population, sample size and sampling strategies, procedure for data collection and data analysis, ethical consideration, validity and reliability, problems and limitations.

3. 2. Study Approach

This study used quantitative approach. Quantitative data focuses on the quantity of things – how many are there? What are the statistical patterns? It generally takes the form of numbers, and their analysis involves counting or quantifying these to draw conclusions. Larger sets of data will be involved than is the case with qualitative research, and statistically rigorous techniques are used to analyze these (Brief, 2012).

3.3. Study Design

This was a comparative cross-sectional study. The study was conducted in one point of time and the comparison of risk behaviors and dental health practice was done between urban and rural public school. It was comparative because it compared two different data.

3.4. Study area

The study was conducted in one urban and rural Public school located in one of the Districts where the Basic Practice of Oral Care (BPOC) was initiated. The BPOC project was initiated by the SOS in Northern Province (Gicumbi District), Southern Province (Nyamagabe District) and Kigali City (Gasabo District).

Kacyiru primary school was selected to represent urban schools, and it is situated in Gasabo district in kacyiru sector, kamatamu cell near Rwanda Broadcasting Agency. For rural public schools, G.S Kibali was selected and it is located in Gicumbi District in Northern Province.

3.5. Study population

The study population was children attending urban and rural public schools where the BPOC was initiated and the target population were those children whose age is between 6 to 12 years (school age). The target population was 400 children.

3.6. Sampling

3.6.1. Sample size

The study sample comprised students aged between 6 to 12 years studying in primary level one and primary level six (P1 to P6) in both urban and rural public schools. A computer software (Raosoft) was used to calculate the sample size based on 95% confidence level ,and 5% margin of error (The amount of error that you can tolerate) and 50% response distribution; the minimum required sample size was 197 children (Raosoft, 2004).The following formula was used:

$$n = {}^{N\,x}/_{((N\text{-}1)E^{2} + x)}$$

n=Minimum required sample size=population size=margin error =5%, X=0.5420 calculated from r = response rate $Z({}^{c}/_{100}) = 1.96$

$$x = Z({}^{c}/_{100})^{2} r(100\text{-}r)=(1.96*1.96)*0.8*(1\text{-}0.8)=0.542$$

$$n = {}^{1600*\,0.54}/_{((1600\text{-}1)(0.05)^{2} + 0.542)}$$

$$n = 863.2/((3.9975 + 0.542)$$

$$n = {}^{863.2}/_{4.5} = 197.7$$

3.6.2. Sampling strategy

A stratified sampling has been used to recruit children in study sample. It is a technique where the population is stratified into a number of subpopulations or strata and sample items are selected from each stratum. A purposive sample used, is a non-probability sample that is selected based on characteristics of a population and the objective of the study. Purposive sampling is also known as judgmental, selective, or subjective sampling (C.R.Kothari, 2004).

For this study, each school was a stratum in urban and rural. In 197students, 99 were from one school and 98 from another by dividing the sample size in two strata. Among P1 to P6, small strata were again formed referred to student list, and student that have been chosen were written apart. If one level had different classes (For example: P1, A, B, C…), one class was chosen to represent the rest of the grade of the same level. Girls and boys have been given same opportunity to participate.

Kacyiru/Gasabo District N=99		**Kibali/Gicumbi District N=98**	
P1	16	P1	16
P2	16	P2	16
P3	16	P3	16
P4	16	P4	16
P5	16	P5	17
P6	17	P6	16

Inclusion and exclusion criteria

Inclusion criteria

The children attending primary school whose age is between six and twelve years at Kacyiru in Gasabo district and at Kibali in Gicumbi district were included in the study. Children whose parents gave permission to participate in the study and who were voluntarily signed the assent form were included in the study.

Exclusion criteria

Children aged below six years and above twelve were excluded in the study. Children without parental permission to participate in the study and those who did not sign the assent to participate in the study were excluded.

3.7. Validity and reliability

After completion of the questionnaire, data were entered into SPSS to compute Cronbach's Alpha coefficient that provided a measure of the internal consistency of the instrument (internal consistent reliability).According to Tavakol, M. and Dennick, R., 2011.The tool is reliable when Cronbach's Alpha coefficient value ranging from 0.70 to 0.95.The coefficient of reliability falls between 0 and +1, higher values closer to +1 reflect higher reliability and higher degree of internal consistency and no reliability equaling 0.The Cronbach's alpha for the present study instrument was 0.747. This means that the instrument is supportive to measure the risk behaviors and practices toward dental health.

3.7.1. Pilot study

After developing a tool, it has been reviewed by my supervisors then; a pilot study was carried out on a sample of 20 students (approximately 10% of the sample size) from other primary school to test the validity and reliability of the tool and feasibility of the study. The pilot subjects were not included in the main study sample.

3.8. Data collection

3.8.1. Data collection tool

A structured questionnaire adapted from Adapted from Zhu, Petersen, Wang, and Bian&Zhang, (2003) composed of two parts was used to collect the data. The first part was Section A) served to collect the child's demographic characteristics (age, gender, and grade, parent occupation, level of education of parents and school localization),section B composed of risk behaviors toward dental health (regularity of tooth care, sugar consumption habit,…) then the last part(Section C) covered tooth brushing techniques.

3.8.2. Data collection procedures

After ethical clearance of the study from the School of Nursing, and after the permission to conduct the study by the Head Teachers of respective schools have been guaranteed, the researcher contacted the class teachers of respective grades for recruitment process. Parental permission forms and assent forms have been distributed and collected one week before interview. Data collection was conducted in morning and afternoons during break time and the answering of the questionnaire was lasting 10-15 minutes for each of respondent.

3.9. Data analysis

The questionnaire forms were coded and entered into a pledge sheet. Statistical analysis was performed by using the Statistical package for social sciences (SPSS) version 21.0.Frequencies, percentages were computed and tables and graphs have been used for data visualization. Chi-squared test was used (Chi-square test is one of the important tests that is used to compare more than two variables for a randomly selected data (Dennick, R., 2011).

