

**KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING HUMAN  
PAPILLOMAVIRUS VACCINATION, AMONG CAREGIVERS OF GIRLS ATTENDING  
PRIVATE SCHOOLS IN SOUTH AFRICA.**

by

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**CO-SUPERVISOR: PROF SKAAL L (UL)**

**2020**

## DECLARATION

I declare that knowledge, attitudes and practices regarding human papillomavirus vaccination, among caregivers of girls attending private schools in South Africa (mini-dissertation) hereby submitted to the University of Limpopo, for the degree of Master of Public Health has not previously been submitted by me for a degree at this or any other university; that it is my work in design and in execution, and that all material contained herein has been duly acknowledged.

.....

Milondzo, T (Ms)

.....

Date

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## ABSTRACT

The South African government provides human papillomavirus (HPV) vaccination to public school girls for free. The study aimed to investigate knowledge, attitudes and practices towards HPV vaccination, of caregivers of girls aged  $\geq 9$  years in grade 4 to 7 attending private schools in South Africa. Objectives included determining levels of knowledge; describing attitudes; describing practices; and investigating levels of knowledge and attitudes of caregivers associated with HPV vaccination coverage in these girls. Turfloop Research Ethics Committee granted ethical clearance. A link to an online survey (Survey Monkey®, USA) was circulated to caregivers via an email to school principals and a Facebook advert. Epi Info™ was used for data analysis. While 76.5% of caregivers had good knowledge about cervical cancer and HPV vaccination, 45.3% had positive attitudes towards HPV vaccination and 19.4% of the girls were vaccinated. Caregivers with good knowledge were 3.6 (95% CI: 1.6-8.0;  $p < 0.005$ ) times more likely to have vaccinated their daughters/wards, while caregivers with a positive attitude were 5.2 (95% CI: 2.9-9.2;  $p < 0.05$ ) times more likely. The low HPV vaccination uptake is concerning. Results suggest that a positive attitude towards HPV vaccination is a strong predictor of its uptake.

KEYWORD: Human papillomavirus (HPV), Vaccination, Caregiver, Private schools, knowledge, attitude,

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## DEFINITION OF CONCEPTS

<b>Attitude</b>	Is a manner, disposition, feeling, position, etc with regard to a person or thing; tendency or orientation, especially of the mind ( <a href="https://www.dictionary.com/browse/attitude">https://www.dictionary.com/browse/attitude</a> ). In this survey, attitude refers to caregiver's feeling about HPV vaccination.
<b>Caregiver</b>	Is someone who is responsible for looking after another person, for example, a person who has a disability, or is ill or very young. ( <a href="https://www.collinsdictionary.com/dictionary/english/caregiver">https://www.collinsdictionary.com/dictionary/english/caregiver</a> ). In this survey, a caregiver refers to someone who is responsible for looking after the girl.
<b>Girl</b>	Is a female child, from birth to full growth (Dictionary.com, 2017). In this survey, a girl is a female person aged 9 years and older in grade 4 to 7 attending private schools in South Africa.
<b>Human papillomavirus (HPV)</b>	Is the virus which causes the most common viral infection of the reproductive tract (World Health Organization, 2014). This survey concerns the HPV strains that cause cervical cancer.
<b>Knowledge</b>	Is familiarity or conversance with a particular subject or branch of learning (Dictionary.com, 2017). In this survey, knowledge refers to the information that caregivers have about HPV vaccination and cervical cancer.
<b>Practice</b>	Is the action or process of performing or doing something (Dictionary.com, 2017). In this survey, practice refers to whether a girl is vaccinated with the HPV vaccine or not.
<b>Private school</b>	Is a school founded, conducted, and maintained by a private group rather than by the government, usually charging tuition and often following a particular philosophy, viewpoint, etc. (Dictionary.com,

2017). In this survey, a private school is a school that does not receive financial support from the South African government and belongs to the Independent Schools Association of Southern Africa (ISASA).

**Vaccination**

Is the act or practice of vaccinating; inoculating with vaccine (Dictionary.com, 2017). In this survey, vaccination refers to protecting girls from cervical cancer by injecting them with HPV vaccine.

## **ABBREVIATIONS**

AMP	Allopathic medical practitioners
CAM	Complementary and alternative medicine
HPV	Human papillomavirus
IARC	International Agency for Research on Cancer
ISASA	Independent Schools Association of Southern Africa
NDOBE	National Department of Basic Education
PHASA	Public Health Association of South Africa
RSA	Republic of South Africa
SANDOH	South African National Department of Health
USA	United States of America
WHO	World Health Organization

## CHAPTER ONE

### INTRODUCTION

#### 1.1 INTRODUCTION AND BACKGROUND TO THE STUDY

Cervical cancer is the third most common cancer among women worldwide, with an estimated 569 847 new cases and 311 365 deaths in 2018 (Bruni, Albero, Serrano, Mena, Gómez, Muñoz, Bosch, de Sanjosé, 2018). The vast majority (70% of the global burden of cervical cancer) occurs in less developed regions such as sub-Saharan Africa (24%; 95% CI: 23.1–25.0%), Latin America and the Caribbean (16.1%; 95% CI: 15.8–16.4%), eastern Europe (14.2%; 95% CI:14.1–14.4%), and south-eastern Asia (14%; 95% CI:13.0–15.0) (World Health Organization [WHO], 2017).

In the year 2018, cervical cancer was the 2<sup>nd</sup> leading cause of female cancer in Africa and about 119 284 new cervical cancer cases were diagnosed (Bruni et al, 2018b). In contrast, in the same year, cervical cancer was the 6<sup>th</sup> leading cause of female cancer with about 71 689 cases diagnosed in United States of America (USA) (Bruni et al, 2018c).

Among the African countries with high incidences of cervical cancer, Swaziland had the highest incidences of about 75.3 cases per 100 000, followed by Malawi with 72.9 cases per 100 000 and the Republic of South Africa (RSA) being the 14<sup>th</sup> on the list with 43.5 cases per 100 000 (Bruni et al, 2018b).

It is estimated that in RSA, cervical cancer ranks as the second most common female cancer and is the leading cause of female cancer deaths (Bruni et al, 2018d). It is the most common female cancer in women aged 15 to 44 years, with 12 983 new cases being diagnosed annually, and causing about 5 595 deaths annually (Bruni et al, 2018d). For early detection of cervical cancer among woman in RSA, the South African National Department of Health (SANDOH) implemented a cervical cancer screening programme as a secondary prevention strategy, but the rate of screening remains low in the country due to several challenges including poor level of knowledge about cervical cancer (Richter, 2015).

Human papillomavirus (HPV) is the most common virus infecting the reproductive tract, and can cause genital warts, pre-cancerous lesions, and HPV-related cancers such as cervical, vulvar, vaginal, anal, and penile cancer, depending on the HPV type (WHO, 2017). HPV types 16 and 18 are high-risk HPV types which cause about 70% of cervical cancer cases while HPV types 6 and 11 are low risk HPV types that cause about 90% of genital warts cases (WHO, 2017).

It is estimated that 8 out of 10 adults will come into contact with HPV through sexual intercourse, genital contact, skin-to-skin contact or transmission from mother to child during delivery which is very rare (WHO, 2017). Since HPV types causing cervical cancer are mainly sexually transmitted, primary prevention offering the best protection is through vaccination of girls who have not yet come into contact with these HPV types i.e. before sexual debut (WHO, 2017).

Two HPV vaccines (Gardasil® and Cervarix®) were approved by the Medicines Control Council (MCC) of RSA in March 2008 and are currently available in RSA (Harries, Moodley, Barone, Mall & Sinanovic, 2009; Richter, 2015). As recommended by WHO, SANDOH in response to the alarming mortality and morbidity due to cervical cancer in RSA, introduced a school based HPV vaccination programme in April 2014, for girls in Grade 4 in public sector schools who are aged  $\geq 9$  years (Richter, 2015; Tathiah, Naidoo & Moodley, 2015). This programme uses two doses of the bivalent Cervarix® vaccine given 6 months apart (Delany-Moretlwe, Kelley, James, Scorgie, Subedar, Dlamini, Pillay, Naidoo, Chikandiwa & Rees, 2018). The bivalent Cervarix® protects against 70% of the high-risk HPV types causing cervical cancer (WHO, 2017).

For ethical reasons, because this is a school-based programme the target group for HPV vaccination in RSA cannot receive the vaccine without the caregiver's consent (South African Government News Agency, 2015). Caregivers of girls who are attending private schools and wish to vaccinate their children, are advised to consult their doctors at their own cost (South African Government News Agency, 2015). A study conducted in Durban, RSA, found that 86.5% of healthcare workers who prescribed the vaccine did so on the client's request, which could lead to low uptake of this vaccine since requesting it is subject to knowledge of its existence (Allie & Moodley, 2012). Another study conducted in Johannesburg, RSA, found that most female parents understand

that vaccination is important in keeping their children healthy, but lacked knowledge about the HPV vaccine (Francis, Battle-Fisher, Liverpool, Hipple, Mosavel, Soogun & Mofammere, 2011).

Knowledge and understanding of the HPV vaccine, HPV infection and cervical cancer, are important factors that influence the caregivers' decision to get their daughters vaccinated. Similarly, attitudes towards HPV vaccination greatly affect its uptake (Allie et al, 2012). This is what prompted the need to investigate knowledge, attitudes and practices regarding HPV vaccination, of caregivers of age-eligible girls in grade 4 to 7 attending private schools in the RSA.

## **1.2 RESEARCH PROBLEM**

Girls attending private schools may continue to contribute to the mortality and morbidity due to cervical cancer in the future, if they are not vaccinated in time. The concerning issue is whether the parents/caregivers who are responsible for taking eligible girls for vaccination to a private doctor or pharmacist, know and understand the cause of cervical cancer and the importance of vaccinating against it. Also if they know about HPV vaccination, their attitude towards it, and whether or not they are taking their eligible daughters for HPV vaccination, are questions that remain unanswered in RSA.

## **1.3 PURPOSE OF THE STUDY**

### **1.3.1 Research aim**

The study aimed to investigate knowledge, attitudes and practices regarding HPV vaccination, of caregivers of girls aged  $\geq 9$  years in grade 4 to 7 attending private schools in RSA.

### **1.3.2 Research objectives**

- To determine the level of knowledge that caregivers have about HPV vaccination.
- To describe the attitudes of caregivers towards HPV vaccination.
- To describe the practices of caregivers regarding HPV vaccination.
- To investigate levels of knowledge and attitudes of caregivers associated with HPV vaccination coverage in girls aged  $\geq 9$  years.



### **1.3.3 Research questions**

- What is the level of knowledge that these caregivers have about HPV vaccination?
- What are the attitudes of these caregivers towards HPV vaccination?
- What are the practices of these caregivers regarding HPV vaccination?
- Are different levels of knowledge about and attitudes towards HPV vaccination associated with different levels of vaccination coverage in girls aged  $\geq 9$  years?

### **1.4 SIGNIFICANCE OF THE STUDY**

This study investigated the levels of knowledge, attitudes and practices of caregivers of private school girls in all nine provinces of RSA in order to determine the HPV vaccination coverage among private school girls, and investigate if varying levels of knowledge and attitudes contribute to vaccination uptake. The findings may be utilised to formulate strategies to address issues of concern relating to HPV vaccination among girls attending private schools and provide information that may be used to develop educational messages. The study might also assist in making participating caregivers aware of cervical cancer prevention options, which may increase the uptake of HPV vaccination for their daughters, and cervical cancer screening of the mothers / female caregivers.

### **1.5 OUTLINE OF DISSERTATION**

#### Chapter 1

The chapter provides an introduction to the study, background, research problem, purpose as well as the significance of conducting a study on knowledge, attitudes and practices regarding HPV vaccination, among caregivers of adolescent girls attending private schools in RSA.

#### Chapter 2

This chapter reviews literature related to the epidemiology of cervical cancer, the prevention and control of cervical cancer, HPV vaccination coverage around the world and in RSA, knowledge and attitudes about cervical cancer and HPV vaccination among parents, studies reporting on knowledge and attitudes associated with HPV

vaccination uptake, and caregivers' reasons for not allowing children to be vaccinated with the HPV vaccine.

### Chapter 3

The chapter outlines the methods used to conduct the study. The chapter is therefore discussed in terms of research methodology, research design, population, sampling, data collection, data analysis, validity, reliability and ethical considerations.

### Chapter 4

This chapter presents and interprets the results of the study arranged according to the study objectives. Tables and charts are used to present the study findings.

### Chapter 5

The chapter focuses on discussing the findings of the study, recommendations, limitations of the study and concluding remarks.

## **1.6 CONCLUSION**

The chapter briefly highlighted the epidemiology of cervical cancer and the introduction of HPV vaccination programme in the world and in RSA. It further highlighted the exclusion of girls attending private schools from the national immunization programme in RSA as the research problem. The purpose as well as the significance of conducting a study on knowledge, attitudes and practices regarding HPV vaccination, among caregivers of adolescent girls attending private schools in RSA was also highlighted.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 INTRODUCTION**

This chapter gives a brief overview of the epidemiology of cervical cancer, the prevention and control of cervical cancer, HPV vaccination coverage around the world and in RSA, knowledge and attitudes about cervical cancer and HPV vaccination among parents, studies reporting on knowledge and attitudes associated with HPV vaccination uptake and caregivers' reasons for not allowing children to be vaccinated with the HPV vaccine.

#### **2.2 THE EPIDEMIOLOGY OF CERVICAL CANCER**

##### **2.2.1 Causative organism – HPV**

Cervical cancer occurs as a result of persistent HPV infection with high-risk HPV strains (WHO, 2017). HPVs belong to the family Papillomaviridae which infect both cutaneous and mucosal epithelium and have the potential to induce cancer (WHO, 2017). HPVs can be classified as cutaneous or mucosal types depending on the location of the body that they infect, or high-risk vs low-risk types depending on their potential to induce cancer (WHO, 2017). High-risk HPV types include types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, while low-risk HPV types include types 6, 11, 68 and 73 (WHO, 2017).

HPV type 6 and 11 are vaccine preventable and are also responsible for other diseases such as recurrent juvenile respiratory papillomatosis and genital warts. In the year 2012, HPV type 16 and 18 were responsible for 71% of the cervical cancer cases in the world. HPV type 16 accounted for 60.6% (95% CI: 59.6–61.6), HPV type 18 accounted for 10.2% (95% CI: 9.6–10.9) while 20% was due to HPV type 31, 33, 35, 45, 52 and 58 collectively. (WHO, 2017; Bruni, Barrionuevo-Rosas, Albero, Serrano, Mena, Gómez, Muñoz, Bosch & de Sanjosé, 2017).

##### **2.2.2 Transmission of HPV**

HPV infection is the most common viral infection of the reproductive tract (WHO, 2017). It is estimated that 8 out of 10 adults will come into contact with HPV through sexual intercourse, genital contact, skin-to-skin contact, or in rare cases, transmission from mother to child during delivery (WHO, 2017). Persistent Infection with high risk HPV

type may result into cervical cancer if untreated or inappropriately treated. Between 5 to 10% of infections with high risk HPV type will turn into cervical cancer after about 20 years of infection (WHO, 2017).

### **2.2.3 Morbidity and mortality from cervical cancer**

Cervical cancer is the third most common cancer among women in the world, contributing about 569 847 new cervical cancer cases and 311 365 cervical cancer deaths per year (Bruni et al, 2018a). Most (85%, 445 000 annually) cervical cancer cases occur in the less developed regions of the world (Figure 2.1) (WHO, 2017).

In the year 2018 cervical cancer cases and deaths in Africa had escalated to 119 284 and 81 687 respectively. This made cervical cancer to be rated as the second leading cause of cancer as well as the second most common cause of cancer deaths among females who are 15 to 44 years of age in Africa (Bruni et al, 2018b).

Eastern African countries had the highest incidence (30%) of cervical cancer cases followed by western (23%), middle (21.1%) and southern (20%) African countries (Bruni et al, 2018). Among African countries, Swaziland has the highest cervical cancer incidence rate with 75.3 cases per 100 0000, followed by Malawi with 72.9 cases per 100 0000. RSA was the 14<sup>th</sup> on the list with 43.5 cervical cancer cases per 100 0000 (Bruni et al, 2018b).

In 2018, cervical cancer was rated the second leading cause and the first most common female cancer in women aged 15 to 44 years in RSA. It contributed 12 983 new cervical cancer cases and about 5 595 cervical cancer deaths annually in the country in the year 2018 (Bruni et al, 2018d). The vast majority of cervical cancer cases occur in Black women. For example, in 2011 the South African National Cancer Registry (NCR) recorded 4 907 cases of cervical cancer of which 4 056 (82.7%) occurred in black women while only 437 (8.9%) occurred in white women. This massive difference was linked to lack of access to comprehensive and effective integrated care among black woman (SANDOH 2017).

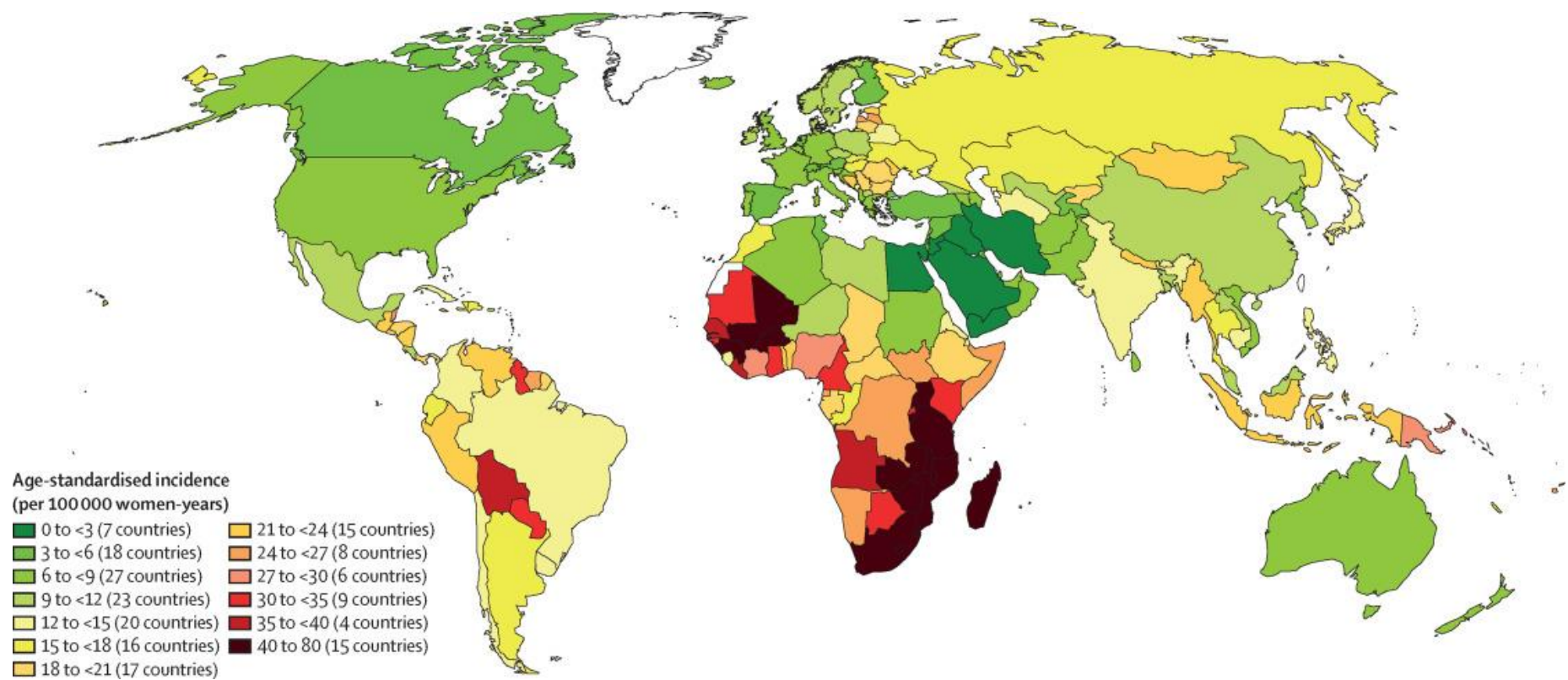


Figure 2.1 Global geographical distribution of cervical cancer incidence in 2018 (Arbyn, Weiderpass, Bruni, de Sanjosé, Saraiya, Ferlayl, Bray, 2020).

