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Understanding the HPV vaccine decision making among caregivers of schoolgirls in Mpumalanga and Free State: A Secondary Analysis of qualitative data

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UNIVERSITY OF WITWATERSRAND, JOHANNESBURG
FACULTY OF HEALTH SCIENCES
SCHOOL OF PATHOLOGY

Title: Understanding the HPV vaccine decision making among caregivers of schoolgirls in Mpumalanga and Free State: A Secondary Analysis of qualitative data

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A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for the degree Master's of Science in Medicine (Vaccinology)

Johannesburg, 2025

Declaration form

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Abstract

Introduction: Human papillomavirus (HPV) is linked to cervical cancer, which is the second most common cancer among females in South Africa. Cervical cancer is regarded as a significant public health concern, and vaccination against HPV reduces its risk. In 2014, South Africa introduced a school-based HPV programme to immunise Grade 4 girls. This study explored the perceptions and beliefs that influence caregivers' decisions regarding the HPV vaccine for schoolgirls eligible under the national programme.

Method: This secondary data analysis analysed qualitative data collected for the study "*Understanding HPV vaccine decision making in South Africa: a qualitative study of vaccine hesitancy in two provinces*." Transcripts from in-depth interviews with caregivers of schoolgirls eligible for vaccination in Lejweleputswa (Free State) and Bushbuckridge (Mpumalanga) were analysed and coded. These included caregivers of schoolgirls involved in the national school-based programme and caregivers of grade 10 girls part of the single-dose catch-up campaign. The interviews were conducted between September and November 2019. A total of 18 transcripts were analysed using the Health Belief Model framework to interpret the coded data.

Results: All participants (n = 18) in the study were female. The most common motivators for vaccine acceptance in this population were cervical cancer prevention, as this was seen as the main benefit, and recommendations from healthcare professionals (the most frequent cue to action). The primary barriers contributing to vaccine hesitancy were limited access to information and a lack of awareness and understanding of HPV and cervical cancer. Most caregivers held positive attitudes towards the vaccine. However, concerns about its safety persisted, along with barriers such as poor communication between caregivers and the national programme, as well as cultural or religious factors that hindered vaccine uptake.

Conclusion: This study provided a clearer understanding of the factors, both facilitators and barriers, that influence caregivers' decisions regarding the HPV vaccine and vaccine hesitancy within this population. It is recommended that trusted sources, such as healthcare professionals, provide more information. Additional

detailed information from the national programme should accompany the consent forms to improve the community's understanding and encourage vaccine uptake.

Dedication

To my mom, Mimi Attias, my stepdad, Olivier Attias, and my brother, Tshepo Moselane, thank you for your unwavering support throughout this journey. I appreciate you so much, and I am truly grateful to have you as part of this journey. Acknowledgements

I want to thank Dr Clare Cutland from Wits ALIVE (African Leadership In Vaccinology Expertise) for the opportunity to pursue my master's degree, Lerato Makhale for assisting at the beginning of the project, and the Wits RHI and their study team for allowing me to undertake this project and for providing the data to conduct the study.

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1. Introduction

Although cervical cancer is largely preventable, it remains a significant global health problem (Arbyn et al., 2020). Each year, approximately 604,000 new cases are diagnosed, and there are 341,831 related deaths (Sung et al., 2021), which amounts to roughly 7.2 deaths per 100,000 women annually (Singh, 2023). In South Africa, cervical cancer is the second most common cancer among women and causes the highest number of cancer-related deaths in women (Olorunfemi et al., 2018), with breast cancer being the most common (Sung et al., 2021). As of 2023, there were about 24.10 cases of cervical cancer per 100,000 women each year in South Africa (NICD, 2023).

The primary cause of cervical cancer is persistent infection with specific types of human papillomavirus (HPV) (Włoszek et al., 2025), with HPV types 16 and 18 linked to 70% of cervical cancer cases (National Cancer Institute, 2024). Available HPV vaccines include the bivalent, quadrivalent, and nonavalent vaccines (Kamolratanakul and Pitisuttihum, 2017), all of which are highly effective at preventing HPV infections (Centers for Disease Control and Prevention, 2024 (1)). Other preventive measures against HPV include proper and consistent condom use (Centers for Disease Control and Prevention, 2021), reducing the number of sexual partners, and opting for alternatives to penetrative sex (Centers for Disease Control and Prevention, 2024(2)). In addition to vaccination, screenings are recommended to detect precancerous lesions (Pimple et al., 2020). However, in low- and middle-income countries, limited access to screening poses a significant challenge (Singh et al., 2023). In 2020, the World Health Organisation (WHO) launched an initiative to eliminate cervical cancer and issued global targets to be achieved by 2030. The initiative aims for 90% of girls to be vaccinated before age 15; for 70% of women to undergo screening for cervical cancer before age 35; and for 90% of those diagnosed or identified with cervical cancer to receive appropriate treatment and care (WHO, 2022).

Although HPV vaccines are generally considered safe (Handler et al., 2015), some caregivers still lack confidence in the vaccine and do not accept it. This hesitancy has been attributed to safety concerns (Khosa et al., 2022), as well as misinformation and misconceptions about the vaccine (Boom et al., 2018). A lack of information and awareness about HPV vaccines (Ntonifor et al., 2025), along with socio-economic and

environmental factors, also influence vaccine hesitancy and acceptance (Soares et al., 2025). Caregivers' acceptance and consent are vital for ensuring that eligible girls in South Africa are vaccinated, as they cannot receive any vaccines without their caregivers' approval (Strode et al., 2015). Vaccine acceptance refers to caregivers' willingness to allow schoolgirls to be vaccinated, while consent involves providing legal permission. Understanding caregivers' attitudes, beliefs, and perceptions regarding HPV vaccine decision-making is essential to strengthen the HPV vaccination programme, given their influential role in vaccine uptake.

1.1. Background

Cervical cancer is caused by persistent HPV infection (Zhang et al, 2020), which is the most common sexually transmitted infection (STI) globally (Centers for Disease Control and Prevention, 2024). HPV is a small, enveloped virus that infects epithelial cells (Ray, 2025). Types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, and 59 are classified as high-risk HPV types (National Cancer Institute, 2024). HPV plays a crucial role in the development of cervical cancer (Bruni et al., 2023), although other factors influence the progression from infection to cancer. These include, but are not limited to, low socioeconomic status, smoking, having multiple sexual partners (Kashyap et al., 2019), and age, particularly women aged between 35 and 44 (Bønløkke et al., 2024). Moreover, the use of medications such as oral contraceptives and immunosuppressants (Zhang et al., 2020; Ray, 2025) can serve as risk factors. Additional contributors include a weakened immune system (Ray, 2025) and immunosuppressive diseases like HIV (Zhang et al., 2020).

HPV vaccination is recommended as the primary method of preventing cervical cancer (Wang et al., 2020). There are three HPV vaccines available: 1) the Bivalent vaccine; 2) the Quadrivalent vaccine; and 3) the Nonavalent vaccine. These vaccines are administered intramuscularly into the deltoid muscle (Centers for Disease Control and Prevention, 2021) and are highly immunogenic, with a 99% seroconversion rate, an efficacy exceeding 95% (Kamolratanakul and Pitisuttithum, 2017), and they are safe and well tolerated (Handler et al., 2015; Stanley et al., 2014). The bivalent vaccine targets oncogenic HPV types 16 and 18, the quadrivalent vaccine protects against non-oncogenic HPV types 6 and 11 in addition to HPV 16 and 18 (Cutts et al., 2007),

and the nonavalent vaccine provides protection against types 6, 11, 16, 18, and other oncogenic types such as 31, 33, 33,45, 52, and 58 (Mariani et al., 2017). These vaccines were first licensed in 2006 (Markowitz and Schiller, 2021), and ongoing post-licensure studies have been conducted. These studies indicate that approximately 6% of vaccinated individuals reported experiencing serious adverse events (Centers for Disease Control and Prevention, 2025 (1); Suraugh et al., 2018).

Before the HPV vaccine was introduced, the main method of preventing cervical cancer was screening. However, achieving sufficient coverage of screening can be challenging in Low-income countries (LMICs) because access to cervical cancer screening services is limited (Singh et al., 2023), primarily due to the lack of health facilities and the associated costs (Mantula et al., 2024). LMICs have the highest incidence and prevalence of cervical cancer (Sung et al., 2021), but in HICs, the incidence of cervical cancer has declined due to the availability of screening (Basu, 2019).

In South Africa, there are approximately 10,702 new cases of cervical cancer and 5,870 deaths every year (Bruni et al., 2023). Women in South Africa represent a large proportion of women living with HIV worldwide (Hull et al., 2020). This is concerning because women with HIV face a greater burden of cervical cancer (Stelzle et al., 2021). Among women living with HIV, the chance of developing cervical cancer is six times higher than for women not living with HIV. In South Africa, approximately 63% of women diagnosed with cervical cancer are living with HIV (Stelzle et al., 2021). Notably, women with HIV who develop cervical cancer tend to be around ten years younger than those who are not living with HIV (Dhokotera et al., 2022).

In South Africa, a national school-based HPV vaccination programme was introduced in 2014, offering HPV vaccines to grade 4 girls (aged 9 years and above) (DOH, 2021). In 2020, this was changed to grade 5 girls to reduce the number of schoolgirls excluded for being under 9 years old in grade 4. When first introduced, the South African programme involved vaccinating schoolgirls with two doses of the bivalent vaccine, administered six months apart (Ledibane et al., 2023; Delany-Moretlwe et al., 2018), which since 2025 has been reduced to a single dose (Government of South Africa, 2025) based on WHO recommendations (World Health Organization, 2024).

Since HPV vaccines have a higher seroconversion rate in individuals who have not previously been infected with HPV (Kamolratanakul & Pitisuttithum, 2021), the vaccination programme enables girls to be vaccinated before they are exposed to the virus, ensuring the highest possible seroconversion rate. In South Africa, the average age for sexual debut is 17.5 years (Muchiri and Odimegwu, 2019), with some as young as 15 (Bakilana, 2005). Considering this, vaccinating primary schoolgirls allows a substantial number of girls to be vaccinated before exposure to HPV, thereby maximising seroconversion.

Vaccinating schoolgirls at an early age increases the rate of seroconversion; however, obtaining consent from their caregivers is essential for the vaccination process. Although some studies have explored caregivers' beliefs and perceptions regarding the HPV vaccine, there is limited research on this subject. This results in a gap in the information needed to enhance the delivery and acceptance of the HPV vaccine.

1.2. Literature review

Parental attitudes towards HPV vaccination

The willingness of caregivers to give consent for the HPV vaccine significantly influences vaccine uptake (Ayalew et al., 2024). A positive attitude towards the vaccine is recognised as a key factor in encouraging consent (Kim et al., 2021).

Globally, there has been widespread support for the HPV vaccine, along with positive views towards the vaccine and the HPV vaccination programme (Radisic et al., 2017; Davies et al., 2021; Jwa et al., 2023).

In Africa, attitudes towards the HPV vaccine differ across countries. For example, Kenya generally reports positive views (Kolek et al., 2022), while Nigeria shows negative perceptions (Ohareri et al., 2020). The unfavourable attitudes in Nigeria and similar nations are mainly influenced by factors such as the vaccine's cost, limited access to vaccination centres, safety concerns, and religious beliefs (Ohareri et al., 2020; Kolek et al., 2022).

In South Africa, high acceptance of the HPV vaccine has been observed (Milondzo et al., 2021), with parental attitudes towards the vaccine mainly being positive after the programme's initial introduction (Delany-Moretlwe et al., 2018).

1.2.1 Factors that influence parental acceptance of HPV vaccines

1.2.1.1 Parental awareness and knowledge of HPV vaccines:

When it comes to the link between HPV vaccine awareness and the uptake of the HPV vaccine, studies have shown a variety of results. Some literature suggests that a lack of understanding about the vaccine is a barrier to HPV vaccine acceptance (Adedimeji et al., 2021). Meanwhile, although some caregivers are aware of the HPV vaccine programme, this awareness does not necessarily impact their decision to accept the HPV vaccine (Beavis et al., 2022).

1.2.1.2 Perceived benefits vs risk perception of HPV and cervical cancer:

The perceived importance and benefits of the HPV vaccine significantly influence vaccine acceptance, as individuals who perceive the vaccine as essential or beneficial are more likely to accept it (Valentino and Poronsky, 2016). The recurring perceived benefits of the HPV vaccine include cancer prevention and a consequent reduction in the risk of death. Some caregivers associated cancer with death, and this was a key factor driving HPV vaccine acceptance.

Some caregivers view the vaccine as unnecessary (Bednarczyk et al., 2019), while others believe the girls are too young to receive it (Boom et al., 2018). Additionally, some consider the immune system's ability to naturally clear HPV, making the vaccine seem unnecessary (Bednarczyk et al., 2019).

1.2.1.3 Trust in the health system:

Trust in healthcare and healthcare workers is a key factor influencing vaccine acceptance (Jwa et al., 2023; Dempsey and O'Leary, 2018; Rahman et al., 2015). Healthcare providers serve as a credible source of information for many caregivers (Jwa et al., 2023; Dempsey and O'Leary, 2018; Yusuf et al., 2024), who often lack understanding or are unaware of HPV, the vaccine, and cervical cancer. Rahman et

al. (2015) found a link between caregivers' attitudes towards the vaccine and how healthcare workers recommended it to them. Additionally, Jwa et al. (2023) identified that healthcare recommendations were linked to the intention to receive the vaccine (Jwa et al., 2023).

1.2.1.4 Social and cultural influences:

Vaccine decision-making is a complex process influenced by various social factors, including religious and cultural beliefs, as well as societal norms. Research has shown that strong religious and cultural beliefs are often linked to vaccine refusal (Ohareri et al., 2020; Kolek et al., 2022), with parents holding such beliefs being less inclined to accept vaccination (Khan, 2023; Loveday, 2022)

Caregivers' worries about the HPV vaccine are often shaped by negative stories or personal experiences shared by family and friends (Beavis et al., 2022; Khosa et al., 2022). The stigma surrounding the vaccine further contributes to negative attitudes and concerns (Kolek et al., 2022). A US-based study found that hearing negative stories about the HPV vaccine on social media was linked to higher rates of vaccine refusal (Margolis et al., 2019).