3.10. Ethical considerations

Approval to conduct research was obtained from Institution Review Board of University of Rwanda, College of medicine and health sciences (Ref.:CMHS/IRB/046/2019). Authorization to collect data was also obtained from the Headmasters of selected schools, children have been explained the purpose of the study, their rights including right to accept or refuse participation, to withdraw from the study at any time without providing explanation of reasons and assent forms was signed.

Confidentiality of children information was respected by using professionally licensed research assistants who already have and know responsibilities of keeping privacy of health information. No participants' names, numbers or any identification method was written on questionnaires .Data collected used only for the agreed purpose (academic research).

3.11. Data management

After data collection, data were coded and cleaned to ensure data quality. Data collection tools have been kept in a private locked cupboard to ensure data security and privacy of information. After entering data in a computer, it has been locked with a personal password.

The data backup was done on flash-drive to ensure security of information. The stored data will be archived for five years, and then will be destroyed.

3.12. Data Dissemination

After completion of the study, it has been presented to the panel as it was planned by the University of Rwanda then it will be presented in conferences and later will be published in journals.

3.13. Problems and limitations

The limitation is that the study was done only on participants who are enrolled in the school. Those who are in the community, and those who were absent during data collection have not been concerned. The results also of the study cannot be generalized; further researches are needed for other public primary schools and private schools.

3.14. Conclusion:

The methodology used quantitative approach with cross sectional design,Raosoft formula have been used to calculate the sample size, study area was defined, the tool was obtained and adopted and it has been tested for reliability and validity. SPSS version 21 has been used to analyze data and ethical consideration was respected.

CHAPITER .IV.RESULTS PRESENTATION

Introduction

This chapter describes the results from the survey. Results are presented according to the objectives of the study which are to identify the risk behaviors towards dental health among children in rural and urban primary schools, to determine tooth brushing practices among children in rural and urban primary schools, to compare dental health practices among children in rural and urban primary schools.

4.1. Demographic characteristics of respondents

Table 1: Socio-demographic characteristics of study participants

Characteristics	N	%
Gender		
Male	95	48.7
Female	100	51.3
Localization of school		
Urban	95	48.7
Rural	100	51.3
Age of participants		
5-7 years	36	18.5
8-10 years	87	44.6
11-12 years	72	36.9
School level		
P1-P3	100	51.3
P4-P6	95	48.7
Parent education		
Primary level/No formal education	83	42.6
Secondary/technical	76	39.0
University	36	18.5
Parent employment		
Employed	49	25.1
Self-employed	85	43.6
Casual jobs/Jobless	61	31.3

The results show that 51.3% of our participants were females, 51.3% were from rural area and most of the respondents were from P1 to P3. Forty two percent (42%) of the parents of participants had primary school or no formal education while 43.6% of the parents of participants were self-employed.

4.2. Risk behaviors towards dental health

Table 2: Frequency behaviors of study participants towards dental health

Behaviors	Urban [N(%)]	Rural [N(%)]
Frequency of brushing teeth		
Less than once per day	8 (8.4%)	5 (5.0%)
Twice per day	34 (35.8%)	29 (29.0%)
Once per day	53 (55.8%)	66 (66.0%)
Time to brush teeth		
In the morning	55 (57.9%)	53 (53.0%)
Before going to bed	8 (8.4%)	12 (12.0%)
After meals	1 (1.1%)	7 (7.0%)
In between meals	3 (3.2%)	0 (0.0%)
In the morning and before going to bed	13 (13.7%)	9 (9.0%)
In the morning and after meals	15 (15.8%)	17 (17.0%)
In the morning and in between meals	0 (0.0%)	1 (1.0%)
Before going to bed and in between meals	0 (0.0%)	1 (1.0%)
Frequency of drinking sugary drinks		
Never	4 (4.2%)	8 (8.0%)
Less than once a week	3 (3.2%)	8 (8.0%)
Once a week	34 (35.8%)	47 (47.0%)
Two-three times per a week	30 (31.6%)	29 (29.0%)
Four-five times per a week	0 (0.0%)	2 (2.0%)
Every day	24 (25.3%)	6 (6.0%)
Habits in drinking Sugary drinks at night		
Never	14 (14.7%)	17 (17.0%)
Sometimes	54 (56.8%)	62 (62.0%)
Each night	27 (28.4%)	21 (21.0%)
Frequency of eating sweets and candies		
1-3 times per day	62 (65.3%)	56 (56.0%)
4-6 times per day	14 (14.7%)	24 (24.0%)
7-10 times per day	4 (4.2%)	1 (1.0%)
Do not have such habit	15 (15.8%)	19 (19.0%)
Frequency of dentist visit		
Regularly every 6-12 months	0 (0.0%)	3 (3.0%)
When I have dental pain	33 (34.7%)	38 (38.0%)
Occasionally	24 (25.3%)	11 (11.0%)
I never visited a dentist	38 (40.0%)	48 (48.0%)
Last dentist visit		
Less than 1	16 (16.8%)	21 (21.0%)

1-2 years ago	25 (26.3%)	24 (24.0%)
3 or more years ago	6 (6.3%)	5 (5.0%)
Never seen a dentist	48 (50.0%)	50 (50.0%)

The majority of our participants (61%) brush their teeth once per day and among them 90% brush their teeth in the morning, Forty one percent(41%) of the participants drink sugary drinks once per week and 59.5% of the participants reported to take sugary drinks at the night. Sixty percent (60%) of the participants reported to eat sweets and candies 1 to 3 times per day. Forty four percent (44 %) of the participants from rural area had never visited a dentist in lifetime and among those who visited the dentist, 50% reported to have visited the dentist in 1 to 2 years ago.