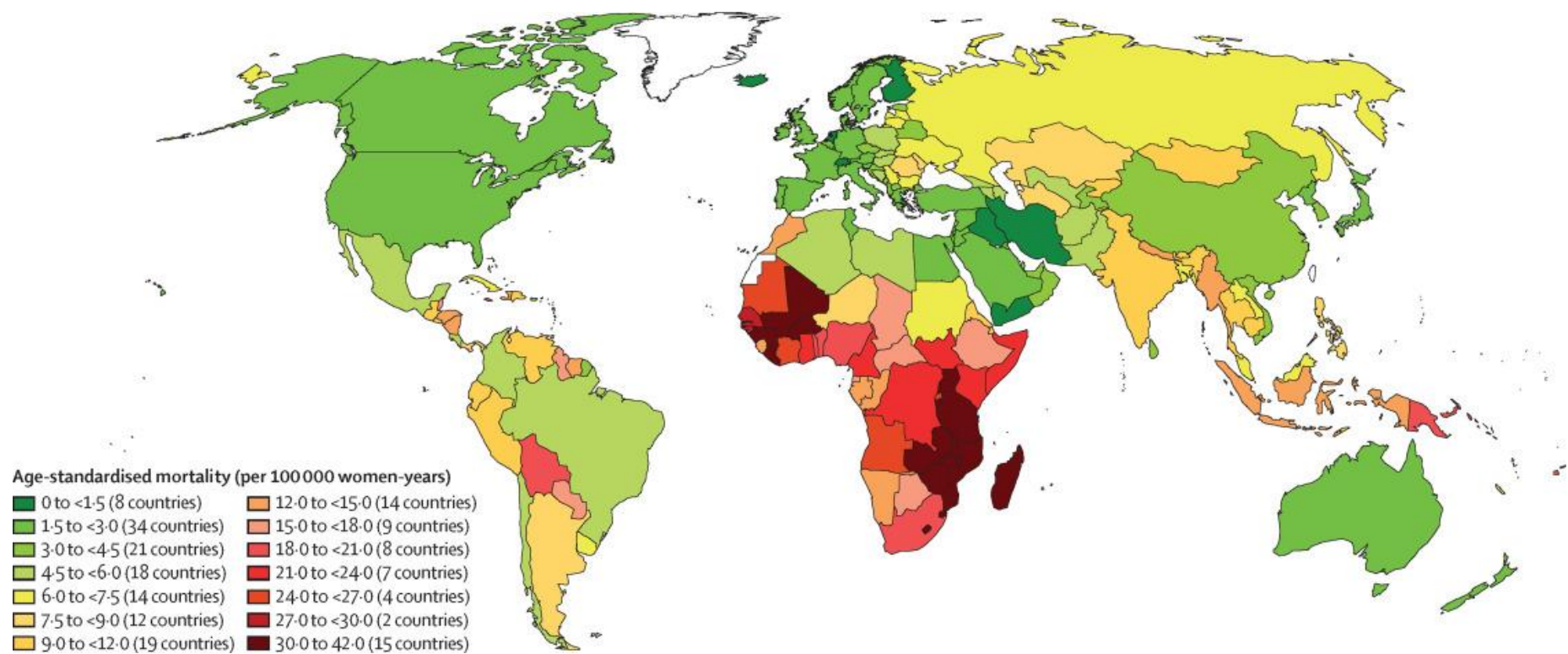


Figure 2.2 Global geographical distribution of age standardized cervical cancer mortality in 2018 (Arbyn, Weiderpass, Bruni, de Sanjosé, Saraiya, Ferlayl, Bray, 2020)

## **2.3. THE PREVENTION AND CONTROL OF CERVICAL CANCER**

### **2.3.1 Primary prevention of cervical cancer**

As a primary preventative strategy aiming to prevent the acquisition of HPV infection and the development of cellular changes in the cervix, three types of prophylactic vaccine against HPV-related diseases are available worldwide (SANDOH, 2017; WHO, 2017). The first vaccine licensed in 2006 was the quadrivalent vaccine followed by the bivalent vaccine in 2007 and the nonavalent vaccine in 2014. All HPV vaccines are based on purified L1 proteins of the different HPV types used in the vaccines, and all are injected intramuscularly. All three HPV vaccines have relatively similar effectiveness in preventing cervical cancer, and are recommended for males and females from the age of 9 years (WHO, 2017).

The bivalent HPV vaccine protects against HPV types 16 and 18, and is used for the prevention of premalignant anogenital lesions affecting the cervix, vulva, vagina and anus including cervical and anal cancers causally related to the specific HPV types targeted by the vaccine. It is available in 1 dose or 2 dose vials or prefilled syringes (WHO, 2017). Two Phase III studies have proven that the bivalent HPV vaccine is highly efficacious in protecting against infection and cervical lesions associated with HPV type 16 and 18 in HPV naïve females (WHO, 2017). The first reported efficacy of 64.9% (95% CI: 52.7–74.2) against cervical intraepithelial neoplasia(CIN) 2+ and 93.2% (95% CI: 78.9–98.7) against CIN3+ in HPV naïve women, irrespective of HPV type (Lehtinen, Paavonen, Wheeler, Jaisamrarn, Garland, Castellsagué, Skinner, Apter, Naud, Salmerón, Chow, Kitchener, Teixeira, Hedrick, Limson, Szarewski, Romanowski, Aoki, Schwarz, Poppe, De Carvalho, Gernar, Peters, Mindel De Sutter, Bosch, David, Descamps, Struyf, Dubin 2012). The second study reported efficacy of 80.8% (95% CI: 52.6–93.5) against CIN2+ in HPV naïve women irrespective of HPV type (Hildesheim, Wacholder, Catteau, Struyf, Dubin, Herrero, CVT Group, 2014).

The quadrivalent HPV vaccine protects against four HPV types, namely 6, 11, 16 and 18, and is used for prevention of premalignant lesions and cancers affecting the cervix, vulva, vagina and anus caused by high-risk HPV types, and anogenital warts causally related to the specific HPV types targeted by the vaccine. It is available in 1 dose vials

or prefilled syringes. It has been proven in 3 Phase II/III studies to be clinically highly efficacious in preventing infections and lesions of the cervix (98.2% 95% CI: 93.3–99.8), vagina and vulva of any grade and for vulvar intraepithelial neoplasia grade 2+ (100% 95% CI: 82.6–100) (Kjaer, Sigurdsson, Iversen, Hernandez-Avila, Wheeler, Perez, Brown, Koutsky, Tay, García, Ault, Garland, Leodolter, Olsson, Tang, Ferris, Paavonen, Lehtinen, Steben, Bosch, Dillner, Joura, Majewski, Muñoz, Myers, Villa, Taddeo, Roberts, Tadesse, Bryan, Maansson, Lu, Vuocolo, Hesley, Saah, Barr, Haupt, 2009).

The nonavalent HPV vaccine protect against HPV types 6, 11, 16, 18, 31, 33, 45, 52 and 58. It is used for the prevention of premalignant lesions and cancers affecting the cervix, vulva, vagina and anus caused by high-risk HPV types, and anogenital warts causally related to specific HPV types (WHO, 2017). A randomized, international, multicenter, double-blind study of the immunogenicity, efficacy, and side-effect profile of the nonavalent HPV vaccine was conducted in women aged 16 to 26 years. The study reported nonavalent HPV vaccine to be highly efficacious in preventing high-grade disease epithelial neoplasia, adenocarcinoma in situ, and cervical cancer related to HPV-31, 33, 45, 52, and 58. It was reported to be 100% (95% CI, 70.4 to 100) efficacious for disease related to the vaccine HPV types and 19.7% (95% CI, –34.5 to 52.5) for disease not related to the vaccine HPV types. (Joura, Giuliano, Iversen, Bouchard, Mao, Mehlsen, Moreira, Ngan, Petersen, Lazcano-Ponce, Pitisuttithum, Restrepo, Stuart, Woelber, Yang, Cuzick, Garland, Huh, Kjaer, Bautista, Chan, Chen, Gesser, Moeller, Ritter, Vuocolo, Luxembourg, 2015).

In January 2016, the WHO Global Advisory Committee for Vaccine Safety which regularly reviews the evidence on the safety of HPV vaccines around the world reported that there is no evidence that suggests any safety concern regarding the use of HPV vaccines (WHO, 2017). Of the 835 (9.0%) serious adverse events that occurred amongst bivalent HPV vaccine group and 829 (8.9%) in the control group of healthy women aged 15–25 years in PATRICIA (derived from PApilloma TRlial against Cancer In young Adults), only 10 (0.1%) and 5 (0.1%) events respectively, were related to vaccination. (Lehtinen et al, 2012). The quadrivalent HPV vaccine was found to be the safest vaccine amongst the three licensed vaccines (WHO, 2017). In a randomized, international, double-blind, phase 2b–3 study conducted amongst 14 215 women who



were given the quadrivalent HPV vaccine or the nonavalent HPV vaccine, participants who were given quadrivalent HPV vaccine experienced less injection site adverse events (84.9%) than those who received the nonavalent HPV (90.7%) (Joura et al, 2015).

### **2.3.2 Secondary prevention of cervical cancer**

Secondary prevention of cervical cancer aims to appropriately treat all preinvasive cervical lesions detected through cervical cancer screening (Jordaan, Michelow, Richter, Simoens, 2016; SANDOH, 2017). In the year 2013, the WHO established a Guideline Development Group to develop a guideline document that provided different strategies for a national screen and treat programme from which health planners could choose (Botha & Dreyer, 2017). Different countries have adopted different strategies and developed their national policies regarding cervical cancer. Countries such as the United Kingdom has adopted the screening with an HPV test and treat, over a strategy of screening with cytology followed by colposcopy (with or without biopsy) and treat because it was found to be more cost effective and protective than cytology (Botha & Dreyer, 2017).

In contrast, according to the 2017 SANDOH's cervical cancer prevention and control policy, the current strategy utilized for cervical cancer screening in RSA is cytology-based screening with pap smear for all woman aged 30 years and above. Women who are asymptomatic, aged 30 to 50 years old, HIV-negative or who do not know their HIV status, have never been screened or who had their last screening test more than 10 years ago are considered as low risk and are screened at an interval of 10 years (SANDOH, 2017). HIV positive woman must be screened at diagnosis and at subsequent 3 year intervals if the screening test results are negative and annually if the screening test results are positive for cervical cancer (SANDOH, 2017).

Despite the existence of a national cervical cancer screening programme since 2002 and the implementation of the cervical cancer prevention and control policy (SANDOH, 2017), cervical cancer remains the leading female cancer in women aged 15 to 44 years and the leading cause of female cancer deaths in RSA (Bruni et al, 2018d). Lack

of awareness programmes on cervical screening for the target group, shortage of necessary equipment and health care workers in health facilities are some of the reasons contributing to the low impact of cervical cancer screening in RSA (Jordaan et al, 2016).

### **2.3.3 Tertiary prevention of cervical cancer**

Tertiary prevention of cervical cancer involves the diagnosis and treatment of confirmed cases of cancer through surgery, radiotherapy, chemotherapy and palliative care when the disease has reached an incurable stage (Jordaan et al, 2016; WHO 2014).

With the escalated annual prevalence of cervical cancer cases around the world in 2018 (569 847 new cases) (Bruni et al, 2018a) more especially in less developed African regions (119 284 new cases) (Bruni et al, 2018c) including RSA (129 83 new cases) (Bruni et al, 2018d), the need for invasive cervical cancer treatment by surgery, radiotherapy and/or chemotherapy has also increased. Insufficient capacity to provide these services in less resourced countries such as RSA makes such services inaccessible and unaffordable to the majority of the affected women (WHO, 2017).

## **2.4 HPV VACCINATION COVERAGE**

### **2.4.1 Countries that have introduced HPV vaccination programmes.**

Between June 2006 and October 2014, 64 countries nationally, 4 countries sub-nationally, and 12 overseas territories were implementing the WHO recommendation of introducing HPV vaccine in their national immunisation programme for girls (figure 2.2) (Bruni et al, 2016; Wigle, Fontenot, Zimet 2016). Most (67.7%, n=42) of the programmes were school based while others were health care facility based, from the 62 programmes which provided information (Bruni et al, 2016). The majority of the programmes (71.8%, n=57) targeted those who were 12 years of age, followed by 47.4% (n=37) of programmes that targeted those who were 11 years of age, 37.2% (n=29) that targeted those who were 13 years, 19.2% (n=15) targeted those who were 9 years and 17.9% (n=14) for those who were 14 years old (Bruni et al, 2016). By 31 March 2017 the proportion of countries that had introduced HPV vaccination in their national programme had increased to 37% (n=71) for girls and 6% (n=11) for boys (WHO, 2017).

Between 2006 and 2014 the global target for HPV immunisation was estimated to be 118 million women. Out of the 118 million, 39.7% (95% CI 33.0–46.8) of those who were aged 9 to 45 years and 54.9% of those aged 45 to 65.4 years were covered by the immunisation programme. The majority (82%, n= 97 million) of those woman were from more developed regions as compared to 18% (n=21 million) who were from less developed regions of the world (Bruni et al, 2016b).

#### **2.4.2 HPV vaccination coverage in sub-Saharan Africa**

By 10 December 2018 only 10 of 55 (16.36%) African countries had introduced HPV vaccination into their national immunisation programme while 18 (32.73%) countries only piloted it (Table 2.1) (Black & Richmond, 2018 & Bruni et al, 2018c). The number is expected to increase as HPV vaccination has been found to be a cost effective strategy for cervical cancer prevention as compared to alternative cervical cancer prevention and control measures particularly in less developed areas where resources needed to treat cervical cancer are limited (WHO, 2017).

Another factor that may increase HPV vaccination in Africa is the strong commitment of the ministers of health and of education in the implementation of school based HPV vaccination as reported by 15 countries that were presented at the “Implementing HPV vaccination in Africa: opportunities for strengthening adolescent health” workshop held in October 2015, in Johannesburg, RSA (Dochez., Burnett, Mbassi , Were, Musyoki, Trovoada, Mphahlele, 2017).

Government ownership and support of the HPV vaccination programme, distribution of information and education through community leaders, teachers, and health workers, school based HPV vaccination and vaccination of out-of-school girls at health centres were successful strategies for HPV vaccination implemented in Rwanda and recommended to other sub-Saharan Countries (Black & Richmond, 2018).

#### **2.4.3 HPV vaccination coverage in RSA**

RSA is also one of the countries which implemented the WHO’s recommendation of protecting girls against cervical cancer by vaccinating those aged 9 years and older, attending grade 04 in all RSA’s government funded or public schools. In this programme eligible girls are injected with 2 doses of the bivalent Cervarix® vaccine at 0 and 6 months. The programme was initiated in April 2014 by the SANDOH through their

relaunched Integrated School Health Programme (ISHP) in collaboration with the Department of Basic Education (DOBE) and Department of Social Development (SANDOH, 2017; Delany-Moretlwe et al, 2018).

The first dose phase of the 2014 HPV vaccination campaign in RSA successfully managed to reach 91% (15 620 out of 17 175) of the targeted schools which had 408 273 girls aged 9 years and older in grade 4. All the eligible girls were given informed consent packages to take home for their parents / caregiver to sign consent for their vaccination. Most of them (86.6%, 353 564) returned the signed consent form and were vaccinated with the first dose. Only 13.4% were not vaccinated for reasons such as not having parental consent, being absent from school, or not being medically eligible for the vaccine on the vaccination day (Delany-Moretlwe et al, 2018). By 6 September 2016, a total of 2 187 761 eligible girls had received both dose 1 and 2 of the HPV vaccine in RSA (Table 2.2) (Denny & Kuhn, 2017).

Prior to this, HPV vaccines were only available at a cost from the private health sector. This was one of the contributory factors to HPV vaccination low uptake in RSA where only 50 000 individuals were vaccinated by private practitioners between December 2009 and November 2014 (Richter, 2015).

## **2.5. KNOWLEDGE AND ATTITUDES ABOUT CERVICAL CANCER AND HPV VACCINATION.**

Despite the approval of the quadrivalent HPV vaccine in the USA in the year 2006 for females and for males in 2009, and implementation of HPV vaccination as recommended by WHO, there is still a notable gap in knowledge and misunderstanding among parents of the purpose of WHO's recommendation for the targeted age group (Fontenot, Domush, Zimet, 2015). In the National Health Interview Survey 2010, conducted 4 years after the approval of the quadrivalent vaccine, 63% of 5 735 parents of children aged 8 to 17 reported to have heard of the HPV vaccine. Similarly, only 68% of adults reported to have heard of the HPV vaccine in a survey conducted in 2013 in the USA (Beavis & Levinson, 2016).

