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# Assessing knowledge, attitudes and belief toward HPV vaccination of parents with children aged 9-14 years in rural communities of North West Cameroon: a qualitative study



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| Complete List of Authors: | Elit, Lorraine; Baptist Institute for Health Sciences; McMaster University<br>Ngalla, Calvin; Mbingo Hospital, Women's Health Program<br>Afugchwi, Glen; Baptist Institute for Health Science, Pediatric Oncology<br>Tum, Eric; Information and Vocational Orientation Centre<br>Fokom-Domgue, Joël; Faculty of Medicine and Biomedical Sciences, University of Yaoundé I, Yaoundé, Cameroon, Department of Obstetrics and Gynecology<br>Nouvet, Elysée; Western University, School of Health Studies |
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Title: Assessing knowledge, attitudes and belief toward HPV vaccination of parents with children aged 9-14 years in rural communities of North West Cameroon: a qualitative study

[1,2,3] Elit L, [2]Ngalla C, [2]Afugchwi G, [4]Tum E, [5]Folkom-Domgue J, [6]Nouvet E.

Affiliations

[1]Baptist Health Institute of Science, Mbingo, NW Cameroon

[2]Mbingo Hospital, Cameroon Baptist Convention Health Services, Mbingo, NW, Cameroon

[3]Department of Obstetrics and Gynecology, McMaster University, Hamilton, Canada

[4]Information and Vocational Orientation Centre, Bamenda

[5]Department of Public Health, Faculty of Medicine and Biomedical Sciences, University of Yaounde, Cameroon

[6]School of Health Studies, Western University, London, Canada

Corresponding Author: Lorraine Elit

Affiliations: Baptist Health Institute of Science, Mbingo, NW Cameroon

Mbingo Hospital, Cameroon Baptist Convention Health Services, Mbingo, NW, Cameroon

Department of Obstetrics and Gynecology, McMaster University, Hamilton, Canada

Email: elitl@mcmaster.ca

ABSTRACT

**Introduction**: Despite HPV vaccine being incorporated in the National Immunization Program in Cameroon in 2019, HPV vaccine uptake among eligible girls has been poor (5%). The barriers to HPV vaccination in this high-burden setting have not been previously studied, especially in rural areas. We propose to evaluate the knowledge, attitudes and beliefs of parents of girls aged 9 to 14 years regarding HPV vaccine.

**Methods and Analysis:**

*Study design*: A qualitative descriptive study will be conducted using one-on-one semi structured interviews with parents of girls aged 9-14-year-old from 3 health districts in Cameroon (Mbingo, Njinikom and Fundong) who can converse in English or Pidgeon English. Enrolment will occur until thematic saturation – like 40 participants.

*Analysis*: Quantitative methods will be used to describe the interviewees. All interviews will be audio recorded, transcribed and loaded into ATLAS.ti. Transcripts will be coded and thematic analysis will be conducted. Analysis will occur concurrent with interviews.

**Ethics and Dissemination:**

*Ethics*: Institutional review board approval will be obtained from the Cameroon Baptist Convention Health Board (CBCHB), Cameroon and McMaster University, Hamilton, Canada.

*Dissemination*: Study findings will be presented via a report and webinar to the Ministry of Health, the funders, the CBCHB and in person to healthcare providers and interested members of the general population in the study region. Plans are to share findings internationally through peer reviewed publication(s) and presentation(s).

Key words: HPV vaccine, Knowledge, Attitudes and Beliefs

**Limitations**

-During the conduct of the study, NW Cameroon is in the midst of civil conflict. This limits the methods available for recruitment and potential willingness of parents to attend the interviews

**Strengths**

-Rigorously developed protocol will be implemented by a research team that has experience with qualitative methods and analysis.

-5 of the 6 researchers reside in Cameroon with 4 of them residing between Mbingo and Bamenda. Mbingo is the site for the interviews. This is important as it facilitates understanding of the anthropologic nuances of the Kom people in this region.

- The conflict has been ongoing in this region since 2018. This study will reflect the impact of long lasting civil unrest on access to knowledge about and access to preventative strategies against cancer.

## INTRODUCTION

Infection with the Human Papilloma Virus (HPV) is an important public health problem given that HPV is the major cause of preinvasive disease and/or cancer of the lower genital tract and/or oral cavity [1,2]. The introduction of HPV vaccines prior to exposure to the virus has been shown to play a major role in lowering disease burden associated with the oncologic types of this virus. The problem is that HPV vaccination uptake is still low in several countries [3,4]. At least 179 countries have implemented various HPV National Immunization Programs (NIP). Currently HPV vaccination coverage stands at 30% in low and low middle-income countries, 55% in upper middle-income countries and 80% in high income countries [4,5]. In Cameroon, a West African Country, reports from the Ministry of Health indicate a lower HPV vaccination rate, with only 5% of eligible girls having received the vaccine in 2020 [6]. Several factors may contribute to this low uptake: lack of knowledge or awareness of health care providers and the general population [7] and low acceptance of this vaccine among parents, guardians and adolescents themselves [8].

In Africa, cervical cancer is the second leading cause of cancer mortality in women [7]. According to GLOBOCAN, 2020, the age standardized incidence and mortality rate of cervical cancer in Western African countries including Cameroon is 33.7 per 100,000 and 16.6 per 100,000 respectively [5,9]. The World Health Organization (WHO) has proposed a 90-70-90 cervical cancer reduction goal by 2030. This envisions achieving a 90% world vaccination rate for all girls by age 15 years, screening 70% of women at age 35 and again at 45-year-old by a high-performance test, and delivering appropriate treatment to 90% of those with disease [10]. The global goal is a cervical cancer incidence rate of <4 per 100,000. Unfortunately, there is a paucity of population-based cancer statistics in much of the world, including Cameroon. Currently Cameroon reports cervical cancer as the second most common of all cancers (representing 13.8% of all cancer diagnoses) 11]. Cervical screening uptake is very low with just 4% of women having access to screening services [12,13].