4.3. Practices towards dental health

Table 3: Practices and techniques of tooth brushing of study participants

Practices	Urban [N (%)]	Rural [N (%)]
Tool used to clean teeth		
Toothbrush and toothpaste	78 (82.1%)	57 (57.0%)
Charcoal	4 (4.2%)	17 (17.0%)
Toothpicks	2 (2.1%)	15 (15.0%)
Fingers	11 (11.6%)	11 (11.0%)
Time spent while brushing teeth		
Less than minute	8 (8.4%)	8 (8.0%)
One Minute	44 (46.3%)	43 (43.0%)
Two minutes	36 (37.9%)	36 (36.0%)
Three minutes or more	7 (7.4%)	13 (13.0%)
Technique of washing teeth		
Horizontal	48 (50.5%)	54 (54.0%)
No systematic methods	47 (49.5%)	46 (46.0%)
Time for changing toothbrush		
1-3 months	40 (42.1%)	33 (33.0%)
4-6 months	30 (31.6%)	17 (17.0%)
7-12 months	2 (2.1%)	5 (5.0%)
Do not know	9 (9.5%)	20 (20.0%)
Do not have toothbrush	14 (14.7%)	25 (25.0%)
Brushed teeth this morning		
Yes	66 (69.5%)	60 (60.0%)
No	29 (30.5%)	40 (40.0%)
Brushed teeth last night		
Yes	26 (27.4%)	28 (28.0%)
No	69 (72.6%)	72 (72.0%)

The results show that 69.2% of the participants used toothbrush and toothpaste in brushing their teeth; others used things like charcoal, finger and toothpick. Considering the time spent on brushing the teeth, 44.6% reported to spend 1 minute, Fifty two percent (52%) of the participants reported t to brush their teeth horizontally while 47.7% have no systematic method in brushing their teeth. while in those who have toothbrushes .Thirty seven percent (37.4%) of them change their toothbrushes with 1 to 3 months. On the day of interview 64.6% of the respondents reported to have brushed their teeth that morning while 73.3% did not, brush their teeth that same night.

4.4. Comparison of behaviors of participants

Table 4: Comparison of behaviors of participants towards dental health in rural and urban settings

Behavior	Localization		P value (Chi-Square test)
	Urban	Rural	
Frequency of brushing teeth			
Less than once per day	8 (8.4%)	5 (5.0%)	
Twice per day	34 (35.8%)	29 (29.0%)	0.304
Once per day	53 (55.8%)	66 (66.0%)	
Frequency of dentist visit			
Regularly every 6-12 months	0 (0.0%)	3 (3.0%)	
When I have dental pain	33 (34.7%)	38 (38.0%)	0.026
Occasionally	24 (25.3%)	11 (11.0%)	
I never visited a dentist	38 (40.0%)	48 (48.0%)	
Frequency of drinking sugary drinks			
Never	4 (4.2%)	8 (8.0%)	
Less than once a week	3 (3.2%)	8 (8.0%)	
Once a week	34 (35.8%)	47 (47.0%)	
Two-three times per a week	30 (31.6%)	29 (29.0%)	0.002
Four-five times per a week	0 (0.0%)	2 (2.0%)	
Every day	24 (25.3%)	6 (6.0%)	
Habits in drinking Sugary drinks at night			
Never	14 (14.7%)	17 (17.0%)	
Sometimes	54 (56.8%)	62 (62.0%)	0.481
Each night	27 (28.4%)	21 (21.0%)	
Frequency of eating sweets and candies			
1-3 times per day	62 (65.3%)	56 (56.0%)	
4-6 times per day	14 (14.7%)	24 (24.0%)	0.166
7-10 times per day	4 (4.2%)	1 (1.0%)	
Do not have such habit	15 (15.8%)	19 (19.0%)	

The results showed that there is a statistical significant difference in the frequency of dentist visit between urban and rural participants (p=0.026).

Results revealed also a statistical differences in Frequency of drinking sugary drinks (P=0.002) between children from urban and rural children

4.5. Comparison of practices of participants

Table 5: Comparison of practices of participants towards dental health in rural and urban settings

Behavior	Localization		P value
	Urban	Rural	
Materials used to clean teeth			
Toothbrush and toothpaste	78 (82.1%)	57 (57.0%)	<0.001
Charcoal	4 (4.2%)	17 (17.0%)	
Toothpicks	2 (2.1%)	15 (15.0%)	
Fingers	11 (11.6%)	11 (11.0%)	
Time spent while brushing teeth			
Less than minute	8 (8.4%)	8 (8.0%)	0.655
One Minute	44 (46.3%)	43 (43.0%)	
Two minutes	36 (37.9%)	36 (36.0%)	
Three minutes or more	7 (7.4%)	13 (13.0%)	
Technique of washing teeth			
Horizontal	48 (50.5%)	54 (54.0%)	0.668
No systematic methods	47 (49.5%)	46 (46.0%)	
Time for changing toothbrush			
1-3 months	40 (42.1%)	33 (33.0%)	0.011
4-6 months	30 (31.6%)	17 (17.0%)	
7-12 months	2 (2.1%)	5 (5.0%)	
Do not know	9 (9.5%)	20 (20.0%)	
Do not have toothbrush	14 (14.7%)	25 (25.0%)	

The above table shows that there is a statistically significant difference (P=<0.001) in materials used to brush teeth between children from rural and urban children. Furthermore, There is a statistically significant difference (p=0.011) in time to changing the toothbrush between children from rural and urban areas.

CHAP V. DISCUSSION OF RESULTS

5.1. Introduction

This chapter discusses the findings from the survey and makes comparisons with what was found in similar and studies. Like results presentations, discussion also was done according to the objectives of the study which are to identify the risk behaviors towards dental health among children in rural and urban primary schools, to determine tooth brushing practices among children in rural and urban primary schools, to compare dental health practices among children in rural and urban primary schools.

5.2. Socio-demographics

In the results, the highest proportion (51.3%) of children were females living in rural area(51.3%).This is in the line with the Rwandan Demographic Health Survey (RDHS)which showed that females are predominant among the Rwandan population and reported that the majority of the population lives the rural areas of the country (RDHS, 2014).

