



Faculty of Medicine and Health Sciences

Department of Epidemiology and Social Medicine

**Cervical Cancer Prevention Methods for Zambia, using the Social Ecological Model
and Theory of Triadic Influence**

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To be defended by Anayawa Nyambe

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Promoter: Prof. dr. Guido Van Hal

Promoter: Prof. dr. Jarl K. Kampen



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Methodes voor baarmoederhalskankerpreventie in Zambia, gebaseerd op de Social Ecological Model en de Theory of Triadic Influence

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Anayawa Nyambe

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Promoter: Prof. dr. Guido Van Hal

Promoter: Prof. dr. Jarl K. Kampen

TABLE OF CONTENTS

ABBREVIATIONS	9
ACKNOWLEDGEMENTS	11
DECLARATIONS	12
ABSTRACT	13
CHAPTER 1: BASIS OF THE DOCTORAL DISSERTATION	15
1.1 Introduction.....	15
1.2 Background and Problem Statement.....	16
1.2.1 Cervical Cancer Prevention in Europe	16
1.2.2 Cervical Cancer Prevention in Sub-Saharan Africa	17
1.2.3 Cervical Cancer Prevention in Zambia and Problem Statement.....	19
1.3 Inventory of Theories.....	20
1.3.1 The Social Ecological Model	21
1.3.2 The Theory of Triadic Influence	21
1.3.3 Justification for the SEM and TTI	22
1.4 Rationale for the Study	22
1.5 Method of Research Administration.....	24
CHAPTER 2: SCREENING AND VACCINATION AS DETERMINED BY THE SOCIAL ECOLOGICAL MODEL AND THE THEORY OF TRIADIC INFLUENCE: A SYSTEMATIC REVIEW	35
2.1 Abstract.....	35
2.2 Introduction.....	36
2.2.1 The Social Ecological Model	37
2.2.2 The Theory of Triadic Influence	38
2.2.3 Relevance of a systematic review of SEM and TTI.....	39
2.3 Methods	40
2.3.1 Criteria for selecting studies for this review	40
2.3.2 Data collection and analysis	43
2.4 Results.....	45
2.4.1 Description of studies.....	45
2.4.2 Quality Assessment	52

2.5 Discussion	54
2.5.1 Characteristics of SEM.....	54
2.5.2 Characteristics of TTI.....	54
2.5.3 Similarities and Differences of SEM and TTI	55
2.6 Conclusion	57

CHAPTER 3: KNOWLEDGE, ATTITUDES AND PRACTICES OF CERVICAL

CANCER PREVENTION AMONG ZAMBIAN WOMEN AND MEN	71
3.1 Abstract	71
3.2 Background	72
3.3 Methods	75
3.3.1 Study Design, Site and Population	75
3.3.2 Questionnaires and Measures.....	76
3.3.3 Operationalization of Knowledge of Cervical Cancer	77
3.3.4 Sampling Design	78
3.3.5 Data Analysis	78
3.4 Results.....	79
3.4.1 Sample Composition and Practices	79
3.4.2 Knowledge, Practices and Intentions	83
3.4.3 Impact of Social Support on Practice and Intentions	88
3.4.4 Impact of Religious Beliefs on Knowledge, Practice and Intentions.....	89
3.4.5 Multivariate Analysis	89
3.5 Discussion.....	91
3.5.1 Knowledge, Practices and Intentions	91
3.5.2 Impact of Social Support on Practice and Intentions	92
3.5.3 Impact of Religious Beliefs on Knowledge, Practice and Intentions.....	93
3.6 Conclusions.....	93

CHAPTER 4: THE IMPACT OF THE SOCIAL ENVIRONMENT ON ZAMBIAN

CERVICAL CANCER PREVENTION PRACTICES.....	101
4.1 Abstract.....	101
4.2 Background	101
4.3 Method	105
4.3.1 Study Design, Site and Population.....	105

4.3.2 Study Instruments and Development	106
4.3.3 Sampling Design	106
4.3.4 Data Analysis	107
4.4 Results.....	107
4.4.1 Administration of cervical cancer prevention services in Zambia.....	108
4.4.2 Cervical Cancer in General	109
4.4.3 Screening.....	112
4.4.4 Vaccination.....	113
4.5 Discussion.....	115
4.6 Conclusions.....	117

**CHAPTER 5: USING FILM TO DISSEMINATE INFORMATION ON CERVICAL
CANCER PREVENTION IN LUSAKA: RESULTS FROM A SMALL
INTERVENTION STUDY.....**

5.1 Abstract.....	123
5.2 Introduction.....	123
5.3 Method	125
5.3.1 Study design, site and population.....	125
5.3.2 Instruments and measures	125
5.3.3 Operationalization of knowledge of cervical cancer.....	126
5.3.4 Development of the film	127
5.3.5 Sampling design	127
5.3.6 Data analysis	128
5.4 Results.....	128
5.4.1 Socio-demographics and cervical cancer practices.....	128
5.4.2 Film and awareness of cervical cancer.....	129
5.4.3 Film and knowledge of risk factors and protective factors	130
5.5 Discussion.....	131
5.6 Conclusion	131

CHAPTER 6: GENERAL DISCUSSION AND CONCLUSION

6.1 Main Findings	135
6.2 General Discussion	136
6.2.1 Academic assessment of the SEM and TTI	136

6.2.2 Development of a successful cervical cancer prevention strategy	139
6.3 General Conclusion and Recommendations	141
CHAPTER 7: EXECUTIVE SUMMARY	145
7.1 Background	145
7.2 Method	146
7.2.1 The Systematic Review	146
7.2.2 Study in Zambia	147
7.3 Overview of findings	152
7.3.1 The Systematic Review	152
7.3.2 Study in Zambia	152
7.4 Recommendations	153
APPENDICES	157