There have been two previous pay for HPV vaccination projects in Cameroon. In 2009, the National Committee for the Fight Against Cancer approved the use of Gardasil in Cameroon for the vaccination of girls aged 9 to 26 years (though emphasis was made on girls aged 9 to 13 years) [14,15]. As a result, the Cameroon Baptist Convention Health Services (CBCHS), a large faith-based private health services organization in Cameroon, vaccinated 6,851 girls from 2010-2012 [15]. There was a fee to cover administration of the doses ($8USD/dose). Uptake was highest in the north and south west regions but poor in Yaoundé. Eighty-five percent of girls received all three doses. In 2017, the Cervarix vaccine (a bivalent vaccine produced by GlaxoSmithKline (GSK) against HPV 16,18) was approved for use in Cameroon by the Ministry of Health [14]. This pay for vaccine was used for Cameroonian women aged 9 through 55. Results of this opportunity in terms of number of Cervarix doses administered or number of cycles completed are not available.

In 2019, Gardasil 4 was incorporated into the national (EPI) vaccine program for Cameroon but there has been poor communication concerning availability of doses both to health care providers and the community [9,16]. In North West Cameroon, while there is supply of free Gardasil 4 for girls aged 9-14-year-old, the 2021 supply expired before use. Despite CBCHS campaigns to promote vaccination against HPV related diseases, the uptake of the HPV vaccination has been low in Cameroon. There exists no evidence-based explanation for this low uptake for the Cameroonian context.

Our hypothesis is that the uptake of the HPV vaccine depends on the public's comprehension of implications of an HPV infection and their understanding of the benefits of the HPV vaccine in

preventing lower genital tract and oral cancer [17]. The aim of this study is to assess knowledge, beliefs and attitudes of parents of young girls aged 9 to 14 years about HPV vaccines within some rural communities in the North West Region of Cameroon served by three well attended hospitals. These are Mbingo Baptist Hospital, St Martin de Porres Catholic Hospital Njinikom and Fundong District Hospital. We wish to understand from a public perspective the reasons for this low uptake. While there are many stakeholders involved in the process of HPV vaccination (like Ministry of Health, Ministry of Education, Hospitals, Pharmaceutical companies, Schools, community leaders (like Fons, Chiefs, quarter heads, pastors, public, girls aged 9-14yo), understanding the perspectives of parents with girls aged 9-14yo who may or may not provide consent for vaccination is essential to improve HPV vaccine uptake. The above listed hospitals have been conducting activities related to primary prevention (vaccination) since as early as 2016 and secondary prevention (screening) for cervical cancer since 2007. We also know that communities served by these hospitals are in the region in which CBCHS organizes HPV vaccine promotion campaigns. While these sites are in a zone of conflict, the area has been more stable in the recent 2 years as compared to 2018. We recognize the presence of COVID in the region since March 2020 with COVID vaccinations for health workers and the public being available as of April2021.

The aim of this study is to assess knowledge, beliefs and attitudes of parents to young girls aged 9 to 14 years about HPV vaccines within some rural communities in the North West Region of Cameroon served by three hospitals in that area. The specific objectives of this evaluation are: To evaluate the knowledge, beliefs and attitudes of parents of young girls aged 9 to 14 years regarding the vaccine. To obtain learning on possible intervention to improve acceptance of HPV vaccine by parents of young girls aged 9 to 14 years in the area of study.

## METHODS

This is a qualitative descriptive study as described by Sandelowski [1],8 which is a suitable method for advancing understanding of questions related to health care seeking. The Theoretical framework of acceptability (TFA) will serve as a guide for this study [19]. The TFA provides a reflection of how much healthcare interventions are considered appropriate by providers and receivers based on real or perceived understanding and emotional implications of the intervention. The TFA assesses acceptability of interventions by looking at seven domains which include perceived effectiveness, burden, affective attitude, intervention coherence, self-efficacy, ethicality and opportunity cost.

This study involves the collection and analysis of approximately 40 one-on-one semi-structured interviews with parent(s) of one or more female children (ages 9-14 years) living in rural communities in North West Cameroon. More specifically they live within Fundong, Njinikom or Mbingo health areas. Interviews are being conducted between January and November2022.

Sampling will involve a quota sampling method for parent(s) consent to participate in the interviews. Given a study objective is to clarify motivations driving HPV vaccination or its avoidance in this district, sampling will include purposively seeking a balance between parents who have at the time of interview opted in or out of HPV vaccination for their girl(s) with maximum variation (e.g., level of parental education, occupation). We will include up to 10 parents of girls who received HPV vaccine and 30 parents of girls who did not receive the HPV vaccine. Potential parent participants will be identified from HPV vaccination registry at the Mbingo Baptist Hospital women's health program office (for girls who received

the vaccine). Regarding families who did not receive the vaccine, potential parent participants will be those who respond to word-of-mouth advertisements by health area community mobilizers

To be invited for an interview, the individual must be a parent of a daughter aged 9 to 14 years living in Mbingo, Njinikom and Fundong health areas. Individuals will be excluded if they are a health workers or working in any health institution. It is our assumption that the knowledge, attitudes and beliefs of health care worker differ from those of the general public. This study is focused on advancing understanding of these from a public perspective as they pertain to HPV vaccination. Other exclusion criteria include unwillingness to provide consent to participate, inability to converse in the language of the interviewer (English or Pidgin English). Pidgin English otherwise known as Cameroonian Creole or Kamtok is spoken in the North and South West regions of Cameroon that are primarily English speaking. Enrolment will be continued until we reach thematic saturation (i.e, the point when new data does not add new thematic information to what has been learned from completed interviews).