Results have shown that the parents of the participants (42.6%) had primary or no formal education while 43.6% of the parents of participants were self-employed, 25.1% were employed either public or private and 31.3% were jobless or doing casual jobs. Parent level of education and social economic status can compromise the dental health of the children because poor knowledge and lack of sufficient financial means have important influence on risk behaviors and practices toward dental health of their children.

This is similar to studies conducted in Zimbabwe that revealed that Parental oral health knowledge influences the prevalence of dental caries in children, through their knowledge and attitudes they are gaining increased attention in prevention and control of dental caries for their.(Kato *et al.*, 2017).Similarly, another study conducted in Japanese children has shown that the occurrence of dental caries was 14.7%. Compared with having an unemployed father, having a father employed in professional and engineering, clerical, sales, security, or manufacturing process was significantly associated with a lower prevalence of dental caries. They confirmed that higher levels of parental education and household income decreased the prevalence of dental caries (Ayele *et al.*, 2013)**.**

In this study, the majority of the respondents (51,3%) were studying in p1 to p3,which explains that the attitude and knowledge of risk behaviors can be influenced by the child's level of understand toward promotion of good dental health. Similarly ,a cross-sectional study conducted among primary school children in Ethiopia stated that the prevalence of dental caries was 21.8% and poor habit of tooth cleaning as well as studying in grade one, two ,three and four were significant risk factor associated with dental caries (Mulu *et al.*, 2014).

5.3. Behaviors toward dental health

The results of this study showed that the majority of our participants (61%) brush their teeth once per day and among them, 90% brush their teeth in the morning. While professional dentists recommend brushing teeth twice a day, only 32, 3% of the participants reported to brush their teeth twice a day. Brushing teeth twice a day preferably in the morning after breakfast and before bed time is very important as it helps to clean out food debris after breakfast and decreases the amount of bacteria which cause dental decay during the night. Similarly ,The study conducted in Madagascar in 12-year old school children have reported that only 8.6% reported cleaning their teeth twice per a day and more with 55.1% cleaning their teeth once per day while 36.2% reported cleaning their teeth less than once per day (Scaglia and Niknamdeh, 2017).

Brushing twice a day has been reported to significantly decreases the prevalence of caries compared to brushing only once per day. Similar beneficial effects of brushing twice daily have also been found in terms of gingival health. Despite this clear scientific evidence and the strong support of twice daily brushing from the dental profession through bodies such as the WHO, the FDI and dental associations, significant participants segments still only brush their teeth once a day or even less (Listl *et al.*, 2015).

This study revealed that 41% of the participants drink sugary drinks once per week, 59.5% of them reported to take sugary drinks at the night while 60% of the participants reported to eat sweets and candies 1 to 3 times per day. Increase in sugar and sweets candies consumption associated with lack of parental control over the amount of sweets or chocolate that children consume and poor tooth brushing after sugar consumption, are an important factors contributing to teeth erosions, cavities formation and dental decay in children.

Similarly studies have shown the same results like a study conducted in Indonesia in school children ,found that the majority of the respondents (90%) used to eat sweet candies and drunk sugary drinks every day and including night time (Sirag, Ahmed and Elawad, 2016) .

The study reported that 44% of the participants have never visited a dentist in lifetime. Yet dental consultation is very important for better dental and oral health as it helps to rule out any abnormality for early prevention and treatment. Based on American Academy of Pediatric Dentistry (AAPD) first examination is recommended at the time of the eruption of the first tooth and no later than 12 months of age and a six months regular basis visits should be followed for the developing dentition, and complete oral health assessment of general health/growth, pain., extra oral soft tissues, temporal mandible joints, intraoral soft tissues, oral hygiene, periodontal health, and caries risk behavior of child(Of *et al.*, 2018).

5.4. Practices and techniques of tooth brushing

Toothbrush and fluoridated toothpastes are the mostly recommended to clean the teeth for adults as well as for children but the results of the study showed that 69.2% of the participants use toothbrush and toothpaste in brushing their teeth, 10.8% reported to use charcoal, 8.7% reported to use toothpick while 11.3% use fingers to clean their teeth. Similarly, a study conducted in Asia revealed that only 65.7% used toothbrush to clean their teeth and others used other items such as charcoal, miswak, fingers (Scaglia and Niknamdeh, 2017). Toothbrush was not commonly used in Ethiopian children where one study revealed that 67.6% of children clean their teeth using small stick of wood (Mulu *et al.*, 2014).Fluoride toothpastes in the control of dental caries is well established and beyond dispute. One of the systematic reviews has shown that the use of standard fluoride toothpastes reduces approximately 24–29% the incidence of dental caries in children's permanent teeth (Dos Santos, Nadanovsky and De Oliveira, 2013).

The time spent during tooth brushing, is also an important factor which impact on dental health. For this study,44.6% reported to spend 1 minute, 36.9% spend 2 minutes while only 10.3%of them reported to spend 3 minutes and more in brushing their teeth .The more the time to brush the teeth increased the more the food debris and bacteria removed as it hence the activity of the fluoride on the teeth. Contrarily, a study conducted in Indonesia found that more than a half (63.8%) of the respondents reported brushing their teeth for more than 3 minutes and 34.8% reported brushing teeth for less than 3 minutes (Rahardjo *et al.*, 2014).

The study found that 42% of the participants reported to brush their teeth horizontally while 47.7% have no systematic method in brushing their teeth. The technique used to clean the teeth is also very crucial in dental health because it allow the bacteria and food debris to be removed well and promote the fluoride to be fascinated well within gums. Similarly, various studies revealed the methods of brushing teeth used by children. In India, different methods of tooth brushing were reported by respondents including horizontal strokes (26.1%), up and down strokes (55.5%) and no systematic method (24%) (Suprabha *et al.*, 2013). In Soudan, 40.4% respondents reported brushing their teeth from all direction while 39.6% reported brushing their teeth from top to down and down to top (Sirag, Ahmed and Elawad, 2016).