ABBREVIATIONS

χ^2	Chi-square
ACEWCC	African Centre of Excellence for Women's Cancer Control
AIDS	Acquired Immune Deficiency Syndrome
β	beta value
CAQDA	Computer Assisted/Aided Qualitative Data Analysis Software
CCPPZ	Cervical Cancer Prevention Program in Zambia
CDH	Cancer Disease Hospital
CDC	Centers for Disease Control and Prevention
CI	Confidence Interval
CIDRZ	Centre for Infectious Disease Research in Zambia
CRQ	Central Research Question
DDMU	District Disaster Management Unit
DEB	District Education Board
DEF	Data Extraction Form
<i>df</i>	Degrees of freedom
DHO	District Health Office
DNA	Deoxyribonucleic acid
eC3	Electronic cervical cancer control
ECDC	European Centre for Prevention and Disease Control
ECZ	Examinations Council of Zambia
GPS	Global Positioning System
HIV	Human Immunodeficiency Virus
HPV	Human papillomavirus
INESOR	Institute of Economic and Social Research
M	Mean
MCDMCH	Ministry of Community Development Maternal and Child Health
MoE	Ministry of Education
MoH	Ministry of Health
N	Population/Sample size
NA	Not applicable
nd	no date
NGO	Nongovernmental organization

NR	Not reported
OR	Odds Ratio
PCI	Project Concern International
PHO	Provincial Health Office
PPAZ	Planned Parenthood Association of Zambia
PSA	Prostate Specific Antigen
SCCA	Stop Cervical Cancer in Africa
SD	Standard Deviation
SEM	Social Ecological Model
SES	Social Economic Status
SMS	Short Message Service
SPSS	Statistical Package for the Social Sciences
STI	Sexually Transmitted Infection
THPAZ	Traditional Health Practitioners Association of Zambia
TTI	Theory of Triadic Influence
UK	United Kingdom
UTH	University Teaching Hospital
UTM	Universal Transverse Mercator
USA	United States of America
VIA	Visual Inspection with Acetic Acid
WHO	World Health Organization
ZDF	Zambia Defense Force
ZICTA	Zambia Information and Communications Technology Authority
ZNBC	Zambia National Broadcasting Corporation

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DECLARATIONS

Plagiarism statement

This doctoral dissertation was written by Anayawa Nyambe. My co-authors helped in the development of the individual articles. Quotations from published and unpublished sources are clearly indicated and acknowledged as such. I am conscious that the incorporation of material from other works or a paraphrase of such material without acknowledgement will be treated as plagiarism. The source of any picture, map or other illustration is also indicated, as is the source, published or unpublished, of any material not resulting from my own experimentation, observation or specimen-collecting.

Ethics

Ethical clearance was obtained from Eres Converge in Lusaka Zambia. For the case study, the reference number was 2016-Jan-010 valid from 24th January 2016 to 23rd January 2017, and for the intervention study, the reference number was 2017-June-016 valid from 24th July 2017 to 23rd July 2018.

Consent was obtained from all respondents and their identities and information they provided are confidential.

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ABSTRACT

Primary and secondary prevention methods have proved to be successful in controlling the spread of cervical cancer. Despite these developments cervical cancer remains the leading cancer among women in Zambia. Such that approximately 81% of the women diagnosed with cervical cancer die from the disease every year. The aim of the research was to identify the optimal cervical cancer prevention procedures that can be practiced in Zambia.

To achieve this aim, the Social Ecological Model and the Theory of Triadic Influence were systematically reviewed and used to study cervical cancer prevention behaviors among Zambians. This involved conducting a case study in Lusaka from February to May 2016. Quantitative data by means of questionnaire was initially collected from the general public (women and men). Then data was collected qualitatively through focus groups discussions with the general public, and interviews with stakeholders (health care providers, teachers and religious leaders), special interest groups (advocacy groups and non-governmental organizations), and policy makers. Finally, a small-scale intervention study assessing knowledge among the general public in Lusaka was conducted from August to September 2017.

Descriptive statistics and appropriate statistical tests (chi square test, analysis of variance, logistic regression) were used to describe and analyze the quantitative data according to hypotheses developed. A knowledge grade (range: 1 – 10 points) which linked causes to risk factors for cervical cancer was used to assess the knowledge of respondents. Qualitative data was coded into predetermined themes (cervical cancer in general, screening, vaccination) and an organizational chart of the administration of cervical cancer prevention services in Zambia was developed.

The population was found to have low levels of awareness, knowledge and practice of screening and vaccination. According to the theoretical frameworks, awareness, knowledge, personal beliefs, social influence, availability of facilities/services, and policy are among the factors that affected the practice of cervical cancer prevention behaviors.

The Zambian cervical cancer prevention system has covered several areas to control the spread of cervical cancer. To optimize this program, awareness, social support and facilities can be improved. Since film was demonstrated to increase awareness and knowledge, it can be used for sensitization campaigns. Interventions must include men because they greatly influence women in the practice of prevention. Furthermore, with

increased knowledge screening practice by self-screening can be better promoted and a future national roll-out of the human papillomavirus-vaccine would mean a reduction in cases of cervical cancer and better survival.

CHAPTER 1: BASIS OF THE DOCTORAL DISSERTATION

1.1 Introduction

Cervical cancer is globally the second most common cancer in women after breast cancer. However, cervical cancer is prevented by screening and vaccination unlike most cancers. Nevertheless, Zambia, a landlocked country in sub-Saharan Africa, has one of the highest rates of cervical cancer in the world. This cancer claims the lives of many Zambian women because it is detected when it is too late to be treated effectively.

To control the spread of cervical cancer in Zambia, screening was started in 2006 (Centre for Infectious Disease Research in Zambia [CIDRZ], 2013). Screening via Visual Inspection with Acetic acid (VIA) is provided free of charge at government clinics where the service is available (Cervical Cancer Prevention Programme in Zambia, n.d.; CIDRZ, 2013). Furthermore, in 2013 the Human papillomavirus (HPV) vaccine Gardasil was administered as a demonstration using a school-based strategy targeting girls in grade 4 and out of school girls aged 10 years old in Lusaka Province (World Health Organization, 2015).

Considering these developments, this study targeted the general public (women and men), stakeholders (health care providers, teachers and pastors), special interest groups (non-governmental organizations, advocacy groups, media) and policy makers in order to have a comprehensive understanding of cervical cancer prevention in Zambia. The main aim was to identify the optimal cervical cancer prevention procedures that can be practiced in Zambia. This was achieved by using multi-level frameworks of the Social Ecological Model (SEM) and the Theory of Triadic Influence (TTI). The SEM consists of the intrapersonal, interpersonal, organizational, community and policy levels of health behavior influence (McLeroy, Bibeau, Steckler et al., 1988; Winch, 2012). The TTI is organized in a 3×3 framework with ultimate, distal and proximal levels and intrapersonal, interpersonal and socio-cultural environmental streams of influence (Snyder & Flay, 2012). These frameworks identified target areas for improving cervical cancer prevention, which formed the basis of an intervention study focusing on awareness and knowledge.