All parents who agree to participate in the study will be invited to Mbingo Baptist Hospital at a date and time convenient to them for the interview with the research interviewer. Interviews will be conducted by a medical anthropologist with post-graduate training in qualitative research. Parents will be reimbursed for the transportation and feeding costs. They will also receive a small stipend of soap.

An interview guide has been created addressing knowledge, attitudes and behaviors toward vaccination in general, sexually transmitted diseases, cervical cancer, and HPV vaccination. The guide contains open ended questions with probes. The guide will be pilot tested with 5 parents for comprehension and flow. All interviews will be done in either English, or pidgin English. The interviews will last between 45 to 60 minutes and will be audio recorded. The interviewer will use an electronic tablet with recording application. All the interviews will be transcribed into English. All recorded audio files will be saved on password-protected computers and backed up on to Mbingo Baptist Hospital servers. Only study investigators and the interviewer will have access to the saved files.

*Patient and Public Involvement:* This study is designed to foreground the voices of parents approached for consent to have their daughters' vaccinated within Cameroon's National Vaccination Program. Cameroonian healthcare professionals familiar with the study region, and ultimately responsible for vaccination in the region supported the design and recruitment strategies. Member checking will be conducted using a focus group within the community to discuss themes identified in the individual interviews.

**ANALYSIS**

Data will be analyzed concurrently with the interviews. A four step thematic content analysis will be conducted including data familiarization, theme identification, data coding and organization of codes and themes using the framework method. Through an iterative process, transcripts will be coded and analyzed for description and interpretive themes. All transcribed interviews will be inputted into ATLAS Ti. Two study personnel (CN, GMA) will code each of the first 2 interviews, with the goal of identifying key beliefs and attitudes that could clarify a participant's or wider society hesitancy to seek out HPV vaccination. Codes will be compared and discrepancies resolved in dialogue with the study co-leads (LE, JFD, EN). Sequential groups of 2 interviews will be double coded until agreement is achieved. Thereafter, an interview will only need to be coded by one member of the study team. An individual external to the

team (EH) will conduct an audit coding of all the coded content once all the interviews have been coded, towards verifying the accuracy and coherence of the coding process. The research team will meet to discuss and reach consensus on the themes identified and their implications in relation to the study question.

**ETHICS**

Institutional Ethics approval has been obtained both in Canada at McMaster University and through the Cameroon Baptist Convention Health Board. Participant information and informed consent documents will be read and explained to potential participants prior to participating in the interviews. The consent describes in detail the study intervention, study procedures, benefits, risks, compensation, voluntary participation, confidentiality, right as a participant and ability to withdraw from the study. Those who opt into the study will be asked to sign the consent form. A copy of the signed informed consent document will be stored in the participant's research record and another signed copy retained by the consenting participant. Consent forms will be kept separate from the data collected and no identifying information will be included in the transcription of the interview.

Any information that is obtained during this study will be kept confidential. All participant information will have a research code number (and no personal identifying information). These documents will be stored in encrypted and password-protected computer files. Only the PI and other investigators will have access. These files will be backed up at Mbingo Baptist Hospital secure servers. The identifiers and other data will be destroyed 7 years after study completion.

Direct benefits to study participants are unlikely; however, information garnered from this study will be used to determine the knowledge, beliefs and attitudes of parents of young girls aged 9 to 14 years regarding the HPV vaccine and identify possible interventions to improve acceptance of HPV vaccine by parents of young girls aged 9 to 14 years in the area of study.

We anticipate minimal risks for participants in this study. A few risks will involve traveling up to about 30Km to Mbingo Baptist Hospital for the interviews. There has been a waxing and waning civil conflict in this region since 2018. If in the opinion of local hospital administration and/or Cameroon Baptist Convention Health Services (CBCHS) that people should not travel to the hospital on a given day, the interviews will be cancelled that day and/or the study will be put on hold. Other risks include the possible discomfort in expressing personal perceptions in response to some interview questions. To mitigate these, interviews will be arranged for dates and times that are suitable for the participants and participants shall be informed prior to the start of interviews not to provide names or personal identifiers on recordings.

Participants will be free to withdraw from the study at any time upon request. If they choose to leave the study after data has been collected, they will be able to request a withdrawal of collected information. If the study is prematurely terminated or suspended, the PI will promptly inform the Research Ethics Committee at McMaster University and the Cameroon Baptist Convention Health Board and the study sponsors and funders (Merck), providing the reason(s) for the termination or suspension. Any amendment to the protocol will be submitted to various ethics committees before the changes are implemented to the study.

The PI and study team will conduct the study in compliance with the approved protocol. The PI and study team will not implement any deviation from or changes to the protocol without prior review and documented approval from the Ethics Committee. Any unintentional deviations from the protocol will be reported to the Ethics Committee.

**EXPECTED OUTCOMES AND DISSEMINATION**

At the end of this study we hope to better understand the perspective of parents and their knowledge, attitudes and beliefs about HPV vaccinations for their young daughters. This is the first study of its kind in rural communities in the North West Region, Cameroon. This information will help us understand if there are knowledge gaps that could be addressed through education, or negative attitudes that could be challenged through peer communication. We anticipate this project could serve as a stepping stone to similar projects in other regions of Cameroon or intervention projects based on the findings of this study. Results will be disseminated to the funders, to CBCHB, Cameroon Ministry of Health and interested parties like the EPI vaccine program. Presentation locally at the internal medicine and surgery residents of the Baptist Institute of Health Sciences is anticipated. A peer review publication and presentation at peer reviewed meeting(s) are planned.