1.2.2 HPV vaccine hesitancy and refusal

In 2019, the WHO identified vaccine hesitancy as one of the top ten global health threats (WHO, 2019), referring to the delay or refusal of vaccine uptake despite its availability (Macdonald, 2015).

Some reports, including those on social media, highlight HPV vaccine hesitancy and refusal among caregivers of schoolgirls (Milondzo et al., 2021). This hesitancy is present in several African countries, such as South Africa. Globally and across Africa, concerns about the vaccine’s safety, effectiveness, and side effects are main reasons for hesitancy (Beavis et al., 2022; Dera et al., 2023; Marshall et al., 2023; Yusuf et al., 2024; Khosa et al., 2022). Research from Malawi and Europe indicates that misconceptions about vaccines (Bwanali et al., 2024; Boom et al., 2018), lack of awareness and information (Ntonifor et al., 2025), mistrust in healthcare systems (Tsui et al., 2023), cultural and religious beliefs (Ohareri et al., 2020; Kolek et al., 2022), perceived low urgency because of the girls’ age (Wong et al., 2011), and absence of

doctors' recommendations, such as in Nigeria (Yusuf et al., 2024), influence acceptance and hesitancy.

1.2.3 Rationale and justification for this research

In South Africa, minors must obtain parental consent before receiving any vaccines (Strode et al., 2015). Consequently, informed consent from parents or guardians is crucial for ensuring high vaccination rates. When the HPV vaccine was first introduced in 2014, coverage was about 85% (Bruni et al., 2021). However, HPV vaccination coverage dropped below 70% in 2017 (Bruni et al., 2021), and by 2020, it reached 75% for the first dose and 61% for the final dose among 15-year-old girls, which is below the WHO goal of 90% coverage (WHO, 2021; WHO, 2022). Overall, HPV vaccine coverage has declined over time.

1.2.4 Problem statement

Understanding what influences parental consent for HPV vaccination in caregivers is essential. However, little is known about how South African caregivers' beliefs and perceptions influence their acceptance and consent for the HPV vaccine. Additionally, gaining deeper insight into HPV vaccine hesitancy and its causes is essential. These investigations could be key to maintaining high vaccination rates, as existing knowledge gaps challenge the development of effective strategies to sustain and increase coverage

1.3. The study's aim and objectives

1.3 Study aim

The study aims to investigate the factors influencing vaccine decision-making and to document expressions of vaccine hesitancy among caregivers of schoolgirls who were eligible for HPV vaccination, either through the national HPV vaccination programme or a single-dose HPV vaccination campaign conducted as part of a research study in the Free State.

1.3.2 Study objectives

The objectives of this study are to:

I. Examine the barriers and facilitators of HPV vaccine uptake and acceptance among caregivers of grade 4 and grade 10 schoolgirls (who were part of the catch-up campaign), and suggest strategies to enhance vaccine coverage.

II. Explore and describe the forms of parental vaccine hesitancy of the caregivers of the grade 4 and grade 10 schoolgirls.

3. Methods

3.1. Study design

This study is a secondary data analysis of qualitative data collected as part of the study "*Understanding HPV vaccine decision making in South Africa: a qualitative study of vaccine hesitancy in two provinces*". This secondary qualitative analysis involved analysing transcripts and coded data from semi-structured, open-ended, in-depth interviews (IDIs) with participants in two provinces, the Free State and Mpumalanga, in South Africa. The secondary study enhances understanding of how perceptions and beliefs influence the acceptance of the HPV vaccine in South Africa (Free State and Mpumalanga).

3.2. Study setting

The Free State was selected as a study site because it had already been involved in an evaluation of both single-dose and two-dose vaccination strategies (Machalek et al., 2022). As part of the research, all adolescent girls in Grade 10 (expected age 15-16 years) attending 66 high schools in one district in South Africa were offered a single dose of the bivalent HPV vaccine (Cervarix) between February and May 2019. Grade 10 girls were selected for the single-dose catch-up campaign because they missed the opportunity to participate in the HPV vaccination programme, being in Grade 5 when the programme was first introduced in 2014 (Delany-Moretlwe et al., 2024). Lejweleputswa is a semi-urban district and one of five in the Free State, with a

population of approximately 634,462 people living in 194,315 households (Cogta, 2023), and 407,072 learners attending public primary schools. Bushbuckridge, a rural municipality within the Ehlanzeni District of Mpumalanga, has an estimated population of approximately 541,248 across approximately 135,000 households (Census, 2011).

Mpumalanga was selected because of early evidence of potential HPV vaccine hesitancy in the province. This was revealed during an assessment after the initial rollout of the HPV school-based programme in 2014, when an anti-HPV vaccine message circulated on social media, urging parents not to vaccinate their children (Delany-Moretlwe et al., 2018). The province of Mpumalanga has a total of 597,045 learners in public primary schools (DBE, 2018), although specific data on the number of learners in each district could not be obtained. Both districts encompass suburbs, townships, and rural areas.

3.3. Study participants

The study's inclusion criteria focused on caregivers of Grade 4 schoolgirls in Lejweleputswa (Free State) and Bushbuckridge (Mpumalanga), who are enrolled in the national school-based HPV programme. It also included caregivers of Grade 10 girls who took part in the 2019 single-dose HPV catch-up campaign in Lejweleputswa. The Department of Health (DoH) and the Department of Education (DBE) in each province assisted in selecting the schools involved in the IDI. These caregivers represented various schools in each province. Schools sent letters on behalf of the school-based programme to invite caregivers to participate in the IDIs.

3.4. Data collection

The primary qualitative study involved semi-structured IDIs with caregivers of schoolgirls participating in the school-based HPV vaccine programme. The IDIs took place between September and November 2019, with open-ended questions guiding the discussions (see Appendix A). These interviews occurred during this period because it coincided with the second dose of the HPV vaccine campaign, which helped maximise participants' recall. Purposive sampling was used to target participants who had either consented to or declined the HPV vaccine for their

daughters. The IDIs were conducted in the participants' preferred languages, and each participant was interviewed individually after providing written informed consent. The IDI guide was not prepared in local languages and was translated by the interviewer, depending on the participant, and served as prompts for the IDI. The interviews took place at neutral venues such as the Wits RHI offices in Welkom or the Wits Rural Facility in Bushbuckridge, located in the Lejweleputswa district of the Free State and the Bushbuckridge municipality in Mpumalanga. The discussions focused on HPV vaccine hesitancy, participants' understanding of HPV and the vaccine, factors influencing vaccine decision-making, and their experiences with the HPV vaccine programme. The interviews were audio-recorded, transcribed, and subsequently translated into English.

The data used in this study consisted of transcripts and data initially coded by three trained individuals at Wits RHI, with further coding performed by me. My additional coding involved reviewing the raw transcripts and adding more codes to the data, as the original codes were not explicitly developed for my study.

3.5 Data Analysis

The HBM (Figure 3.1) (Champion and Skinner, 2008) provided a framework for examining factors influencing caregivers' decision-making about HPV vaccination for schoolgirls. It was used only during data analysis, not in data collection. Although the study started with preset themes, the HBM helped systematically map these themes and identify new ones within its constructs. The Health Belief Model (HBM) is frequently employed in health behaviour research, focusing on how individuals perceive health threats and respond accordingly. It comprises six constructs that together shape health-related behaviours (Alyafei and Easton-Carr, 2024).

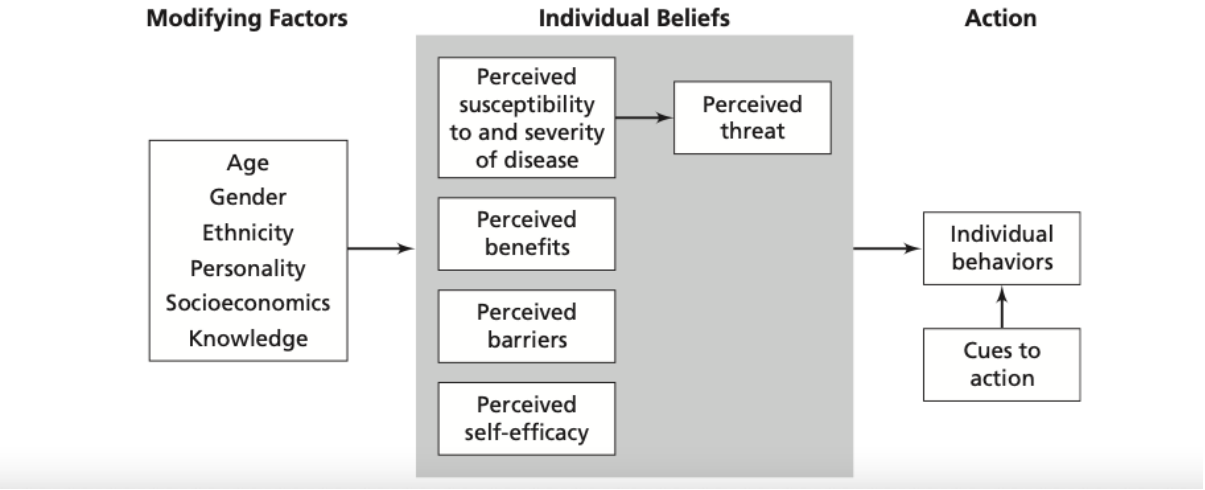

Figure 3.1. The health belief model

Unpacking the HBM for the study

Perceived susceptibility refers to how at-risk caregivers believed the schoolgirls were of contracting an HPV infection or cervical cancer (e.g., recognising that young girls may engage in relationships with other men). Perceived severity evaluated how seriously caregivers viewed HPV and cervical cancer (e.g., associating cancer with death). Perceived benefits refer to caregivers believing in the advantages of the vaccine (such as reducing the risk of cancer or death). Perceived barriers emphasise the obstacles that prevent schoolgirls from getting vaccinated, such as vaccinations only occurring on specific days, so if the schoolchild is absent, they miss out on the vaccine. Perceived efficacy assesses how confident caregivers are in deciding to give consent for their child's vaccination, such as seeking further information and advice from healthcare professionals. Cues to action refer to what motivates the caregiver to make their decision (e.g., a healthcare worker advocating for the HPV vaccine would be a positive cue).

After receiving the data, the transcribed data was further coded (as there was other pre-coded data) using Nvivo 12. This software enabled the data to be analysed, sorted, visualised, and categorised. It also allowed the data to be organised into memos (Dhakal, 2022). For this secondary study, along with the additional coding conducted, similar codes were grouped into different nodes (see Appendix C). The nodes represent the various categories in which the codes were organised (i.e., reason for vaccination; source of information). The different codes were then grouped into predefined nodes, based on their relevance, to facilitate further grouping into the

various constructs of the HBM. The grouping of the predefined codes allowed for the predefined themes (deductive themes) to emerge and for the data-driven themes (inductive themes) to also emerge during the analysis. In summary, the study made use of both inductive and deductive approaches.

3.6 Ethical considerations

The University of Witwatersrand Human Research Ethics Committee (Medical) (HREC) (No. 181-005) approved the primary study. Written consent was obtained from all participants prior to their involvement, and all caregivers of schoolgirls participating in the vaccination programme were invited to participate. The consent form included detailed information, such as: 1) participation was voluntary; 2) participants could withdraw at any time; 3) the study's purpose and interview procedures; 4) potential risks, mainly emotional, such as feelings of embarrassment; 5) benefits mainly at community level rather than for individuals; 6) reimbursements of R150 for transport and refreshments, not for participation; 7) confidentiality measures, emphasising that personal data would be securely stored at Wits RHI and not shared; 8) audio recordings would be destroyed two years after publication. Findings from this study, along with those from related studies, will be used to improve the HPV vaccination programme.

4. Results

4.1 Participant characteristics

A total of 18 transcripts of IDIs with caregivers were coded and analysed. The number was based on the number of participants who could take part in the study, not the data saturation. The socio-demographic characteristics of the participants are shown in Table 4.1. All participants were female. Of the 18 participants, 11 (61.1%) were from the Free State and 7 (38.9%) were from Mpumalanga. All the Mpumalanga participants were caregivers of grade 4 schoolgirls. Among those from the Free State, 5 (45.5%) were caregivers of grade 10 girls, 5 (45.5%) were caregivers of grade 4 girls, and 1 (9.1%) was a caregiver of a grade 6 schoolgirl. Although the caregiver of the grade 6 schoolgirl was not part of the original inclusion criteria, they were included due to recruitment challenges and because the schoolgirl had previously been part of

the programme. Of the 18 participants, eight had missing information (age, relationship to the schoolgirl, and/or marital status). The socio-demographic characteristics of the participants are shown in Table 4.1.

Table 4.1. Sociodemographic characteristics of caregivers (n = 18)

Characteristics of the caregivers	N (%)
Province	
Free State	11 (61.1)
Mpumalanga	7 (38.9)
Gender of the caregiver	
Female	18(100)
Age of the caregiver (years)	
20 - 29	1 (5.6)
30 - 39	5 (27.8)
40 - 49	5 (27.8)
≥50	1 (05.6)
Unknown	6 (33.3)
Relationship to the schoolgirl	
Mother	16(88.9)
Grandmother	1 (05.6)
unknown	1 (05.6)
Marital status of the caregiver	
Single/ widowed/divorced	2 (11.1)
Married	8 (44.4)
Unmarried but in a stable relationship	2 (11.1)
Unknown	6 (33.3)
Employment status of the caregiver	
Employed	11 (61.1)
Unemployed	7 (38.9)
Grade of the child	
Grade 4	12 (66.7)
Grade 10	5 (27.8)
Other	1 (5.6)
Number of household members	
1-4	10 (55.6)
5-10	8 (44.4)

4.2 HPV vaccine acceptance

Overall, 17 (94.4%) caregivers consented for their children or wards to receive the HPV vaccine, with Lejweleputswa having 11 (100%) participants and Bushbuckridge having 6 (85.7%) participants who gave their consent. Female participants described how household decisions were made and who was responsible. In different households, vaccine decision-making varied: some female caregivers 9 (50%) made the final decision, while one participant noted that a male caregiver 1 (5.6%) was responsible. Additionally, both caregivers 6 (27.8%) shared health-related decision-making, and 2 (11.1%) did not specify who makes these decisions.