It was desirable to conduct a study that incorporated Zambian women, men, stakeholders, and policy makers because it improved the quality of research interpretation and findings. It also allowed for the assessment of the SEM and the TTI health behavior frameworks. A research that acknowledges the role of several different stakeholders and

then further executes an intervention had never been done before in Zambia. Moreover, apart from providing the basis for the development of future research, this study can also be used to improve the current cervical cancer prevention program in Zambia because it contributes to the evidence base for policy making.

This doctoral dissertation details the basis, findings and conclusions of this research. The rest of this chapter explains the general background, rationale including study aims, and general method. The next chapters present the publications that outline the different hypotheses/research questions, methods, results and conclusions of data collected. This is followed by a general discussion addressing the central research questions as well as providing recommendations and an overall conclusion. In addition to this, there is the executive summary that summaries the doctoral dissertation. The final part is the appendices with study instruments and supporting result tables that are supplementary to the publications.

1.2 Background and Problem Statement

1.2.1 Cervical Cancer Prevention in Europe

Most women are at risk of cervical cancer, which is the second most common cancer in women after breast cancer. However, unlike most cancers, it is uniquely preventable. In this regard, women in Europe have had the opportunity to benefit from significant advances in cervical screening and Human papillomavirus (HPV) vaccination which has resulted in a reduction of the number of cases of cancer of the cervix.

In 1968, Wilson and Junger first described criteria for approving the viability, effectiveness and appropriateness of a screening program for the World Health Organization (WHO). These ten principles have been used to enhance screening strategies like the national strategy of the United Kingdom (UK) (Tidy, 2014). Needless to say, in Europe, screening has been going on for years and in some countries like Finland, Iceland and Denmark as early as the 1960s (Koch, 2012). Developments in screening systems include expansion to cover the whole nation, development of registers and call/recall invitation programs where women are sent invites as well as reminders to attend screening. Furthermore, most countries are in favor of changing the primary screening method from pap smears to HPV test which is more sensitive and perhaps introducing self-sampling screening methods. However, depending on the test used in the screening program, there are differences between countries on which age groups to screen and at what interval.

The HPV vaccines Gardasil and Cervarix were first licensed in 2006 (Global Advisory Committee of Vaccine Safety, 2014). In 2008, the European Centre for Prevention and Disease Control (ECDC) issued guidelines for the introduction of the HPV vaccines in Europe. As of 2013, 19 European countries have introduced HPV vaccination: Austria, Belgium, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Luxembourg, the Netherlands, Norway, Portugal, Romania, Slovenia, Spain, Sweden and the UK. Although the vaccines are licensed to be used by boys as well, the ECDC recommends the routine vaccination of girls only between 10 and 14 years old which is believed to be more cost effective (European Institute of Women's Health, 2013). However, administration of the vaccine varies from country to country, with some having a school based system, others by doctor's invitation, and some practice a combination of these methods (Koch, 2012). In Flanders Belgium, girls under 19 years old can equally be vaccinated by buying the vaccine from the pharmacy (BO, n.d.). In the UK, Gardasil was licensed in September 2006 for girls and women aged between 9 and 26, while Cervarix was licensed in 2007 for girls and women between the age of 10 and 25 (CRUK, 2014). In the Netherlands, since November 2006, the HPV vaccine was available and indicated for males and females aged nine and above (Klink, 2007).

It should be noted that the cost of screening and vaccination varies; however, some countries have found it effective to make these options free of charge by incorporating them into the national budget. Furthermore, it is important to practice both preventive measures. Although HPV vaccination offers further prevention, it does not eliminate the need of screening vaccinated and non-vaccinated women.

The experiences of introducing cervical screening and HPV vaccination in Europe prove that well organized screening combined with vaccination and early treatment programs are effective in preventing cervical cancer. However, it has been proven to be a challenge to simply implement these methods in low-resource settings such as sub-Saharan Africa.

1.2.2 Cervical Cancer Prevention in Sub-Saharan Africa

Sub-Saharan Africa has the highest incidence of cervical cancer in the world and it is on an increase in many African countries, but the true size of the problem is unknown due to under-reporting and lack of reliable data (WHO Regional Office for Africa, 2012).

There are several reasons for the high rate of cervical cancer in sub-Saharan Africa, such as lack of cervical cancer awareness, absence of policy framework, inadequate

infrastructures, high diversity of HPV types and high HIV/HPV prevalence. It has been recognized that cervical cancer and its precursors are one of the HIV associated diseases and they share similar risk factors (Botha & Dochez, 2012). Aside from this, cancer of the cervix has been under-recognized and under-prioritized compared to competing health priorities such as HIV/AIDS, tuberculosis and malaria (Louie, De Sanjose & Mayaud, 2009).

Despite these challenges, efforts have been made to prevent the spread of cervical cancer. Some countries have developed screening programs. For instance, in Kenya a screening program was developed recommending VIA, Visual Inspection with Lugol's iodine, cytology using pap smear and HPV testing, targeting women between 25 and 49 years in an interval of every 5 years, except for HIV positive women who follow a yearly interval (Ministry of Public Health and Sanitation & Ministry of Medical Services, 2012). Visual inspection techniques are promoted as cheaper alternatives to cytology-based screening. Similarly, cryotherapy has been selected as the treatment option for the eligible test-positive cases. These alternatives are simple and safe techniques that simplify the screening process (WHO, 2012).