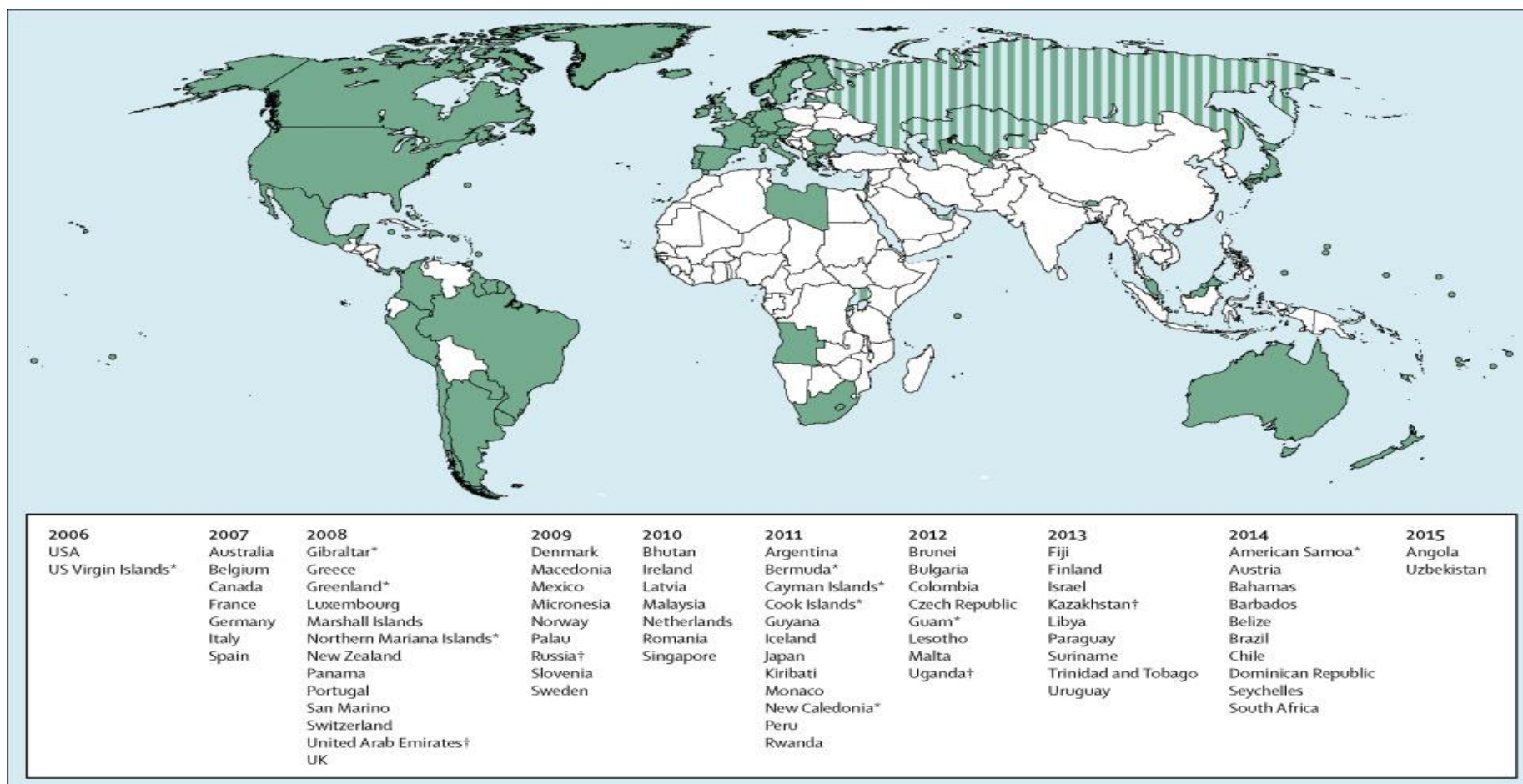


Figure 2.3 Countries that had introduced a publicly funded HPV vaccination in the world by 2015 (Bruni et al 2016). Striped sections indicate implementation in a part of the country. French Polynesia, Liechtenstein, and Niue have reported vaccine programmes, but no information was available about year of introduction. \*Special territory. †Partial implementation.

**Table 2.1 African countries that have initiated HPV vaccination by 2015 (Dochez et al , 2017; Black & Richmond, 2018; & Bruni et al, 2018c)**

Country	Year of introduction	Delivery platform
Botswana	2015	School-based (grades 5–7) and out-of-school girls aged 9–13 years
Ethiopia	2015	*School-based (grade 4) and out-of-school girls aged 10 years
Kenya	2013	*1st demonstration project school-based (grade 4) and 2nd demonstration project health facility based
Lesotho	2012	School-based
Libya	2013	National programme
Malawi	2013	*School-based (grade 4) and out-of-school girls aged 10 years
Mauritius	2016	School-based (grade 5)
Mozambique	2014	*Schools, health facility and community based (10 year old girls)
Rwanda	2011	School-based (grade 6) and out-of-school girls
Sao Tome and Principe	2016	National programme
Senegal	2016	School-based
Seychelles	2014	School-based (grade 6)
South Africa	2014	School-based (grade 4)
Tanzania	2014	*School-based (grade 4) and out-of-school girls aged 9 years
Uganda	2015	School-based (grade 4) and out-of-school girls aged 10 years
Zambia	2014	*School-based (grade 4) and out-of-school girls aged 10 years
Zimbabwe	2014	*School-based (grade 5) and out-of-school girls aged 10 years
*Countries that implemented demonstration projects		

**Table 2.2 Summary of South African national HPV vaccination campaigns, 2014–2016 (Denny & Kuhn, 2017)**

Date and year	Dose 1 coverage	Date and year	Dose 2 coverage	Total dose (1 & 2)
10 March–11 April 2014	419 589	29 September–31 October 2014	329 665	749 254
23 February–20 March 2015	356 228	11 August–4 September 2015	329 000	685 228
16 February–11 March 2016	432 987	2 August–6 September 2016	320 292	753 279
<b>Total</b>	<b>1 208 804</b>	<b>Total</b>	<b>978 957</b>	<b>2 187 761</b>

An online focus group discussion conducted in a national convenience sample of parents in the USA reported that parents who were reported to be knowledgeable about HPV were also in favor of vaccination with the nonavalent vaccine. Their attitude was motivated by the fact that it provides prevention against a number of cancers (Fontenot et al, 2015).

Similarly, in Thailand 52% of parents had knowledge of HPV but only 46% reported that they knew about HPV vaccine. Despite their low level of knowledge about HPV vaccine, parents in Thailand had a high acceptance rate of HPV vaccine for their daughters (Grandahl, Chun Paek, Grisurapong, Sherer, Tyde ´n & Lundberg 2018).

The level of knowledge about HPV, cervical cancer and HPV vaccination was reported to be poor in a study conducted among 30 parents in India. In the study only 7 parents heard of cervical cancer while 2 parents had knowledge of HPV and only 1 knew cervical cancer was associated with sexually transmitted infections. Most of those parents were willing to vaccinate their children against HPV despite their poor level of knowledge about HPV, cervical cancer and HPV vaccination (Paul, Tanner, Gravitt, Vijayaraghavan, Shah & Zimet, 2015).

A report of a systematic review of studies from PubMed/MEDLINE (NCBI), Embase (Elsevier), African Index Medicus (AIM), and POPLINE (K4Health) in sub-Saharan Africa indicated that there is generally a low level of knowledge of cervical cancer and HPV in sub-Saharan Africa. Of the 16 studies reviewed, only one reported moderately high level of knowledge of HPV vaccine while two reported moderate knowledge and three reported no knowledge of cervical cancer, HPV and HPV vaccine. The review concluded that the levels of knowledge of cervical cancer, HPV and HPV vaccine in sub-Saharan Africa is low (Perlman, Wamai, Bain, Welty, Welty & Ogembo, 2014).

In the same systematic review a high acceptance rate of HPV vaccine was reported by 12 studies while 4 reported a high willingness of parents to get their daughters vaccinated. Cameroon, Lesotho, Rwanda, RSA, Tanzania and Uganda were the 6 countries where a HPV vaccination pilot programme was implemented (Perlman et al 2014). Similarly, most (98.1%) of Parents in Lusaka, Zambia were willing to get their children vaccinated and 93% of them believed that their families would allow their children to be vaccinated for an STI while 47.4% were even willing to pay for it (Liu, Vwalika, Hacker, Allen & Awtre, 2012).

In Ilorin, the capital of Kwara State, Nigeria, only 35.1% of parents who participated were aware of HPV vaccine. Despite their low level of knowledge about HPV vaccine, 55.8% believed that all girls

should be vaccinated and 33.4% were well motivated to allow their children to be vaccinated against HPV.

Also, 32% of them indicated that they would have regrets in the future if their children were not vaccinated. This motivation to vaccinate their children could be because half of them also knew of the benefits of the vaccine for their children (Adesina, Saka, Isiaka-Lawal, Adesiyun, Gobir, Olarinoye & Ezeoke, 2018).

A study conducted in Soweto, RSA found low levels of knowledge about HPV and its association with cervical cancer among adolescents and their caregivers. The same caregivers were highly motivated to get their daughters vaccinated against HPV since it is an STI, and they fear that their daughters are vulnerable to sexual violence and age-discordant relationships (Katz, Nkala, Dietrich, Wallace, Bekker, Pollenz, Bogart, Wright, Tsai, Bangsberg & Gray, 2013).

Another study conducted among 1546 women aged 30 years old in four clinics around Vhembe district, RSA also found that only 25.9%(n=246) of participants had heard about HPV. The majority of them did not know that HPV caused cervical cancer and about the HPV vaccine (97.5%, n=1512 and 91.2%, n=1410 respectively) (Ramathuba & Ngambi, 2018). In contrast to caregivers of adolescents in Soweto, the majority (91.2%, n=1424) of women from the four clinics around Vhembe district, were unsure of whether to allow their daughter to receive HPV vaccine or not. This was linked to their lack of knowledge about HPV, cervical cancer and HPV vaccine (Ramathuba & Ngambi, 2018).

## **2.6. STUDIES REPORTING ON KNOWLEDGE AND ATTITUDES ASSOCIATED WITH HPV VACCINATION UPTAKE**

A cross-sectional study conducted n 826 parents from 7 Brazilian cities (Belém, Belo Horizonte, Brasília, Porto Alegre, Rio de Janeiro, São Paulo, and Salvador) reported an adequate knowledge about HPV and HPV vaccine with a high HPV vaccine acceptance rate of 92% for girls and 86% for boys less than 18 years of age. In the study, parents who believed in vaccines in general, had trust in their National Immunization Programme and believed in the efficacy of HPV vaccine were statistically significantly more likely to accept HPV vaccination as compared to those who believed that: HPV vaccine is not safe or can cause severe reactions, girls age 9 to 13 years are too young to get HPV vaccine, and HPV vaccination can cause girls to become sexually active earlier (Mendes Lobão, Duarte, Burns, de Souza Teles Santos, Chagas de Almeida, Reingold & Moreira Junior, 2018).



An online HPV survey conducted among 179 parents of daughters aged 9 to 17 years from the USA, United Kingdom and Australia in 2017 found that parents' knowledge about HPV infection and HPV vaccination was the strongest factor associated with their daughters' vaccination status ( $p < 0.001$ ). Parents with both very low and very high knowledge scores were less likely to have their daughters vaccinated (Nickel, Dodd, Turner, Waller, Marlow, Zimet, Ostini & McCaffery, 2017).

Similarly, a study conducted in Hong Kong between May 2015 and July 2016 amongst parents or guardians of female students aged 9 to 14 years enrolled in primary grades 4 to 6 and secondary grades 1 to 2 reported that parents who had never heard of HPV vaccine were 0.28 (95% CI 0.10–0.81,  $p = 0.02$ ) less likely to vaccinate their daughters against HPV (Yuen, Lee, Chan, Tran, Sayko, 2018).

A low level of knowledge about HPV vaccine was reported in a cross-sectional study conducted among 450 parents of high school students from the city of Zgorzelec in southwestern Poland. In the study only 20.2% of the parents scored  $>50\%$  on the knowledge test. Of all parents, 85.1% were willing to have their children vaccinated, 4.2% had a negative attitude towards HPV vaccination and 10.7% were unsure. Parents' willingness to vaccinate their adolescent children against HPV was 2.02 ( $p = 0.01$ ) more in parents who had ever heard of HPV infection and 3.02 ( $p = 0.006$ ) more among those who had positive attitudes toward vaccines (Ganczak, Owsianka & Korzen', 2018).

The results of a systematic review of 14 peer-reviewed articles on the factors associated with HPV vaccine acceptability among adults in African countries also reported a low vaccine-related awareness and knowledge within the sub-Saharan region but their acceptance of the HPV vaccine for their daughters was high (range 59-100%) (Cunningham, Davison, Aronson, 2014).

Another study confirmed that HPV awareness was low (42.8%) among mothers of female secondary school students in Abakaliki, Nigeria. The study reported that 89.1% of the mothers were willing to vaccinate their daughters, but only 6.9% of them reported that their daughters had ever received HPV vaccine. The study concluded that lack of awareness on HPV vaccine and cost of vaccination are the most cited reasons for low vaccine uptake among the mothers (Azuogu, Umeokonkwo, Azuogu, Onwe, Okedo-Alex, Egbuji, 2019)

A study conducted in RSA during an HPV vaccine implementation project in the Western Cape and Gauteng Province reported that parents had poor knowledge about HPV vaccination during their daughter's first HPV vaccination sessions but their knowledge was found to have significantly increased 6 months later after they attended the information session and school-based HPV vaccination of their daughters (Dreyer, van der Merwe, Botha, Snyman, Constant, Visser, Harvey, 2015).

In the University of KwaZulu-Natal, RSA, 96% of 48 non-medical academics employees who participated in a cross-sectional survey had heard of cervical cancer and all had heard about HPV. After reading the factual information on cervical cancer and HPV, the acceptance rate to vaccinate their daughter against cervical cancer increased from 80% to 89% ( $p < 0.05$ ) (Hoque, 2015).

## **2.7 REASONS FOR NOT ALLOWING CHILDREN TO BE VACCINATED WITH THE HPV VACCINE**

### **2.7.1 Recommended vaccination age**

In South Carolina, USA parents were reluctant to vaccinate their children at the recommended age of 11–12 years old because they likened vaccinating their children against a sexually transmitted virus to endorsing sexual activity amongst children, which is against their religious beliefs (Cartmell, Young-Pierce, McGue, Alberg, Luque, Zubizarreta & Brandt, 2018). This is also because most of them felt that it was unlikely that girls younger than 15 would be sexually active.

Considering their adolescent daughters as being too young to receive the HPV vaccine and not wanting their daughters to be stigmatized as promiscuous were reasons given by 46.5% and 37.6% parents respectively of adolescent girls aged 12–18 years attending secondary school in Kwai Chung district, in Hong Kong, for not accepting HPV vaccination (Loke, Chan & Wong, 2017).

Parents in Northwest Tanzania suggested vaccinating girls who are younger than 7 years because they believe that the majority of girls engage in sexual activities around 10 years of age (Remes et al, 2012). Similarly, 72.5% of the academics working at the University of KwaZulu-Natal, RSA reported that HPV vaccination should be given before their daughters are matured enough to understand about sex, while 22.5% think that their children will decide for themselves whether they want to be vaccinated or not when they are grown up (Hoque, 2015).

In RSA, the recommended age for vaccination is between 9 to 12 years, because (a) the immunological response is stronger in this age group than in older girls; (b) there are high levels of sexual abuse of young girls; and (c) sexual debut is early, occurring between the ages of 9 and 15 years (Harries et al, 2009).

### **2.7.2 HPV vaccine side effects**

In a review aimed to evaluate the recent research in disparities in vaccine uptake in the USA concerns about side effects was one of the reasons given by parents who lack knowledge about HPV vaccine for not vaccinating their daughters (Beavis & Levinson, 2016).

The study conducted in Brazil also reported that fear of reactions or adverse events was the most common reason for 51% of parents to refuse HPV vaccination for their children (Mendes Lobão et al, 2018). This was also reported by 52% of the parents who decided not to vaccinate their daughters in the study conducted in Tuen Mun and Yuen Long districts, Hong Kong (Yuen et al, 2018). Another reason for HPV vaccine refusal mentioned by 64.7% of Parents in Kwai Chung district, Hong Kong was that the side-effects of the HPV vaccine are unknown since the vaccine is relatively new (Loke, Chan & Wong, 2017).

In contrast to the reports above, 56.9% of parents in Poland were not concerned about the safety of HPV vaccine, but those who were concerned about the possible side effects of HPV vaccine were 0.60 less willing to vaccinate their adolescent children against HPV ( $p < 0.05$ ) (Ganczak et al, 2018).

Concerns about vaccine safety also was one of the reasons given by 5 of 48 non-medical academics working at the University of KwaZulu-Natal, RSA, who still did not want to vaccinate their daughters even after reading the factual information on cervical cancer and HPV. However, they indicated that evidence on the safety and effectiveness of the vaccine might change their minds regarding vaccinating their daughters (Hoque, 2015).

### **2.7.3 Physician's recommendation**

According to a study conducted in the USA, the main reason for most parents (44%) not vaccinating their daughters was lack of a physician's recommendation, resulting in missed vaccination opportunities for eligible girls (Perkins, Clark, Apte, Vercruyssen, Sumner, Wall-Haas, Rosenquist, & Pierre-Joseph, 2014).

A study conducted in Hong Kong also supports that having a doctor's recommendation of the HPV vaccine is an important factor associated with the uptake of HPV vaccine. Parents who had their

doctor's recommendation in Tuen Mun and Yuen Long districts were more willing to allow their daughters to be vaccinated (OR 4.54, 95% CI 1.05–19.57,  $p = .04$ ) (Yuen et al, 2018).

A study based on interviews conducted with state leaders who represented diverse organisations with potential impact on HPV vaccination policies and practices in the US, South Carolina, gives some insights on why some physicians may not give this recommendation. Reasons included: (a) lack of awareness of HPV vaccine guidelines among some pediatricians and family practitioners; (b) providers' limited comfort in discussing the topic; (c) perceptions about the time required to present HPV vaccination to parents and address their questions; and (d) the tendency of adolescents to visit physicians only for acute health issues making it difficult to address preventive care issues (Cartmell et al, 2018).

In RSA girls attending private schools are not included on the national HPV vaccination programme, they should get vaccinated from their private doctors at their own cost. A doctor's recommendation for HPV vaccination is therefore key (Harries et al, 2009). The low HPV vaccination uptake of 50 000 individuals estimated from 2009 to 2014 was associated with insufficient knowledge and awareness of HPV infection, cervical cancer and HPV vaccine availability among healthcare workers and patients. It was therefore, recommended that the private sector should increase knowledge and awareness of HPV, cervical cancer and the need for HPV vaccination among adolescents (Tathiah et al, 2015).