4.2.1 Factors that influenced HPV vaccine acceptance

4.2.1.1 Perceived threat

Perceived threat combined perceived susceptibility and perceived severity, examining how and if the caregivers perceived the risk of cervical cancer for the schoolgirls and whether they perceived cervical cancer itself as a threat. Some participants recognised cervical cancer as a health threat and expressed concerns about the schoolgirls contracting it (see Table 4.2).

> "*…. cancer is dangerous, many people die because of it*" – M2.

Perceived susceptibility was influenced by knowing someone in your family or community who has experienced living with cancer (even if it wasn't necessarily cervical cancer), which affected vaccine decision-making.

> "*We've had cancer in our family before but not cervical cancer so anything to prevent your child getting that cancer, why not*" – F5

It was recognised that there is a risk of sexually transmitted infections like HPV in the community because there are young girls engaging in relationships with older men.

> " …*young girls have affairs with older men*" – F1

There was also a general concern about the widespread nature of diseases.

> "*These days there are lot of diseases*" - M2

There was evidence that caregivers are aware of and understand cervical cancer but do not necessarily perceive it as a threat.

> "*There is understanding however we tend to ignore other things. We want to be reactive as opposed to being proactive*" – F7

4.2.1.2 Perceived benefits

The caregivers of the schoolgirls regarded the HPV vaccine as an important safety measure to prevent cervical cancer, decrease the risk of death from cervical cancer, and lower the chances of acquiring sexually transmitted infections (STIS). (see Table 4.2)

> "…*it was important to them to be vaccinated to reduce the chances of them from getting cervical cancer*" – F9

It was noted that vaccinating the girls at a younger age is preferable.

> "*rather prevent it while they are still young*" – F4

Additionally, caregivers regarded this as an opportunity to offer future protection for the schoolgirls. Several participants shared similar reports:

> "Because I gathered that this is meant to help my child for her future" – M3

Caregivers stated that vaccination was an indicator of their concern for the schoolgirl's well-being.

> "*If you don't allow your child to be vaccinated, it means that you don't have her best interest at heart*" – M2

Notably, there was also trust that the vaccine had to be beneficial for the schoolgirls; otherwise, health professionals would not have given or recommended it to them.

> "*I believe that they won't give something to the children that will harm them*" – F6

It was observed that the vaccine was free at the schools because it is costly to receive privately, and not many caregivers could afford to pay for it themselves.

> "*It (the vaccine) cost a lot of money*" - F2

The vaccine was regarded as the safer option

> "*if it's really is gonna happen and you will rather take the lesser of the evil … you will try and protect the child*" – F2

4.2.1.3 Perceived barriers

Several factors were identified by the participants as barriers to vaccine acceptance within the two population groups. Firstly, a lack of understanding, knowledge, or information about the HPV vaccine and cervical cancer can lead to the disregard and rejection of the vaccine.

> "*Yes, lack of information can make one not give consent for his child to participate*" – M7

Participants reported that they lacked sufficient information, and the information that was shared with them was not easy to understand.

> *"I think more information should be provided*" – F4

There was a messaging failure (Caregiver reported HPV as IPV).

> *"For someone who is not educated it was not easy to follow it, because the terms they use like IPV what, what I do not even know what it stands for"* – M7

Participants highlighted a systematic barrier: school meetings were brief and lacked sufficient information sharing. (See table 4.1.).

> *" So, it was not a long meeting. They did not say many details"* – F1

Furthermore, language barriers posed a challenge, as the information leaflets sent home to caregivers were in English, which sometimes differed from the languages that caregivers spoke and understood.

> "*if a parent doesn't understand English, it's going to be a problem*", "*next time…they could write English on one side and Xitsonga on the other side*" – M4

The only way a student could access the vaccine was if she was at school on the day of the vaccination, absenteeism or being out of school was identified as a barrier to vaccine uptake.

"*It was so unfortunate that the day vaccination, she become ill and was taken to the hospital*"- F1

Caregivers expressed concerns about the safety of the vaccine, as well as doubts stemming from other caregivers in their communities, which contributed to uncertainty about the vaccine. (See table 4.1.)

"*Others are negative about the injections because in the past people once said that there were injections that were not good. So other parents don't trust injections*" – M2

Participants reported that some churches did not support the use of injections, and as a result, the use of vaccines conflicted with the beliefs of other caregivers in the community.

"*They don't believe in the injection and whatsoever. Their churches don't believe in injections, something like that. That's what we were told*." – F4

In other communities, there was a lack of belief in Western medicine (and therefore a lack of belief in vaccines), as some prefer to utilise traditional medicine. Additionally, some churches do not support the uptake of injections and, on a cultural and religious level, they are discouraged from accepting the HPV vaccine. (see table 4.2.)

"They don't believe in the injection and whatsoever. Their churches don't believe in injections, something like that. That's what we were told" – F4

Community members had varying influences on the acceptance of the HPV vaccine.

"*Others are negative about the injections because in the past people once said that there were injections that were not good. So other parents don't trust injections*." – M2

"*Yes, they (*community members*) said it is not good, they said it causes vomiting, diarrhoea, and sweating, so I didn't want my child to get sick, but later they said it does not cause sweeting or vomiting*" – M6

*"I spoke to one of the mothers whose husband is a doctor, *** (name withheld) her mother I spoke to her and she said "no by all means*" – F5

4.2.14 Perceived self-efficacy

Perceived self-efficacy is the confidence an individual has in their ability to undertake the necessary actions to achieve a desired health outcome. Self-efficacy in making an informed decision to consent or not to consent to HPV vaccination for their child or ward varied significantly among caregivers. Knowledge served as a source of self-efficacy, influencing confidence in decision-making.

Caregivers who demonstrated a solid understanding of HPV and cervical cancer, and felt confident making decisions independently, initially seek information that guides their consent. Their confidence comes from being well-informed about HPV, cervical cancer, and the relevant vaccine topics. Most caregivers felt confident in making decisions, either relying on their existing knowledge or after consulting trusted sources.

> "*I like to do my own research and then find out for myself and get my own clear understanding*" – F2

Caregivers in healthcare settings or closely connected to healthcare workers demonstrated a clear understanding of HPV, cervical cancer, and the HPV programme. This knowledge increased their confidence in making decisions, resulting to higher vaccine acceptance rates.

> "*I am working in the department of health, I knew about the campaign because we work with the nurses. The school health nurses they always go out and conduct the campaign. We already knew what was going to happen about this campaign and that is why I was ready and willing to get my child vaccinated*." – F11

Additionally, regular pap smears improved understanding of HPV and cervical cancer, increasing confidence and encouraging individuals to decide on and accept the vaccine.

> "*I know that it is important, and I also do my Pap smear every year. Because I know it is also important*." – F9

Others actively sought additional information and guidance from different sources, including other members of the communities. This was an indication that being more

informed or knowledgeable about the vaccine enabled them to have the confidence to decide whether to get the HPV vaccine.

> "*I spoke with other parents whom their children are also in grade 4, they said that they also received the form and they won't leave this opportunity for their children to be protected*" – M2

Caregivers sought advice from clinic nurses or their personal doctors regarding HPV vaccination and whether to give consent. Recommendations from healthcare workers, including family members involved in healthcare) developed a positive attitude towards HPV vaccination among caregivers. The doctor's recommendation increased confidence in making a decision.

> "*were really just little bit concerned we spoke to the doctor and he explained to us that is a good thing and his daughter is also going for it."* – F6

Caregivers reported consulting Wits researchers for advice and information about the vaccine, which aided them in making an informed decision and providing their consent.

> "*influenced me (*Wits Researcher and pamphlet) *to sign the form because from the form I learned that it is important that the child prevent at an early age for this disease*." – M5

4.2.1.5 Cues to action

Most caregivers were influenced by others when deciding whether to consent to the HPV vaccine. Caregivers in this population received both positive and negative cues. Positive cues encouraged them to accept the HPV vaccine, while negative cues discouraged it. Discussions with healthcare professionals (doctors and nurses), community members, siblings, other schoolgirls who had previously been vaccinated, work colleagues, and fellow caregivers at the schools influenced their decision-making.

<u>Positive Cues:</u>

Positive cues are encouraging prompts or influences from a caregiver, of a schoolgirl, to accept or receive the vaccine.

Healthcare workers, including EPI nurses, clinic nurses, and doctors, were among the main drivers of vaccine acceptance in the study, as participants highly valued recommendations from healthcare professionals. Several respondents stated they consented to and accepted the vaccine because a healthcare provider recommended it. External prompts from trusted personnel served as a cue to action.

> "*I went to my doctor and his daughter is also in grade 10 and he said is a very good thing*" – F6

School meetings facilitated by EPI nurses that provided information about vaccination were cited by caregivers as a cue to action, further emphasising the importance of healthcare recommendations. External prompts from trusted personnel served as a cue to action.

> "*And then I also came to Ausi Lebo and the team (Nurses) and also asked them what is this HPV thing and they explained to me, that's how I understand it*" – C4

Previous experience with childhood vaccinations was also seen as an essential cue to action. Some caregivers reported bringing their daughters to receive most or all of their childhood vaccines (see Table 4.2), and another caregiver mentioned that her trust in the HPV vaccine is based on the effectiveness of childhood vaccines.

> "*for instance there are other vaccinations that they got. My children are very very healthy, they haven't had measles or chicken pox or all those other things. I think it is due to the vaccinations, so I believe that this one works as well*" – F2

Caregivers gave consent for the wrong reasons. One caregiver mistakenly thought that the schoolgirls would be tested for cancer, not realising it was to vaccinate them against cancer.

> "*They had inserted with the brackets the word "cancer" and I thought they were checking children for cancer*" - F1
>
> "*I understood the information on the form, and it explained lot of things and that they will check other diseases*" – M2

On the other hand, positive stories about people's favourable experiences with the vaccine cast the HPV vaccine in a good light. This prompted vaccine acceptance.

"*People are getting these vaccinations and nothing is happening to their children, they're fine*" – F2

Furthermore, radio broadcasts discussing the HPV vaccine encouraged caregivers to give their consent and increased the acceptance of the vaccine, due to recommendations from trusted sources.

"*I know that it (HPV) is important is also important... I heard it on the radio*" – F9

Pamphlets distributed by schools served as strong prompts for action, as some caregivers only needed the school's endorsement to take responsible steps and provide consent.

"*I just signed* (The letter from the school, without consulting and did not know what HPV was)" – F10

Encouragement from community members to accept the vaccine, was a prompt to accept the vaccine.

*"I spoke to one of the mothers whose husband is a doctor, *** (name withheld) her mother I spoke to her and she said "no by all means*" – F5

Notably, confidence in the government and healthcare system is linked to the belief that sufficient research has been conducted on the vaccine. This made the caregivers more receiving of the vaccine.

"*I told myself they did their researches and they know that it's gonna work.*" – F4

"*I believe that they won't give something to the children that will harm them*" – F6

<u>Negative Cues:</u>

Positive cues are prompts or influences from a caregiver, of a schoolgirl, not to accept or receive the vaccine.

Stories circulating within the communities included misinformation about the side effects of the vaccine; that schoolgirls are exposed to and vaccinated with other viruses, such as AIDS; and that needles would be reused for vaccination. This discouraged the acceptance of the vaccine.

"*Everybody thinks you gonna inject them with some or other virus or AIDS virus*" – F5

Adverse experiences that other schoolgirls had with the vaccine discourage other caregivers from giving consent, and feedback from previous pupils who had been vaccinated discouraged a caregiver from consenting to and accepting the vaccine. This made caregivers hesitant about receiving the vaccine.

"*I was told by the pupils who were vaccinated, they said if I give consent, she will be sick and have diarrhoea. I do not want her be sick. And also body fever*" – M6

Stories on social media mentioned side effects of the vaccine, and that some schoolgirls have been left in a vegetative state after receiving the HPV vaccine. These stories influenced caregivers to not accept the vaccine.