AUTHORS' CONTRIBUTIONS

Elit- the research team leader and writing of the protocol

Ngalla-provided feasibility and cultural input into recruitment and design of the interview guide

Afungchwi – provided feasibility and cultural insight into recruitment, design of the interview guide and analysis

Tum-provided cultural input into recruitment and design and reiterations of the interview guide

Folkom-Domgue- provided input into the background, rationale and cultural insight into recruitment and design of the interview guide

Nouvet – provided input into the background and rationale, methods and analysis

COMPETING INTERESTS STATEMENT

This is an investigator initiated research project which has been funded by Merck. Merck does not have access to any of the original material but will be provided with any manuscripts that result from this work for review prior to publication.

FUNDING STATEMENT

This work was supported by Merck grant number 100035 (Elit 13Oct2021). Merck had no role in the study design, implementation, data collection. Interpretation and dissemination of the findings of this study.

**REFERENCES**

1. De Martel C, Georges D, Bray F, et al. Global burden of cancer attributable to infections in 2018: A worldwide incidence analysis. Lancet Glob. Health. 2020;8:e180-90.
2. Arbyn M, Weiderpass E, Bruni L, et al. Estimates of incidence and mortality of cervical cancer in 2018: A worldwide analysis. Lancet Glob. Health. 2020;8:e191–e203.
3. Lei J, Ploner A, Elfström KM, et al. HPV vaccination and the risk of invasive cervical cancer. N. Engl. J. Med. 2020;383:1340–8.
4. PATH Global HPV vaccine introduction overview. https://www.path.org/resources/global-hpv-vaccine-introduction-overview/ (2019), Accessed Feb 2020.
5. Lemp JM, De Neve JW, Bussmann H, et al. Lifetime prevalence of cervical cancer screening in 55 low- and middle-income countries. JAMA. 2020;324:1532-42.
6. HPV Facts. 2021 for Cameroon ICO/IARC Information Centre on HPV and Cancer https://hpvcentre.net/statistics/reports/CMR.pdf Accessed 14Feb2022.
7. WHO. (2010). WHO/ICO Information Centre on HPV and Cervical Cancer (HPV Information Centre). Human Papillomavirus and Related Cancers in Cameroon. Summary Report 2010. www.who.int/hpvcentre. Accessed 28 Aug 2011.
8. Shelton RC, Snavely AC, De Jesus M, et al. HPV vaccine decision-making and acceptance: does religion play a role? J Relig Health. 2013;52(4):1120–30.
9. 2020 Cameroon country data. www.who.int. Accessed 16 Feb2022.
10. Global strategy to accelerate the elimination of Cervical cancer. 17Nov2020. www.who.int Accessed 21Feb2022.
11. Enow Orock GE, Ndom P, Doh AS, 2012. Current cancer incidence and trends in Yaounde, Cameroon. Oncol Gastroenterol Hepatol Reports, 1(1), pp.58-63.
12. World Health Organization. (2002). Cervical cancer screening in developing countries: Report of a WHO consultation. Geneva: World Health Organization.
13. Okyere J, Duodu PA, Aduse-Poku L, et al. Cervical cancer screening prevalence and its correlates in Cameroon. Secondary data analysis of the 2018 demographic and health survey. BMC Public Health 2021;21;1071-9.
14. Wamai RG, Ayissi CA, Oduwo GO, et al. Assessing the effectiveness of a community-based sensitization strategy in creating awareness about HPV, cervical cancer and HPV vaccine among parents in North West Cameroon. Journal of Community Health 2012;37(5):917-26.
15. Ogembo JG, Manga S, Nulah K, et al. Achieving high uptake of HPV vaccine in Cameroon: Lessons learned in overcoming challenges. Vaccine 2014;32(35):4399-403.
16. https://www.journalducameroun.com/en/cameroonnationwide-vaccination-against-cervical-cancer-to-begin-soon Accessed Apr 15, 2021.
17. Marlow LA, Waller J, Wardle J. Public awareness that HPV is a risk factor for cervical cancer. Br J Cancer. 2007;97(5):691–4.
18. Sandelowski M. Whatever happened to qualitative description? Research in Nursing and health 2000;23(4):334-40.
19. Sekhon M, Cartwright M, Francis JJ. Acceptability of healthcare interventions: an overview of reviews and development of a theoretical framework. BMC Health Services Research. 2017;17:88.

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Affiliations

[1]Baptist Health Institute of Science, Mbingo, NW Cameroon

[2]Mbingo Hospital, Cameroon Baptist Convention Health Services, Mbingo, NW, Cameroon

[3]Department of Obstetrics and Gynecology, McMaster University, Hamilton, Canada

[4]Information and Vocational Orientation Centre, Bamenda

[5]Department of Public Health, Faculty of Medicine and Biomedical Sciences, University of Yaounde, Cameroon

[6]School of Health Studies, Western University, London, Canada

Corresponding Author: Lorraine Elit

Affiliations: Baptist Health Institute of Science, Mbingo, NW Cameroon

Mbingo Hospital, Cameroon Baptist Convention Health Services, Mbingo, NW, Cameroon

Department of Obstetrics and Gynecology, McMaster University, Hamilton, Canada

Email: elitl@mcmaster.ca

ABSTRACT

**Introduction**: Despite HPV vaccine being incorporated in the National Immunization Program in Cameroon in 2019, HPV vaccine uptake among eligible girls has been poor (5%). The barriers to HPV vaccination in this high-burden setting have not been previously studied, especially in rural areas. We propose to evaluate the knowledge, attitudes and beliefs of parents of girls aged 9 to 14 years regarding HPV vaccine.