For good teeth brushing, a gentle scrub technique with very short horizontal movements start with outer and inner surfaces, and brush at a 45-degree angle in short, half-tooth-wide strokes against the gum line, move on to chewing surfaces., hold the brush flat and brush back and forth along these surfaces and inside surfaces of your front teeth, tilt the brush vertically and use gentle up-and-down strokes with the tip of brush and finally brush gently along the gum line is the recommended technique which has to be done two to three minutes. Also tooth brush must be changed every 3month (Gharlipour *et al.*, 2016).

5.5. Comparison of behaviors and practices from rural and urban children

The study results revealed that there is statistical difference in the frequency of dentist visit between urban children and rural participants (p=0.026).Participants from rural area (48%) reported to never have visited a dentist compared to 40% from urban area. For rural children, 11% reported to consult occasionally compared to 25.3% from urban area. This means that Geographical location in terms of city, region and social poses a barrier to achieve good dental health, in terms of dental health care services access. Similarly, a study conducted on 478 children in Brazil revealed that only 112 (23.68%) was found to have visited a dentist; 67.77% of those had seen the dentist for preventive care and the majority (63.11%) used public rather than private services. The use of dental services and the sugar consumption habit are linked to parental socioeconomic status where children from low socioeconomic backgrounds and those whose parents rated their oral health as "poor" used dental services less frequently and consume sugary diet less frequently (Machry *et al.*, 2013).

The study found a statistical significant difference in frequency of sugar consumption (p=0.002) between Children from urban area than rural area. It showed that 25% of the participants from urban drunk sugary drinks every day while 6% only of rural participants' drunk sugary drinks every day. Children from urban area are exposed to accessibility of the sweets, and sugary candies than rural and their differences in economic status. Similar studies have shown the same results like a study conducted in India in school children ,found that the majority of the respondents (90%) used to eat sweet candies and drunk sugary drinks every day including night time and 62,3% of them were from urban area (Sirag, Ahmed and Elawad, 2016) .

The results of this study also reported that there is a statistically significant difference in materials used to brush teeth among children from rural compared to children from urban(P=<0.001).Children from urban (78%)reported to clean their teeth with toothbrushes and toothpaste compared to 57% from rural. In rural area 17% reported to use chacoal, 15% reported to use toothpick 15%. Similarly as a study from Zimbabwe where it reported that only 65.7% used toothbrush to clean their teeth and others used other items such as charcoal, fingers and others while only 68.6% used toothpaste while cleaning their teeth.

Toothbrush was not commonly used in Ethiopian children where one study revealed that 67.6% of children clean their teeth using small stick of wood (Mulu *et al.*, 2014),where participants report poor social economic status of their family.

This study revealed also that is a statistically significant difference in time changing the toothbrush (p=0.011).Children from urban (42.1%) change their toothbrushes within 1 to 3 month compared to 33% children from rural areas. Good status of the toothbrush promotes effective tooth brushing .The same study conducted in Australia has found that the rural/remote children in this study had worse oral health than either state or national average in both the 5- 6 year old and 11-12 year age group. Socioeconomic status, tooth-brushing and indigenous statuses were significantly associated with caries in these communities (Zander *et al.*, 2013).

There were no differences in time spent on brushing and the technique to brush teeth among children from urban compared to children from rural area.

5.6. Conclusion

Risk factors and practices toward dental health of children has been found to be similar for children in Rwandan as well as children from other countries, either there are from rural or urban areas.

Even though most oral diseases are preventable, almost everyone is likely to be affected during the lifetime. Oral diseases have a significant impact on the quality of life of individuals, their participation in society and economic productivity as well as on health systems, making oral diseases a significant public health concern.

CHAP VI. CONCLUSION AND RECOMMENDATIONS

6.1. Introduction

This chapter provides conclusion basing on presented and discussed results. It also gives recommendations for improving identified gaps.

6.2. Conclusion

The risk behaviors identified were frequency in sugar consumption, time spent to brush, and the time to visit the dentist. Practices identified related to teeth brushing were tooth brushing materials, time to change them and the technique used to brush the teeth. Children from urban counted higher in sugar consumption frequency compared to children from rural area. Most of children from rural, have never visited a dentist and the majority of them reported to use other things than toothbrushes in cleaning their teeth.

6.3. Recommendations

Schools

Schools and pre-schools are ideal settings to promote oral health; they reach children and young people at a friendly age and can help in developing lifelong healthy behaviors. Supportive school policies, an enabling physical environment and skills-based health education are essential in maintaining oral health and the control of risk behaviors.

Parents' involvement

It is best for children not to eat or drink anything for 30 minutes following brushing in order to get the most benefit from the fluoridate toothpaste. Brushing after meals or a snack may provide the most ideal time. Parents should encourage the children to brush their teeth before bedtime in order to prevent plaque and food particles remaining in contact with the teeth throughout the night. All children from rural as well as from urban should be educated also on use of toothbrush and toothpaste, on the time for tooth cleaning, time to change the brush, avoid eating sweets candies, and parents should remember the recommended time for dentist visits.

Integration of strategies for funding and prevention of oral diseases

National public health initiatives for the control and prevention of disease need to include oral health promotion and integrated disease prevention strategies based on common risk-factor approaches. To facilitate the implementation of oral health activities and mobilize resources, partners should be identified and a network of interested parties established. Partnerships between community interest groups and health and development workers are instrumental for the successful operation of district oral health plans.

Primary Health Care

Oral health care that relies on a technology-focused and curative approach is unlikely for many low and middle-income countries. To achieve equity in oral health care, essential oral health care measures need to be integrated in Primary Health Care including promotion of oral health.

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APPENDICES

ANNEXE 1. NTERVIEW GUIDE (English version)

SECTION A. DEMOGRAPHIC DATA

Age:

Sex:

Grade

School: Urban…..Rural…..