"*There's always the horror stories like for instance with the HPV vaccine of the child that went and she was fine, nothing was wrong with her and she was top of the class and then she went for this vaccine and then it affected her, and she was like a vegetable afterwards*" - F2

Table 4.2. Illustrative quotes modelled against the health belief model

The letter in the participant ID identified the location, and the number is allocated towards a specific participant

HMB element	Illustrative quotes
Perceived susceptibility and severity (perceived threat)	**Free State** " …*young girls have affairs with older men*" – F1 "*You read also the stories about people getting cervical cancer and you think to yourself in the end you do what you can to protect your child*" – F2 "*and in the end you don't want to have your child have an illness that could cause her death*" – F2- "I know cancer is something serious, so I couldn't hesitate to say no they should go on with it to my daughter." – F4 "*We've had cancer in our family before but not cervical cancer so anything to prevent your child getting that cancer, why not*" – F5 "*There is understanding however we tend to ignore other things. We want to be reactive as opposed to being proactive*" – F7 **Mpumalanga** "*No, what I found is that cancer is dangerous, many people die because of it*" – M2
Perceived benefits	**Free State** "*So I feel that it will be a good thing if she went to get this so that knows that she will not get that cancer*" – F2 "*It (the vaccine) cost a lot of money*" - F2 "*Yeah, I also spoke to my husband and he also felt that if it can help her in the future, we will take it so ja*" – F2 "*if it's really is gonna happen and you will rather take the lesser of the evil … you will try and protect the child*" – F2 "*This is going to help them to prevent and reduce the rate of cervical cancer when they get into adulthood*" – F3 "*We heard that it prevents cancer*" – F4 "*it's gonna help protect her into getting cancer*" – F5

	"*I believe that they won't give something to the children that will harm them*" – F6 **Mpumalanga** *I spoke with other parents whom their children are also in grade 4, they said that they also received the form and they won't leave this opportunity for their children to be protected*" – M2 "*If you don't allow your child to be vaccinated, it means that you don't have her best interest at heart*" – M2 "*Those who implemented this vaccination know why girls need to be vaccinated*" – M2 "Because I gathered that this is meant to help my child for her future" – M3 "*it was more on the prevention, because the HPV vaccination would prevent the cancer, that is the cervical cancer and such like things*" – M3
Perceived barriers	**Free State** "*It was so unfortunate that the day vaccination, she become ill and was taken to the hospital*"- F1 "*They don't believe in the injection and whatsoever. Their churches don't believe in injections, something like that. That's what we were told*." – F4 "*we heard a lot of parents were concerned and saying that they will get sick and everything*" – F6 "*they said like they will get nausea, and vomit and almost like flu thing you know"* – F6 "*but as black people we are very ignorant and one would respond saying you are now telling about this European way of doing things*" – F7 "*When you call her biological father he would say you believe in the western culture a lot, but you can go ahead and do what you want*." – F7 "*Something that you do not know anything about you just ignore it*." – F9 **Mpumalanga**

	"*Others are negative about the injections because in the past people once said that there were injections that were not good. So other parents don't trust injections*" – M2 "*if a parent doesn't understand English, its going to be a problem*", "*next time…they could write English on one side and Xitsonga on the other side*" – M4 "*they believe in traditional healers*" – M5 "*if in that family the parent is a traditional healer. Normally, they are the ones who do not give consent because they use traditional medicine than western medicine from hospital*" – M7 "*Yes, lack of information can make one not give consent for his child to participate*" – M7 *"Because sometimes you find that we give consent without understanding what will happen and end up regretting later on"* – M7 *"For someone who is not educated it was not easy to follow it, because the terms they use like IPV what, what I do not even know what it stands for"* – M7
Perceived self-efficacy	**Free State** "*I like to do my own research and then find out for myself and get my own clear understanding*" – F2 "*You know how I read that consent form, ooh is HPV and ok, Wits we work with this, ok is fine, then I signed*" – F3 "*I spoke to one of the mothers whose husband is a doctor, *** (name withheld) her mother I spoke to her and she said "no by all means*" – F5 "were really just little bit concerned we spoke to the doctor and he explained to us that is a good thing and his daughter is also going for it." – F6 "*one of the ladies who works at the clinic, I then asked her, she is a nurse there, and she is on top management, she said it is good to go and it prevents cancer from our kids or what, something like that. And I said it is okay*" – F8 "*I know that it is important, and I also do my Pap smear every year. Because I know it is also important*." – F9

	"*I am working in the department of health, I knew about the campaign because we work with the nurses. The school health nurses they always go out and conduct the campaign. We already knew what was going to happen about this campaign and that is why I was ready and willing to get my child vaccinated*." – F11 **Mpumalanga** "*we came here at WITS and they taught us they are going to vaccinate children for cancer in grade 4*" – M1 "*other things we are taught at clinics about cancer, that cervical cancer is common to us women*" – M2 "*influenced me (*Wits Researcher and pamphlet) *to sign the form because from the form I learned that it is important that the child prevent at an early age for this disease*." – M5
Cues to action	**Free State** "*They had inserted with the brackets the word "cancer" and I thought they were checking children for cancer*" - F1 "There's always the horror stories like for instance with the HPV vaccine of the child that went and she was fine, nothing was wrong with her and she was top of the class and then she went for this vaccine and then it affected her, and she was like a vegetable afterwards" - F2 "*People are getting these vaccinations and nothing is happening to their children, they're fine*" – F2 "*I just asked her (*EPI nurse*) what she would do and she said if she had a child she would vaccinate her*" – F2 "*for instance there are other vaccinations that they got. My children are very very healthy, they haven't had measles or chicken pox or all those other things. I think it is due to the vaccinations, so I believe that this one works as well*" – F2 "*She had HBCG at birth, yes and she had measles and the DT's and the scheduled nusises [not clear] she did but I think for 12 she skipped those ones, she still has to catch up*." – F3 "*And then I also came to Ausi Lebo and the team (Nurses) and also asked them what is this HPV thing and they explained to me, that's how I understand it*" – F4 "*I told myself they did their researches and they know that it's gonna work.*" – F4

	"*I spoke to one of the mothers whose husband is a doctor, *** (name withheld) her mother I spoke to her and she said "no by all means*" – F5 "*Everybody thinks you gonna inject them with some or other virus or AIDS virus*" – F5 . "*No she got all the ones (*Childhood vaccines*) she's supposed to get on a clinic card*" – F5 "*I believe that they won't give something to the children that will harm them*" - F6 "*I went to my doctor and his daughter is also in grade 10 and he said is a very good thing*" – F6 "*one of the ladies who works at the clinic, I then asked her, she is a nurse there, and she is on top management, she said it is good to go and it prevents cancer from our kids or what, something like that. And I said it is okay*" – F8 "*She has all those vaccinations for six months; three months. All of them and the one she is receiving for all Grade 10*" -F8 "*I know that it (HPV) is important is also important... I heard it on the radio*" – F9 "*I just signed* (The letter from the school, without consulting and did not know what HPV was)" – F10 "*I am working in the department of health*" – F11 **Mpumalanga** "*Others are negative about the injections because in the past people once said that there were injections that were not good. So other parents don't trust injections*." – M2 "*when they use the same injection when vaccinating people. People are afraid that might contract diseases because of that*" – M2 "*Yes (Childhood vaccines were received), even the injection that you stop getting it when you are five years old."* – M2 "*I understood the information on the form, and it explained lot of things and that they will check other diseases*" – M2 "*they (*nurses at the clinic*) explained that is actually good that we give consent to this preventative vaccination because it will be beneficial to them in future*" – M4

	"*Yes, they did receive them* (childhood vaccines)" – M5 "*Yes* (they received all childhood vaccines) – M6 "*I heard some pupils saying if she takes that vaccine, she will get fever and vomit. Then I refused them to vaccinate her*"… "*I was told by the pupils who were vaccinated, they said if I give consent, she will be sick and have diarrhoea. I do not want her be sick. And also body fever*" – M6 "*Yes, I called my sister because she is a nurse and she said it is good and I must give my consent*." – M7

5. Discussion

Using the Health Belief Model, this study examined the beliefs and perceptions that influence HPV vaccine acceptance and uptake among caregivers in South Africa. We found that caregivers generally accept and hold positive attitudes towards the HPV vaccine, which aligns with other literature from South Africa (Delany-Moretlwe et al., 2018) and from other LMICs in Africa (Kolek et al., 2022). The main perceived benefit identified was cervical cancer prevention, consistent with other findings (Wemrell & Gunnarsson, 2022; Valentino & Poronsky, 2016; Mendes Lebao et al., 2018). Moreover, Valentino and Poronsky (2016) describe that perceiving the HPV vaccine as beneficial predicts vaccine uptake.

Caregivers who perceived the schoolgirls as susceptible to cervical cancer were motivated to accept the vaccine; this included caregivers with a history of cancer in their families, which aligned with findings from other studies (Mendes Labao et al., 2018). Although not all caregivers explicitly mentioned it, some recognised that adolescents and young women in South Africa are at risk of sexually transmitted infections, which further encouraged vaccine acceptance.

Although caregivers recognised barriers to vaccination, including lack of information, logistical challenges such as missing the vaccine due to the schoolgirl's absence, language difficulties, concerns about vaccine safety, and religious and cultural beliefs (Ohareri et al., 2020; Kolek et al., 2022), these were not insurmountable and did not appear to influence their decisions significantly. Caregivers with some knowledge and awareness of HPV, especially those who had worked in healthcare settings or around healthcare personnel, were able to make informed choices independently. Caregivers who perceived their information as limited frequently sought advice from healthcare professionals (doctors and nurses) and health researchers. Recommendations from healthcare personnel play a key role in vaccine acceptance among caregivers, as observed in other similar studies worldwide (Dempsey & O'Leary, 2018; Jwa et al., 2023; Yusuf et al., 2024; Zakhour et al., 2023). Some caregivers also sought information from community members, some of whom supported the vaccine, while others opposed it. Lack of support from family, friends, and community members was linked to reduced acceptance of the HPV vaccine, but ultimately, caregivers in this

study still provided their consent. The influence of family, friends, and community beliefs has been noted in other studies (Allen et al., 2010).

There was some hesitancy within this study population, which was attributed to: not viewing cervical cancer as a health threat; lack of information or understanding about HPV, cervical cancer, or the HPV vaccine (Ntonifor et al., 2025); concerns regarding the safety of the vaccine (Beavis et al., 2022; Dera et al., 2023; Marshall et al., 2023; Yusuf et al., 2024; Khosa et al., 2022); being misinformed about the vaccine; and, lastly, religious and cultural beliefs that conflicted with the use of Western medicine and vaccines (Ohareri et al., 2020; Kolek et al., 2022). These factors were associated with low perceived severity and perceived barriers.

Generally, the perceived benefits of vaccination outweigh the barriers. The vaccine was regarded as beneficial because caregivers had prior experience with effective childhood vaccines. This finding suggested a potential connection between the acceptance of childhood vaccines and the acceptance of the HPV vaccine, although further analysis is needed. Additionally, caregivers who had positive previous experiences with vaccines were more accepting of the HPV vaccine, as demonstrated in other studies (Kutz et al., 2023). Caregivers also trusted healthcare professionals' recommendations that the vaccine would be beneficial. Finally, the fact that the vaccine was free was viewed as an added benefit, increasing accessibility to the HPV vaccine and encouraging vaccine acceptance in this context.

Ultimately, participants in this sample were encouraged to consent to HPV vaccination for their child or ward. Recommendations from healthcare professionals, such as doctors and nurses, were a key cue to action in this study, as observed in other research (Dempsey & O'Leary, 2018; Jwa et al., 2023). Positive experiences with the vaccine served as an essential cue to action, outweighing the negative information circulating on social media or within the community. Additional information from news broadcasts, pamphlets, and school meetings was seen as a trusted source of information, helping to mitigate negative information. This finding aligns with those from other studies (Kutz et al., 2023).

Strengths and limitations

This study's strengths include shedding more light on insights from LMICs, where the burden of HPV infection and cervical cancer is highest, and where HPV vaccine coverage and uptake are lowest. The study only includes data from two provinces, as these provinces represent the highest and lowest HPV vaccine coverage rates. The data was collected in two different locations in South Africa. Qualitative data also allowed for complex decision-making to be explored in more depth, and the results can be applied to other provinces and similar LMICs. The model used in the study (The HBM) revealed the lengths to which caregivers would go to obtain information to make well-informed decisions. The study also provides a better understanding of where to improve the HPV vaccination programme, specifically in terms of bridging the gap between caregivers' awareness and knowledge of HPV.

The limitations of the study include that most participants were caregivers who had consented to the vaccine, resulting in limited information on those who chose not to consent, and they were underrepresented in this study. Recruitment was challenging; consequently, the data primarily included caregivers of schoolgirls who had previously received vaccinations. The underrepresentation of individuals who did not consent to the vaccine reduces the generalisability of the study's findings. Recall bias was another limitation, as some caregivers of the schoolgirls had forgotten details included in the pamphlets or consent letters, such as vaccination information. The data were collected before the COVID-19 pandemic, at a time when vaccine hesitancy was on the rise. Lastly, there was some missing information or records about the participants, such as the ages of all participants being unknown.

Recommendations

This data offers valuable insights into parental decision-making regarding HPV vaccination for their children and wards, emphasising the importance of providing adequate information through various trusted sources. To enhance future school-based HPV vaccine programmes, specific considerations should be taken into account. These should include improving and increasing communication between caregivers, schools, and the programme, such as sending informative SMSs, emails,

and letters to caregivers, as well as hosting detailed school meetings. Such measures can help address the reported lack of information or unavailability of information regarding HPV and cervical cancer. Additionally, providing extra letters with more detailed information when distributing the consent forms and explaining the vaccine's purpose and side effects can further inform caregivers about HPV and cervical cancer, thereby raising awareness, which is vital for improving vaccine uptake. Increasing interactions between caregivers and those administering the vaccine can help enhance and sustain confidence in the vaccine. Caregivers report that healthcare professionals are a trusted and relied-upon source of information. Therefore, doctors could serve as a source of information for caregivers, and pamphlets could be distributed at clinics, hospitals, or practices. Engaging with specific population groups, such as the caregivers of the grade 4 girls now in grade 5, will help increase public trust, which in turn influences the acceptance of vaccines. Educating caregivers will also help eliminate misinformation and misconceptions about the vaccine. Community-based campaigns and awareness initiatives involving religious leaders could further help address vaccine concerns among caregivers with strong religious beliefs (Wong et al., 2020; Vincent et al., 2024).

6. Conclusion

This study has provided insight into the factors influencing caregivers' decisions regarding HPV vaccination in the Free State and Mpumalanga, South Africa. Most caregivers hold positive views of the vaccine. This study revealed that healthcare workers were a key source of information and the most trusted source, with their recommendations playing a significant role in driving vaccine acceptance. Other factors included positive community attitudes towards the vaccine and positive past experiences with other vaccines. Several barriers still need to be addressed to increase vaccine uptake, including systemic issues such as communication with caregivers and their access to information, as well as religious and cultural obstacles. Factors influencing vaccine hesitancy include a lack of perceived severity and perceived barriers, such as knowledge gaps, safety concerns, misinformation, and religious, cultural, and traditional beliefs and practices. The programme should aim to address these barriers through community engagement to promote and increase the

uptake of the HPV vaccine, as well as raise awareness in communities by improving health communication and access to information.

Future studies could include examining caregivers who did not give consent for the vaccine to understand their reasons for non-acceptance better. Additionally, research could explore the root causes of misinformation and develop strategies to combat it. Furthermore, the relationship between the acceptance of childhood vaccines and the HPV vaccine in a South African context could be further investigated.