**Methods and Analysis:**

*Study design*: A qualitative descriptive study will be conducted using one-on-one semi structured interviews with parents of girls aged 9-14-year-old from 3 health districts in Cameroon (Mbingo, Njinikom and Fundong) who can converse in English or Pidgeon English. Enrolment will occur until thematic saturation – approximately 40 participants.

*Analysis*: Quantitative methods will be used to describe the interviewees. All interviews will be audio recorded, transcribed, and loaded into a tool to facilitate analysis (ATLAS.ti). Transcripts will be coded and thematic analysis will be conducted. Analysis will occur concurrent with interviews.

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*Dissemination*: Study findings will be presented via a report and webinar to the Ministry of Health, the funders, the CBCHB and in person to healthcare providers and interested members of the general population in the study region. Plans are to share findings internationally through peer reviewed publication(s) and presentation(s).

Key words: HPV vaccine, Knowledge, Attitudes and Beliefs

**Strengths**

-The interview guide was developed and will be implemented by a predominantly Cameroon research team that has experience with medical anthropology, qualitative methods and analysis.

-Analysis will be conducted by a predominantly Cameroon research team who has understanding of the anthropologic nuances of the Kom people residing in this region.

**Limitations**

-Cameroon is a unique country setting and the region where the study was conducted is in a conflict zone; this may limit generalizability of findings.

-This study is limited to the perceptions of one group of key decision-makers in vaccination in the region: those of parents.

## INTRODUCTION

Infection with the Human Papilloma Virus (HPV) is an important public health problem given that HPV is the major cause of preinvasive disease and/or cancer of the lower genital tract and/or oral cavity [1,2]. The introduction of HPV vaccines prior to exposure to the virus has been shown to play a major role in lowering disease burden associated with the oncologic types of this virus. The problem is that HPV vaccination uptake is still low in several countries [3,4]. At least 179 countries have implemented various HPV National Immunization Programs (NIP). Currently HPV vaccination coverage stands at 30% in low and low middle-income countries, 55% in upper middle-income countries and 80% in high income countries [4,5]. In Cameroon, a West African Country, reports from the Ministry of Health indicate a lower HPV vaccination rate, with only 5% of eligible girls having received the vaccine in 2020 [6]. This is lower than reports for other childhood vaccinations like measles (8%) [7] and in Fouban (neighboring province), 28.6% for BCG, 22.8% for DPT-Hi+Hb3 and 14.3% for measles/rubella [8]. Several factors may contribute to this low uptake: lack of knowledge or awareness of health care providers and the general population [9] and low acceptance of this vaccine among parents, guardians and adolescents themselves [10].

In Africa, cervical cancer is the second leading cause of cancer mortality in women [9]. According to GLOBOCAN, 2020, the age standardized incidence and mortality rate of cervical cancer in Western African countries including Cameroon is 33.7 per 100,000 and 16.6 per 100,000 respectively [5,11]. While other HPV related cancers include oro-pharyngeal (ASI/ASM per 100,000 is 2.21/1.55 (men), 0.38/0.14 (women)), anal (0.62/0.46 (men), 0.70/0.49 (women)), and other male or female lower genital tract sites (0.67/0.44 (vulva), 0.63/0.38 (vaginal), 0.14/0.06 (penile)), disease specific incidence and mortality rates appear low in part due to a lack of systematic cancer reporting in Cameroon [6]. The World Health Organization (WHO) has proposed a 90-70-90 cervical cancer reduction goal by 2030. This envisions achieving a 90% world vaccination rate for all girls by age 15 years, screening 70% of women at age 35 and again at 45-year-old by a high-performance test and delivering appropriate treatment to 90% of those with disease [12]. The global goal is a cervical cancer incidence rate of <4 per 100,000. Unfortunately, there is a paucity of population-based cancer statistics in much of the world, including Cameroon. Currently Cameroon reports cervical cancer as the second most common of all cancers (representing 13.8% of all cancer diagnoses) [13]. Cervical screening uptake is very low with just 4% of women having access to screening services [14,15].

There have been two previous pay for HPV vaccination projects in Cameroon. In 2009, the National Committee for the Fight Against Cancer approved the use of Gardasil in Cameroon for the vaccination of girls aged 9 to 26 years (though emphasis was made on girls aged 9 to 13 years) [16,17]. As a result, the Cameroon Baptist Convention Health Services (CBCHS), a large faith-based private health services organization in Cameroon, vaccinated 6,851 girls from 2010-2012 [17]. There was a fee to cover administration of the doses ($8USD/dose). Uptake was highest in the north and south west regions but poor in Yaoundé. Eighty-five percent of girls received all three doses. In 2017, the Cervarix vaccine (a bivalent vaccine produced by GlaxoSmithKline (GSK) against HPV 16,18 was approved for use in Cameroon by the Ministry of Health [16]. This pay for vaccine was used for Cameroonian women aged 9 through 55. Results of this opportunity in terms of number of Cervarix doses administered or number of cycles completed are not available.

In 2019, Gardasil 4 was incorporated into the national (EPI) vaccine program for Cameroon for girls age 9 years old. There has been poor communication concerning availability of doses both to health care providers and the community [11,18]. In North West Cameroon, the CBCHS has made a supply of free

Gardasil 4 for girls aged 9-14-year-old, the 2021 supply expired before use. Despite CBCHS campaigns to promote vaccination against HPV related diseases, the uptake of the HPV vaccination has been low. There exists no evidence-based explanation for this low uptake for the Cameroonian context.