Parent education:

Parent Job:

SECTION B. RISK BEHAVIORS TOWARDS DENTAL HEALTH

How often do you brush your teeth?

a. Less than once per day

b. Twice per day

c. Once per day

d. More than twice per day

When do you brush your teeth? (More than one response are accepted)

a. In the morning

b. Before going to bed

c. after meals

d. in between meals

e. After eating sweets

How often do you visit your dentist?

a. Regularly every 6-12 months

b. When I have dental pain

c. Occasionally

d. I never visited a dentist

Last time I visited the dentist:

a. Less than 1 year

b. 1-2 years ago

c. 3 or more years ago

d. Never seen a dentist

How often do you drink Sugary drinks?

a. Never

b. Less than once a week

c. once a week

d. Two-three times per a week

e. Four-five times per a week

f. Every day

How often do you drink Sugary drinks at night?

a. Never

b. Sometimes

c. Each night

How often do you eat sweets or candies?

a. 1-3 times per day

b. 4-6 times per day

c. 7-10 times per day

d. Do not have such habit

SECTION C. TOOTH BRUSHING PRACTICES

What do you use for cleaning your teeth?

a. Toothbrush and toothpaste

b. Mouthwash

c. Charcoal

d. Toothpicks

e. fingers

f. others

For how long do you brush your teeth?

a. Less than one minute

b. One minute

c. Two minutes

d. Three minutes or more

How to you wash your teeth?

a. horizontal

b. LTD-recommended methods

c. no systematic methods

When do you exchange the toothbrush?

a. 1-3 months

b. 4-6 months

c. 7-12 months

d. More than one year

e. Do not know

f. Do not have toothbrush

Did you brush your teeth this morning? Yes…..No…..

Did you brush your teeth last night? Yes….No…..

(Adapted from Zhu, Petersen, Wang, Bian&Zhang, 2003)

ANNEXE 2. UMURONGO NGENDERWAHO MU KUBAZWA

IKICIRO CYA MBERE:Umwirondorow'ubazwa

Imyaka:

Igitsina:

Umwakayigamo:

Ishuri: Mu mujyi….. Mu cyaro…..

IKICIRO CYA KABIRI:

Ingarukazishingiyekumyitwarirekubirebanan'ubuzimabw'amenyo.Hitamoigisubizonyacyo kumagamboakurikira:

Wozaamenyoyaweinshurozingahekumunsi?

a. Munsiy'inshuroimwekumunsi

b. Inshuroebyirikumunsi

c. Inshuroimwekumunsi

d. Hejuruy'inshuroebyirikumunsi

Ni ikihegihecy'umunsiukundakozaamenyoyawe? (Hano,igisubizokirenzekimwekiremewe)

a. Mu gitondo

b. Mbereyokuryama

c. Nyumayokurya

d. Hagatiy'ifunguronirindi

e. Nyumayokuryaibintubiryohereye

Eseniryariujyakwisuzumishakumugangaw'amenyo?

a. Burimeziatandatukugerakuricuminabiri

b. Iyo mbabarairyinyo

c. Rimwenarimwe

d. Ntabwonjyanarimwenjyakwamuganga

Uherukakwisuzumishaamenyoryari?

a. Munsi y' umwaka?

b. Hagatiy'umwakanimyakaibiri

c. Hejuruy'imyakaitatu

d. Ntanarimwendajyayo

Eseukundakunywaibintubyiganjemoisukariinshuronyinshi?

a. Ntanarimwe

b. Munsiyinshuroimwekumunsi

c. Rimwe mu cyumweru

d. Inshuroebyirikugezakurieshatukumunsi

e. Inshuroenyekugerakurieshanukumunsi

f. Burimunsi

Eseukundakunywaibintubirimoisukariugiyekuryama?

a. Oyantanarimwe

b.Rimwenarimwe

c. Burijoro

Eseukundagufataibintuby'isukaribanyunguta?(urugero:bombo,biswi)

a. Inshuroimwekugerakugezakurieshatukumunsi

b. Inshuroenyekugerakuriesheshatukumunsi

c. Inshurozirindwikugerakuicumi

d. Uwomucontawongira

<u>IKICIRO CYA GATATU</u>:UBURYO BWO KOZA AMENYO

hitamoigisubizonyacyokuriburikibazomuriibibikurikira

Eseukoreshaikiiyowozaamenyo?

a.Uburoson'umutiw'amenyo

b. Umutiwoza mu kanwagusa

c. Amakara

d. Agati

e. Urutoki

f. Ibindi**?**

Eseukoreshaigihekinganaikiiyowozaamenyo?

a. Munsiy'umunotaumwe

b. Umunotaumwe

c. Iminotaibiri

d. Iminotaitatukuzamura

Ni gutewozaamenyo?

a. Nyozantambika

b. Nozanzamurankanamanura

c. Nyozaukombonye

Eseuburosobw'amenyoubuhinduraryari?

a.Hagatiy'ukwezikumwen'atatu

b. Hagatiy'amezianen'atandatu

c. Hagatiy'ameziarindwinacumin'abiri

d. Hejuruy'umwaka

e. ntacyombiziho

f. Ntaburosobw'amenyongira

Esewogejeamenyo mu gitondo? yego…..oya…..

Esewabawayogejeninjoro? yego….oya…..

MURAKOZE!!!!!!!!!!

ANNEXE 3. PARENTAL PERMISSIONLETTER

Dear Parent,

Introduction

My name is **Janviere MUKABIZIMANA.** I am a Master Student in Nursing, Pediatric Track at University of Rwanda conducting my Master's research project. I am requesting you to let your child participate in this project which will consist of assessment of the risk behaviors and practices towards dental health among children in rural and urban public primary schools in Rwanda.

Purpose of the study

The purpose of the project is to know the risk behaviors and practices towards dental health among children in rural and urban public primary schools in Rwanda and be able to take decision on additional dental health education beyond basic practice of oral care (BPOC) or expanding the BPOC in other parts of the country according to study results.

.