7. References

1. Adedimeji, A., Ajeh, R., Pierz, A., et al., 2021. Challenges and opportunities associated with cervical cancer screening programs in a low-income, high HIV prevalence context. *BMC Women's Health*, 21(74). DOI: 10.1186/s12905-021-01211-w
2. Allen, J. D., Othus, M. K., Shelton, R. C., Li, Y., Norman, N., Tom, L., & del Carmen, M. G. 2010. Parental decision-making about the HPV vaccine. *Cancer Epidemiology, Biomarkers & Prevention, 19*(9), 2187–2198. DOI: 10.1158/1055-9965.EPI-10-0217
3. Alyafei, A. and Easton-Carr, R. 2024. *The Health Belief Model of Behavior Change*. Treasure Island, FL: StatPearls Publishing
4. Arbyn, M., Weiderpass, E., Bruni, L., de Sanjosé, S., Saraiya, M., Ferlay, J., & Bray, F. 2020. Estimates of incidence and mortality of cervical cancer in 2018: a worldwide analysis. *The Lancet Global Health, 8*(2), e191–e203. DOI: 10.1016/S2214-109X(19)30482-6
5. Ayalew, K., Mamo, M., & Hailu, A. 2024. Willingness of caregivers to have their daughters vaccinated against human papillomavirus and associated factors in Jimma Town, Southwest Ethiopia. *Frontiers in Global Women's Health, 5*, Article 1400324. DOI: 10.3389/fgwh.2024.1400324
6. Bakilana. Age at sexual debut in South Africa. *African Journal of AIDS Research, 4*(1), 1–5. DOI: 10.2989/16085900509490335
7. Basu, P. 2019. HPV vaccination and screening for cervical cancer. In S. Vaccarella, J. Lortet-Tieulent, R. Saracci, et al. (Eds.), *Reducing social inequalities in cancer: evidence and priorities for research* (pp. 168). International Agency for Research on Cancer.

8. Beavis, A.L., Meek, K., Moran, M.B., Fleszar, L., Adler, S. & Rositch, A.F., 2022. Exploring HPV vaccine hesitant parents' perspectives on decision-making and motivators for vaccination. *Vaccine*, [online] 12, 100231. Available at: DOI: 10.1016/j.jvacx.2022.100231

9. Bednarczyk, R.A., 2019. Addressing HPV vaccine myths: practical information for healthcare providers. *Human Vaccines & Immunotherapeutics*, [online] 15(7–8), 1628–1638. Available at: DOI: 10.1080/21645515.2019.1565267
10. Bønløkke, S., Blaakær, J., Steiniche, T., & Iachina, M. 2024. Social factors and age play a significant role in cervical cancer and advanced-stage disease among Danish women. *BMC cancer*, *24*(1), 259. DOI: 10.1186/s12885-024-11994-4
11. Boom, Julie A., Rachel M. Cunningham, and Lindy U. McGee., 2018. "Vaccine myths: Setting the record straight." *Journal of Family Strengths*
12. Bruni L, Albero G, Serrano B, Mena M, Collado JJ, Gomez D, Munoz J, Bosch FX, de Sanjose S. 2023. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in South South Africa
13. Bruni, L., Saura-Lázaro, A., Montoliu, A., Brotons, M., Alemany, L., Diallo, M.S. and Bloem, P., 2021. HPV vaccination introduction worldwide and WHO and UNICEF estimates of national HPV immunization coverage 2010–2019. *Preventive Medicine*, 144, p.106399. DOI: doi: 10.1016/j.ypmed.2020.106399
14. Bwanali, A.N., Liundi, P., Lubanga, A.F., Mpinganjira, S.L. & Gadama, L.A., 2024. Caregiver acceptance of human papillomavirus vaccine for their female children in Chileka, Blantyre, Malawi. *Vaccine: X*, *Census. 2011*. Cooperative governance and traditional affairs (Cogta), 2023. Profile: Lejweleputswa district municipality.
15. Census. 2011. Bushbuckridge local Municipality 877.
16. Centers for Disease Control and Prevention (1). 2024. *HPV Vaccine Safety and Effectiveness Data*
17. Centers for Disease Control and Prevention (2). (2024, May 29). *Prevention and Treatment of STIs*.
18. Centers for Disease Control and Prevention (CDC), 2021. *Administering HPV vaccine*. Atlanta: Centers for Disease Control and Prevention. Available at: https://www.cdc.gov/vaccines/vpd/hpv/hcp/administration.html

19. Centers for Disease Control and Prevention. 2021. *Sexually Transmitted Infections Treatment Guidelines, 2021: Clinical Prevention*.
20. Centers for Disease Control and Prevention. 2025 (1). Human Papillomavirus (HPV) Vaccine Safety. Retrieved from https://www.cdc.gov/vaccine-safety/vaccines/hpv.html
21. Centers for Disease Prevention and Control, 2024. About genital HPV infections. *Centers for Disease Prevention and Control.*
22. Champion, V.L. and Skinner, C.S., 2008. The health belief model. *Health behavior and health education: Theory, research, and practice*, *4*, pp.45-65.
23. Cutts, F.T., Franceschi, S., Goldie, S., Castellsagué, X.D., De Sanjosé, S., Garnett, G., Edmunds, W.J., Claeys, P., Goldenthal, K.L., Harper, D.M. & Markowitz, L., 2007. Human papillomavirus and HPV vaccines: a review. *Bulletin of the World Health Organization*, 85(9), pp.719-726. doi: 10.2471/BLT.06.038414
24. Davies, C., Stoney, T., Hutton, H., Parrella, A., Kang, M., Macartney, K., Leask, J., McCaffery, K., Zimet, G., Brotherton, J.M.L. & Marshall, H.S., 2021. School-based HPV vaccination positively impacts parents' attitudes toward adolescent vaccination. *Vaccine*, 39(30), pp.4190-4198. doi: 10.1016/j.vaccine.2021.05.051
25. Delany-Moretlwe, S., Kelley, K.F., James, S., Scorgie, F., Subedar, H., Dlamini, N.R., Pillay, Y., Naidoo, N., Chikandiwa, A. & Rees, H., 2018. Human papillomavirus vaccine introduction in South Africa: implementation lessons from an evaluation of the national school-based vaccination campaign. *Global Health: Science and Practice*, 6(3), pp.425-438. doi:10.9745/GHSP-D-18-00090
26. Delany-Moretlwe, S., Machalek, D.A., Travill, D., Petoumenos, K., Nyemba, D.C., Mbulawa, Z.Z., Ndlovu, N., Kaldor, J.M. & Rees, H., 2024. Impact of single-dose HPV vaccination on HPV 16 and 18 prevalence in South African adolescent girls with and without HIV. *JNCI Monographs*, 67, pp.337-345. doi:10.1093/jncimonographs/lgae041
27. Dempsey, A.F. & O'Leary, S.T., 2018. Human papillomavirus vaccination: narrative review of studies on how providers' vaccine communication affects attitudes and uptake. *Academic Pediatrics*, 18(2 Suppl), pp.S23-S27. doi:10.1016/j.acap.2017.09.001

28. Department of Health (DOH), 2021. *Cervical Cancer Prevention and Control Policy*. Republic of South Africa. Available at: https://www.health.gov.za/wp-content/uploads/2021/07/cervical-cancer-policy.pdf
29. Dera, M., Wondimagegnehu, A. & Asfaw, Z.G., 2023. Determinants for hesitancy in human papillomavirus (HPV) vaccine uptake among school girls in Jimma Town, Ethiopia. A mixed approach: quantitative and qualitative. *Reproductive Health*, 20(1), article 175. doi:10.1186/s12978-023-01711-y. BioMed Central
30. Dhakal, K., 2022. *NVivo*. *Journal of the Medical Library Association*, 110(2), pp.270-272. doi:10.5195/jmla.2022.1271. JMLA+1
31. Dhokotera, T., Asangbeh, S., Bohlius, J., Singh, E., Egger, M., Rohner, E., Ncayoyana, J., Clifford, G.M., Olago, V. & Sengayi-Muchengeti, M., 2022. Cervical cancer in women living in South Africa: a record linkage study of the National Health Laboratory Service and the National Cancer Registry. *ecancermedicalscience*, 16, p.1348. doi:10.3332/ecancer.2022.134
32. Government of South Africa. 2025. Gauteng Health launches campain to protect girls against cervical cancer
33. Handler, N.S., Handler, M.Z., Majewski, S. and Schwartz, R.A., 2015. Human papillomavirus vaccine trials and tribulations: vaccine efficacy. *Journal of the American Academy of Dermatology*, 73(5), pp.759–767. https://doi.org/10.1016/j.jaad.2015.07.024
34. Hull, R., Mbele, M., Makhafola, T., Hicks, C., Wang, S.M., Reis, R.M., Mehrotra, R., Mkhize-Kwitshana, Z., Kibiki, G., Bates, D.O. and Dlamini, Z., 2020. Cervical cancer in low and middle-income countries. *Oncology Letters*, 20(3), pp.2058–2074. https://doi.org/10.3892/ol.2020.11754
35. Jwa, S., Yuyama, Y., Yoshida, H. & Hamazaki, T., 2023. A favorable impression of vaccination leads to a better vaccination rate for the human papillomavirus vaccine: A Japanese questionnaire survey investigation. *Vaccine: X*, 13, p.100254. doi:10.1016/j.jvacx.2022.100254
36. Kamolratanakul, S. & Pitisuttithum, P., 2021. Human papillomavirus vaccine efficacy and effectiveness against cancer. *Vaccines*, 9(12), p.1413. doi:10.3390/vaccines9121413.
37. Kashyap, N., Krishnan, N., Kaur, S. & Ghai, S., 2019. Risk factors of cervical cancer: A case-control study. *Asia-Pacific Journal of Oncology Nursing*, 6(3), pp.308–314. doi:10.4103/apjon.apjon_73_18

38. Khan, F., 2023. Limitation of parental consent in respect of vaccinations in South Africa: guidance from the United Kingdom and the United States. *Obiter*. Available at: https://obiter.mandela.ac.za/article/view/14499
39. Khosa, L.A., Meyer, J.C., Motshwane, F.M.M., Dochez, C. & Burnett, R.J., 2022. Vaccine Hesitancy Drives Low Human Papillomavirus Vaccination Coverage in Girls Attending Public Schools in South Africa. *Frontiers in Public Health*, 10, Article 860809. doi:10.3389/fpubh.2022.860809
40. Kim, S.Y., Seo, J.W. & Ryu, E., 2021. Korean college students' attitudes and health behavior regarding human papillomavirus vaccination. *Collegian*, 28(1), pp.57–62. doi:10.1016/j.colegn.2020.04.003.
41. Kolek, C.O., Opanga, S.A., Okalebo, F., Birichi, A., Kurdi, A., Godman, B. & Meyer, J.C., 2022. Impact of parental knowledge and beliefs on HPV vaccine hesitancy in Kenya—findings and implications. *Vaccines*, 10(8), p.1185. doi:10.3390/vaccines10081185.
42. Kutz, J.M., Rausche, P., Gheit, T., Puradiredja, D.I. & Fusco, D., 2023. Barriers and facilitators of HPV vaccination in sub-Saharan Africa: a systematic review. *BMC Public Health*, 23, p.974. doi:10.1186/s12889-023-15842-1.
43. Ledibane, T.D., Ledibane, N.R. & Matlala, M., 2023. Performance of the school-based human papillomavirus vaccine uptake in Tshwane, South Africa. *Southern African Journal of Infectious Diseases*, 38(1), p.492. doi:10.4102/sajid.v38i1.492.
44. Loveday, M., Goga, A., Dhai, A., Labuschaigne, M., Roussouw, T., Burgess, T., Strode, A., Wallace, M., Blockman, M., Daniels, B. and Spooner, E., 2022. Ethically acceptable consent approaches to adolescent research in South Africa. Southern African Journal of HIV Medicine
45. MacDonald, N.E., 2015. Vaccine hesitancy: Definition, scope and determinants. *Vaccine*, 33(34), pp.4161–4164. doi:10.1016/j.vaccine.2015.04.036
46. Machalek, D., Rees, H., Chikandiwa, A., Munthali, R., Travill, D., Mbulawa, Z., Petoumenos, K., Delany-Moretlwe, S. & Kaldor, J., 2022. Impact of one and two human papillomavirus (HPV) vaccine doses on community-level HPV prevalence in South African adolescent girls: study protocol and rationale for a pragmatic before–after design. *BMJ Open*, 12(2), p.e059968. doi:10.1136/bmjopen-2021-059968.