#### **2.7.4 Vaccination cost**

HPV vaccination is known as a cost effective method of preventing cervical cancer (WHO, 2017). However, the cost of vaccination can become a barrier to accessing the HPV vaccine in places like South Carolina, Columbia, USA where most of the children receive their vaccination through their private insurance, Medicaid, or the federal Vaccines for Children (VFC) programme (Cartmell et al, 2018)

A study conducted in public and government-funded schools in Tuen Mun and Yuen Long districts, New Territory West, Hong Kong between May 2015 and July 2016 amongst parents or guardians of female students aged 9 to 14 years enrolled in primary grades 4 to 6 and secondary grades 1 to 2 reported that 64.5% of parents who participated were willing to pay less than US\$125 for their daughter's HPV vaccination. Parents who preferred for their daughter to receive the vaccine at a private clinic (OR 0.44, 95% CI 0.26 –.75,  $p = 0.002$ ) and parents who were willing to pay more than HK\$2000 for the vaccine (OR 0.39, 95% CI 0.19–0.81,  $p = .01$ ) were less likely to have their daughters vaccinated against HPV (Yuen et al, 2018).

This challenge also applies in RSA where free vaccination is offered to girls aged 9 years and older attending grade 4 in public schools only. Parents whose daughters attend private schools are advised to take them to private health service providers for vaccination at their own cost (Richter, 2015). Those who do not have medical insurance or are underinsured and those whose private insurers does not cover the vaccine may remain unvaccinated and may contribute to the increase in prevalence of HPV infection and related mortality and morbidity including cervical cancer in the future (Cartmell et al, 2018).

## **2.8 CONCLUSION**

This chapter gave a brief overview of the epidemiology of cervical cancer, the prevention and control of cervical cancer, HPV vaccination coverage around the world and in RSA, knowledge and attitudes about cervical cancer and HPV vaccination among parents, studies reporting on knowledge and attitudes associated with HPV vaccination uptake and caregivers' reasons for not allowing children to be vaccinated with the HPV vaccine. The next chapter discusses the methodology used to conduct the study.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 INTRODUCTION**

This chapter describes the research design and methodology applied to determine the level of knowledge that caregivers have about HPV vaccination, to describe the attitudes and practices of caregivers towards HPV vaccination as well as to investigate levels of knowledge and attitudes of caregivers associated with HPV vaccination coverage in girls aged  $\geq 9$  years.

#### **3.2 RESEARCH METHODOLOGY**

Quantitative research methodology was used in this study because firstly, the study aimed to measure (a) knowledge levels; (b) frequencies of positive, negative and neutral attitudes; and (c) frequencies of practices (i.e. vaccination coverage and the number of doses) regarding HPV vaccination. Secondly, a quantitative methodology was needed in order to identify (and measure the strength and statistical significance of) any association between knowledge and practice, and between attitudes and practice. Quantitative research is a formal, objective, systematic process implemented to obtain numerical data for understanding aspect of the world (Grove, Burns & Gray, 2013).

#### **3.3 RESEARCH DESIGN**

A cross sectional design was applied in the study because survey data were collected from the participating caregivers at a specific point in time. Cross-sectional studies examine the relationship between outcomes (such as diseases or other health-related characteristics) and other variables of interest as they exist in a defined population at a particular point in time (Detels, Gulliford, Karim & Tan, 2015).

#### **3.4 SAMPLING**

##### **3.4.1 Study population**

The study population was all caregivers of girls aged  $\geq 9$  years in grade 4 to 7 attending private schools in RSA. The number of South African private schools offering education for girls in grades 4 to 7 totalled 1497 with 90 722 girls in the year 2018 (personal communication with NDOBE). Further details are provided in Table 3.1.



Figure 3.1 Image illustrating the map of South Africa with provinces and neighbouring counties (Sartorius, Sartorius, Chirwa & Fonn, 2011).

### 3.4.2 Sampling method

In this study, 4 provinces (Figure 3.1) were selected from the 9 provinces of RSA using simple random sampling as follows: The province names were written on separate pieces of paper which were folded up and shaken in a box. Four provinces (Gauteng, Western Cape, North West and Limpopo) were drawn from the box.

### 3.4.3 Sample size

This study used an online survey for data collection, and since it is well established that the response rate for online surveys is low (Nulty, 2008; Hoque, 2015), sampling below provincial level was not conducted and it was planned that all 1026 schools in the 4 selected provinces were to be invited to participate through an invitation sent to the principal of each school (See Annex 1). If all

schools had accepted, then the survey would have been distributed by the principals to all caregivers of 66 759 eligible girls (Table 3.2).

### 3.4.4 Inclusion criteria

Private schools that belonged to the Independent Schools Association of South Africa (ISASA) offering tuition to girls in grades 4 to 7 were included because it is the largest private school association in RSA with a data base of contact details. Caregivers with at least one daughter aged  $\geq 9$  years in grade 4 to 7 attending any of the private schools that were included in this survey, were included. In cases where caregivers had more than one eligible daughter, HPV vaccination data was collected only on the youngest eligible daughter.

**Table 3.1 Schools and girls related to the study population numbers per province in 2018 (personal communication with NDOBE, 2018)**

Province	No. of all independent schools	No. of ISASA affiliated schools	No. of girls in Grade 4	No. of girls in Grade 5	No. of girls in Grade 6	No. of girls in Grade 7	Grand Total	Final sample**
Gauteng	617	185	12 823	11 403	10 465	9780	44 471	250 (47.6)
Western Cape	204	19	2448	2283	2163	1932	8826	119 (22.7)
Eastern Cape	166	38	3105	2703	2589	2477	10 874	35 (6.7)
Kwa-Zulu Natal	145	70	1945	1824	1646	1696	7111	50 (9.5)
Limpopo	142	26	2924	2638	2431	2182	10 175	43 (8.2)
Mpumalanga	80	17	877	740	655	589	2861	5 (1.0)
North West	63	6	959	831	800	697	3287	15 (2.9)
Free State	58	18	786	737	604	599	2726	7 (1.3)
Northern Cape	22	1	122	98	98	73	391	1 (0.2)
<b>Grand Total</b>	<b>1497</b>	<b>380</b>	<b>25 989</b>	<b>23 257</b>	<b>21 451</b>	<b>20 025</b>	<b>90 722</b>	<b>525</b>

**Table 3.2 Sampled provinces (personal communication with NDOBE, 2018)**

Province	No. of all independent schools	No. of ISASA affiliated schools	No. of girls in Grade 4	No. of girls in Grade 5	No. of girls in Grade 6	No. of girls in Grade 7	Grand Total
Gauteng	617	185	12 823	11 403	10 465	9780	44 471
Western Cape	204	19	2448	2283	2163	1932	8826
Limpopo	142	26	2924	2638	2431	2182	10 175
North West	63	6	959	831	800	697	3287
<b>TOTAL</b>	<b>1 026</b>	<b>236</b>	<b>19 154</b>	<b>17 155</b>	<b>15 859</b>	<b>14 591</b>	<b>66 759</b>



### **3.4.5 Exclusion criteria**

Private schools that did not belong to ISASA and did not accommodate girls in grades 4 to 7 were excluded from the survey. Caregivers with daughters younger than 9 years and no daughters  $\geq 9$  years of age were excluded from the survey. Table 3.2 presents the number of Independent female learners per grade and per province, in 2018.

## **3.5 DATA COLLECTION**

### **3.5.1 Data collection approach and method**

A structured self-administered anonymous online survey (see Annex 2) to obtain information about caregiver's socio-demographic data, their knowledge, attitudes and practices regarding HPV vaccination was conducted.

### **3.5.2 Development of data collection instrument**

The online survey was created through Survey Monkey software (<https://www.surveymonkey.com>).

### **3.5.3 Characteristics of data collection instrument**

The survey consisted of 46 questions divided into 4 sections:

*Section A:* Asked questions on socio-demographic data of both the caregiver and their daughter/ward.

*Section B:* Had questions on knowledge of caregivers regarding HPV, cervical cancer and HPV vaccination.

*Section C:* Had questions on caregiver's attitude towards HPV vaccination.

*Section D:* Had questions on caregiver's practice regarding HPV vaccination. Caregivers who have not taken their daughters for vaccination were also asked questions related to their reasons for not vaccinating their daughter/ward.

### **3.5.4 Data collection process**

The email addresses for 904 of the 1 026 schools fitting the inclusion exclusion criteria were sourced from NDOBE. After finalising the questionnaire, on 19 March 2018 all 904 school principals were sent an invitation email (See Annex 2) in which the rationale for the study was explained, and they were requested to circulate the invitation by email to the relevant caregivers. The invitation provided information on the aim and objectives of the study followed by a consent statement and an option to

accept or decline participation in the study. Participants were informed that the survey was completely anonymous, and that participation was strictly voluntary, thus they could withdraw from the study at any point without penalty. Those who clicked on the “accept” hyperlink were redirected to the anonymous questionnaire. Participants were requested to select the most applicable answer from the lists provided for each question.

For emails that bounced back, valid email addresses were searched for telephonically and through electronic searches on school names using Google. Emails were resent to addresses that could be found between 6 May to 16 June 2018. Reminder emails were sent to all valid email addresses between 15 August to 27 September 2018. Since there was a very poor response rate, a paid Facebook advert (worded as follows: If you have a daughter in grades 4 to 7 attending a South African private school, please click on the link below to participate in an anonymous HPV vaccination survey, and stand a chance for your daughter's school to win R20 000 in gift vouchers) with a link to the survey was placed from 31 October to 3 November 2018. The advert targeted all South African Facebook users over the age of 25 years, thus caregivers from all 9 provinces were included (See section 4.2.2). In addition, the advert was placed on the South African Vaccination and Immunisation Centre’s Facebook page from 31 October to 19 November 2018.

### **3.6 DATA ANALYSIS**

Data were exported from Survey Monkey to Microsoft Excel 2010 where the following was performed:

Demographics of caregivers and girls: For the continuous data collected for age of daughters measures of central tendency (average, median and mode) and dispersion (range and standard deviation [SD]) were calculated. For categorical data (e.g.: caregivers’ relationship to girls, education level of caregivers, employment status of caregivers, etc.), frequency distributions using percentages and 95% CIs were calculated.

*For Objective 1:* There were 8 statements included in the knowledge test, and respondents had to select one option: True, False, Unsure. Each correct answer was scored 1, while incorrect answers (including “unsure”) were scored 0. The total possible score was thus 8. The mean and median scores, score range and SD were calculated. Furthermore, knowledge scores were converted to categorical data using cut-offs. Knowledge categories were poor (score: 0-3), average (score: 4) and good (score: 5-8).

*For Objective 2:* There were 6 statements included in the attitude test, and respondents had to select one option from a 5-point Likert scale: “Strongly disagree”, “Disagree”, “Neither agree nor disagree”, “Agree”, “Strongly agree”. Positive answers were scored from 4 to 0 for each respective option, while negative statements were scored from 0 to 4. The possible scores thus ranged from 0 to 24. The mean and median scores, score range and SD were calculated. Furthermore, attitude scores were converted to categorical data using cut-offs. Attitude categories were negative (score: 0-11), neutral (score: 12) and positive (score: 13-24).

*For Objective 3:* Only categorical data were collected for this objective (e.g.: vaccination status, vaccine type, medical insurance, healthcare provider, reasons for not vaccinating, etc.), thus frequency distributions using percentages and 95% CIs were calculated.

*For Objective 4:* Inferential data analysis was used to measure associations between knowledge and HPV vaccination coverage, and attitudes and HPV vaccination coverage, and their statistical significance. These statistics included odds ratios (ORs), the 95% confidence intervals (95% CI) around the ORs, and chi-square p-values for the ORs.

### **3.7 VALIDITY**

Validity is a measure of whether a data collection tool accurately measures what it is supposed to (Moule & Goodman, 2014). A self-administered questionnaire based on reviewed literature was used to collect data. The questionnaire was sent to various experts in the field of HPV vaccination including supervisors for review in order to ensure content validity of the questionnaire. Thereafter the survey was pre-tested from 12 January to 21 February 2018 on 17 academics working in the field of vaccination. The volunteers gave input to improve the questionnaire, which was then finalised by the 12 March 2018. The results of the pre-test were excluded from the data analysis.

### **3.8 RELIABILITY**

Reliability is the consistency with which a tool measures what it is intended to (Moule & Goodman, 2014). Analysis of data obtained from Survey Monkey was repeated in order to ensure reliability of the study and consistency of the data collection tool.

### **3.9 ETHICAL CONSIDERATIONS**

#### **3.9.1 Ethical clearance and permissions**

The proposal for this study was reviewed by the School of Health Sciences Senior Degree Committee, after which corrections were made. The proposal was then reviewed and given ethical clearance by the Turfloop Research Ethics Committee (TREC/259/2017:PG) (Annex 2).

### **3.9.2 Ensuring participant privacy**

In this study, privacy was ensured by sending the invitation via the school principals and making the survey anonymous. Thus the researcher did not have access to the participants' email addresses; and no personal identifier data (home address, telephone number, parent's name, name of daughter or her student number) was captured by the survey. The same applies to the paid Facebook advert, and the free Facebook advert placed on the SAVIC Info Facebook page.

### **3.9.3 Ensuring participant autonomy**

In order to obtain the participants' consent, comprehensive and clear information was provided to the participants regarding their participation in the study, which included the aim and objectives of the study followed by an option to accept or decline participation in the study. The information with a link to the online questionnaire was emailed to the targeted caregivers by the school principals. Similarly, the Facebook advert had a link to the online survey. Only caregivers who consented to participate and clicked on the link, completed the survey.

### **3.9.4 Ensuring beneficence and non-maleficence**

There were no risks for participants in this study, with the only inconvenience being the time taken to complete the survey. The benefits for participants and society are described in section 8 below. The incentive offered to schools to encourage their participation (i.e. being entered into a lucky draw to win R20 000) was not an undue incentive to participate in risky research, as there are no risks, and HPV vaccination is a public good that is recommended by the WHO (WHO, 2017). All participating schools were given a number which was entered into a lucky draw using Research Randomizer (<https://www.randomizer.org/>), to win a R20 000 gift voucher. The winning school was asked to select the store from which the voucher was purchased, based on the needs of the school.

### **3.10 Conclusion**

This chapter discussed the research methodology employed in executing the research study. The research methodology, research design, population, sampling, data collection, data analysis, validity, reliability and ethical consideration was emphasised. The chapter that follows presents and interprets the results of the research study.

## CHAPTER FOUR

### PRESENTATION OF FINDINGS OF THE STUDY

#### 4.1 INTRODUCTION

In this chapter, the results of the study based on caregivers' knowledge regarding HPV, cervical cancer and HPV vaccine including their attitudes towards HPV vaccination and their daughter/wards' HPV vaccination status are presented.

#### 4.2 RESPONSES

##### 4.2.1 Response from invitation sent via school principals

Of the 904 schools with email addresses on the NDOBE list, 814 had valid email addresses. Of the 814 schools with valid email addresses that were emailed between 19 March and 16 June, 2.0% (16/814) were named by respondents as the school their daughter was attending. There were 139 responses by 14 August, the day before the reminder emails were sent out.

After sending the reminder emails between 15 August to 27 September 2018, by the 30 October 2018, the day before the Facebook advert was placed, the proportion of schools named by respondents increased to 2.3% (19/814), while responses had increased to 167. Since 2.3% of the schools had responded, the approximate number of girls whose caregivers received the invitation to participate was calculated as 2.3% of 66 759 (see Table 3.1), giving 1 535. This gave a response rate of only 10.9% (167/1535).

##### 4.2.2 Response from Facebook advert

The paid Facebook advert placed from 31 October to 3 November 2018 had the potential to reach all caregivers of the 90 722 eligible girls, since it targeted all South African Facebook users over the age of 25 years from all nine provinces. By the time the advert was withdrawn on 3 November, it had been viewed by 118 105 Facebook users (views are called "Impressions" by Facebook), and the responses had increased to 562. The number of caregivers of eligible girls who were among those who viewed the advert is unknown. Also, the number of caregivers of eligible girls who use Facebook is unknown. It is thus not possible to calculate a response rate for this increase of 395. In addition, the free advert that was placed on the South African Vaccination and Immunisation

Centre's Facebook page from 31 October to 19 November 2018 brought in an additional 53 responses after 3 November, bringing the total number of responses to 615.

#### **4.2.3 Total responses**

There were 615 responses in total. All 615 completed the question on their relationship to the girl, while 580 completed the questions on demographics. Only 479 completed the section on the age and grade of the girl, while 455 completed the sections measuring knowledge and attitudes, and 413 completed the question on HPV vaccination status.

### **4.3 CAREGIVERS' DEMOGRAPHICS**

#### **4.3.1 Relationship with the girls (n=615)**

The frequency distribution of participants' relationship with the girl is presented in Table 4.1. The majority of caregivers who participated (88.1% [542/615]) were biological parents of the girls.

#### **4.3.2 Caregivers' gender (n=615)**

Of all caregivers, 91.4% (562/615) were females while 8.6% (53/615) were males. Of legal guardians, 84.6% (11/13) were females and 15.4% (2/13) were males.

#### **4.3.3 Caregivers' age (n=580)**

The majority (83.1% [482/580]) of caregivers who participated were aged between 30 and 49 years (Table 4.1).

#### **4.3.4 Caregivers' race / ethnicity (n=580)**

The dominant race among the caregivers who participated were Whites (62.6% [363/580]) as compared to 37.4% (217/580) of other races (Figure 4.1).

#### **4.3.5. Caregivers' level of education (n=580)**

Most of the caregivers (74.1% [430/580]) had a tertiary qualification. Of these, 38.1% (164/430) were postgraduates while 29.5% (127/430) and 28.4% (122/430) graduated with a Diploma and a Bachelor's degree respectively (Table 4.1).