In contrast to other sub-Saharan countries, South Africa is classified as an upper middle-income country by the World Bank. In South Africa, apart from cytology and Visual Inspection with Acetic Acid (VIA), HPV testing is being extensively investigated as another alternative method for screening (Botha & Dochez, 2012). The limitations of HPV testing include the cost, infrastructure and time needed to obtain a result. Nevertheless, as a promising alternative to the HPV test is the *care*HPV test which was developed in China as a simple, rapid, portable and operational HPV molecular-based test for low-resource settings. This test has been demonstrated to reduce the incidence of cervical cancer by 56% in China if given just three times over a woman's lifetime and effective treatment is available. However, its performance needs to be evaluated in African settings (HPV in Africa Research Partnership, 2010). Self-screening tests are marketed in South Africa. Studies there have demonstrated that self-sampling is a viable alternative among adolescents (Alder, 2013) and HIV positive women (Mahomed et al., 2014). Equally, in Cameroon, self-screening was found to be an effective primary screening test for women between 30 and 49 years old (Untiet, 2014).

In regards to HPV vaccine, challenges faced in introducing it in sub-Saharan Africa include competing priorities, decision making for introduction of new vaccines, need for surveillance systems to support new vaccine introduction, cost of introducing new

vaccines, need to sustain current routine immunization, weak health systems hamper progress to achieve high immunization coverage, data management for monitoring program performance and integrating immunization with other health interventions (Chauke-Moagi & Mumba, 2012).

Global Alliance for Vaccines and Immunization was established in 2000 to provide financial support for immunization to the poorest countries of the world (Schoub, Mphahlele, Ngcobo et al., 2012). With the help of donor organizations, the relatively expensive HPV vaccines are being made accessible to low-resource countries. As of April 2011, Rwanda became the first country in the sub-region to introduce the HPV vaccine nationwide (Chauke-Moagi & Mumba, 2012). The Rwandan program aims to vaccinate girls aged 12 to 15 years and provide HPV testing for women between 35 and 45 years. This program has been made possible because of a 3 year donation of 2 million doses of the quadrivalent vaccine and 250000 HPV screening tests. The vaccine company also agreed to provide Rwanda with a discounted price after 3 years (Botha & Dochez, 2012). Most sub-Saharan countries that have introduced or piloted the vaccine have targeted only girls following a school-based system with an outreach program for out of school girls. In Uganda, it was found that coverage rates were higher when vaccinating girls according to grade or class than identifying them by age (Program for Appropriate Technology in Health et al., 2011). A study on HPV among men in sub-Saharan Africa found that prevalence of HPV is high. Therefore, implementation of the HPV vaccines could help prevent the spread (Olesen, Munk, Christensen et al., 2014).

1.2.3 Cervical Cancer Prevention in Zambia and Problem Statement

Looking at Zambia, the basic actions that are undertaken in cervical cancer prevention are screening and HPV vaccination. The primary form of screening practiced is VIA. To enhance screening coverage, Zambia developed the “electronic cervical cancer control” or eC3, which involves internet and SMS technology to consult with health professionals (Parham, Mwanahamuntu, Pfaendler, et al, 2010). During May 2013, Zambia piloted the HPV vaccine Gardasil which is administered using a school-based strategy targeting girls 9 to 11 years old (African Centre of Excellence for Women’s Cancer Control, 2014). The main challenges in the HPV vaccination program were identified as data management, planning and co-ordination, social mobilization, logistics and service delivery (Chimba, 2014).

Problem Statement

The problem is that Zambia, a landlocked country in Sub-Saharan Africa, has one of the highest rates of cervical cancer in the world. According to the WHO, Zambia has a population of 3.17 million women ages 15 years and older who are at risk of developing cervical cancer (Castellsagué, de Sanjosé, Aguado, 2007). Furthermore, there are approximately 1,650 women in Zambia diagnosed with cervical cancer every year and 1,340 die from the disease (about 81%) (Zambia Cancer Society, 2013).

To alleviate this problem the government of Zambia has invested in cervical screening and piloted the HPV vaccine. With this, efforts have been made to improve access to health care treatment, cheaper screening test techniques are used, campaigns have been created and a few studies have been conducted to determine the Zambian woman's perception of cervical cancer.

The experiences of other countries have proved that there is a vast range of screening techniques and vaccination procedures available to prevent cancer of the cervix in the developed and developing world. This research focuses on finding the optimal cervical cancer prevention procedures that can be practiced in Zambia.

1.3 Inventory of Theories

Most health behavior and health promotion theories were adapted from the social and behavioral sciences. Usually, strategies to change health behaviors have focused on individual-level factors such as knowledge and beliefs (Glanz, 2014). As a matter of fact, reviews of theories utilized for the past two decades suggest that the most widely applied theories in health behavior research have been the Transtheoretical Model and Stages of Change, Social Cognitive Theory, the Health Belief Model, the Theory of Reasoned Action and Theory of Planned Behavior, and Social Networks/Social Support (Noar & Mehrotra, 2010).

Nevertheless, according to the Ottawa Charter for Health Promotion (1986) health behaviors are thought to be improved when environments and policies support healthy choices, and individuals are motivated and educated to make those choices (Glanz, Rimer & Viswanath, 2008). Furthermore, it was concluded by Elder et al., that socio-ecological frameworks are essential in programs or studies that employ multi-level interventions and measurement strategies (Elder, Lytle, Sallis et al., 2007). In this regard, a number of models have been developed that specify all of the different levels that affect behavior in

one model such as the Social Action Theory, Process Person Concept Time Model and the Andersen Model of Healthcare Utilization.

Naturally, decisions on effective preventive procedures in regard to cervical screening and vaccination are not only dependent on the individual but are influenced by other societal factors. After reviewing literature on multi-level models, the Social Ecological Model (SEM) and the Theory of Triadic Influence (TTI) were chosen as frameworks that can be used to assess prevention programs.