47. Mantula, F., Toefy, Y. & Sewram, V., 2024. Barriers to cervical cancer screening in Africa: a systematic review. *BMC Public Health*, 24(1), p.525. doi:10.1186/s12889-024-17842-1.
48. Margolis, M.A., Brewer, N.T., Shah, P.D., Calo, W.A. & Gilkey, M.B., 2019. Stories about HPV vaccine in social media, traditional media, and conversations. *Preventive Medicine*, 118, pp.251–256. doi:10.1016/j.ypmed.2018.11.021.
49. Mariani, L., Preti, M., Cristoforoni, P., Stigliano, C.M. & Perino, A., 2017. Overview of the benefits and potential issues of the nonavalent HPV vaccine. *International Journal of Gynecology & Obstetrics*, 138(3), pp.271–276. doi:10.1002/ijgo.12075.
50. Markowitz, L.E. & Schiller, J.T., 2021. Human Papillomavirus Vaccines. The Journal of Infectious Diseases, 224(12 Suppl 2), pp.S367–S378. doi: 10.1093/infdis/jiaa621.
51. Marshall, S., Fleming, A., Sahm, L.J. & Moore, A.C., 2023. Identifying intervention strategies to improve HPV vaccine decision-making using behaviour change theory. Vaccine, 41(7), pp.1368–1377. doi: 10.1016/j.vaccine.2023.01.017.
52. Mendes Lobão, W., Duarte, F.G., Burns, J.D., de Souza Teles Santos, C.A., Chagas de Almeida, M.C., Reingold, A. & Duarte Moreira, E., 2018. Low coverage of HPV vaccination in the national immunization programme in Brazil: Parental vaccine refusal or barriers in health-service based vaccine delivery? PLOS ONE, 13(11), p.e0206726. doi: 10.1371/journal.pone.0206726.
53. Milondzo, T., Meyer, J.C., Dochez, C. & Burnett, R.J., 2021. Misinformation drives low human papillomavirus vaccination coverage in South African girls attending private schools. Frontiers in Public Health, 9, p.598625. doi: 10.3389/fpubh.2021.598625.
54. Muchiri, E. & Odimegwu, C., 2019. Trends and gender differences in age at sex debut among adolescents and young adults in urban Cape Area, South Africa. African Health Sciences, 19(4), pp.2964–2972. doi: 10.4314/ahs.v19i4.17
55. National Cancer Institute. 2024. *Human Papillomavirus (HPV) and Cancer*. National Cancer Institute
56. National Cancer Registry (NCR), National Institute for Communicable Diseases (NICD). 2023. *Summary statistics of cancer diagnosed histologically in 2023: South Africa*. National Health Laboratory Service (NHLS)

57. Ntonifor, M.M.N., Tazinkeng, N.N., Kemah, B.L., Claudia, N.E., Sonia, Y.K., Nchinjoh, S.C., Mbanga, C.M., Elbasheer, M.M.A. & Agbor, V.N., 2025. Factors associated with parental hesitancy towards the human papillomavirus vaccine: a cross-sectional study. Scientific Reports. doi: 10.1038/s41598-025-94067-1.
58. Ohareri, B., Adefolaju, A.O. and Onyeneho, C.A., 2020. Knowledge, attitudes and perceptions of Nigerian parents towards human papilloma virus (HPV) vaccines. European Journal of Midwifery, 4.
59. Olorunfemi, G., Ndlovu, N., Masukume, G., Chikandiwa, A., Pisa, P.T. and Singh, E., 2018. Temporal trends in the epidemiology of cervical cancer in South Africa (1994–2012). International Journal of Cancer, 143(9), pp.2238–2249. doi: 10.1002/ijc.31610.
60. Pimple, S.A. and Mishra, G.A., 2019. Global strategies for cervical cancer prevention and screening. Minerva Ginecologica, 71(4), pp.313–320. doi: 10.23736/S0026-4784.19.04397-1.
61. Radisic, G., Chapman, J., Flight, I. and Wilson, C., 2017. Factors associated with parents' attitudes to the HPV vaccination of their adolescent sons: a systematic review. Preventive Medicine, 95, pp.26–37. doi: 10.1016/j.ypmed.2016.11.019
62. Rahman, M., Laz, T.H., McGrath, C.J. and Berenson, A.B., 2015. Provider recommendation mediates the relationship between parental human papillomavirus (HPV) vaccine awareness and HPV vaccine initiation and completion among 13-to 17-year-old US adolescent children. *Clinical Pediatrics*, 54(4), pp.371–375. doi:10.1177/000992281454954
63. Ray, A., 2025. Human Papillomavirus and other relevant issues in cervical cancer pathogenesis. International Journal of Molecular Sciences, 26(12), 5549. doi: 10.3390/ijms26125549
64. Singh, D., Vignat, J., Lorenzoni, V., Eslahi, M., Ginsburg, O., Lauby-Secretan, B., Arbyn, M., Basu, P., Bray, F. and Vaccarella, S., 2023. Global estimates of incidence and mortality of cervical cancer in 2020: a baseline analysis of the WHO Global Cervical Cancer Elimination Initiative. *The Lancet Global Health*, 11(2), pp.e197–e206. doi:10.1016/S2214-109X(22)00501-1
65. Soares, L.M.C., de Medonça, A.E.O., de Souza, D.L.B., Carvalho, A.V., Flores, M.G., Neto, A.M., de Andrade, D.A.P. & Rodrigues, A.N., 2025. Factors associated with HPV vaccine hesitancy: A nationally representative cross-sectional study. Vaccine, 59, 127278. doi: 10.1016/j.vaccine.2025.127278.

66. Stanley, M.A., Sudenga, S.L. and Giuliano, A.R., 2014. Alternative dosage schedules with HPV virus-like particle vaccines. Expert Review of Vaccines, 13(8), pp.1027–1038. doi: 10.1586/14760584.2014.935767.
67. Stelzle, D., Tanaka, L.F., Lee, K.K., Khalil, A.I., Baussano, I., Shah, A.S., McAllister, D.A., Gottlieb, S.L., Klug, S.J., Winkler, A.S. and Bray, F., 2021. Estimates of the global burden of cervical cancer associated with HIV. The Lancet Global Health, 9(2), pp.e161–e169. doi: 10.1016/S2214-109X(20)30459-9
68. Stokley, S., Jeyarajah, J., Yankey, D., Cano, M., Gee, J., Roark, J., Curtis, R.C. and Markowitz, L., 2014. Human papillomavirus vaccination coverage among adolescents, 2007–2013, and postlicensure vaccine safety monitoring, 2006–2014—United States. *MMWR Morbidity and Mortality Weekly Report*, 63(29), pp.620–624. doi:10.15585/mmwr.mm6329a3
69. Strode, A., 2015. A critical review of the regulation of research involving children in South Africa: From self-regulation to hyper-regulation. *Journal of South African Law/Tydskrif vir die Suid-Afrikaanse Reg*, 2015(2), pp.334–346. doi:10.10520/EJC-61b5079ee
70. Sung, H., Ferlay, J., Siegel, R.L., Laversanne, M., Soerjomataram, I., Jemal, A. and Bray, F., 2021. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA: A Cancer Journal for Clinicians*, 71(3), pp.209–249. doi:10.3322/caac.21660
71. Suragh, T.A., Lewis, P., Arana, J., Mba-Jonas, A., Li, R., Stewart, B., Shimabukuro, T.T. and Cano, M., 2018. Safety of bivalent human papillomavirus vaccine in the US vaccine adverse event reporting system (VAERS), 2009–2017. *British Journal of Clinical Pharmacology*, 84(12), pp.2924–2932. doi:10.1111/bcp.13754
72. Tsui, J., Martinez, B., Shin, M. B., Allee-Munoz, A., Rodriguez, I., Navarro, J., Thomas-Barrios, K. R., Kast, W. M., & Baezconde-Garbanati, L. 2023. Understanding medical mistrust and HPV vaccine hesitancy among multiethnic parents in Los Angeles. *Journal of behavioral medicine*, *46*(1-2), 100–115. DOI: 10.1007/s10865-022-00283-9
73. Valentino, K. and Poronsky, C.B., 2016. Human papillomavirus infection and vaccination. *Journal of Pediatric Nursing*, 31(2), pp.e155–e166. doi:10.1016/j.pedn.2015.10.015

74. Vincent, S.C., Al Yaquobi, S. and Al Hashmi, A., 2024. A systematic review of knowledge, attitudes, and factors influencing HPV vaccine acceptance among adolescents, parents, teachers, and healthcare professionals in the Middle East and North Africa (MENA) region. *Cureus*, 16(5), e60293. doi:10.7759/cureus.60293
75. Wang, R., Pan, W., Jin, L., Huang, W., Li, Y., Wu, D., Gao, C., Ma, D. and Liao, S., 2020. Human papillomavirus vaccine against cervical cancer: Opportunity and challenge. *Cancer Letters*, 471, pp.88–102. doi:10.1016/j.canlet.2019.11.039
76. Wemrell, M. and Gunnarsson, L., 2022. Attitudes toward HPV vaccination in Sweden: A survey study. *Frontiers in Public Health*, 10, 729497. doi:10.3389/fpubh.2022.729497
77. World Health Organization. 2019. Ten threats to global health in 2019. https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019&ved=2ahUKEwje_bC2iYCQAxXhUEEAHSmiNj0QFnoECAoQAQ&usg=AOvVaw3JAIjJ7gw2g4dpHWXQtLtt
78. World Health Organization, 2024. *WHO adds an HPV vaccine for single-dose use*. https://www.who.int/news/item/04-10-2024-who-adds-an-hpv-vaccine-for-single-dose-use
79. Włoszek, E., Krupa, K., Skrok, E., Budzik, M. P., Deptała, A., & Badowska-Kozakiewicz, A. 2025. HPV and Cervical Cancer-Biology, Prevention, and Treatment Updates. *Current oncology (Toronto, Ont.)*, *32*(3), 122. https://doi.org/10.3390/curroncol32030122
80. Wong, C. A., Berkowitz, Z., Dorell, C. G., Anhang Price, R., Lee, J., & Saraiya, M. (2011). Human papillomavirus vaccine uptake among 9- to 17-year-old girls: National Health Interview Survey, 2008. *Cancer*, 117(23), 5612–5620. DOI: 10.1002/cncr.26246
81. World Health Organization, 2021. Cerviclal Cancer South Africa 2021 country profile. World Health Organization.
82. World Health Organization, 2022. *Accelerating the elimination of cervical cancer as a public health problem: Towards achieving 90–70–90 targets by 2030* (No. SEA/RC75/12). World Health Organization. Regional Office for South-East Asia.

83. Yusuf, K. K., Olorunsaiye, C. Z., Gadanya, M. A., Ouedraogo, S., Abdullahi, A. A., & Salihu, H. M. 2024. HPV vaccine hesitancy among parents and caregivers of adolescents in Northern Nigeria. *Vaccine: X*, 21, 100591. DOI: 10.1016/j.jvacx.2024.100591
84. Zakhour, R., Tamim, H., Faytrouni, F., Makki, M., Hojeij, R., & Charafeddine, L. 2023. Determinants of human papillomavirus vaccine hesitancy among Lebanese parents. *PLOS ONE*, 18(12), e0295644. DOI: 10.1371/journal.pone.0295644
85. Zhang, S., Xu, H., Zhang, L., & Qiao, Y. 2020. Cervical cancer: Epidemiology, risk factors and screening. *Chinese Journal of Cancer Research*, 32(6), 720–728. DOI: 10.21147/j.issn.1000-9604.2020.06.05

8. Appendices

Appendix A: IDI guide used in the data collection of the primary study

In-depth Interview Guide: Caregivers of female learners

Instructions: Please fill in this front page for each participant, neatly, using a black pen. Any corrections or alterations must be signed and dated as per GCP. If you take notes in a separate notebook, be sure to attach those notes to these pages.

AUDIO FILE NAME	
Participant ID	

Instruction to interviewer: Please fill information in the table below before an interview

ITEM	OPTION
SEX	Female ☐
	Male ☐
AGE	In years:
RESIDENCE	Name of town/suburb/village/rural location:
EMPLOYMENT	Employed full-time ☐
	Employed part-time ☐
	Self-employed ☐
	Not employed ☐
	Retired ☐
TYPE OF WORK	
RELATIONSHIP TO LEARNER	
STUDY SITE	
VACCINATION CAMPAIGN	Single dose ☐ National programme ☐

Interviewer preparation checklist

- Is the interview room private and quiet?
- Is the audio recorder working?
- Do you have the correct version of the interview script?

Ethics checklist (Circle Yes/No)

Have you explained the purpose of the research?	Y / N
Have you explained issues related to confidentiality?	Y / N
Have you explained how long the interview will take?	Y / N
Have you obtained a signed informed consent form?	Y / N
Have you checked preferred language for the interview?	Y / N

Does the participant have any questions before we start?
Document the questions asked by the participant and your response to the questions.

Thank you for volunteering to take part in this study. I have a series of questions that will help to guide the discussion, but please remember that there are no right or wrong responses.

Single dose campaign:
In February and March this year, a research team from Wits RHI, together with the DOH and DBE, implemented an HPV vaccination campaign among Grade 10 learners at high schools in Lejweleputswa. You were asked – as a parent/guardian – to consent to your [daughter] receiving the vaccine.

National programme:
School health teams have just visited primary schools in Lejweleputswa/Bushbuckridge, to administer the second dose of the HPV vaccine to Grade 4 learners. You were asked – as a parent/guardian – to consent to your [daughter] receiving the vaccine.

The purpose of this interview is to learn more about your views on this vaccination campaign, no matter what they are, and how you approached the decision to consent or not to consent to the vaccine. We will be using this information to understand how HPV vaccination looks from your perspective as a caregiver so that communication from the DOH about the HPV vaccine can be improved in future vaccination campaigns.

Note to interviewer: Use probes to stimulate conversation and direct the responses. Ask for examples and details using the terms WHAT, WHERE, WHEN, WHY, HOW, TELL ME MORE, etc.

1. **Information about household, family and community**

- What kind of community do you live in?
- Family members; other household members
- Other household members employed?
- Decision-making about health, family matters, finances
- Childhood vaccinations received by [daughter]
- Involvement with school, relationship with teachers

2. **Information sources**

- Memory of informed consent process: what did it entail?
- Memory of information provided in information sessions/ on info sheets
    - *Probe: HPV, purpose of vaccine, benefits/risks, side effects, effectiveness of 1 vs 2 doses, etc.*
    - *Note to interviewer: Explain that at the end of the interview you will give participant a 'FAQ' sheet that provides clear information about the HPV vaccine. If she/he has pressing questions about it now, however, please address them immediately.*
- Adequacy of information
- Other sources consulted independently for information on HPV vaccine
  *Note to interviewer: if participant mentions **websites**, obtain name of site or URL; for **social media** messages (WhatsApp, SMS, etc), ask for messages to be located on phone and forwarded to you; if **Facebook** consulted, obtain the necessary info to allow you to locate source pages after interview*
- How did the information you received shape/influence your thinking about the vaccine?
- New doubts or concerns?