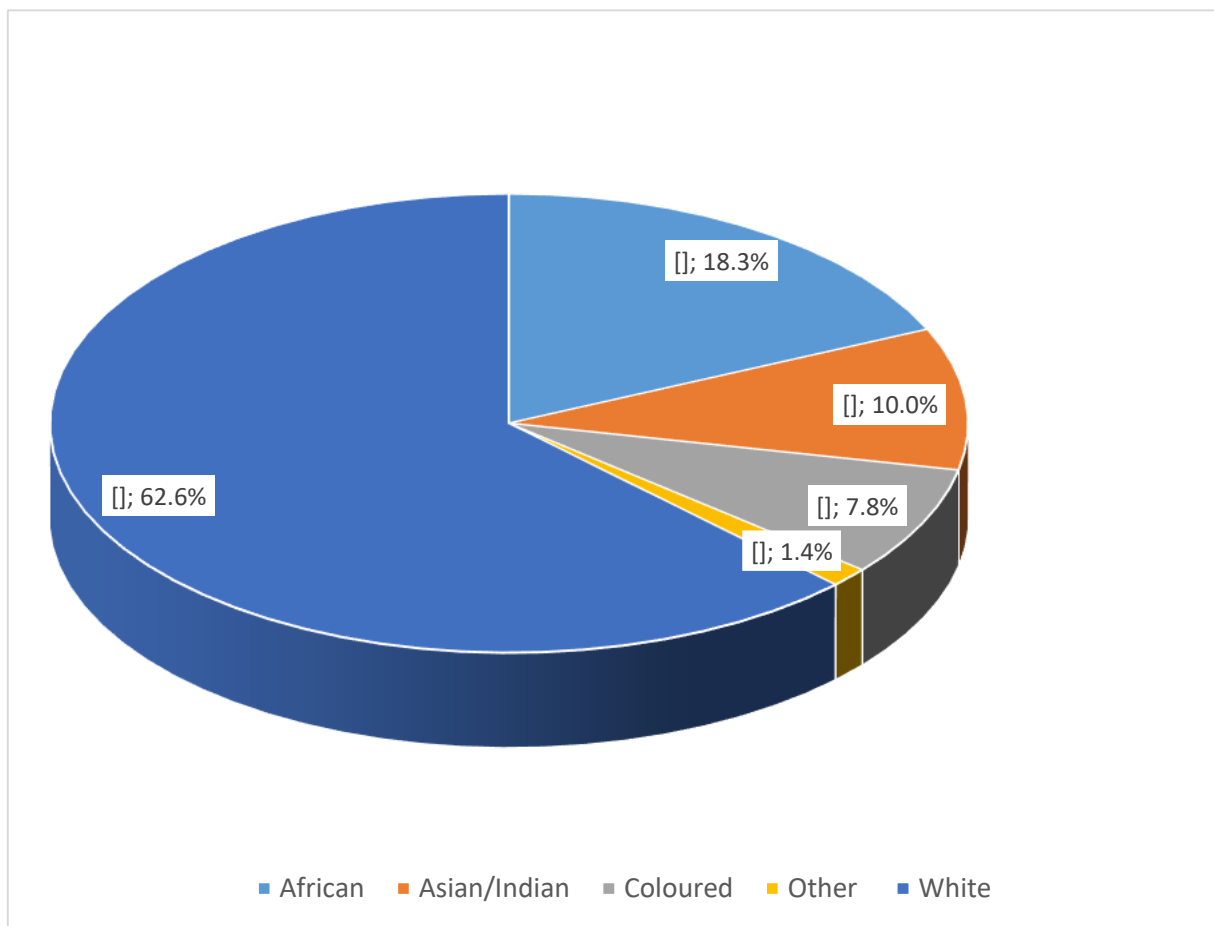
#### **4.3.6. Caregivers' employment status (n=580)**

The majority of the caregivers (86.0% [499/580]) were employed or self-employed (Table 4.1).

**Table 4.1 Frequency distribution of caregiver' socio-demographics.**

Variable		n (%)	95% CI
<b>Relationship with girl (n=615)</b>			
<i>Biological Parents</i>	Mother	501 (81.5)	78.1-84.4
	Father	41 (6.7)	4.9-9.0
<i>Relatives</i>	Grandmother	11 (1.8)	0.9-3.3
	Grandfather	2 (0.3)	0.1-1.3
	Aunt	35 (5.7)	4.1-7.9
	Uncle	7 (1.1)	0.5-2.4
<i>Step Parents</i>	Step-mother	4 (0.7)	0.2-1.8
	Step-father	1 (0.2)	0.0-1.1
<i>Legal guardian</i>	Female: 11; Male: 2	13 (2.1)	1.2-3.7
<b>Age (n=580)</b>			
	≤19	29 (5.0)	3.4-7.2
	20-29	24 (4.1)	2.7-6.2
	30-39	199 (34.3)	30.5-38.4
	40-49	283 (48.8)	44.7-52.9
	50-59	36 (6.2)	4.4-8.6
	≥60	9 (1.6)	0.8-3.0
<b>Education level (n=580)</b>			
<i>Graduated with a tertiary qualification: 74.1% (430)</i>	Diploma	127 (21.9)	18.6-25.5
	Bachelors degree	122 (21.0)	17.8-24.6
	Honours degree	92 (15.9)	13.0-19.2
	Masters degree	51 (8.8)	6.7-11.5
	Doctoral degree	21 (3.6)	2.3-5.6
	*College qualification	17 (2.9)	1.8-4.8
<i>Incomplete tertiary qualification</i>	1 year of college	32 (5.5)	3.9-7.8
	2 years of college	20 (3.4)	2.2-5.4
	3 years of college	12 (2.1)	1.1-3.7
<i>Secondary qualification</i>	12th grade	68 (11.7)	9.3-14.7
<i>Incomplete secondary school education</i>	9th grade	5 (0.9)	0.3-2.1
	10th grade	4 (0.7)	0.2-1.9
	11th grade	3 (0.5)	0.1-1.6
<i>Primary qualification</i>	7th grade	2 (0.3)	0.1-1.4
<i>None / little education</i>	1st grade	2 (0.3)	0.1-1.4
	Did not attend school	2 (0.3)	0.1-1.4
<b>Employment status (n=580)</b>			
<i>Employed or self-employed</i>	Full-time employed	315 (54.3)	50.2-58.4
	Self-employed	123 (21.1)	18.0-24.8
	Part-time employed	61 (10.5)	8.2-13.4
<i>Unemployed</i>	Unemployed by choice	50 (8.6)	6.5-11.3
	Seeking employment	24 (4.1)	2.7-6.2
	Retired	6 (1.0)	0.4-2.4
	Disabled; unable to work	1 (0.2)	0.0-1.1

\*Unspecified



**Figure 4.1. Pie chart presenting Caregivers’ race/ethnicity (n=580)**

**4.3.7 Caregivers’ country of birth (n=580)**

Of the 580 caregivers, 13.6% (79/580) were born outside of RSA, with 8.3%(n=48/580) being born in other African countries; 3.4%(n=20/580) in Europe; 0.7% (n=4/580) in the Americas; 0.5% (n=3/580) in Australasia; 0.5% (n=3/580) in Asia; and 0.2% (1/580) in the Middle East (Table 4.2).

**4.3.8 Caregivers’ Province of birth (n=497)**

Of the caregivers born in RSA who answered the question on their province of birth (497 of 501), 73.2% (364/497) were born in three provinces: Gauteng, Kwa-Zulu Natal and Western Cape (Table 4.3).



**Table 4.2 Frequency distribution of caregivers' countries of birth (n=580)**

Country of birth	Frequency	Percent	95% CI
South Africa	501	86.4	83.3-89.0
Zimbabwe	29	5.0	3.4-7.2
United Kingdom of Great Britain and Northern Ireland	12	2.1	1.1-3.7
Namibia	4	0.7	0.2-1.9
Zambia	4	0.7	0.2-1.9
Germany	3	0.5	0.1-1.6
United States of America	3	0.5	0.1-1.6
Australia	2	0.3	0.1-1.4
India	2	0.3	0.1-1.2
Lesotho	2	0.3	0.1-1.4
Nigeria	2	0.3	0.1-1.4
Algeria	1	0.2	0.0-1.1
Andorra	1	0.2	0.0-1.1
Angola	1	0.2	0.0-1.1
Botswana	1	0.2	0.0-1.1
Bulgaria	1	0.2	0.0-1.1
Democratic Republic of the Congo	1	0.2	0.0-1.1
Ghana	1	0.2	0.0-1.1
Holy See	1	0.2	0.0-1.1
Kenya	1	0.2	0.0-1.1
Kuwait	1	0.2	0.0-1.1
Mozambique	1	0.2	0.0-1.1
New Zealand	1	0.2	0.0-1.1
Russian Federation	1	0.2	0.0-1.1
Slovakia	1	0.2	0.0-1.1
Switzerland	1	0.2	0.0-1.1
Uruguay	1	0.2	0.0-1.1
<b>Total</b>	<b>580</b>	<b>100.0</b>	

**4.3.9 Caregivers' country of residence (n=569)**

At the time of the survey, 2.1% (12/569) of caregivers were residing outside RSA, with 1.4% (8/569) residing in other African countries; 0.4% (2/569) in the Americas; and 0.2% (1/569) each in Europe and the Middle East (Table 4.4).

**Table 4.3 Frequency distribution of caregivers' province of birth (n=497)**

Province of birth	Frequency	Percent	95% CI
Gauteng Province	191	38.4	34.2-42.9
Kwa-Zulu Natal Province	91	18.3	15.1-22.1
Western Cape Province	82	16.5	13.4-20.1
Limpopo Province	47	9.5	7.1-12.5
Eastern Cape Province	37	7.4	5.4-10.2
Mpumalanga Province	16	3.2	1.9-5.3
Northwest Province	15	3.0	1.8-5.0
Free State Province	12	2.4	1.3-4.3
Northern Cape Province	6	1.2	0.5-2.7
<b>Total</b>	<b>497</b>	<b>100.0</b>	

**Table 4.4 Frequency distribution of caregivers' countries of residence (n=569)**

Country of residence	Frequency	Percent	95% CI
South Africa	557	97.9	96.2- 98.9
Lesotho	2	0.4	0.1- 1.4
Namibia	2	0.4	0.1- 1.4
Albania	1	0.2	0.0- 1.1
Botswana	1	0.2	0.0- 1.1
Brazil	1	0.2	0.0- 1.1
Cameroon	1	0.2	0.0- 1.1
Nigeria	1	0.2	0.0- 1.1
Qatar	1	0.2	0.0- 1.1
Uganda	1	0.2	0.0- 1.1
United States of America	1	0.2	0.0- 1.1
<b>Total</b>	<b>569</b>	<b>100.0</b>	

**4.3.10 Caregivers' Province of residence (n=550)**

Of the 557 caregivers residing in RSA, 550 answered the question on current province of residence. Of these, 70.4% (387/550) resided in Gauteng Province and Western Cape Province (Table 4.5).

**Table 4.5 Frequency distribution of caregivers' province of residence (n=550)**

Province of residence	Frequency	Percent	95% CI
Gauteng Province	265	48.2	43.9- 52.5
Western Cape Province	122	22.2	18.8- 25.9
Kwa-Zulu Natal Province	51	9.3	7.0- 12.1
Limpopo Province	41	7.5	5.5-10.1
Eastern Cape Province	40	7.3	5.3- 9.9
Northwest Province	16	2.9	1.7- 4.8
Mpumalanga Province	8	1.5	0.7- 3.0
Free State Province	5	0.9	0.3-2.2
Northern Cape Province	2	0.4	0.1- 1.5
<b>Total</b>	<b>550</b>	<b>100.0</b>	

#### 4.4 GIRLS' DEMOGRAPHICS

##### 4.4.1 Province where the girls attended school (n=525)

Of the 525 caregivers who provided information on the province where their daughter/wards attended school, 70.3% (369/525) of the girls attended school in Gauteng and Western Cape Province (Table 4.6).

**Table 4.6 Frequency distribution of the province where the girls attended school (n=525)**

Province of residence	Frequency	Percent	95% CI
Gauteng Province	250	47.6	43.3-52
Western Cape Province	119	22.7	19.2-26.5
Kwa-Zulu Natal Province	50	9.5	7.2-12.4
Limpopo Province	43	8.2	6.1-11
Eastern Cape Province	35	6.7	4.8-9.2
Northwest Province	15	2.9	1.7-4.78
Free State Province	7	1.3	0.6-2.9
Mpumalanga Province	5	1	0.4-2.3
Northern Cape Province	1	0.2	0.0-1.2
<b>Total</b>	<b>525</b>	<b>100.0</b>	

#### 4.4.2 Girls' school grade (n=479)

All 479 girls whose caregivers answered this question were in grades 4 to 7. Table 4.7 presents the frequency distribution of school grade of the girls, with the majority of them being in grades 4 and 5 (52.6% [252/479]).

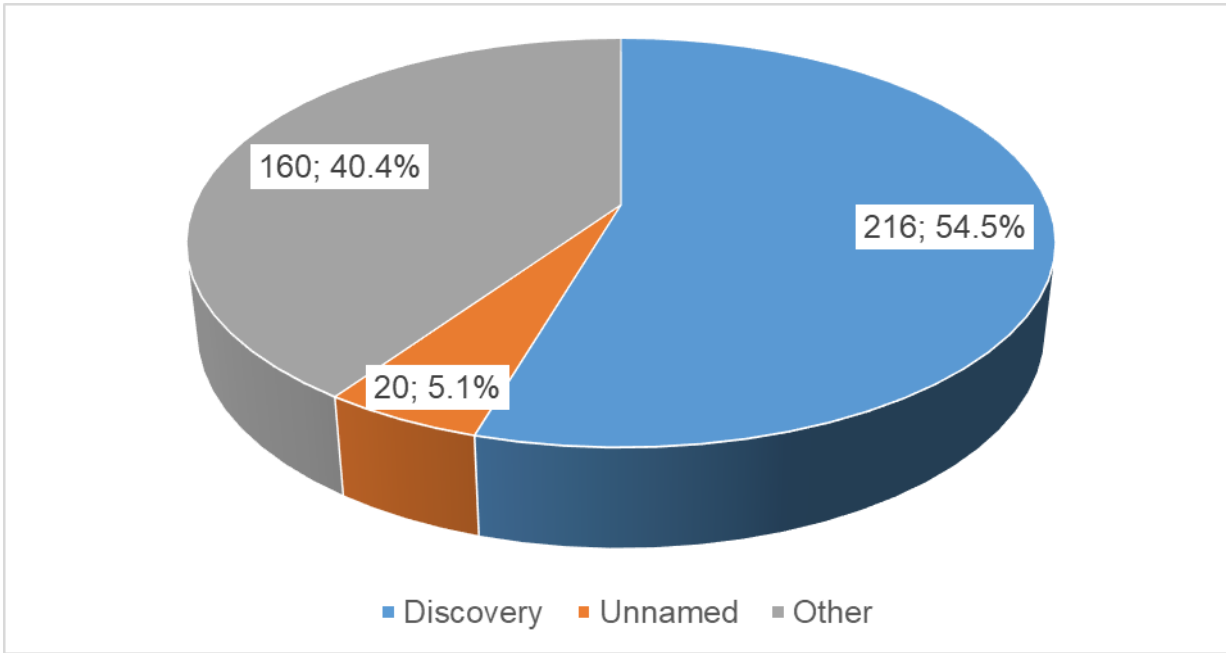
#### 4.4.3 Girls' age (n=479)

Of the 479 caregivers who provided their daughter/wards demographic information as illustrated in table 4.7, 58.5% (280/479) of their daughter/wards were less than 12 years of age.

**Table 4.7 Frequency distribution of socio-demographics of girls (n=479)**

Variable	n (%)	95% CI
<b>Age in years</b>		
9	59 (12.3)	9.6-15.7
10	126 (26.3)	22.5-30.5
11	95 (19.8)	16.4-23.8
12	110 (23.0)	19.3-27.1
13	76 (15.9)	12.8-19.5
>13	13 (2.7)	1.5-4.7
<b>Grade</b>		
4	146 (30.5)	26.4-34.9
5	106 (22.1)	18.5-26.2
6	104 (21.7)	18.2-25.7
7	123 (25.7)	21.9-29.9
<b>Medical insurance</b>		
Yes	396 (82.7)	78.9-85.9
No	83 (17.3)	14.1-21.1
<b>Healthcare provider</b>		
Doctor	396 (82.7)	78.9-85.9
Other*	39 (8.1)	5.9-11.1
Nurse	29 (6.1)	4.2-8.7
Pharmacist	15 (3.1)	1.8-5.2

\*Homeopath, naturopath, chiropractor, holistic treatment (n=23)



**Figure 4.2 Pie chart representing daughter/ward's medical insurance/aid name (n=376)**

#### **4.4.4 Girls' medical insurance/aid status and name**

Of the 396 caregivers whose daughter/wards have medical insurance/aid, 376 caregivers provided the names of their daughter/wards' medical insurance/aid (Table 4.7). More than half (54.5% [216/396]) of their daughter/wards were insured by Discovery Health Medical Scheme (Figure 4.2).

#### **4.5 OBJECTIVE 1: CAREGIVERS' KNOWLEDGE ABOUT HPV, HPV VACCINE AND CERVICAL CANCER (N=455)**

Knowledge scores ranged from 0/8 (obtained by 0.7% [3/455] of respondents) to 8/8 (obtained by 10.3% [47/455] of respondents), with a mean of 5.6 (standard deviation [SD]: 1.7) and a median of 6.0. Table 4.8 gives details of proportion of respondents who answered each knowledge question correctly and Figure 4.3 represent the distribution of caregivers' scores for the HPV, cervical cancer and HPV vaccine knowledge test.

**Table 4.8 Frequency distribution of the daughter/wards' medical insurance name**

Medical aid name	Frequency	Percent	95% CI
Discovery	216	57.5	52.4- 62.3
Momentum	25	6.7	4.5- 9.6
GEMS	22	5.9	3.9- 8.7
Bonitas	16	4.3	2.6- 6.8
Bankmed	12	3.2	1.8- 5.5
Bestmed	10	2.7	1.5- 4.8
Fedhealth	8	2.1	1.1- 4.1
Camaf	7	1.9	0.9- 3.8
Medihelp	7	1.9	0.9- 3.8
Genesis	6	1.6	0.7- 3.4
Affinity health	3	0.8	0.3- 2.3
Essential med	3	0.8	0.3- 2.3
Polmed	3	0.8	0.3- 2.3
Profmed	3	0.8	0.3- 2.3
Sasolmed	3	0.8	0.3- 2.3
Malcor	2	0.5	0.2- 1.9
Netcare	2	0.5	0.2- 1.9
Old Mutual	2	0.5	0.2- 1.9
One plan	2	0.5	0.2- 1.9
Platinum health	2	0.5	0.2- 1.9
Resolution Health	2	0.5	0.2- 1.9
SAMWU Med	2	0.5	0.2- 1.9
Wooltru	2	0.5	0.2- 1.9
Barloworldmedical aid	1	0.3	0.1- 1.5
Cigna International	1	0.3	0.1- 1.5
Compicare	1	0.3	0.1- 1.5
De Beers	1	0.3	0.1- 1.5
Imperialmed	1	0.3	0.1- 1.5
In house with Medscheme	1	0.3	0.1- 1.5
Keyhealth	1	0.3	0.1- 1.5
Medical 1 insurance	1	0.3	0.1- 1.5
Medshield	1	0.3	0.1- 1.5
Moto Health care	1	0.3	0.1- 1.5
Nedbank Medical Aid Scheme	1	0.3	0.1- 1.5
Nedgroup	1	0.3	0.1- 1.5
Pula Medical Aid Fund	1	0.3	0.1- 1.5
sisonke medical aid	1	0.3	0.1- 1.5
Suremed	1	0.3	0.1- 1.5
TopMed	1	0.3	0.1- 1.5
<b>TOTAL</b>	<b>376</b>	<b>100.0</b>	

**Table 4.9 Caregivers' knowledge about HPV, HPV vaccine and cervical cancer (n=455)**

Statement*	Respondents who answered correctly n (%)	Respondents who did not answer correctly n (%)	Respondents who were unsure of the answer n (%)
HPV infection can cause cervical cancer (Correct answer: True).	325 (71.3)	42 (9.2)	89 (19.5)
Cervical cancer is a serious disease (Correct answer: True).	436 (95.6)	10 (2.2)	10 (2.2)
The vaccines against cervical cancer prevent all (100% of) cervical cancers (Correct answer: False).	212 (46.5)	73 (16.0)	171 (37.5)
The vaccines against cervical cancer are highly effective when given to adult women (Correct answer: False).	228 (50.0)	53 (11.6)	175 (38.4)
Cervical cancer is a very rare disease in South Africa (Correct answer: False).	362 (79.4)	18 (4.0)	76 (16.7)
Of cancers affecting women, cervical cancer is one of the most common cancers affecting South African women (Correct answer: True).	316 (69.3)	27 (5.92)	113 (24.8)
Girls should receive HPV vaccination before they become sexually active (Correct answer: True).	276 (60.5)	114 (25.00)	66 (14.5)
HPV vaccination can be obtained by consulting a healthcare provider (Correct answer: True).	390 (85.5)	6 (1.3)	60 (13.2)

\*The question asked was: Is this statement true or false?