Parents conventionally play a key role in non-adults' healthcare decision-making in this part of Cameroon, thus our hypothesis is that the uptake of the HPV vaccine depends in part on the public's comprehension of implications of an HPV infection and their understanding of the benefits of the HPV vaccine in preventing lower genital tract and oral cancer [19]. The aim of this study is to assess knowledge, beliefs and attitudes of parents of young girls aged 9 to 14 years about HPV vaccines within some rural communities in the North West Region of Cameroon served by three well attended hospitals. These are Mbingo Baptist Hospital, St Martin de Porres Catholic Hospital Njinikom and Fundong District Hospital. We wish to understand from a public perspective the reasons for this low uptake. While there are many stakeholders involved in the process of HPV vaccination (like Ministry of Health, Ministry of Education, Hospitals, Pharmaceutical companies, Schools, community leaders (like Fons, Chiefs, quarter heads, pastors, public, girls aged 9-14yo), understanding the perspectives of parents with girls aged 9-14yo (who may or may not provide consent for vaccination) is essential to improve HPV vaccine uptake. The above listed hospitals have been conducting activities related to primary prevention (vaccination) since as early as 2016 and secondary prevention (screening) for cervical cancer since 2007. We also know that communities served by these hospitals are in the region in which CBCHS organizes HPV vaccine promotion campaigns. While these sites are in a zone of conflict, the area has been more stable in the recent 2 years as compared to 2018. We recognize the presence of COVID in the region since March 2020 with COVID vaccinations for health workers and the public being available as of April2021.

The aim of this study is to assess knowledge, beliefs and attitudes of parents to young girls aged 9 to 14 years about HPV vaccines within some rural communities in the North West Region of Cameroon served by three hospitals in that area. The specific objectives of this evaluation are: To evaluate the knowledge, beliefs and attitudes of parents of young girls aged 9 to 14 years regarding the vaccine. To obtain learning on possible intervention to improve acceptance of HPV vaccine by parents of young girls aged 9 to 14 years in the area of study.

## METHODS

This is a qualitative descriptive study as described by Sandelowski [20] which is a suitable method for advancing understanding of questions related to health care seeking. The Theoretical framework of acceptability (TFA) will serve as a guide for this study [21]. The TFA provides a reflection of how much healthcare interventions are considered appropriate by providers and receivers based on real or perceived understanding and emotional implications of the intervention. The TFA assesses acceptability of interventions by looking at seven domains which include perceived effectiveness, burden, affective attitude, intervention coherence, self-efficacy, ethicality and opportunity cost.

This study involves the collection and analysis of approximately 40 one-on-one semi-structured interviews with parent(s) of one or more female children (ages 9-14 years) living in rural communities in North West Cameroon. More specifically they live within Fundong, Njinikom or Mbingo health areas. Interviews are being conducted between January and November2022.

Sampling will involve a quota sampling method for parent(s) consent to participate in the interviews. Given a study objective is to clarify motivations driving HPV vaccination or its avoidance in this district, sampling will include purposively seeking a balance between parents who have at the time of interview opted in or out of HPV vaccination for their girl(s) with maximum variation (e.g., level of parental education, occupation). We will include up to 10 parents of girls who received HPV vaccine and 30 parents of girls who did not receive the HPV vaccine. Potential parent participants will be identified from HPV vaccination registry at the Mbingo Baptist Hospital women's health program office (for girls who received the vaccine). Regarding families who did not receive the vaccine, potential parent participants will be those who respond to word-of-mouth advertisements by health area community mobilizers

To be invited for an interview, the individual must be a parent of a daughter aged 9 to 14 years living in Mbingo, Njinikom and Fundong health areas. Individuals will be excluded if they are a health worker or working in any health institution. It is our assumption that the knowledge, attitudes, and beliefs of health care worker differ from those of the general public. This study is focused on advancing understanding of these from a public perspective as they pertain to HPV vaccination. Other exclusion criteria include unwillingness to provide consent to participate, inability to converse in the language of the interviewer (English or Pidgin English). Pidgin English otherwise known as Cameroonian Creole or Kamtok is the main language spoken in the North and South West regions of Cameroon. There is a small percent of the population who only communicate in Fula. Also, an older segment of the population (beyond the age of the parents on whom we focus here) who have not been exposed to formal education may only speak their tribal language. We do not anticipate exclusion of these linguistic minorities impacting on our ability to recruit sufficient participants. Enrolment will be continued until we reach thematic saturation (i.e, the point when new data does not add new thematic information to what has been learned from completed interviews).

All parents who agree to participate in the study will be invited to Mbingo Baptist Hospital at a date and time convenient to them for the interview with the interviewer. We understand that this may limit participation of some individuals but by allowing participants to dictate their preferred timing for the interview, by reimbursing transportation and meal costs and by offering a small token for their time (in the form of soap), we have tried to optimize participation. Interviews will be conducted by a medical anthropologist with post-graduate training in qualitative research.

An interview guide has been created addressing knowledge, attitudes, and behaviors toward vaccination in general, sexually transmitted diseases, cervical cancer, and HPV vaccination (Supplementary Table). The guide contains open ended questions with probes. The guide will be pilot tested with 5 parents for comprehension and flow. The interviews will last between 45 to 60 minutes and will be audio recorded. The interviewer will use an electronic tablet with recording application. All the interviews will be verbatim transcribed into English. All recorded audio files will be saved on password-protected computers and backed up on to Mbingo Baptist Hospital servers. Only study investigators and the interviewer will have access to the saved files.

*Patient and Public Involvement:* This study is designed to foreground the voices of parents approached for consent to have their daughters' vaccinated within Cameroon's National Vaccination Program. Cameroonian healthcare professionals familiar with the study region, and ultimately responsible for vaccination in the region supported the design and recruitment strategies. Member checking will be conducted using a focus group within the community to discuss themes identified in the individual interviews.