3. **Vaccine decision-making**

- Discussion with [daughter] about decision
- Discussion with others about decision

- Family/household member who had final say about vaccine decision
- *For participants who did not consent to vaccination:* reasons for non-consent
- National programme only: *If participant consented to first dose but withdrew consent for second dose, probe about change in attitude and decision*
- Talk in the community about the vaccine (among neighbours, friends, parents of other children, community or religious leaders)

4. Personal experience of HPV vaccination campaign

- Aspects of the campaign that were challenging/could have been improved (e.g. ICF process, engagement with community, adequacy of information)
- Feedback from [daughter] about vaccination day
- Feedback from others about vaccination day

5. General communication with children and adolescents about sexual matters

- Views on appropriate timing of communication with girls; with boys
- Appropriate messaging to communicate
- How does HPV vaccine fit into this communication?
- Communication about STIs specifically

Thank you very much for your time. Do you have any additional comments or questions for me?
Document questions or comments from participant in the box below

Appendix B: Consent Letters

Appendix B.1: Consent form for grade 4 learners' caregivers

INFORMATION DOCUMENT AND
INFORMED CONSENT FOR ENROLMENT (CAREGIVERS, NATIONAL PROGRAMME)

Study title: Understanding HPV vaccine decision-making in South Africa: a qualitative study of vaccine hesitancy in two provinces: ALIVE Qualitative

Sponsored by: ALIVE Consortium, The Bill & Melinda Gates Foundation, The National Health and Medical Research Council, Australia

Principal Investigator: Fiona Scorgie, PhD

Institution: Wits RHI, University of the Witwatersrand

Investigator's telephone number: 071 579 5934 (24 hour number)

To the Potential Participant: This consent form might contain some words that are unfamiliar to you. Please ask the study staff about anything you do not understand or anything you want to learn more about. You may take home **an unsigned copy of this consent form** to think about or discuss with family or friends **before making your decision**. Once you understand the study, and if you agree to take part, you will be asked to sign your name or make your mark on this form. You will be offered a copy to keep.

INTRODUCTION

Hello, my name is _____ (INSERT NAME), I am a _____(INSERT DESIGNATION) at Wits RHI. Wits RHI is a part of the University of the Witwatersrand, Johannesburg and we conduct research on vaccine preventable diseases and on sexual and reproductive health problems, which affect many people living in South Africa.

We would like to invite you to take part in a short interview with a trained researcher, to discuss the HPV vaccination campaign that recently visited your child's school.

The project is sponsored by African Leadership in Vaccinology Expertise Consortium (ALIVE), The Bill & Melinda Gates Foundation, and the National Health and Medical Research Council, Australia.

The purpose of this consent form is to provide you with important information to help you decide if you want to participate in the study. Before you make a decision, we would like to tell you a bit more about the project, its purpose, what is involved, and the risks and benefits. If you decide to take part, you will be asked to provide written consent for participation. You will receive a copy of this form to keep.

Before you learn about the project, it is important that you know the following:

PARTICIPATION IS VOLUNTARY

- Your participation is voluntary. You do not have to participate if you do not want to.
- You may refuse to participate, and you may withdraw at any time, even on the day of the scheduled interview.
- If you decide not to take part or to withdraw consent, there will be no consequences.

PURPOSE OF THE STUDY
Cervical cancer is the second most common cancer among women in South Africa. To protect women from cervical cancer, there is now a national programme to give two doses of the licensed vaccine (Cervarix) to all girls in Grade 4 in public schools in the country. This vaccine prevents infection with most types of human papillomavirus (HPV), the agent that causes cervical cancer later in life.

In August this year, healthcare workers visited all primary schools in this district/municipality to administer the second dose of the HPV vaccine to Grade 4 female learners. Learners and their caregivers could decide whether to receive the vaccine or not.

In this study, we are hoping to speak to caregivers of Grade 4 female learners who were invited to be vaccinated during that campaign. Information from this interview will be analysed and shared with relevant Departments of Health (DOH) and Basic Education (DBE) staff, and used to improve their communication and engagement with communities about HPV vaccination in the future.

Approximately 15 to 20 caregivers like you will be interviewed over the course of two to three months.

STUDY PROCEDURES
The interview will last at maximum an hour to an hour and a half. The questions you will be asked during the interview will focus on:

- your understanding of the HPV vaccine;
- how the decision was made about whether to have your child vaccinated or not; and
- the sources of information you have accessed to learn about HPV vaccination and cervical cancer

With your consent, the conversation during the interview will be audio-recorded as a way to document what was said. All the information we collect for this research study will be stored in locked filing cabinets and kept in secure computer files, and only researchers will have access to the recordings and transcripts thereof. Audio files will be destroyed two years after publishing the research findings, or six years after the recording was made, if the information has not been published.

The audio-recording will be listened to by a professional transcriber after the interview and everything on the recording will be written down in full, and (if necessary) translated into English. This allows the research team to have an accurate and reliable copy of the interview once it is over, so that they may access it for purposes of analysis.

All identifying information in the transcript will be removed. Your name will not be included in the transcript.

WHAT ARE THE RISKS AND COSTS TO YOU?
There are no anticipated risks to you from participating in the study. None of the questions are likely to be embarrassing or uncomfortable to answer. Nevertheless, if you do feel uncomfortable during the interview, you have the right to not answer any questions if you so wish, and you have the right to withdraw from the interview at any time.

There are no financial costs to you for participating in the study.

WHAT ARE THE POTENTIAL BENEFITS?
There are no obvious benefits to participating in the study, but your contribution may help health workers and others working on adolescent health to better understand how community members are responding to HPV vaccination. You will also be told when the results of the study may be available, and how to learn about them, if you wish. We will provide you with any additional information that becomes available during the study, which may affect your willingness to continue with the study. We

will provide you with any additional information that becomes available during the study, which may affect your willingness to continue with the study.

REIMBURSEMENT
You will not be paid to participate in this study but you will be reimbursed an amount of R150 for transport and refreshment costs.

CONFIDENTIALITY
Your personal information (name, address, phone number) that you give us during the course of this study, will be kept strictly confidential.

Your name will not be used on study records. Instead your records will be given a unique code. The code will be used to identify the responses collected from you during your interviews. The code list will be kept in a safe place at the study clinic. Only study staff will have access to this list.

All the information we collect for this research study will be stored in locked filing cabinets and kept in password protected and access-controlled computer files. Only researchers will have access to the recordings and transcripts.

We will strictly protect the information recorded during the interview. The audio recording including your voice, the interviewer's notes, and analyses from these materials will be kept confidential. This means that no one other than the research team will have access to your responses.

Audio files will be destroyed two years after publishing the research findings, or six years after the recordings were made, if the information has not been published.

We will not use your name or your child's name or identify either of you personally in any publication or in any information shared with the DOH or DBE.

Your name, or anything else that might identify you personally, will not be used in any publication with information about this study.

PROBLEMS OR QUESTIONS
If you ever have any questions about this study, please contact:

Dr Fiona Scorgie Principal Investigator Wits RHI 2nd Floor Ward 21 Hillbrow Health Precinct Tel 011 358 5856 Mobile 071 579 5934 (after hours)	Prof. Sinead Delany-Moretlwe Co-Principal Investigator Wits RHI 22 Esselen Street Hillbrow Tel 011 358 5414/5 or Mobile 082 377 6275 (after hours)

ETHICAL APPROVAL
This study protocol has been submitted to the University of the Witwatersrand, Human Research Ethics Committee (HREC) and written approval has been granted by that committee.

The study has been structured in accordance with the Declaration of Helsinki (last updated: October 2013), which deals with the recommendations guiding doctors in biomedical research involving human participants. A copy may be obtained from me should you wish to review it.

If you have questions about your rights as a study participant or feel that you have not been treated fairly, you can contact:

Prof. Clement Penny, Chairperson of the University of the Witwatersrand, Human Research Ethics Committee (HREC) on 011 717 2301. The HREC is an independent committee established to help protect the rights of research participants.

After you have consulted with consulted the study staff or the ethics committee and if they have not provided you with the answers to your satisfaction, you should write to the South African Health Products Regulatory Authority (SAHPRA)

Chief Executive Officer, South African Health Products Regulatory Authority (SAHPRA),Department of Health, Private Bag X828, Pretoria 0001 or:

Tel: 012 395 8126 Email: Portia.Nkambule@health.gov.za

CONFIRMATION OF INFORMED CONSENT

I have read this form, or had it read to me. I have had the opportunity to discuss the information with study staff. My questions have been answered. I understand that my participation in this study is voluntary. It is clear that I may, at any stage, withdraw my consent and participation in the study. By signing this form, my child and I do not give up any of our legal rights.

I have read the information provided above. I have asked all the questions I have at this time.

_____
Printed name and surname of learner

_____
Printed name and surname of parent/guardian (caregiver)

_____
Signature of parent/guardian (caregiver) Date Time

_____
Printed name of study staff person obtaining consent

_____
Signature of person obtaining consent Date (DD/MMM/YY) Time

If the parent/guardian (caregiver) is illiterate:

_____ _____
Witness' Name (print) Witness Signature and date

INFORMED CONSENT FOR AUDIOTAPING

Participant's agreement to be audiotaped

I voluntarily agree for interviews in which I participate to be audiotaped. I understand that the audio files will be destroyed two years after publishing the research findings, or six years after the recording was made, if the information has not been published.

_____

Printed name of parent/guardian

_____

Signature of parent/guardian Date Time

_____

Printed name of study staff person obtaining consent

_____

Signature of person obtaining consent Date (DD/MMM/YY) Time

If the parent/guardian is illiterate:

_____ _____

Witness' Name (print) Witness Signature and date

Appendix B.2: Consent form for grade 10 learners' caregivers

INFORMATION DOCUMENT AND
INFORMED CONSENT FOR ENROLMENT (CAREGIVERS, SINGLE DOSE)

Study title: Understanding HPV vaccine decision-making in South Africa: a qualitative study of vaccine hesitancy in two provinces: ALIVE Qualitative

Sponsored by: ALIVE Consortium, The Bill & Melinda Gates Foundation, The National Health and Medical Research Council, Australia

Principal Investigator: Fiona Scorgie, PhD

Institution: Wits RHI, University of the Witwatersrand

Investigator's telephone number: 071 579 5934 (24 hour number)

To the Potential Participant: This consent form might contain some words that are unfamiliar to you. Please ask the study staff about anything you do not understand or anything you want to learn more about. You may take home **an unsigned copy of this consent form** to think about or discuss with family or friends **before making your decision**. Once you understand the study, and if you agree to take part, you will be asked to sign your name or make your mark on this form. You will be offered a copy to keep.

INTRODUCTION

Hello, my name is _____ (INSERT NAME), I am a _____(INSERT DESIGNATION) at Wits RHI. Wits RHI is a part of the University of the Witwatersrand, Johannesburg and we conduct research on vaccine preventable diseases and on sexual and reproductive health problems, which affect many people living in South Africa.

We would like to invite you to take part in a short interview with a trained researcher, to discuss the single dose HPV vaccination campaign that recently visited your child's school.

The project is sponsored by African Leadership in Vaccinology Expertise Consortium (ALIVE), The Bill & Melinda Gates Foundation, and the National Health and Medical Research Council, Australia.

The purpose of this consent form is to provide you with important information to help you decide if you want to participate in the study. Before you decide, we would like to tell you a bit more about the project, its purpose, what is involved, and the risks and benefits. If you decide to take part, you will be asked to provide written consent for participation. You will receive a copy of this form to keep.

Before you learn about the project, it is important that you know the following:

PARTICIPATION IS VOLUNTARY

- Your participation is voluntary. You do not have to participate if you do not want to.
- You may refuse to participate, and you may withdraw at any time, even on the day of the scheduled interview.
- If you decide not to take part or to withdraw consent, there will be no consequences.

PURPOSE OF THE STUDY

Cervical cancer is the second most common cancer among women in South Africa. To protect women from cervical cancer, there is now a national programme to give the licensed vaccine (Cervarix) to all girls in Grade 4 in public schools in the country. This vaccine prevents infection with most types of human papillomavirus (HPV), the agent that causes cervical cancer later in life. The South African programme provides two doses of the HPV vaccine, administered 6 months apart.

Research is being carried out globally and in South Africa to investigate if just a single dose of this vaccine may be enough to provide protection. In February and March this year, researchers from Wits RHI, together with partners in the Department of Health (DOH), visited all high schools in the district of Lejweleputswa to vaccinate Grade 10 female learners in a study to measure the effectiveness of a single dose of the vaccine. This was a separate activity to the national HPV vaccination programme, and it had the full support of the DOH and the Department of Basic Education (DBE). Learners and their parents/ caregivers could decide whether to receive the vaccine or not.

In the study I am approaching you about today, we are hoping to speak to caregivers of Grade 10 female learners who were invited to be vaccinated in that campaign. This information will be analysed and shared with relevant DOH and DBE staff, and used to improve their communication and engagement with communities about HPV vaccination in the future.

As a separate activity, we will also be approaching Grade 10 learners to invite them to take part in an interview. Approximately 15 caregivers and 15 learners will be interviewed over the course of two to three months.

STUDY PROCEDURES

The interview will last at maximum an hour to an hour and a half. The questions you will be asked during the interview relate entirely to the single dose HPV vaccination campaign in Lejweleputswa, and will focus on:

- your understanding of the HPV vaccine and of the vaccination campaign;
- how the decision was made about whether to have your child vaccinated or not; and
- the sources of information you have accessed to learn about HPV vaccination and cervical cancer

With your consent, the conversation during the interview will be audio-recorded as a way to document what was said. All the information we collect for this research study will be stored in locked file cabinets and kept in secure computer files, and only researchers will have access to the recordings and transcripts thereof. audio files will be destroyed two years after publishing the research findings, or six years after the recording was made, if the information has not been published.

The audio-recording will be listened to by a professional transcriber after the interview and everything on the recording will be written down in full, and (if necessary) translated into English. This allows the research team to have an accurate and reliable copy of the interview once it is over, so that they may access it for purposes of analysis.

All identifying information in the transcript will be removed. Your name will not be included in the transcript.