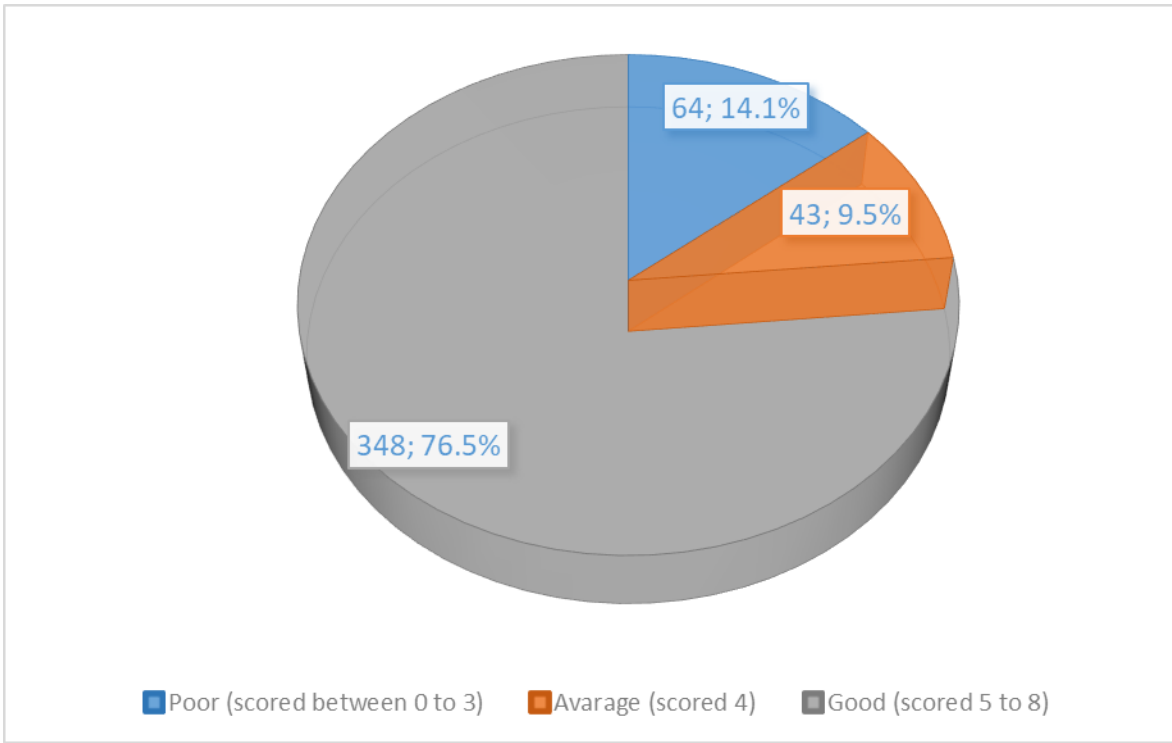
#### **4.6 OBJECTIVE 2: CAREGIVERS' ATTITUDE TOWARDS HPV VACCINATION (N=455)**

Attitude scores ranged from 0 to 24, with a mean of 11.4 (SD: 5.3) and a median of 12. Table 4.10 gives details the proportion of respondents who agreed / disagreed with each attitude statement and Figure 4.4 present caregiver's HPV vaccination attitude score.

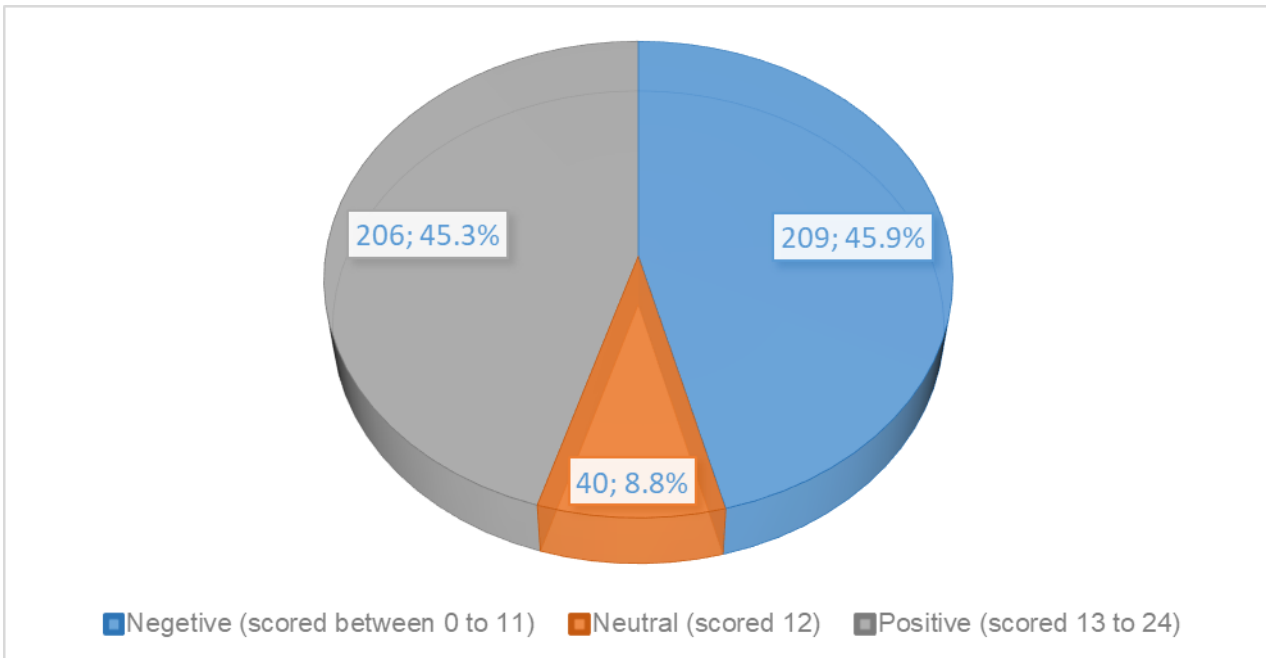
#### **4.8 OBJECTIVE 3: PRACTICES OF CAREGIVERS REGARDING HPV VACCINATION**

##### **4.8.1 Daughter/ward HPV vaccination status (n=413)**

The majority of caregivers (80.6%, 333/413) indicated that their daughter/wards were not vaccinated or were not sure of their daughter/ward's HPV vaccination status (Table 4.11).



**Figure 4.3** Pie chart representing the distribution of caregivers' scores for the HPV, cervical cancer and HPV vaccine knowledge test (n=455)



**Figure 4.4** Pie chart representing caregiver's HPV vaccination attitude score



**Table 4.10 Caregivers' attitude towards HPV vaccination**

Statement*	Strongly disagree n (%)	Disagree n (%)	Neither agree nor disagree n (%)	Agree n (%)	Strongly agree n (%)
Allowing my daughter/ward to receive the HPV vaccine will show her that I care about her future health (Positive statement).	Score: 0	1	2	3	4
	134 (30.45)	87 (19.8)	59 (13.4)	30 (6.82)	130 (29.6)
It worries me that children receive so many vaccines these days (Negative statement).	Score: 4	3	2	1	0
	75 (17.1)	107 (24.3)	73 (16.6)	77 (17.5)	108 (24.5)
I believe that the HPV vaccine is safe and effective for the prevention of cervical cancer (Positive statement).	Score: 0	1	2	3	4
	113 (25.7)	31 (7.1)	92 (20.9)	128 (28.9)	76 (17.3)
I think that it is important for young girls to be vaccinated against cervical cancer (Positive statement).	Score: 0	1	2	3	4
	113 (25.7)	33 (7.5)	51 (11.6)	113 (25.7)	130 (29.6)
I want my daughter/ward to be protected against cervical cancer by being vaccinated against HPV (Positive statement).	Score: 0	1	2	3	4
	115 (26.1)	32 (7.3)	54 (12.2)	114 (26.0)	125 (28.4)
I am worried about the rumors regarding the side-effects of the HPV vaccine (Negative statement).	Score: 4	3	2	1	0
	36 (8.2)	60 (13.6)	100 (22.7)	101 (23.0)	143 (32.5)

\*To what extent do you agree with each of the following statements? Please indicate your response by selecting the appropriate box using the following scale: strongly disagree, disagree, neither agree nor disagree, agree, strongly agree.

**Table 4.11 frequency distribution of the daughter/wards' HPV vaccination status (n=413)**

HPV vaccination status	Frequency	Percent	95%CI
<b>No</b>	312	75.5	71.1-79.6
<b>Unsure</b>	21	5.1	3.3-7.8
<b>Yes</b>	80	19.4	15.7-23.6
<b>Total</b>	<b>413</b>	<b>100.0</b>	

**4.8.2 HPV vaccination type (n=80)**

More than half (53.8% [(43/80)]) of the caregivers knew the type of HPV vaccine that their daughter/ward received. (Table 4.12).

**Table 4.12 Practices of caregivers of vaccinated girls (n=80)**

Variable	n (%)	95% CIs
<b>Doses received (n=80)</b>		
1	31 (38.8)	28.1-50.3
2	34 (42.5)	31.5-54.1
3	15 (18.8)	10.9-29.0
<b>Type of vaccine (n=80)</b>		
Bivalent	15 (18.8)	10.9-29.0
Quadrivalent	28 (35.0)	24.7-46.5
Unsure*	37 (46.3)	35.0-57.8
<b>Vaccination point (n=80)</b>		
Doctor	17 (21.3)	12.9-31.8
Healthcare clinic	21 (26.3)	17.0-37.3
Pharmacist	10 (12.5)	6.2-21.8
Other**	32 (40.0)	29.2-51.6
<b>Medical insurance paid (n=80)</b>		
No***	64 (80.0)	69.6-88.1
Yes	16 (20.0)	11.9-30.4
<b>Proportion payed by medical insurance(n=16)</b>		
59-50	1(6.25)	0.2-30.2
79-70	3(18.75)	4.1-45.7
89-80	3(18.75)	4.1-45.7
99-90	1(6.25)	0.2-30.2
100	8(50.0)	24.7-75.4
<b>Amount paid by caregivers for the cost of their daughter/ward's vaccination (n=59)</b>		
****Less than R700	38(64.4)	50.9-76.5
Between R700- R800	5(8.5)	2.8-18.7
Between R800-R900	5(8.5)	2.8-18.7
Between R900-R1000	2(3.4)	0.4-11.7
More than R1000	9(15.3)	7.2-26.9
<b>Access to HPV vaccination information (n=80)</b>		
Yes	58 (72.5)	61.4-81.9
No	18 (22.5)	13.9-33.2
Not sure	4 (5.0)	1.4-12.3
<b>Main influencer of decision to vaccinate (n=79)</b>		
Allopathic healthcare provider	57 (72.2)	60.9-81.7
Other*****	16 (20.3)	Not available
School principal / class teacher	4 (5.1)	1.4-12.5
Alternative medical practioner	2 (2.5)	0.3-8.9

\*26 of 'unsure' vaccinated at school thus received the bivalent vaccine

\*\*31 vaccinated at school for free (1 without parent's consent); 1 vaccinated by parent at home

\*\*\*Includes 27 girls who were vaccinated at a previously attended public sector school for free (there was no option to select zero cost).

\*\*\*\*Includes unanalysed free text data

### **4.8.3 HPV vaccine doses received**

Of all vaccinated girls, 38.8% (31/80) received 1 dose, 42.5% (34/80) received 2 doses and 18.8% (15/80) received 3 doses of the HPV vaccine (Table 4.12).

### **4.8.4 HPV vaccination points (n=80)**

The majority of caregivers indicated that their daughter/ward was vaccinated in healthcare facilities (doctor's consulting room, clinic or pharmacy) (48/80 [60.0%]) (See Table 4.12). Those caregivers selecting "other" were requested to specify where their daughter had received the vaccinations. One of the caregivers (1.3% [1/80]) had obtained the nonavalent vaccine from overseas and vaccinated their daughter, while 38.8% (31/80) of caregivers indicated that their daughter/ward was vaccinated at school. Of those whose daughters were vaccinated at school, 19.4% (6/31) clarified that the school was the previous school attended by their daughter, and of these, one caregiver added that parental consent was not obtained.

### **4.8.5 How vaccination costs were covered (n=80)**

#### **4.8.5.1 Medical insurance coverage**

Of the 80 caregivers whose daughter/ward had been vaccinated, 82.5% (66/80) had medical insurance. However, various proportions of the vaccination costs of 20.0% (16/80) of vaccinations had been paid by medical insurance, as illustrated in Table 4.12. None of the caregivers of the 8 girls whose medical insurance paid 50-99% of the costs answered the question "How much did you pay for the HPV vaccination?".

#### **4.8.5.2 Vaccinations received at school**

Of the 31 girls who were vaccinated at school (see 4.7.4), 74.2% (23/31) had medical insurance, but caregivers of these 23 girls did not claim from medical insurance. In answer to the question "How much did you pay for the HPV vaccination?", all 31 caregivers either did not answer this question (n=4), or selected the lowest possible amount, which was "Less than R700" (n=27). When designing the questionnaire, the possibility of girls having been vaccinated in the public sector before moving to a private sector school was not considered, thus an option of zero cost to caregivers whose daughters were not covered by medical insurance was not included. Thus it must be assumed that 38.8% (31/80) of the girls received HPV vaccination free of charge through the ISHP.

#### **4.8.5.3 Vaccination costs not covered by medical insurance or ISHP**

Of all girls vaccinated, 41.3% (33/80) of caregivers covered the cost of HPV vaccination themselves. Of these, 81.8% (27/33) had medical insurance. This number included the daughter of the caregiver

who obtained the nonavalent vaccine overseas (and thus would not have been able to claim from medical insurance), and 26 girls vaccinated in healthcare facilities.

#### 4.8.5.4 Summary of vaccination costs

Of the 64 caregivers who indicated that their daughter/ward's medical insurance did not cover or pay for the cost of the HPV vaccination, 59 (including 27 whose daughters were vaccinated at school) provided information on the amount they paid for the cost of their daughter/ward's HPV vaccination. These costs are summarised in Table 4.12.

#### **4.8.6 Reasons for being unsure or not wanting to vaccinate daughter/ward against cervical cancer (n=320).**

Of the 333 caregivers whose daughter/ward was not vaccinated / unsure of vaccination status (Table 4.13), 319 answered the question on the reasons why their daughters/ wards were not vaccinated / unsure of whether they should allow them to be vaccinated. In addition, 1 caregiver (mother) whose daughter had received 1 dose of HPV vaccine at a previous school without parental consent, also answered this question. Thus 320 caregivers in total answered this question (Table 4.13). Of all caregivers who answered this question, 45.0% (144/320) gave reasons indicating they may accept vaccination for their daughters in the future while 44.3% (142/320) gave reasons suggesting vaccine hesitancy.

#### **4.8.7 Willingness to vaccinate daughter/wards against cervical cancer if vaccination was offered free of charge (n=326).**

Of the 333 caregivers whose daughter/ward was not vaccinated / unsure of vaccination status, 325 answered the question on whether they would be willing to vaccinate their daughter if vaccination was offered free of charge. In addition, 1 mother whose daughter had received 1 dose of HPV vaccine at a previous school without parental consent, also answered this question (her answer was "no"). Thus 326 caregivers in total answered this question. More than half (54.6% [178/326]) of the caregivers were unsure or not willing to get their daughter/wards vaccinated against cervical cancer even if vaccination was offered free of charge (Table 4.14).

#### **4.8.8 Caregivers' willingness to vaccinate daughter/wards against cervical cancer if vaccination was offered at school (n=325)**

Of the 333 caregivers whose daughter/ward was not vaccinated / unsure of vaccination status, 324 answered the question on whether they would be willing to vaccinate their daughter if vaccination was offered at school. In addition, 1 mother whose daughter had received 1 dose of HPV vaccine at a previous school without parental consent, also answered this question (her answer was "no").

Thus 325 caregivers in total answered this question. More than half (57.2% [186/325]) of the caregivers were unsure / not willing to vaccinate their daughter/wards against cervical cancer even if vaccination was offered at her school (Table 4.15).

**Table 4.13 Frequency distribution of caregivers' reasons for being unsure or not wanting to vaccinate (n=320)**

Caregivers' reasons for un-vaccinated daughter/ward	Frequency	Percent	95% UCL
I don't think the vaccine is safe**	95	29.7	25.0 - 34.9
We never thought about it*	45	14.1	10.7 - 18.3
Haven't had the chance to do it yet (no opportunity)*	44	13.8	10.4 - 18.0
My daughter/ward is too young*	42	13.1	9.9 - 17.3
Vaccine is too new**	32	10.0	7.2 - 13.8
I don't think that vaccines are effective/provide long-term protection**	18	5.6	3.6 - 8.7
My healthcare provider has not suggested it*	13	4.1	2.4 - 6.8
My daughter/ward is not at risk**	6	1.9	0.9 - 4.0
The vaccine is too expensive***	6	1.9	0.9 - 4.0
lack of vaccine information**	6	1.9	0.9 - 4.0
My daughter has an illness/medical condition that precludes vaccination.***	4	1.3	0.5 - 3.2
My healthcare provider has advised me against it**	3	0.9	0.3 - 2.7
Need more research evidence**	3	0.9	0.3 - 2.7
There are too many vaccinations**	3	0.9	0.3 - 2.7
<b>Total</b>	<b>320</b>	<b>100.0</b>	

\*Reasons indicating caregivers may accept vaccination for their daughters in the future.