## ANALYSIS

Data will be analyzed concurrently with the interviews. A four step thematic content analysis will be conducted including data familiarization, theme identification, data coding and organization of codes and themes using the framework method. Through an iterative process, transcripts will be coded and analyzed for description and interpretive themes. All transcribed interviews will be inputted into ATLAS ti9, a program widely used by social scientists to facilitate organization and analysis of qualitative data. Two study personnel (CN, GMA) will code each of the first 2 interviews, with the goal of identifying key beliefs and attitudes that could clarify a participant's or wider society hesitancy to seek out HPV vaccination. Codes will be compared and discrepancies resolved in dialogue with the study co-leads (LE, JFD, EN). Sequential groups of 2 interviews will be double coded until agreement is achieved. Thereafter, an interview will only need to be coded by one member of the study team. An individual external to the team (EH) will conduct an audit coding of all the coded content once all the interviews have been coded, towards verifying the accuracy and coherence of the coding process. The research team will meet regularly to discuss and reach consensus on the themes identified and their implications in relation to the study question.

## ETHICS AND DISEMINATION

Institutional Ethics approval has been obtained both in Canada at McMaster University and through the Cameroon Baptist Convention Health Board. Participant information and informed consent documents will be read and explained to potential participants prior to participating in the interviews. The consent describes in detail the study intervention, study procedures, benefits, risks, compensation, voluntary participation, confidentiality, right as a participant and ability to withdraw from the study. Those who opt into the study will be asked to sign the consent form. A copy of the signed informed consent document will be stored in the participant's research record and another signed copy retained by the consenting participant. Consent forms will be kept separate from the data collected and no identifying information will be included in the transcription of the interview.

Any information that is obtained during this study will be kept confidential. All participant information will have a research code number (and no personal identifying information). These documents will be stored in encrypted and password-protected computer files. Only the PI and other investigators will have access. These files will be backed up at Mbingo Baptist Hospital secure servers. The identifiers and other data will be destroyed 7 years after study completion.

Direct benefits to study participants are unlikely; however, information garnered from this study will be used to determine the knowledge, beliefs and attitudes of parents of young girls aged 9 to 14 years regarding the HPV vaccine and identify possible interventions to improve acceptance of HPV vaccine by parents of young girls aged 9 to 14 years in the area of study.

We anticipate minimal risks for participants in this study. A few risks will involve traveling up to about 30Km to Mbingo Baptist Hospital for the interviews. There has been a waxing and waning civil conflict in this region since 2018. If in the opinion of local hospital administration and/or Cameroon Baptist Convention Health Services (CBCHS) that people should not travel to the hospital on a given day, the

interviews will be cancelled that day and/or the study will be put on hold. Other risks include the possible discomfort in expressing personal perceptions in response to some interview questions. To mitigate these, interviews will be arranged for dates and times that are suitable for the participants and participants shall be informed prior to the start of interviews not to provide names or personal identifiers on recordings.

Participants will be free to withdraw from the study at any time upon request. If they choose to leave the study after data has been collected, they will be able to request a withdrawal of collected information. If the study is prematurely terminated or suspended, the PI will promptly inform the Research Ethics Committee at McMaster University and the Cameroon Baptist Convention Health Board and the study sponsors and funders (Merck), providing the reason(s) for the termination or suspension. Any amendment to the protocol will be submitted to various ethics committees before the changes are implemented to the study.

The PI and study team will conduct the study in compliance with the approved protocol. The PI and study team will not implement any deviation from or changes to the protocol without prior review and documented approval from the Ethics Committee. Any unintentional deviations from the protocol will be reported to the Ethics Committee.

Results will be disseminated to the funders, to CBCHB, Cameroon Ministry of Health and interested parties like the EPI vaccine program. Presentation locally at the internal medicine and surgery residents of the Baptist Institute of Health Sciences is anticipated. A peer review publication and presentation at peer reviewed meeting(s) are planned.

## EXPECTED OUTCOMES

At the end of this study we hope to better understand the perspective of parents and their knowledge, attitudes and beliefs about HPV vaccinations for their young daughters. This is the first study of its kind in rural communities in the North West Region, Cameroon. This information will help us understand if there are knowledge gaps that could be addressed through education, or negative attitudes that could be challenged through peer communication. We anticipate this project could serve as a stepping stone to similar projects in other regions of Cameroon or intervention projects based on the findings of this study.

## AUTHORS' CONTRIBUTIONS

Elit- the research team leader and writing of the protocol

Ngalla-provided feasibility and cultural input into recruitment and design of the interview guide

Afungchwi – provided feasibility and cultural insight into recruitment, design of the interview guide and analysis

Tum-provided cultural input into recruitment and design and reiterations of the interview guide

Folkom-Domgue- provided input into the background, rationale and cultural insight into recruitment and design of the interview guide

Nouvet – provided input into the background and rationale, methods and analysis

## COMPETING INTERESTS STATEMENT

This is an investigator initiated research project which has been funded by Merck. Merck does not have access to any of the original material but will be provided with any manuscripts that result from this work for review prior to publication.

## FUNDING STATEMENT

This work was supported by Merck grant number 100035 (Elit 13Oct2021). Merck had no role in the study design, implementation, data collection. Interpretation and dissemination of the findings of this study.

## ETHICS APPROVAL

Ethics approval was obtained from Hamilton Institutional Research Ethics Board (14022) and Cameroon Baptist Convention Health Board Institutional Review Board (IRB2021-075).