WHAT ARE THE RISKS AND COSTS TO YOU?
There are no anticipated risks to you from participating in the study. None of the questions are likely to be embarrassing or uncomfortable to answer. Nevertheless, if you do feel uncomfortable during the interview, you have the right to not answer any questions if you so wish, and you have the right to withdraw from the interview at any time.

There are no financial costs to you for participating in the study.

WHAT ARE THE POTENTIAL BENEFITS?
There are no obvious benefits to participating in the study, but your contribution may help health workers and others working on adolescent health to better understand how community members in South Africa are responding to HPV vaccination. You will also be told when the results of the study may be available, and how to learn about them, if you wish. We will provide you with any additional information that becomes available during the study, which may affect your willingness to continue with the study.

REIMBURSEMENT
You will not be paid to participate in this study but you will be reimbursed an amount of R150 for transport and refreshment costs.

CONFIDENTIALITY
Your personal information (name, address, phone number) that you give us during the course of this study, will be kept strictly confidential.

Your name will not be used on study records. Instead your records will be given a unique code. The code will be used to identify the responses collected from you during your interviews. The code list will be kept in a safe place at the study clinic. Only study staff will have access to this list.

All the information we collect for this research study will be stored in locked filing cabinets and kept in password protected and access-controlled computer files. Only researchers will have access to the recordings and transcripts.

We will strictly protect the information recorded during the interview. The audio recording including your voice, the interviewer's notes, and analyses from these materials will be kept confidential. This means that no one other than the research team will have access to your responses.

Audio files will be destroyed two years after publishing the research findings, or six years after the recordings were made, if the information has not been published.

We will not use your name or your child's name or identify either of you personally in any publication or in any information shared with the DOH or DBE.

Your name, or anything else that might identify you personally, will not be used in any publication with information about this study.

PROBLEMS OR QUESTIONS
If you ever have any questions about this study, please contact:

Dr Fiona Scorgie Principal Investigator Wits RHI 2nd Floor Ward 21 Hillbrow Health Precinct Tel 011 358 5856 Mobile 071 579 5934 (after hours)	Prof. Sinead Delany-Moretlwe Co-Principal Investigator Wits RHI 22 Esselen Street Hillbrow Tel 011 358 5414/5 or Mobile 082 377 6275 (after hours)

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The study has been structured in accordance with the Declaration of Helsinki (last updated: October 2013), which deals with the recommendations guiding doctors in biomedical research involving human participants. A copy may be obtained from me should you wish to review it.

If you have questions about your rights as a study participant or feel that you have not been treated fairly, you can contact:

Prof. Clement Penny, Chairperson of the University of the Witwatersrand, Human Research Ethics Committee (HREC) on 011 717 2301. The HREC is an independent committee established to help protect the rights of research participants.

After you have consulted with consulted the study staff or the ethics committee and if they have not provided you with the answers to your satisfaction, you should write to the South African Health Products Regulatory Authority (SAHPRA):

Chief Executive Officer, South African Health Products Regulatory Authority (SAHPRA),Department of Health, Private Bag X828, Pretoria 0001 or:

Tel: 012 395 8126 Email: Portia.Nkambule@health.gov.za

CONFIRMATION OF INFORMED CONSENT

I have read this form, or had it read to me. I have had the opportunity to discuss the information with study staff. My questions have been answered. I understand that my participation in this study is voluntary. It is clear that I may, at any stage, withdraw my consent and participation in the study. By signing this form, my child and I do not give up any of our legal rights.

I have read the information provided above. I have asked all the questions I have at this time.

_____
Printed name and surname of learner

_____
Printed name and surname of parent/guardian (caregiver)

_____
Signature of parent/guardian (caregiver) Date Time

_____
Printed name of study staff person obtaining consent

_____
Signature of person obtaining consent Date (DD/MMM/YY)
Time

If the parent/guardian (caregiver) is illiterate:

_____
_____
Witness' Name (print) Witness Signature and date

INFORMED CONSENT FOR AUDIOTAPING

Participant's agreement to be audiotaped

I voluntarily agree for interviews in which I participate to be audiotaped. I understand that the audio files will be destroyed two years after publishing the research findings, or six years after the recording was made, if the information has not been published.

_____

Printed name of parent/guardian (caregiver)

_____

Signature of parent/guardian (caregiver) Date
Time

_____

Printed name of study staff person obtaining consent

_____

Signature of person obtaining consent Date (DD/MMM/YY)
Time

If the parent/guardian (caregiver) is illiterate:

_____ _____

Witness' Name (print) Witness Signature and date

Information Document and Informed Consent for Enrolment: Caregivers, Single Dose, English, Version 2.0 (19 Jul 2019)
ALIVE Qualitative. Version 2.0, 19 Jul 2019
Investigator's Name: Dr Fiona Scorgie
Approved by Wits HREC: 20 August 2019 Caregiver Initials: _____

Appendix C: Nodes used for the study

ALIVE Qualitative V11.0

Codes

Name	Description
A - Background	
A1 - Community environment	Where participants live, their surroundings, landmarks, what sort of community is it, etc.
A2 - Home & family	Mention of who the participant lives with, how many people are in the home, whether the home has water or private spaces for her, etc. Include also descriptions of the participant's relationship with others in her home space.

A3 - Childhood vaccinations	Mention of vaccinations received by their child before the HPV vaccine, during infancy and early childhood
A4 - Health and finance decision-making	How decisions are made about the health of the children in the house, be it illness or general wellbeing, and who makes these decisions. Also decisions pertaining to finances and spending patterns.
B - Sources of information about HPV	This code answers the question: how did participants learn about HPV and the vaccine?
B1 - Family & friends	Information on HPV/HPV vaccine sought or received from friends and family
B2 - Internet	The actual info that the participant found online, as well as descriptions of the act of searching online for info about HPV, the vaccine, or cervical cancer.
B3 - HCWs	Info received from a healthcare worker about HPV, HPV vaccine, or cervical cancer OUTSIDE OF THE COMMUNICATION GIVEN BY HCWS IN THE CAMPAIGN. Also the act of seeking advice from a HCW about these topics. Where consulting a HCW forms part of the vaccine decision-making process, the text may be double-coded to 'F - Vaccine decision-making'
B4 - Pamphlets, posters	Information obtained from pamphlets or posters placed in healthcare facilities or schools or given to participants directly.
B5 - Media	Magazines, newspapers, radio, TV
C - Talk in community about HPV vaccine, CC	Anything the participant might have heard about the vaccine from members of their community, be it church members, talk in the street, school, workplace, etc. including commentary on the extent to which they have heard others talk about it.
D - Attitudes towards HPV vaccine	This code is for personal opinions about the vaccine, i.e. whether it is something participants support or not.
D1 - Hesitation	Any description of the participant's own hesitation, uncertainty or doubt in relation to the HPV vaccine, when expressing their general views on the vaccine.
D2 - Confidence in	Any voicing of confidence or trust in the HPV vaccine, when articulating personal view of the vaccine.
E - Campaign communication	This code relates to information, education and communication from official sources (usually DOH) before, during and after a vaccination campaign. Could take the form of written info (e.g. pamphlets, ICFs) or verbal info (e.g. parents' info evenings). The focus is on the CONTENT of the info here, but you could also code text on the process of receiving/giving info.
E1 - Information given or received	Includes what information (verbal or written) caregivers and learners recall receiving via formal campaign communication and what information teachers, vaccinators and other healthcare workers recall giving out to others as part of a campaign.
E2 - Views on	Participants' opinions about how they were informed about the campaign, e.g. an opinion that not enough info was given or that it was given to parents in the wrong way. Views could be expressed as negative; if so, and a suggestion for improvement follows, then that is to be coded to recommendations
F - Vaccine decision-making	How the decision for a learner to be vaccinated or not was made, and by whom
F1 - Process	Descriptions of HOW participants arrived at a decision about whether to consent to the vaccine or not.

F2 - Reasons for non-vaccination	Information or speculation about why parents refused for their children to be vaccinated for HPV (did not consent) and to why learners did not receive the vaccine (i,e, there may have been consent but something else happened to result in non-vaccination).
F3 - Reasons for acceptance	Reasons why the decision was made to consent to vaccination. Could overlap with text coded to 'D2 - Confidence in vaccine'.
F4 - Learner autonomy	Anything about learners themselves showing agency in vaccine decision-making, taking steps to be vaccinated/not vaccinated when their parents have already not consented/consented, or even just expressing a desire to be vaccinated/ not vaccinated.
F5 - Parent-learner interaction	This code is only for parent-learner interactions specifically about the decision about whether or not to get vaccinated. Text on parent-learner interactions and discussions about SRH matters more broadly should be coded to 'T1 - Parent - child'
G - This campaign	All sub-codes in this code are about the specific campaign that the participant was interviewed about.
G1 - Instances of non-vaccination	Descriptions of specific instances where a learner did not get the vaccine. Could overlap with text also coded to 'F1 - Reasons for non-vaccination'.
G2 - Challenges	Anything the participant regards as a challenge in this campaign: anything that did not work well or which made it difficult for them to fulfil their role in the campaign.
G3 - Successes	Things the participants regard as having been successful in the campaign.
G4 - Intervening to improve campaign	Anything participants may have done to make the campaign run more smoothly or any extra steps taken to increase uptake of the vaccine
G5 - Coverage	Any mention of the estimated number of girls not vaccinated or the percentage of girls vaccinated/ not vaccinated in a campaign should be coded here
G6 - Vaccine demand	Any description of people wanting the vaccine despite challenges or barriers to getting it or instances where they were ineligible.
H - Learners' experience of vaccination	The focus in this code is primarily text from learners' transcripts, although perspectives from other participants can be coded here if relating specifically to how the learners are thought to experience vaccination.
H1 - Fear of needle pain	Learners' expressions of fear of injection pain or descriptions of actual pain. Also for anything that other participants say about learners fearing the pain.
H2 - Knowledge of vaccine	What learners say about what they know about the vaccine, HPV and cervical cancer.
I - Teachers & Nurses	
I1 - Scope of work	Only for participants' broad descriptions of their jobs, not for descriptions of their roles and responsibilities within the vaccination campaigns.
I2 - Roles in campaign	Only for descriptions of what the participant is responsible for/ what they do in the HPV vaccination campaigns
I3 - Relationships between	Text on relationships specifically between educators and healthcare workers, how they interact during the campaigns, etc.
I4 - Interacting with learners	All text on how teachers and nurses interact with the learners SPECIFICALLY DURING THE CAMPAIGN: what info they give them, what they advise them to do, how they encourage them or reprimand

	them, etc. Text about communicating with learners about broader SRH issues or about sex should be coded to T2
I5 - Interacting with parents	Teachers' and nurses' interactions with parents SPECIFICALLY ABOUT THE CAMPAIGN. This could be in the form of information sessions or in one-on-one interactions when parents come to them with questions, for example.
I6 - Integrated School Health Programme	Any mention of the School Health Programme (of which HPV vaccination is a part), Could be reference to how the School Health Programme fits into the school schedule, or about specific components of it, eg deworming programme
J - 1 dose vs 2 dose	Anything on the fact that only 1 dose was given in the single dose campaign. Anything comparing 1 dose to 2 doses OR comparing 1st round to 2nd round of national campaign. Any commentary on the efficacy/value of the 2nd dose.
K - Vaccine side effects	Any mention of side effects should be coded here, whether a description of someone experiencing a side effect or knowledge/beliefs about the side effects of the HPV vaccine.
L - Historic challenges with HPV campaign	Any mention of previous challenges, setbacks, or problems experienced in prior HPV vaccination campaigns, be it relationships with other staff, interactions with parents, uptake, vaccine shortages, etc.
M - Boys and HPV	Anything relating to boys being included/excluded from HPV vaccine programming. Any questions asked by participants about why boys are not vaccinated or whether boys can get HPV.
N - Vaccine efficacy	Anything about whether or not the vaccine is perceived to "work". Any description of how the vaccine is thought to work.
O - Mop-up campaign	Any mention about vaccinators (vaccine implementers) returning to schools to vaccinate learners who were not vaccinated. Note that this relates to the same dose as the one administered to the rest of the group, not an additional dose of vaccine.
P - Privately sourced HPV vaccine	Any reference to a case where the HPV vaccine is sourced from, or had been received from, a private doctor or other private healthcare practitioner (e.g. pharmacist).
Q - Parental involvement in school	Parents' involvement in their child's schooling, eg. Communication/ relationship with learner's teachers, attending meetings, etc Note that this is broader than their involvement in the HPV campaign.
R - Recommendations	Recommendations for HPV vaccination in the future.
R1 - Community awareness	Any recommendations for how to improve broad community awareness of HPV, cervical cancer, or HPV vaccination, or awareness among specific groups of people.
R2 - Campaign specific	Any recommendations for what should be changed or improved specifically in how an HPV vaccination campaign is run in the future.
S - Social media	Specific mention of social media (Facebook, Twitter, Instagram, Whatsapp, etc.) even if the text is already coded to 'internet' under 'Sources of info about HPV'.
T - Communication about sex and SRH	This code is primarily about communication about sex and SRH (including HPV) between parent and child, and between school and community. Text about such communication between teacher and learner and between teacher and parent should be coded to "I - Teachers & Nurses', sub-codes I4 and I5.
T1 - Parent-child	Any communication between parent and child about sex and SRH, which may/may not include HPV and cervical cancer.

T2 - Teacher & Nurse-learner	Any communication between teachers and nurses on the one hand, and learners on the other, about sex and SRH matters, including HPV.
U - Understandings of cervical cancer, HPV transmission	Anything on participants' understandings of cervical cancer, how it is caused, how it manifests, how it is treated/cured, including narratives about someone they knew who had cervical cancer. Also anything on participants' understandings of how HPV is transmitted, how infectious it is, the fact that it is an STI, etc.
V - Misconceptions about HPV vaccine	Any view about the vaccine that is clearly untrue or a misunderstanding.
W - Questions	Participants' own questions posed to the interviewer or questions they had during the vaccination campaign, whether answered or not.
X - Concluding Comments	