Description of study procedures

The child is expected to be in the study for 10-15minutes. There will be an interview asking the risk behaviours and practices towards dental health. The interview scores will not affect your child's classroom grades and your child's name will not be recorded on the test and will be therefore anonymous (not identifiable).

Confidentiality

Confidentiality will be assured as no names will appear on the interview scheduled guide at any stage of data collection as they will be coded. Signed consent and assent forms will not be attached to instruments to ensure anonymity. If you are willing to let your child participate, a consent form will be signed to indicate acceptance. Data will be stored in a locked cupboard and not be accessible to any other person other than the researcher. The study staff and Institutional review board will have access to all the information collected in this study and results of the study will be published without identifiable information. Furthermore, all documents for the study will be destroyed after 5 years of study completion.

Right to refuse or withdraw from the study

Participants are allowed to refuse or withdraw at any stage of the study. Also, you will have the option of not letting your child in participating in any part or the full interview, without any adverse consequences on your treatment at the study facility.

Benefits of participating in the study

School children who will participate in this study will have additional education on healthy dental practices.

Risks expected in the study

There are no risks to your child for participating in this project and the participation is voluntary.

Contact details

For further information or reporting of study related adverse events, contact me or my supervisor on the following address and numbers:

University of Rwanda

College of medicine and Health Sciences

School of Nursing and Midwifery

Kigali, Rwanda

Janvire MUKABIZIMANA: 0788636859…..

Dieudonne KAYIRANGA – 0783009299…...

For any concern about this project, please contact

College of Medicine and Health sciences

Institutional Review Board chairperson on 0788490522

Or Deputy Chairperson on 0783340040.

If you agree that your child could participate in this project, please sign the consent form attached.

ANNEXE 4. CONSENT FORM FOR PARENT

I……..give voluntary permission to my child…… to participate in the research project "assessment of the risk behaviours and practices towards dental health among children in rural and urban public primary schools in Rwanda". I understand that the project will provide additional dental health information and will improve my child's dental health practices.

……. Date: 2019

Parent or legal guardian signature

……

Date and signature of the researcher

ANNEXE 5. CHILD ASSENT FORM

I……..give voluntary permission to participate in the research project "assessment of the risk behaviours and practices towards dental health among children in rural and urban public primary schools in Rwanda".
I understand that the project will provide additional dental health information and will improve my dental health practices.
I understand that the scores of the interview will not affect the classroom grades and will be kept without names.

…….

Child's signature and date

…….

Researcher's signature and date

Kwemeragufatanya mu bushakashatsi

Njyewe……..nemeyekubushakegufatanya mu bushakashatsiku "myitwarireifiteingarukakubuzimabw'amenyondetsen'uburyobukoreshwakukwitakubuzimabw'amenyo mu banabiga mu mashuriabanzayo mu mugindetse no mu cyaro mu Rwanda".

Ndumvakoububushakashatsibuzamfashakugiraubumenyikubuzimabw'amenyobwiyongerakubwonarinsanganywe; bikazanozauburyonkoreshanitakubuzimabw'amenyo.

Nzikandikoamanotaazaturuka mu ibazwantaruhareazagira mu mitsindireyo mu ishurikandintamazinaazajyaho.

Umukonon'itariki

…….

Umukonon'itarikiby'umushakashatsi

……..

ANNEXE 6. WORK PLAN AND TIME FRAME

TASKS TO BE PERFORMED	DATES TO BE COMPLETED	PERSONNEL ASSIGNED TO TASK	PERSON DAYS REQUIRED.
Choosing research topic	Week 1- 4 Week 2nd -31st Jan,2017	Mukabizimanajanviere	1persons x days = 30 days
Research proposal preparation	Week 5-12 01 Feb. – 30th April2018	Mukabizimanajanviere& Supervisors	1persons x 88days =88days
Research proposal presentation and submission	Week 13-32 29thMay, 2018	Mukabizimanajanviere& Supervisors	1 person x 67 days =67days
Ethical clearance and permission	Week 33 16thOctober- 21st uly ,2018	Mukabizimanajanviere	1 person x 3days =5days
Contacting sectors and school representatives	Week 34: 30th December ,2018	Mukabizimanajanviere	1 person x 3days =5days
Pilot study	Week 34-37 6th – 24th December,2018	Mukabizimanajanviere	1 person x 21 days =21days
Data Collection (Fieldwork)	Week 38-50: 1st November,2018	Mukabizimanajanviere	1 person x 98 days =98days
Data coding, and entry into computer	Week 50-57 February, 2019	Mukabizimanajanviere& Emmanuel	1 person x 42 days =42days
Data analysis	Week 57-60: March,2019	Emmanuel HAKIZIMANA	1 person x 15 days =15days
Report Writing (first draft)	Week 60-61 April,2019	Mukabizimana& Supervisors	1 person x 10 days =10days
Report Presentation Workshop	Week 62: May,2016	Mukabizimanajanviere	1 person x 5days =5days
Report Writing (Final copy)	Week 45-48: May, 2019	Mukabizimanajanviere& Supervisors	1 person x 15 days =15days
Submission of Final Report	Week 49-50 June, 2019	Mukabizimanajanviere	1 person x 15 days =15days

ANNEXE 7. STUDY BUDGET

1. **STUDY PREPARATION**

Activities	**Number of days**	**Number of persons & days**	**Unit price (Rwf)**	**Total price (Rwf)**
Proposal preparation	24 days	3×24=72	5000	360,000
Proposal presentation & submission	6 days	1×12=12	5000	60000
Ethical clearance, transport and communication	4 days	1×6=6	5000	20,000
Contact with the hospital administration (CHUK).	3 days	1×3=3	10000	30,000
Sub total	37 days	93	25000	**470,000 RWF**

2. THE SURVEY

No	**Item**	**Quantity**	**No. of days**	**Persons per day**	**Unit price (Rwf)**	**Total**
1	Questionnaires distribution	210	5 days	1	6000	30,000 **Rwf**
2	Collection of completed questionnaire		5 days	1	6,000	30,000**Rwf**
	Cross checking & verification of data		5 days	1	4,000	20,000**Rwf**
2	Entering data	-	5 days	1	4,000	20,000**Rwf**