## REFERENCES

1. De Martel C, Georges D, Bray F, et al. Global burden of cancer attributable to infections in 2018: A worldwide incidence analysis. Lancet Glob. Health. 2020;8:e180-90.
2. Arbyn M, Weiderpass E, Bruni L, et al. Estimates of incidence and mortality of cervical cancer in 2018: A worldwide analysis. Lancet Glob. Health. 2020;8:e191–e203.
3. Lei J, Ploner A, Elfström KM, et al. HPV vaccination and the risk of invasive cervical cancer. N. Engl. J. Med. 2020;383:1340–8.
4. PATH Global HPV vaccine introduction overview. https://www.path.org/resources/global-hpv-vaccine-introduction-overview/ (2019), Accessed Feb 2020.
5. Lemp JM, De Neve JW, Bussmann H, et al. Lifetime prevalence of cervical cancer screening in 55 low- and middle-income countries. JAMA. 2020;324:1532-42.
6. HPV Facts. 2021 for Cameroon ICO/IARC Information Centre on HPV and Cancer https://hpvcentre.net/statistics/reports/CMR.pdf Accessed 13Jul2022.
7. Cameroon Humanitarian situation report no 6. 30Jun2020. https://reliefweb.int/report/cameroon/unicef-cameroon-humanitarian-situation-report-n0-6-mid-year-report-january-june-2020. Accessed 13Jul2022
8. Ateudjieu J, Yakum MN, Goura AP, et al. EPI Immunization coverage, timeliness and dropout rate among children in a West Cameroon health district: a cross sectional study. BMC Public Health 2020;20:228
9. WHO. (2010). WHO/ICO Information Centre on HPV and Cervical Cancer (HPV Information Centre). Human Papillomavirus and Related Cancers in Cameroon. Summary Report 2010. www.who.int/hpvcentre. Accessed 28 Aug 2011.

10. Shelton RC, Snavely AC, De Jesus M, et al. HPV vaccine decision-making and acceptance: does religion play a role? J Relig Health. 2013;52(4):1120–30.
11. 2020 Cameroon country data. www.who.int. Accessed 16 Feb2022.
12. Global strategy to accelerate the elimination of Cervical cancer. 17Nov2020. www.who.int Accessed 21Feb2022.
13. Enow Orock GE, Ndom P, Doh AS, 2012. Current cancer incidence and trends in Yaounde, Cameroon. Oncol Gastroenterol Hepatol Reports, 1(1), pp.58-63.
14. World Health Organization. (2002). Cervical cancer screening in developing countries: Report of a WHO consultation. Geneva: World Health Organization.
15. Okyere J, Duodu PA, Aduse-Poku L, et al. Cervical cancer screening prevalence and its correlates in Cameroon. Secondary data analysis of the 2018 demographic and health survey. BMC Public Health 2021;21;1071-9.
16. Wamai RG, Ayissi CA, Oduwo GO, et al. Assessing the effectiveness of a community-based sensitization strategy in creating awareness about HPV, cervical cancer and HPV vaccine among parents in North West Cameroon. Journal of Community Health 2012;37(5):917-26.
17. Ogembo JG, Manga S, Nulah K, et al. Achieving high uptake of HPV vaccine in Cameroon: Lessons learned in overcoming challenges. Vaccine 2014;32(35):4399-403.
18. https://www.journalducameroun.com/en/cameroonnationwide-vaccination-against-cervical-cancer-to-begin-soon Accessed Apr 15, 2021.
19. Marlow LA, Waller J, Wardle J. Public awareness that HPV is a risk factor for cervical cancer. Br J Cancer. 2007;97(5):691–4.
20. Sandelowski M. Whatever happened to qualitative description? Research in Nursing and health 2000;23(4):334-40.
21. Sekhon M, Cartwright M, Francis JJ. Acceptability of healthcare interventions: an overview of reviews and development of a theoretical framework. BMC Health Services Research. 2017;17:88.

Supplemental Table. Interview guide questions

| Domain | Question |
|---|---|
| Demographic | What is you age |
| | Are you a parent? |
| | List the age and gender of your children |
| | Have you ever had a vaccine (examples include, measles, mumps, rubella, covid)? |
| | If yes, which one? |
| | Have any of your children had vaccination |
| | If yes, do you know which disease(s) the vaccine prevented? |
| | Have you ever had cancer? |
| | If yes, which type of cancer? |
| | What is you occupation? |
| | What is your tribe? |
| | Which languages are you comfortable speaking? |
| | What village is closest to where you live? |
| Knowledge | Have you ever heard of a vaccine that prevents cancer? |
| | If yes, can you tell us what you remember about this vaccine |
| | Have you ever heard about the HPV vaccine? |
| | How did you hear about this vaccine? |
| | If yes, can you tell us anything about the vaccine? |
| Attitudes | Would you be willing to be vaccinated again a virus that causes cancer? |
| | If yes, Why?<br>If no, Why not? |
| | Would you be willing to have your children vaccinated against a virus that causes cancer?<br>If yes, Why?<br>If no, Why not? |
| | What do you think would be the benefit if your child was vaccinated against HPV? |
| | What do you think could go wrong with your child if she received the HPV vaccine? |
| | Would you advise someone else to be vaccinated against the HPV?<br>If yes, Why?<br>If no, Why not? |
| Beliefs | Do you believe vaccines can prevent disease?<br>If no, can you tell us more<br>If yes, can you tell us more |
| | If you had questions about a vaccine, who would you go to to get more information? |
| | Those whose daughter's have not been vaccinated<br>Are there reasons why you have chosen not to vaccinate your daughter |
| | Those who are pro vaccine<br>What things do you think could be done to encourage people to have their daughters' vaccinated<br><br>Those who have not had their daughter's vaccinated<br>Is there anything that would make you want to get your daughter's vaccinated? |

Standards for Reporting Qualitative Research

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