1.3.1 The Social Ecological Model

The SEM was developed out of the work of a number of prominent researchers: Urie Bronfenbrenner's Ecological Systems Theory (1979), which focused on the relationship between the individual and the environment (Glanz, 2008); McLeroy and associates' Ecological Model of Health Behaviors (1988), which classified five different levels of influence on health-related behaviors and conditions (National Cancer Institute, 2005); and Daniel Stokols' Social Ecological Model of Health Promotion (1992, 2003), which identified the core assumptions that underpin the SEM (Glanz, 2008);

Components of the SEM are (1) Intrapersonal for individual characteristics that influence behavior knowledge, skills, self-efficacy; (2) Interpersonal (family, friends, peers) for interpersonal processes and groups providing identity and support; (3) Organizational (Churches, stores, community organizations) for rules, regulation, policies, structures constraining or promoting behaviors; (4) Community (Social networks) for community norms and regulations; and (5) Policy (Local, state, federal) for policies and laws that regulate or support healthy practices/actions (Winch, 2012). (See Chapter 2 for Figure 2.1 of the SEM)

1.3.2 The Theory of Triadic Influence

Flay, Snyder and Petraitis, 2009 borrow from and build on the ideas of Bronfenbrenner and Bandura (Snyder & Flay, 2012). The TTI is organized in a 3 × 3 framework with three levels and three streams of influence. Such that, independent variables that predict behavior are categorized into three levels of influence: ultimate, distal, and proximal. Ultimate-level causes are broad and relatively stable causes that individuals have little control over and these include politics, religion, and age. Distal-level influences are divided into first and second levels, as variables affecting behavior that individuals are likely to have some control over. Proximal-level predictors are more

immediate precursors to a specific behavior and are under the control of an individual, although still influenced by the distal and ultimate factors. Equally, causes of behavior are categorized into three streams of influence: intrapersonal/personal stream (self-control, self-determination and competence), interpersonal/social stream (peers, school, work and friends), and socio-cultural environmental stream (media, social organization, and culture) (Snyder & Flay, 2012). (See Chapter 2 for Figure 2.2 of the TTI)

1.3.3 Justification for the SEM and TTI

The SEM and TTI allow for the integration of multiple levels of influence to establish an overall view of health behavior change, specifically the uptake of the HPV vaccine and cervical screening for the purpose of this study. Changing individual's behavior by providing them with the necessary skills and motivation is only possible if environments and policies are also considered. These models target mechanisms of change at several different levels of influence involving both individual-level and environmental/policy-level interventions. These models also consider social norms in terms of the interactions between partners, family members and friends at interpersonal level. In particular, the TTI considers social normative beliefs as a concept that directly influences health behaviour. Unfortunately, most researches hardly ever have the opportunity to utilize multi-level models.

The SEM compared to the complex TTI, is a more commonly utilized ecological model and has been proven to be an effective method for developing for example, screening interventions. It is for this reason that the SEM was a good model to follow in this research. The TTI was selected because of its distinct difference in structure to the SEM. The TTI is a relatively new model and was used in a cancer screening study proving it may be effective for other topics apart from substance abuse. In general, the SEM and TTI greatly differ in approach and areas of focus, making these models interesting for comparison in determining which of these models would be most effective in a cervical cancer study.

1.4 Rationale for the Study

Zambia recently started its cervical cancer prevention program and as such, very few studies have been conducted that focus on cervical cancer and its prevention. At the time of the research, cervical cancer prevention in Zambia focused on screening, vaccination and

general sensitization of the public. The cervical cancer prevention program can be improved by considering the views of the general public and coupling this information with that sourced from other groups of society including health care providers, advocates and policy makers. Most studies focus on intrapersonal characteristics of a single target group of people. In this way, this research is unique because it considered the views of multiple groups of society which allowed for a more comprehensive view on the cervical cancer prevention program.

The information obtained highlighted the gaps in the implementation of cervical cancer prevention services. It also illustrated the methods of prevention the society is willing to try such as self-screening and vaccination of boys. The possibility of implementing these methods was linked to the views of key stakeholders and policy makers. This study went further by conducting an intervention study that focused on increasing awareness and knowledge by means of watching a short film. According to literature, this type of intervention was never done before in Zambia. This research clearly suggested some areas that can be targeted for future research on improving uptake of cervical cancer services.

Finally, this study advances health behavior science by testing two frameworks, the TTI and the SEM. It followed social theory in that individual's health behavior is not only determined by the individual but is equally influenced by the environment around them. These theories are rarely used by researchers in general because of their complexity. This research not only outlines their use but also applies these frameworks.

Aim/General Objective

The aim of the research was to identify the optimal cervical cancer prevention procedures that can be practiced in Zambia.

Specific Objectives

In accordance to the aim, the following specific objectives were developed:

- i. Determine the views of Zambians on screening and self-screening for cervical cancer
- ii. Determine the views of Zambians on HPV vaccination of boys and girls
- iii. Improve the current cervical cancer prevention program based on the best model between the SEM and TTI that can be used in Zambia

- iv. Determine whether watching a short film can increase knowledge levels regarding cervical cancer prevention

Central Research Questions

The central research questions were as follows:

1. To what extent are the SEM and TTI different in proposing optimal measures for cervical cancer prevention?
2. To what extent is the execution of the two respective prevention frameworks (SEM, TTI) feasible in Zambia?

1.5 Method of Research Administration

This research officially began in October 2013 but a year later a co-supervisor with expertise in research design and methodology was included in the team. This resulted in a change in the overall direction of the research. It was at that point that the study frameworks (SEM and TTI) were selected and new central research questions were developed.

A systematic review was conducted to address the first research question, to what extent are the SEM and TTI different in proposing optimal measures for cervical cancer prevention? The method involved performing separate literature searches during January and February 2015 using Medline, Ovid, Proquest, PubMed, University of Antwerp Discovery Service and Web of Science, for articles that apply the SEM and TTI. A Data Extraction Form with closed questions was developed to assist with data extraction. Basic descriptive statistics was utilized to summarize the general characteristics of the 40 SEM studies and 46 TTI studies that were included in the review. (See chapter 2)

Since the frameworks share similar concepts, it was decided to integrate them for answering the second research question, to what extent is the execution of the two respective prevention frameworks (SEM, TTI) feasible in Zambia? It was planned to conduct a case study in Lusaka Zambia focussing on vaccination (including vaccination of boys), screening (including self-screening), and improving the current cervical cancer prevention program based on the best model between the SEM and TTI.

The frameworks were used in the development of the study instruments (questionnaires, focus group discussion guides, semi-structured interview guides) and selection of target study participant groups. The frameworks were integrated according to

ecological levels intrapersonal, interpersonal and environmental which combine the SEM's organizational, community and policy levels. Each concept of the SEM and TTI was operationalized into a question. The questions were either taken and modified from existing literature or developed by the authors. Table 1.1 and 1.2 below summarize how the SEM and TTI have been applied to this research.