\*\*Reasons indicating vaccine hesitancy.

\*\*\* Other reasons

**Table 4.14 Willingness to vaccinate daughter/wards against cervical cancer if vaccination was offered free of charge**

Caregivers' willingness to vaccinate daughter/ward	Frequency	Percent	95% CI
Yes	148	45.4	39.9- 50.1
No	134	41.1	35.8- 46.7
Unsure	44	13.5	10.1- 17.3
<b>Total</b>	<b>326</b>	<b>100.0</b>	

**Table 4.15 Frequency distribution of caregivers' willingness to vaccinate daughter/ward against cervical cancer if vaccination was offered at school**

Caregivers' willingness to vaccinate daughter/ward	Frequency	Percent	95% CI
No	149	45.9	40.4 -51.4
Yes	139	42.8	37.4- 48.4
Unsure	37	11.4	8.2- 15.5
<b>Total</b>	<b>325</b>	<b>100.0</b>	

**4.8.9 Type of healthcare provider advising caregivers on taking care of their daughter/ward's health (n=479)**

Of all 478 caregivers who answered this question, 93.9% (449/478) consulted allopathic medical practitioners (AMPs) for advice on taking care of their daughter/ward's health (Table 4.16).

**Table 4.16 Frequency distribution of healthcare provider advising caregivers on taking care of their daughter/ward's health stratified by vaccination status of the daughter.**

Healthcare provider	Vaccination status			Totals n (%)	95% CI
	Yes n (%)	No n (%)	Undisclosed n (%)		
AMP	76 (95.0)	308 (92.8)	65 (98.5)	449 (93.9)	91.4-95.7
CAM	2 (2.5)	17 (5.1)	1 (1.5)	20 (4.2)	2.7-6.4
Myself	1 (1.3)	3 (0.9)	0 (0.0)	4 (0.8)	0.3-2.1
Other (unspecified)	1 (1.3)	4 (1.2)	0 (0.0)	5 (1.1)	0.5-2.4
<b>TOTAL</b>	<b>80 (100.0)</b>	<b>332 (100.0)</b>	<b>66 (100.0)</b>	<b>478 (100.0)</b>	

\*"No" and "unsure" were added together for this analysis

**4.8.10 Most trusted source of vaccination information or advice stratified by vaccination status of the daughter (n=411)**

AMPs were the most trusted source that 74.0% (305/412) of caregivers turn to for vaccination information, of which 87.5% (70/80) of their daughter/wards were vaccinated (Table 4.17).

**Table 4.17 Frequency distribution of the most trusted source of vaccination information or advice**

The most trusted source vaccination information	Vaccination status		Total	95% CI
	Yes n(%)	No n(%)		
General medical practitioner (GP)	36 (45.0)	112 (33.7)	148 (35.9)	31.4 - 40.7
Pediatricians	18 (22.5)	70 (21.1)	88 (21.4)	17.7 - 25.6
Clinic nurse	13 (16.3)	31 (9.3)	44 (10.7)	8.1 - 14.0
trusted research	4 (5.0)	26 (7.8)	30 (7.3)	5.2 - 10.2
Alternative medical practitioner	3 (3.8)	25 (7.5)	28 (6.8)	4.7 - 9.7
Gynecologist	2 (2.5)	3 (0.9)	5 (1.2)	0.5 - 2.8
Media	2 (2.5)	0 (0.0)	2 (0.5)	0.1 - 1.8
Pharmacist	1 (1.3)	9 (2.7)	10 (2.4)	1.3 - 4.4
Google / other search engine	1 (1.3)	30 (9.0)	31 (7.5)	5.4 - 10.5
Vaccine package insert	0 (0.0)	8 (2.4)	8 (1.9)	1.0 - 3.8
None	0 (0.0)	3 (0.9)	3 (0.7)	0.3 - 2.1
Other (please specify)	0 (0.0)	3 (0.9)	3 (0.7)	0.3 - 2.1
Variety of allopathic medical professionals as appropriate	0 (0.0)	3 (0.9)	3 (0.7)	0.3 - 2.1
Homeopath	0 (0.0)	2( 0.6)	2 (0.5)	0.1 - 1.8
Specialist	0 (0.0)	2 (0.6)	2 (0.5)	0.1 - 1.8
The school principal or class teacher of my daughter / ward	0 (0.0)	2 (0.6)	2 (0.5)	0.1 - 1.8
A friend	0 (0.0)	1 (0.3)	1 (0.2)	0.0 - 1.4
A relative	0 (0.0)	1 (0.3)	1 (0.2)	0.0 1.4
Traditional healer	0 (0.0)	1 (0.3)	1 (0.2)	0.0 - 1.4
<b>TOTAL</b>	<b>80 (100.0)</b>	<b>332 (100.0)</b>	<b>412 (100.0)</b>	

\*\*No” and “unsure” were added together for this analysis

#### **4.8.11 Least trusted source of vaccination information or advice stratified by vaccination status of the daughter (n=407).**

Complementary and alternative medicine (CAM) and the internet (Google search, Facebook, Twitter and other social media) are the source of vaccination information that 62.7% (256/408) caregivers have least trust in (Table 4.18).

**Table 4.18 Frequency distribution of the least trusted source of vaccination information or advice**

The least trusted source of vaccination information	Vaccination status		Total n(%)	95% CI
	Yes n(%)	No n(%)		
Traditional healer	16 (20.3)	73 (22.2)	89 (21.8%)	18.1 - 26.1
Facebook	17 (21.5)	50 (15.2)	67 (16.4)	13.2 - 20.4
General medical practitioner (GP)	4 (5.1)	29 (8.8)	33 (8.1)	5.8 - 11.2
Clinic nurse	3 (3.8)	23 (7.0)	23 (5.6)	4.4 - 9.2
The school principal or class teacher of my daughter / ward	1 (1.3)	23 (7.0)	24 (5.9)	4.0 - 8.6
Google / other search engine	9 (11.4)	23 (7.0)	32 (7.8)	5.6 - 10.9
Paediatrician	1 (1.3)	22 (6.7)	23 (5.6)	3.8 - 8.3
Religious leader	9 (11.4)	16 (4.9)	25 (6.2)	4.2 - 8.9
Alternative medical practitioner	8 (10.1)	15 (4.6)	23(5.6)	3.8 - 8.3
A friend	1 (1.3)	10 (3.0)	11 (2.7)	1.5 - 4.8
Variety of allopathic medical professionals as appropriate	3 (3.8)	10 (3.0)	13 (3.2)	1.7 - 5.1
pharmacy	2 (2.5)	9 (2.7)	11 (2.7)	1.5 - 4.8
Twitter	3 (3.8)	9 (2.7)	12 (2.9)	1.7 - 5.1
Government facilities	0 (0.0)	4 (1.2)	4 (1.0)	0.4 - 2.5
Social media	1 (1.3)	4 (1.2)	5 (1.2)	0.5 - 2.8
Anyone other than a medical doctor	0 (0.0)	3 (0.9)	3 (0.7)	0.3 - 2.1
Other (unspecified)	1 (1.3)	3 (0.9)	4 (1.0)	0.4 - 2.5
doctor	0 (0.0)	2 (0.6)	2 (0.5)	0.1 - 1.8
A relative	0 (0.0)	1 (0.3)	1 (0.2)	0.0 - 1.4
<b>TOTAL</b>	<b>79 (100.0)</b>	<b>329 (100.0)</b>	<b>408 (100)</b>	

\*\*"No" and "unsure" were added together for this analysis

#### **4.8.12 The biggest influence of caregivers' decision about HPV vaccination stratified by vaccination status of the daughter (n=411)**

Advice given by healthcare providers have the biggest influence in 50.4% (207/411) of caregivers' decision about whether or not to allow their daughter/ward to receive the HPV vaccine as compared to advices given by others. (Table 4.19).



**Table 4.19 frequency distribution of the Influence of caregivers' decision about HPV vaccination (n=411)**

Influence of caregivers' decision	Vaccination status		Total n(%)	95 % CI
	Yes n(%)	No n(%)		
The advice given to me by a healthcare provider	58 (73.4)	149 (44.9)	207(50.4)	45.6 - 55.2
Research Findings	6 (7.6)	31 (9.3)	37(9.0)	6.6 - 12.2
The advice given to me by the school principal or class teacher of my daughter / ward	4 (5.1)	6 ( 1.8)	10 (2.4)	1.3 - 4.4
The advice given to me by a friend	3 (3.8)	9 (2.7)	12 (2.9)	1.7 - 5.0
Article/s I found while using Google / other search engine.	2 (2.5)	35 (10.5)	37(9.0)	6.6 - 12.2
The advice given to me by an alternative medical practitioner	2 (2.5)	24 (7.2)	26 (6.3)	4.4 - 9.1
None ... was given to my daughter without full informed consent	1( 1.3)	0 (0.0)	1 (0.2)	0.0 - 1.4
Experience of adverse events of vaccination	1 (1.3)	17 (5.1)	18 (4.4)	2.8 - 6.8
Article/s I read in a magazine	1 (1.3)	7 (2.1)	8 (1.9)	1.0 - 3.8
Article/s posted on Facebook	1 (1.3)	6 (1.8)	7 (1.7)	0.8 - 3.5
Article/s posted on online news	0 (0.0)	12 (3.6)	12 (2.9)	1.7 - 5.0
Article/s I read in the newspaper	0 (0.0)	7 (2.1)	7 (1.7)	0.8 - 3.5
Other (please specify)	0 (0.0)	6 (1.8)	6 (1.5)	0.7 - 3.2
The advice given to me by a relative	0 (0.0)	6 (1.8)	6 (1.5)	0.7 - 3.2
Vaccine insert	0 (0.0)	4 (1.2)	4 (1.0)	0.4 -2.5
Article/s I watched on television	0 (0.0)	2 (0.6)	2 (0.5)	0.1 - 1.8
Haven't spoken to anyone yet	0 (0.0)	2 (0.6)	2 (0.5)	0.1 - 1.8
I haven't made a final decision yet	0 (0.0)	2 (0.6)	2 (0.5)	0.1 - 1.8
My personal decision	0 (0.0)	2 (0.6)	2 (0.5)	0.1 - 1.8
Not aware of the vaccine	0 (0.0)	2 (0.6)	2 (0.5)	0.1 - 1.8
The advice given to me by a religious leader	0 (0.0)	2 (0.6)	2 (0.5)	0.1 - 1.8
The manufacturer themselves convinced me not to take that chance.	0 (0.0)	1 (0.3)	1 (0.2)	0.0 -1.4
<b>TOTAL</b>	<b>79 (100.0)</b>	<b>332 (100.0)</b>	<b>411 (100)</b>	

\*\*No" and "unsure" were added together for this analysis

#### **4.8.13 Caregivers' access to information stratified by vaccination status of the daughter (n=409)**

More than half (59.2% [242/409]) of caregivers feel that they have access to enough information about the HPV vaccine to allow them to make a well-informed decision about vaccinating their daughter/wards (Table 4.12).

#### 4.9 OBJECTIVE 4: FACTORS (KNOWLEDGE AND ATTITUDE) ASSOCIATED WITH HPV VACCINATION COVERAGE

Of the 455 respondents who completed the knowledge and attitude tests. 413 had also answered the question on whether their daughter had received any HPV vaccinations. For the factors analysis, the knowledge scores were categorised into good knowledge (scores of  $\geq 5$  out of 8) and average / poor knowledge (scores of  $\leq 4$ ). and the attitude scores were categorised into positive attitudes (scores of  $\geq 13$  out of 24) and neutral/ negative (scores of  $\leq 12$ ). There was a statistically significant association between having good knowledge and uptake of the HPV vaccine ( $p=0.001$ ). There was also a statistically significant association between having a positive attitude and uptake of the HPV vaccine ( $p=0.000$ ). Caregivers with good knowledge were 3.6 times more likely to have vaccinated their daughters, while caregivers with a positive attitude were 5.2 times more likely to have vaccinated their daughters. See Table 4.21 for further details.

**Table 4.21 Contingency table showing the associations between vaccination status and knowledge and attitudes of caregivers towards HPV vaccination**

		Ever received HPV vaccine		OR		95% CI	
		Yes n (%)	No* n (%)				
Knowledge	Good	72 (91.1)	248 (74.2)	3.6	1.6-8.0		
	Average / poor	7 (8.9)	86 (25.8)				
Attitude	Positive	61 (77.2)	132 (39.5)	5.2	2.9-9.2		
	Neutral / negative	18 (22.8)	202 (60.5)				
<b>TOTAL</b>		<b>79 (19.1)</b>	<b>334 (80.9)</b>				

\*"No" and "unsure" were added together for this analysis

#### 4.10 CONCLUSION

This chapter presented the results of the research study. Firstly, the response rate was described followed by socio-demographic data of the caregiver and their daughter/wards. Caregivers' knowledge regarding HPV, cervical cancer and HPV vaccine including their attitudes towards HPV vaccination and their daughter/wards' HPV vaccination status was also presented. Results of the association between daughter/wards HPV vaccination status, and the different levels of knowledge about and attitudes towards HPV vaccination among caregivers was also presented.

## **CHAPTER FIVE**

### **DISCUSSION, CONCLUSION AND RECOMMENDATIONS**

#### **5.1. INTRODUCTION**

The previous chapter presented the results of the research study. In this chapter, the results presented in chapter 4 are interpreted. Recommendations, limitations and conclusion related to the study findings are provided.

#### **5.2. RESPONSE RATE**

Despite the use of various practices to improve the response rate, online surveys are generally less likely to achieve response rates as high as paper based surveys (Nulty, 2008). The poor response rate of 10.9% (167/1535) from the email invitation sent via school principals between 19 March and 30 October 2018 was not very different from the 9% response rate to an online cross-sectional survey conducted among non-medical academics working at the University of KwaZulu-Natal between November 2013 and February 2014 (Hoque. 2015).

In the current study, 167 responses were collected in 7 months in response to an email invitation while 395 were collected in just over 3 weeks through Facebook. This is evidence that social networking sites are an efficient platform for conducting health surveys in RSA, as in other countries (Remschmidt, Walter, Schmich, Wetzstein, Deleré & Wichmann, 2014).

#### **5.3 CAREGIVERS' KNOWLEDGE ABOUT HPV, HPV VACCINE AND CERVICAL CANCER**

Knowledge about HPV infection and its link to cervical cancer is an important determinant of HPV vaccine uptake. In the current study, 59.17% (242/409) of caregivers felt that they have access to enough information about the HPV vaccine to allow them to make a well-informed decision and 76.5% (95% CI:72.3-80.2) (348/455) had good knowledge about HPV, HPV vaccine and cervical cancer.

Findings of other South African studies conducted among the University of KwaZulu-Natal employees and in 4 clinics around rural Vhembe district, Limpopo Province reported that 96% of the non-medical academics heard of cervical cancer and all heard about HPV before while 74.1% of women aged 30 years and above utilizing the 4 clinics never heard about HPV before (Hoque, 2015; Ramathuba & Ngambi. 2018). The disparity in knowledge about HPV, cervical cancer and HPV

vaccine reported in both studies could be linked to poor access to information by the less educated and unemployed individuals.

#### **5.4 CAREGIVERS' ATTITUDE TOWARDS HPV VACCINATION**

Parental attitudes towards HPV vaccination directly influence their daughter/ward's HPV vaccination uptake. Despite the low level of knowledge noted in the sub-Saharan countries, all 12 studies which examined acceptability levels of HPV vaccine in the systematic review reported high levels of acceptability of HPV vaccine (Perlman et al, 2014).

In RSA, 91.2% of woman in Vhembe District were still uncertain or undecided about whether to allow their daughter to receive HPV vaccine or not even after receiving the pamphlet on HPV vaccine information (Ramathuba & Ngambi. 2018). In the current study, 45.9% of caregivers had a negative attitude towards HPV vaccination for their daughter/wards as well, which is a point of concern.

Since 74.1% (430/580) of the participants in the study were highly educated with a tertiary qualification, the assumption could be that their educational information should significantly increase HPV vaccine acceptability for their daughters.

#### **5.5 PRACTICES OF CAREGIVERS REGARDING HPV VACCINATION**

One of the aims of this study was to determine whether caregivers are taking their daughters/wards for vaccination or not. The study found a low (19.4%) HPV vaccination coverage among girls attending private schools in RSA, and only 61.3% of them have received  $\geq 2$  doses of HPV vaccine as compared to 80% of eligible girls attending public schools who had received the first dose by 6 September 2016 (Table 2.2) (Denny & Kuhn, 2017).

The huge gap may be explained by the difference in the vaccination cost between girls attending private schools and those at public schools, as those attending private schools have to pay for vaccination while those who attend public schools get vaccinated at no cost from the national HPV immunisation programme.

#### **5.6 FACTORS (KNOWLEDGE AND ATTITUDE) ASSOCIATED WITH HPV VACCINATION COVERAGE.**

While a study conducted in Zgorzelec, in southwestern Poland did not identify a statistically significant association between parental HPV knowledge level and their vaccine acceptance (Ganczak et al, 2018), the current study revealed that there is a statistically significant association

between caregivers who have good knowledge about HPV, cervical cancer & HPV vaccination and their daughter/wards HPV vaccine coverage ( $p=0.001$ ).

A study conducted in the 7 cities of Brazil also reported that parental attitudes were significantly associated with HPV vaccine acceptance (Mendes Lobão et al, 2018), while an online HPV survey conducted in USA, United Kingdom and Australia in 2017 gave a different report. The study reported that parents' knowledge about HPV ( $p < 0.001$ ) and HPV vaccination ( $p < 0.05$ ) was associated with their daughters' vaccination status, but parents with low knowledge scores and parents with high knowledge scores were less likely to have their daughters vaccinated (Nickel et al, 2017).

### **5.7 REASONS FOR BEING UNSURE OR NOT WANTING TO VACCINATE DAUGHTER/WARD AGAINST CERVICAL CANCER**

Similar to studies conducted in the USA (Beavis & Levinson, 2016), Brazil (Mendes Lobão et al 2018), Poland (Ganczak, 2018), Hong Kong (Loke, Chan & Wong, 2017) and around RSA (Hogue, 2015; Ramathuba & Ngambi, 2018) vaccine safety was the main reason given by 29.7% of caregivers for not wanting to vaccinate their daughters/wards against HPV.