3	Analysis of data	-	4 days	3	5,000	60,000**Rwf**
4	Report (Draft 1)	-	3 days	1	5000	15000**Rwf**
5	Result presentation		3days	1	5000	15000**Rwf**
6	Preparation of final report		4 days	3	5000	60,000**Rwf**
7	Submission of final report		3 days	1	10000	30,000**Rwf**
	TOTAL	-	37days	13		**328,000 Rwf**

1. **STUDY SUPPLIES**

Material	**Quantities**	**Unit price**	**Total price (Rwf)**
Flash disk	1	10,000	10,000**Rwf**
Hand bag	1	20,000	20,000**Rwf**
Reams of paper and printing	2	10,000	20,000**Rwf**
Pencils	2	100	200**Rwf**
Pens	10	100	1000**Rwf**
Laptop	1	350000	350,000**Rwf**
Modem	1	15000	15000RWF
Internet airtime	200	2000	200000
Sub total			**616,200 Rwf**

SUMMARY OF THE BUDGET

No	**Description**	**Sub-total (Rwf)**
Workshop for report validation		**470,000 Rwf**
Study supplies of the project		**616,200 Rwf**
Production of the report		**328,000 Rwf**
TOTAL		**1414,200 Rwf**

ANNEXE 8. ETHICAL CLEARANCE LETTER

UNIVERSITY OF RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 14/01/2019
Ref: CMHS/IRB/046/2019

MUKABIZIMANA Janviere
School of Nursing and Midwifery, CMHS, UR

Dear MUKABIZIMANA Janviere

RE: ETHICAL CLEARANCE

Reference is made to your application for ethical clearance for the study entitled ***"Assessment of the Risk Behaviours and Practices towards Dental Health among Children Aged Between 8-12 Years in Rural and Urban Primary School in Rwanda"***

Having reviewed your protocol and found it satisfying the ethical requirements, your study is hereby granted ethical clearance. The ethical clearance is valid for one year starting from the date it is issued and shall be renewed on request. You will be required to submit the progress report and any major changes made in the proposal during the implementation stage. In addition, at the end, the IRB shall need to be given the final report of your study.

We wish you success in this important study.

Professor Jean Bosco GAHUTU
Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR

Cc:
- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate studies, UR

Janviere MUKABIZIMANA
E-mail: bizimanajanv@gmail.com
Phone: 0788636859

BOUR RECEPTION SECTEUR KACYIRU
NO:
DATE: 11/02/2019
A TRAITER PAR
SIGNATURE

February 9th, 2018

TO: Representative of Kacyiru primary school

Dear Madam

Re: Request of permission of conducting a study in Kacyiru primary school

I would like to conduct research entitled: "**assessment of the risk behaviors and practices towards dental health among children in rural and urban primary schools in Rwanda**" as my dissertation project for finalizing Masters of Science in Nursing in Pediatric track at University of Rwanda, College of Medicine and Health Sciences and I hereby requesting permission of conducting this study within the school that your representing.

The project purpose is to assess the risk behaviours and practices towards dental health among children in rural and urban primary schools in Rwanda, therefore be able to take decision on additional dental health education beyond basic practice of oral care (BPOC) or expanding the BPOC in other parts of the country according to study results.

A descriptive cross-sectional study design will be used in this research project and it will be done under the supervision of the supervisor and co-supervisor of the school of Nursing & Midwifery, College of Medicine and Health sciences, University of Rwanda.

The study sample will comprise 98 students aged between 6 to 12 years who will participate in the study after a stratified random sampling. The participation will be voluntary after the parent/guardian gives the permission and sign informed consent form and the child signs the assent form. An interview guide will be used to collect data. The study will be done in this February 2019 if possible and it will help the participants to have additional dental health education beyond basic practice of oral care. The participants' response will be kept confidential and anonymous. The attached are parental permission, child assent form and interview guide form.

Yours Sincerely,

Janviere MUKABIZIMANA

CC:

-Executive Secretary of Kacyiru Sector

Janviere MUKABIZIMANA
E-mail: bizimanajanv@gmail.com
Phone: 0788636859

DATE DE RECEPTION 25/3/2019
N° D'ENREGISTREMENT
A TRAITE PAR
CLASSEMENT
SECTEUR MUYUMBU

March 22nd, 2019

TO: Representatives of groupe scolaire

Dear Sir/Madam

Re: Request of permission of conducting a stud at Groupe scolaire Muyumbu

I would like to conduct research entitled: **"assessment of the risk behaviors and practices towards dental health among children in rural and urban primary schools in Rwanda"** as my dissertation project for finalizing Masters of Science in Nursing in Pediatric track at University of Rwanda, College of Medicine and Health Sciences and I hereby requesting permission of conducting this study within the school that you are representing.

The project purpose is to assess the risk behaviours and practices towards dental health among children in rural and urban primary schools in Rwanda, therefore able to take decision on additional dental health education beyond basic practice of oral care (BPOC) or expanding the BPOC in other parts of the country according to study results.

A descriptive cross-sectional study design will be used in this research project and it will be done under the supervision of the supervisor and co-supervisor of the school of Nursing & Midwifery, College of Medicine and Health sciences, University of Rwanda.

The study sample will comprise 98 students aged between 6 to 12 years who will participate in the study after a stratified random sampling. The participation will be voluntary after the parent/guardian gives the permission and sign informed consent form and the child signs the assent form. An interview guidewill be used to collect data. The study will be done in this April 2019 if possible and it will help the participants to have additional dental health education beyond basic practice of oral care. The participants' responses will be kept confidentially and anonymous. The attached are parental permission, child assent form and interview guide forms.

Yours Sincerely,

Janviere MUKABIZIMANA

CC:

-Executive Secretary of Muyumbu Sector