Table 1.1: Operationization of the SEM for cervical cancer screening and vaccination for Zambia (Centers for Disease Control and Prevention, 2013; McLeroy, Bibeau, Steckler et al., 1998)

Levels of influence (target group)	Description	Application to current study
Intrapersonal (general public)	Characteristics of the individual such as knowledge, attitudes, behavior, self-concept, skills etc. This includes the developmental history of the individual	<ul style="list-style-type: none"> • basic knowledge • attitude: perceived susceptibility/risk of getting cervical cancer • behaviors: screening and vaccination health beliefs (benefits and common barriers) • attitude: Interest in self-screening and cost • attitude: personal views on age for screening and vaccination • skills • developmental history
Interpersonal (general public)	Formal and informal social network and social support systems, including the family, work group, and friendship networks.	<ul style="list-style-type: none"> • living status • family health care decisions • communicating with others about screening and vaccination • family views on vaccination and screening
Organizational (stakeholders)	Social institutions with organizational characteristics, and formal (and informal) rules and regulations for operation.	<ul style="list-style-type: none"> • Adopting worksite policies that support preventive care (promotion, recommendation, educating on screening and vaccination).
Community (special interest groups)	Relationships among organizations, institutions and informal networks within defined boundaries.	<ul style="list-style-type: none"> • Conducting public awareness and educational campaigns. • media and advertisements • cultural norms and ideals regarding

		screening and vaccination
Public policy (policy makers)	Local, state, and national laws and policies	<ul style="list-style-type: none"> • vaccine and screening policy • vaccine and screening cost and age recommendations • possibility of introducing self-screening • possibility of vaccinating both boys and girls

Table 1.2: Operationization of TTI for cervical cancer screening and vaccination for Zambia (Petraitis, Flay, Miller et al., 1998)

Level of influence	Types of influence (target group)		
	Intrapersonal (general public)	Social/Interpersonal (general public)	Attitudinal/Environment (stakeholders, special interest groups, policy makers)
Ultimate	<p>Definition: Personality traits and intrapersonal characteristics that, although beyond the easy control of women, might promote some internal motivation to screen and vaccinate.</p> <p>Concepts: biology/personality</p> <p>Indicators: Genetic; lack of impulse control; external locus of control; aggressiveness; extroversion; sociability; risk-taking; sensation-seeking; neuroticism or emotional instability; intelligence</p>	<p>Definition: Characteristics of the people who make up women's most intimate social support system. These characteristics are not specific to cervical cancer prevention and are beyond the personal control of women</p> <p>Concepts: social situation</p> <p>Indicators: Infrequent opportunities for rewards from family members; lack of parental warmth, support, or supervision; negative evaluations from parents; home strain; parental divorce or separation; unconventional values of parents; unconventional values among peers</p>	<p>Definition: Aspects of women's' immediate surroundings, neighborhoods, social institutions, and culture that, although beyond the personal control of women, put them at risk</p> <p>Concepts: cultural environment</p> <p>Indicators: Local crime and employment rates; inadequate schools; poor career and academic options; infrequent opportunities for rewards at school; negative evaluations from teachers; media depictions of cervical cancer; availability of services; weak public policies on cervical cancer prevention practices</p>
Application to current study	<ul style="list-style-type: none"> • locus of control • sociability • risk-taking 	<ul style="list-style-type: none"> • living status 	<ul style="list-style-type: none"> • employment rates • inadequate schools • media depictions of cervical

			<p>cancer prevention</p> <ul style="list-style-type: none"> • availability of screening and vaccination services • vaccine and screening policies
Distal	<p>Definition: Affective states and general behavioral skills of women that promote some internal motivation for screening and vaccination</p> <p>Concepts: sense of self-control, social competence; self-determination, social and general skills</p> <p>Indicators: Low self-esteem; temporary anxiety, stress, or depressed mood, poor coping skills; inadequate social skill; weak academic skills</p>	<p>Definition: Emotional attachments of the public and the attitudes and behaviors of influential role models who encourage cervical cancer prevention</p> <p>Concepts: interpersonal bonding, other's behavior and attitudes; motivation to comply, perceived norms</p> <p>Indicators: Weak attachment to and weak desire to please family members; strong attachment to and strong desire to please peers; greater influence by peers than parents; substance specific attitudes and behaviors of role models</p>	<p>Definition: Personal values and behaviors of women that contribute to their attitudes toward screening and vaccination</p> <p>Concepts: interaction with social institutions, information opportunities; values/evaluations, knowledge/expectancies</p> <p>Indicators: Weak commitment to conventional values, school, and religion; social alienation and criticism; weak desire for success and achievement; hedonic values and short-term gratification; rebelliousness; desire for independence from parents; tolerance of deviance</p>
Application to current study	<ul style="list-style-type: none"> • temporary anxiety (fear cervical cancer), social competence • self-determination • self-control • social and general skills 	<ul style="list-style-type: none"> • motivation to comply - influence of family and friends • other's behavior and attitudes -friends/family who practice screening and vaccination • interpersonal bonding - communicating with others about screening and vaccination • perceived norms 	<ul style="list-style-type: none"> • religious values • knowledge • Stigma • interaction with social institutions • information opportunities;
Proximal	<p>Definition: Beliefs about one's ability to practice or not practice cervical cancer prevention</p>	<p>Definition: Beliefs about the normative nature and pressures to practice cervical cancer prevention</p>	<p>Definition: Beliefs and evaluations about the costs and benefits of cervical cancer prevention</p>

	<p>Concepts: self-efficacy behavioral control</p> <p>Indicators: Refusal skills; determination to use avoid substances; use self-efficacy; refusal skill efficacy</p>	<p>Concepts: social normative beliefs</p> <p>Indicators: Prevalence estimates; motivation to comply with other users; beliefs that important others (i.e., friends, parents, and other role models) encourage cervical cancer prevention</p>	<p>Concepts: attitudes toward the behavior</p> <p>Indicators: Expected costs and benefits of prevention methods, evaluation of costs and benefits of prevention methods; attitudes toward prevention by others; attitudes toward prevention by self</p>
Application to current study	<ul style="list-style-type: none"> • use self-efficacy • refusal skill efficacy 	<ul style="list-style-type: none"> • Prevalence estimates • motivation to comply with other users • beliefs that important others (i.e., friends, parents, and other role models) encourage screening and vaccination 	<ul style="list-style-type: none"> • Cost of self-screening • Attitudes towards screening and vaccination (age recommendations, vaccination of boys and girls)