Findings of the study to quantify how health professionals use Twitter to communicate about the HPV vaccine reported that of the 20 451 tweets from health professionals, 16 867 tweets were intended for parents 1 043 centered on a national awareness day and were about resources, personal experiences, boys and girls, while 851 focused on communicating recently published scientific evidence (Massey, Budenz, Leader, Fisher, Klassen & Yom-Tov, 2018).

This is a clear indication that health care providers play an important role in providing information to caregivers regarding HPV, cervical cancer and HPV vaccination. This was confirmed by 97.9% of caregivers who mentioned that they consulted different AMPs for advice on taking care of their daughter/ward's health and they are the most trusted source that 79.3% of caregivers turn to, for vaccination information.

Having influenced 56.7% of caregivers' decision about whether or not to allow their daughter/ward to receive the HPV vaccine of which 74.2% (173/233) were unvaccinated, it is evident that health care providers also have an inevitable role in caregivers' attitude towards HPV vaccination as well.

With such a huge role to play in HPV vaccination uptake and so much responsibility, the question to answer is do they market the HPV vaccination? If so, how do they do it (Harries et al, 2009)? Another reason given by 4.1% (13/320) caregivers for not wanting to vaccinate their daughter/ward

against HPV was that their healthcare provider has not suggested it, while 0.9% (3/360) stated that their healthcare provider has advised them against it (Table 4.21).

Similar to the USA, the private sector in RSA is focused more on curative service than preventative on preventive services (Harries et al, 2009). Doctors usually do not have time to give enough information to clients about HPV vaccination and patients usually visit their health care provider when they are sick further limiting their access to the correct information about HPV vaccination. This contributes to eligible girls missing their HPV vaccination because they never visited a doctor since they were not sick (Cartmell et al, 2018).

With the HPV vaccination programme that only offers vaccination to girls attending grade 4 in public schools only, the role of the private sector and health insurance companies in HPV vaccination awareness and uptake in South Africa is inevitable (Harries et al, 2009). In a study conducted in the Western Cape province, RSA in the year 2007 before the rollout of the national HPV vaccination programme, the NDOH highlighted that the focus of the private sector is not mainly preventative but curative. The vaccination programme is therefore not funded by most medical schemes and they have agreed that it can be freely accessed from the public sector or at a cost from the private sector (Harries et al, 2009).

This was proved to be true in the current study, in which 82.5% (66/80) of vaccinated girls had medical insurance but only 20.0% (16/80) of vaccinations had been paid by medical insurance. None or less HPV vaccination payment by the medical insurance may also contribute to the low (19.4% [80/413]) HPV vaccination uptake amongst this population. As 35.6% (21/59) of the 64 caregivers whose daughter/ward's medical insurance did not cover or pay for the cost of the HPV vaccination had to pay between R700 to more than R1000 for their daughter's vaccination.

The high cost of HPV vaccination was also one of the contributory factors to low HPV vaccination before the rollout of the national HPV vaccination in RSA. The cost of HPV vaccination was approximately R650 per dose of vaccine from private doctors (Tathiah et al, 2015). This also applied in South Carolina, USA where about 2400 HPV vaccination eligible children miss their vaccination every year because their private insurers did not pay or cover the HPV vaccine (Cartmell et al, 2018).

## **5.8 CONCLUSION**

Findings of the study denote that, despite the good knowledge regarding HPV, cervical cancer and HPV vaccine among 76.5% (348/455) of caregivers; 45.9% (209/455) of them have negative attitudes towards HPV vaccination. This is concerning and associated with the low (19.4% [80/413]) HPV vaccination coverage amongst girls attending private schools in RSA. The study further revealed that there is a likelihood of HPV vaccination uptake by caregivers who have good knowledge about HPV, cervical cancer and HPV vaccine and caregivers who have a positive attitude towards HPV vaccination.

Caregivers' knowledge about HPV, cervical cancer and the HPV vaccine is not a good predictor of HPV vaccine uptake but their attitude towards HPV vaccination is also key. Therefore, understanding the complex barriers surrounding HPV vaccine acceptance among caregivers is an important factor in strengthening vaccine uptake among adolescent girls.

## **5.9 LIMITATION AND STRENGTH OF THE STUDY**

Due to the study design applied, this online survey suffers from selection bias. Caregivers without email address or Facebook accounts and those who do not frequently access their emails or Facebook accounts were likely to be underrepresented, therefore the findings may not be generalizable to other caregivers.

Despite all these limitations, the study had its strengths. For example, this was the first study that has investigated knowledge, attitudes and practices regarding HPV vaccination among caregivers of girls attending private schools in RSA.

## **5.10 RECOMMENDATIONS**

Since very low HPV vaccination coverage in the private sector will impact negatively on overall herd immunity in RSA, findings of this study suggest the following:

- Optimal herd immunity against cervical cancer may only be achieved through a school-based HPV vaccination programme that does not exclude private sector schools.
- Education of healthcare workers providing vaccination services regarding HPV, cervical cancer and HPV vaccine in the private sector is vital.
- HPV vaccination advocacy campaign is urgently needed. This needs to be directed at all stakeholders – policy makers, the media, educators, healthcare workers and the general public.

- More studies should be conducted and published about the effect of HPV vaccination on South African girls in order to provide evidence of the vaccine safety in a South African context.
- More studies should be conducted on the same topic using different approaches that can reach a larger sample and include all sub groups that do not have access to email or Facebook accounts.



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# ANNEX 1: RESEARCH COMMITTEE CLEARANCE CERTIFICATE



**University of Limpopo**  
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## TURFLOOP RESEARCH ETHICS COMMITTEE CLEARANCE CERTIFICATE

**MEETING:** 02 November 2017

**PROJECT NUMBER:** TREC/289/2017: PG

**PROJECT:**

**Title:** Knowledge, attitudes and practices regarding Human Papillomavirus vaccination, among caregivers of girls attending private schools in South Africa

**Researcher:** T Milondzo  
**Supervisor:** Prof RJ Burnett  
**Co-Supervisor:** Prof L Skaal  
**School:** Health Care Sciences  
**Degree:** Masters in Public Health



**PROF TAB MASHEGO**

**CHAIRPERSON: TURFLOOP RESEARCH ETHICS COMMITTEE**

The Turfloop Research Ethics Committee (TREC) is registered with the National Health Research Ethics Council, Registration Number: REC-0310111-031

**Note:**

- i) Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.
- ii) The budget for the research will be considered separately from the protocol.  
**PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.**

*Finding solutions for Africa*

## ANNEX 2: EMAIL SENT TO THE SCHOOL PRINCIPALS.

Dear School Principal.

As you may be aware, since 2014 vaccination against cervical cancer (the human papillomavirus [HPV] vaccine) is available for free only to girls in grade 4 attending public sector schools. This presents several challenges for preventing cervical cancer in future South African women who are currently attending private sector schools.

1. The vaccines are expensive and not all parents of girls attending private schools may be able to afford them.
2. This policy may create the impression that girls attending private schools are not at risk for cervical cancer, which is not correct.
3. Parents of girls in private schools have the added burden of making arrangements to have their daughters vaccinated, instead of them being vaccinated within the Integrated School Health Programme. Again, this may impact negatively on the uptake of this vaccine.

I am a Master in Public Health student at the University of Limpopo under the supervision of Prof Rose Burnett and Prof Linda Skaal. I hereby invite your school to participate in an online survey that will be conducted in private schools throughout the Republic of South Africa. The survey aims to investigate whether the factors mentioned above have any impact on the uptake of HPV vaccination by girls in grades 4 to 7 attending private schools in South Africa. Data will be collected using a structured self-administered anonymous online survey. Since this is an anonymous online survey, **you are requested to circulate this email to the relevant parents (i.e. parents / caregivers of girls in grades 4 to 7).** Participating parents must enter the school's name on the survey, and all participating schools will be given a number which will be entered into a lucky draw to win a R20 000 gift voucher. The winning school will be asked to select the store from which the voucher will be purchased, based on the needs of the school.

You are requested to encourage parents to participate, because the findings of this study will be utilised to formulate strategies to address issues of concern relating to HPV vaccination among girls attending private schools. The findings will also provide information that can be used to develop educational messages. Participating in this study will also assist in making

parents aware of cervical cancer prevention options which may increase the uptake of HPV vaccination for their daughters. and cervical cancer screening of the mothers.

**When forwarding this email. please delete this part of the email addressed to you.**

**Thank you very much for forwarding this email to parents of girls in grades 4 to 7.**

Dear Parent/Caregiver.

As a parent/caregiver of girls in grades 4 to 7. you are hereby invited to participate in an online survey that will be conducted in private schools throughout the Republic of South Africa. The survey aims to investigate factors impacting on the uptake of HPV vaccination by girls in grades 4 to 7. aged 9 years or older. attending private schools in South Africa.

Data will be collected using a structured self-administered anonymous online survey. Since this is an anonymous online survey. your school principal has forwarded this email on to you. You will not be asked to provide your names or any other personal information but you are requested to enter the name of the school that your daughter is attending on the survey. since all participating schools will be given a number which will be entered into a lucky draw to win a R20 000 gift voucher. The winning school will be asked to select the store from which the voucher will be purchased. based on the needs of the school.

The findings of this study will be utilized to formulate strategies to address issues of concern relating to HPV vaccination among girls attending private schools. The findings will also provide information that can be used to develop educational messages regarding cervical cancer prevention. Please note that participation is strictly voluntary. and by completing this online survey you are agreeing to the following:

- I have read and understand the aim of the proposed study.
- I understand that participation in this study is completely voluntary.
- I understand that participation in this study is completely anonymous.
- I have not been pressured to participate in any way.
- I know that this study has been approved by the Turfloop Research and Ethics Committee (TREC) of the University of Limpopo.
- I am fully aware that the results of this study will be used for scientific purposes and may be



published electronically and be available throughout the world.

- I hereby give consent to participate in this study.

Attached is the Turfloop Research Ethics Committee Clearance Certificate.

Please click the following link to participate

**<https://www.surveymonkey.com/r/hpv-vaccination-for-private-school-girls>**

Regards

Tracy Milondzo

Master in Public Health student at the University of Limpopo under the supervision of Prof Rose Burnett and Prof Linda Skaal.

### ANNEX 3: SURVEY QUESTIONNAIRE

SECTION A: Demographics		Selection options available online
1.	What is your relationship to the girl?	Father
		Mother
		Step-mother
		Step-father
		Grandmother
		Grandfather
		Aunty
		Uncle
		Legal guardian
2.	What is your gender?	Male
		Female
3.	What is your age?	17 years or younger
		18-20
		21-29
		30-39
		40-49
		50-59
		60 or older
4.	Which race/ ethnicity best describes you? ( Please choose only one)	African
		White
		Colored
		Asian/Indian
5.	Which of the following categories best describes your employment status?	Employed. working part-time
		Employed. working full-time
		Self employed
		Not employed. looking for work
		Not employed. NOT looking for work

		Retired
		Disabled. not able to work
<b>6.</b>	What is the highest level of education you have completed?	Did not attend school
		1st grade
		2nd grade
		3rd grade
		4th grade
		5th grade
		6th grade
		7th grade
		8th grade
		9th grade
		10th grade
		11th grade
		12th grade
		1 year of college
		2 years of college
		3 years of college
		Graduated with a Diploma
		Graduated with a Bachelors degree
		Graduated with an Honours degree
		Graduated with a Masters degree Graduated with a Doctorate
<b>7.</b>	In which country were you born?	(A drop-down menu of all countries to select from was provided)
<b>8.</b>	In what country do you live?	(A drop-down menu of all countries to select from was provided)
<b>9.</b>	In what Province were you born?	(A drop-down menu of all 9 provinces in RSA was provided)
<b>10.</b>	In what Province do you currently reside?	(A drop-down menu of all 9 provinces in RSA was provided)

<b>11.</b>	In which province does your daughter/ward attend school?	(A drop-down menu of all 9 provinces in RSA was provided)
<b>12.</b>	Please enter the name of the school that your daughter/ward is currently attending.	
<b>13.</b>	What grade is your daughter/ward in?	4
		5
		6
		7
<b>14.</b>	How old is your daughter/ward?	9 years
		10 years
		11 years
		12 years
		13 years
		More than 13 years
<b>15.</b>	Which type of healthcare provider advises you on taking care of your daughter/ward's health?	Doctor
		Nurse
		Pharmacist
		Other please specify
<b>16.</b>	Does your daughter/ward have medical insurance/ medical aid?	Yes
		No
<b>17.</b>	Which medical aid does she belong to?	

**SECTION B: HPV/VACCINE KNOWLEDGE.**

(Please select the most appropriate answer to the questions below)

<b>18.</b>	HPV infection can cause cervical cancer.	True
		False
		Unsure
<b>19.</b>	Cervical cancer is a serious disease.	True
		False
		Unsure

<b>20.</b>	The vaccines against cervical cancer prevent all (100% of) cervical cancers	True
		False
		Unsure
<b>21.</b>	The vaccines against cervical cancer are highly effective when given to adult women.	True
		False
		Unsure
<b>22.</b>	Cervical cancer is a very rare disease in South Africa	True
		False
		Unsure
<b>23.</b>	Of cancers affecting women. cervical cancer is one of the most common cancers affecting South African women.	True
		False
		Unsure
<b>24.</b>	Girls should receive HPV vaccination before they become sexually active.	True
		False
		Unsure
<b>25.</b>	HPV vaccination can be obtained by consulting a healthcare provider	True
		False
		Unsure

**SECTION C: ATTITUDE**

To what extent do you agree with each of the following statements? Please indicate your response by selecting the appropriate box using the scale below: strongly agree. disagree. neither agree nor disagree. agree. strongly agree.

<b>26.</b>	Allowing my daughter/ward to receive the HPV vaccine will show her that I care about her future health.	Strongly disagree
		Disagree
		Neither agree nor disagree
		Agree
		Strongly agree
		Strongly disagree
<b>27.</b>	It worries me that children receive so many vaccines these days.	Strongly disagree
		Disagree
		Neither agree nor disagree

		Agree
		Strongly agree
		Strongly disagree
<b>28.</b>	I believe that the HPV vaccine is safe and effective for the prevention of cervical cancer.	Strongly disagree
		Disagree
		Neither agree nor disagree
		Agree
		Strongly agree
		Strongly disagree
<b>29.</b>	I think that it is important for young girls to be vaccinated against cervical cancer.	Strongly disagree
		Disagree
		Neither agree nor disagree
		Agree
		Strongly agree
		Strongly disagree
<b>30.</b>	I want my daughter/ward to be protected against cervical cancer by being vaccinated against HPV.	Strongly disagree
		Disagree
		Neither agree nor disagree
		Agree
		Strongly agree
		Strongly disagree
<b>31.</b>	I am worried about the rumors regarding the side-effects of the HPV vaccine	Strongly disagree
		Disagree
		Neither agree nor disagree
		Agree
		Strongly agree
		Strongly disagree
	SECTION D: PRACTICE	
<b>32.</b>	What age do you think is appropriate for girls to receive human papillomavirus vaccine?	

	(Please specify)	
<b>33.</b>	What is the most trusted source you turn to for vaccination information or advice?	Paediatrician
		General medical practitioner (GP)
		Clinic nurse
		Pharmacist
		The school principal or class teacher of my daughter / ward
		Alternative medical practitioner
		Traditional healer
		Religious leader
		A friend
		A relative
		Facebook
		Twitter
Google / other search engine		
<b>34.</b>	What source of vaccination information do you have the least trust in?	Paediatrician
		General medical practitioner (GP)
		Clinic nurse
		Pharmacist
		The school principal or class teacher of my daughter / ward
		Alternative medical practitioner
		Traditional healer
		Religious leader
		A friend
		A relative
		Facebook
		Others (please specify)
<b>35.</b>	What or who had the biggest influence on your decision about whether or not to allow your daughter / ward to receive the HPV	The advice given to me by a healthcare provider
		The advice given to me by the school principal or class teacher of my daughter

	vaccine?	/ ward
		The advice given to me by an alternative medical practitioner
		The advice given to me by a traditional healer
		The advice given to me by a religious leader
		The advice given to me by a friend
		The advice given to me by a relative
		Article/s I read in the newspaper
		Article/s I read in a magazine
		Article/s I watched on television
		Article/s posted on Facebook
		Article/s posted on Twitter
		Article/s posted on online news
		Article/s I found while using Google / other search engine.
		Others (please specify)
<b>36.</b>	Do you feel that you have access to enough information about the HPV vaccine to allow you to make a well-informed decision?	Yes
		No
		Unsure
<b>37.</b>	Did your daughter/ward receive any HPV vaccination?	Yes
		No
		Unsure
	If the answer to question 37 was no or unsure. participants were asked the following	
<b>38.</b>	Would you want your daughter/ward to be vaccinated	Yes
		No



	against cervical cancer if vaccination was offered free of charge?	Unsure
39.	Would you want your daughter/ward to be vaccinated against cervical cancer if vaccination was offered at her school?	Yes
		No
		Unsure
40.	What are the main reasons for being unsure or not wanting to vaccinate your daughter/ward against cervical cancer? Please select possible reasons from the list	Haven't had the chance to do it yet (no opportunity)
		My daughter/ward is too young
		My daughter/ward is not at risk
		My healthcare provider has not suggested it
		My healthcare provider has advised me against it
		Vaccine is too new
		I don't think that vaccines are effective/provide long-term protection
		I don't have access to a doctor/health clinic
		I don't think the vaccine is safe
		We never thought about it
		There are too many vaccinations
		My daughter has an illness/medical condition that precludes vaccination (please specify).
Other (please specify)		
	If the answer to question 37 was yes. participants were asked the following:	
41.	How many doses did she receive? Please select	1
		2

		3
42.	Which type of HPV vaccine did your daughter/ward receive? Please select from the list	Gardasil®.
		Cervarix®
		Unsure
43.	Where did your daughter/ward get vaccinated? Please select	Doctor
		Pharmacist
		Health care clinic
		Other (please specify)
44.	Did your medical insurance/aid pay for some or all of the cost of your daughter/ward's vaccination?	Yes
		No
If the answer in Question 42 was yes. participants were asked the following:		
45.	What proportion of the cost did they cover?	100%
		99-90%
		89-70%
		79-60%
		69-50%
		59-40%
		49-30%
		29-19%
		19-10%
		9-01%
0%		
46.	How much did you pay for the cost of your daughter/ward's vaccination? please select	Less than R700
		Between R700- R800
		Between R800-R900
		Between R900-R1000
		More than R1000
		Less than R700
		Between R700- R800
		Between R800-R900