From February to May 2016 quantitative and qualitative data was collected in Lusaka Zambia. For the quantitative phase, questionnaires were used to collect data from 300 women and 300 men who resided in Kanyama Compound and Chilenje Township of Lusaka. A team of six data collectors were hired to assist in data collection. Due to inadequate naming of roads and house numbers, sampling was conducted using the random walk technique and houses were mapped using GPS devices until the quota was complete. The random walk is a non-probability sampling method that allows for the sampling of households when very little information about the population is available (Bauer, 2016). Basically, the data collectors were instructed to begin data collection from sections of the main roads in the target areas and then work their way into the community by using a spinning pointer when at crossroads. Data collection was targeted at every second house on a road. Figures 1.1 and 1.2 show the households of respondents that participated. (See chapter 3)

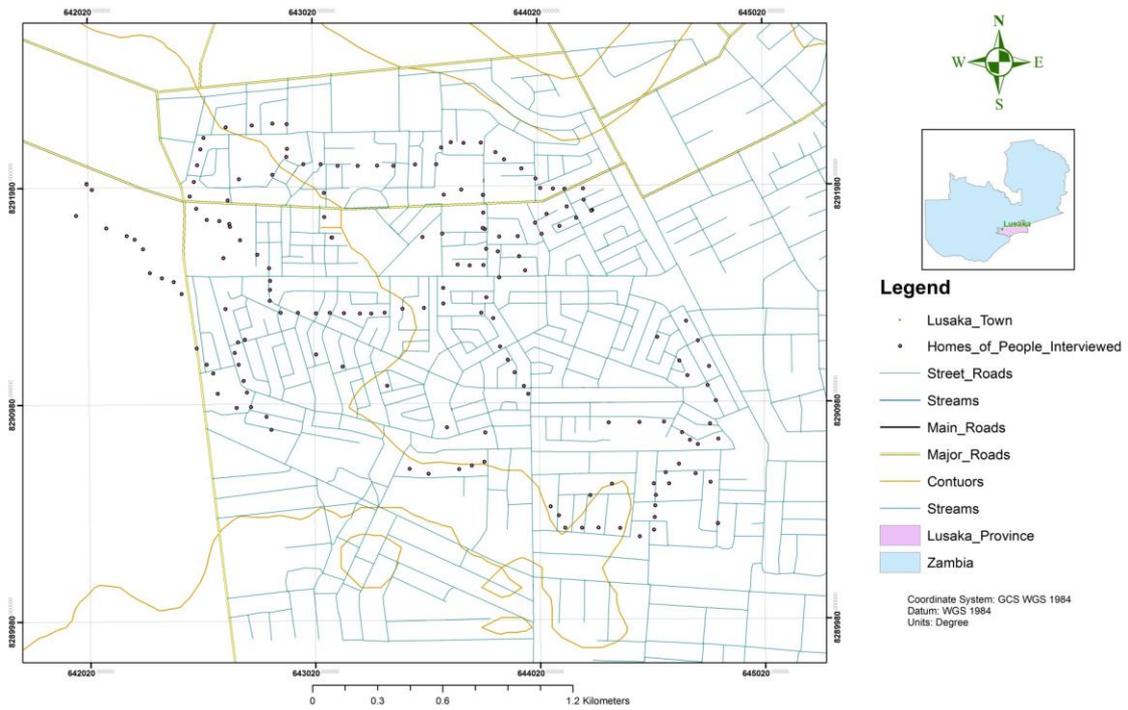


Figure 1.1: Map of Chilenje indicating the houses where respondents were interviewed (courtesy of University of Zambia, School of Mines)

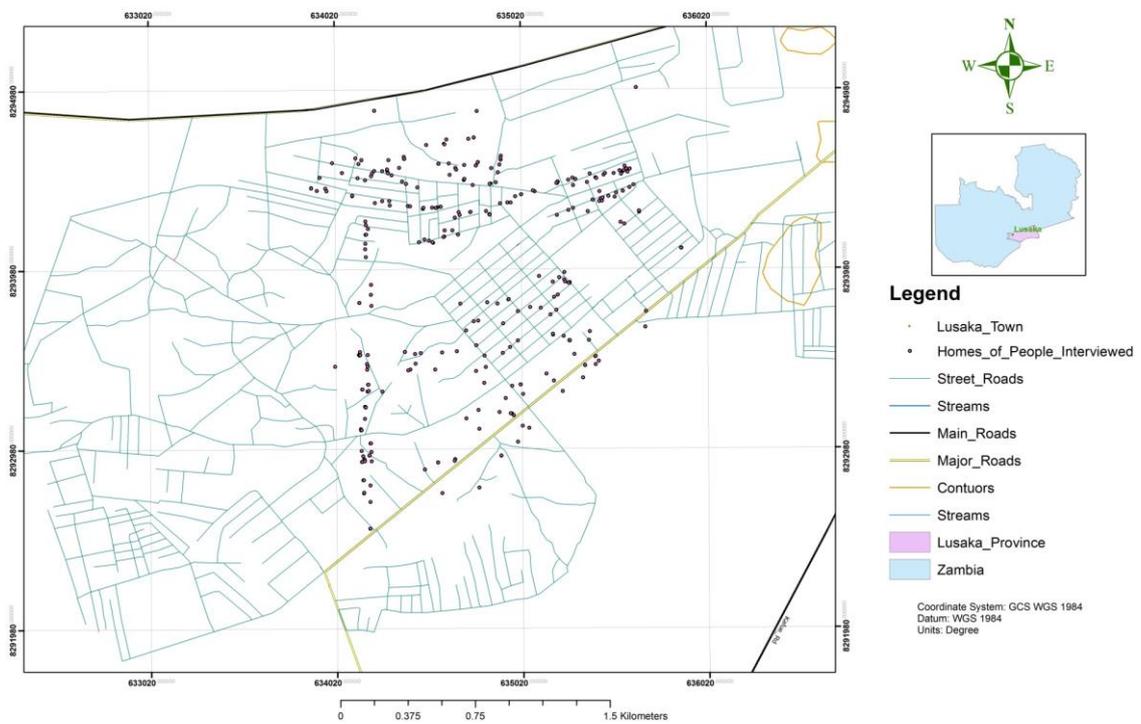


Figure 1.2: Map of Kanyama indicating the houses where respondents were interviewed (courtesy of University of Zambia, School of Mines)

For the qualitative phase, focus group discussions lasting approximately 60 minutes were conducted with groups of only women (5 groups), only men (5 groups) and one mixed group of men and women. The number of respondents attending focus group discussions ranged from 4 to 10. The focus group discussion guide for women and men, was similar in arrangement and content to the questionnaires of the quantitative phase. The focus groups were supposed to be conducted with the same respondents that filled in the questionnaire in order to gain more in depth information as requested by the ethics. In spite of the phone call reminders and declaring interest, very few respondents returned to participate in the discussions. The Environmental Health Department of the Chilenje and Kanyama clinics assisted in recruitment of new participants within the target areas with the inclusion criteria. This resulted into having groups composed of respondents who did not fill-in the questionnaire. However, the results of these discussions were similar to those obtained during the quantitative phase. Furthermore, semi-structured interviews were conducted with stakeholders (health care providers, head teachers, pastors), special interest groups (NGOs and advocacy groups) and policymakers at their place of work. (See chapter 4)

Since it was found that practice was greatly influenced by having awareness of prevention services, it was decided to conduct a small scale intervention study to improve awareness and knowledge among men and women. The intervention that targeted churches was conducted from July to September 2017. (See chapter 5)

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CHAPTER 2: SCREENING AND VACCINATION AS DETERMINED BY THE SOCIAL ECOLOGICAL MODEL AND THE THEORY OF TRIADIC INFLUENCE: A SYSTEMATIC REVIEW

Anayawa Nyambe, Guido Van Hal, Jarl K. Kampen

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2.1 Abstract

Background: Vaccination and screening are forms of primary and secondary prevention methods. These methods are recommended for controlling the spread of a vast number of diseases and conditions. To determine the most effective preventive methods to be used by a society, multi-level models have shown to be more effective than models that focus solely on individual level characteristics. The Social Ecological Model (SEM) and the Theory of Triadic Influence (TTI) are such models. The purpose of this systematic review was to identify main differences and similarities of SEM and TTI regarding screening and vaccination in order to prepare potentially successful prevention programs for practice.

Methods: A systematic review was conducted. Separate literature searches were performed during January and February 2015 using Medline, Ovid, Proquest, PubMed, University of Antwerp Discovery Service and Web of Science, for articles that apply the SEM and TTI.

A Data Extraction Form with mostly closed-end questions was developed to assist with data extraction. Aggregate descriptive statistics were utilized to summarize the general characteristics of the SEM and TTI as documented in the scientific literature.

Results: A total of 290 potentially relevant articles referencing the SEM were found. As for the TTI, a total of 131 potentially relevant articles were found. After strict evaluation for inclusion and exclusion criteria, 40 SEM studies and 46 TTI studies were included in the systematic review.

Conclusions: The SEM and TTI are theoretical frameworks that share many theoretical concepts and are relevant for several types of health behaviors. However, they differ in the

structure of the model, and in how the variables are thought to interact with each other, the TTI being a matrix while the SEM has a ring structure. The main difference consists of the division of the TTI into levels of causation (ultimate, distal and proximal) which are not considered within the levels of the SEM. It was further found that in the articles studied in this systematic review, both models are often considered effective, while the empirical basis of these (and other) conclusions reached by their authors is in many cases unclear or incompletely specified.

Keywords: *Screening, vaccination, multi-level ecological models, Social Ecological Model, Theory of Triadic Influence*

2.2 Introduction

Prevention refers to the efforts of society to promote, protect and sustain the health of the population. This paper focuses on vaccination and screening as primary and secondary prevention measures respectively. The aim of vaccination is to actively limit the incidence of disease by protecting the population from attack before being affected (National Public Health Partnership, NPHP, 2006; Wilson & Jungner, 1968), whereas screening tests identify asymptomatic individuals who may have the disease from those who probably do not (Wilson & Jungner, 1968).

All parts of the health system have an important role in the prevention of health problems (NPHP, 2006). Elder, Lytle, Sallis et al. (2007) concluded that socio-ecological frameworks are essential in programs or studies that employ multi-level interventions and measurement strategies. Two key concepts of the ecological perspective help to identify intervention points for promoting health: 1) behavior both affects and is affected by multiple levels of influence; 2) individual behavior both shapes and is shaped by the social environment (causation) (National Cancer Institute, NCI, 2005).

Accordingly, a number of multi-level models have been developed which incorporate all the different social and ecological factors that can affect health behavior in one single model, such as the Social Ecological Model and the Theory of Triadic Influence. Both provide a multilevel framework that can be used to study health behavior and the social environment.

2.2.1 The Social Ecological Model

The SEM was developed out of the work of a number of eminent researchers including Bronfenbrenner's Ecological Systems Theory (1979); McLeroy, Bibeau, Steckler et al. Ecological Model of Health Behaviors (1988); and Daniel Stokols' Social Ecological Model of Health Promotion (1992, 2003) (NCI, 2005; Glanz et al., 2008).

The below systematic review considers all versions of the SEM. However, focus is on the SEM conceived by McLeroy et al. (1988), because it is one of the more common utilized versions. The SEM targets five levels/rings of influence for health related behaviors and conditions, which are: Intrapersonal (individual) factors for individual characteristics such as developmental history, knowledge, attitudes, behavior, self-concept and skills; Interpersonal processes (primary groups) these are social networks and support systems; Institutional (organizational) factors for social institutions with organizational characteristics and rules and regulations for operation; community factors for relationships among organizations, institutions and networks; and finally Public policy factors for local, state and national laws and policies (McLeroy et al., 1988). The assumption is that people both influence and are influenced by those around them (NCI, 2005).



Figure 2.1: Social Ecological Model (CDC, 2013). Published in accordance with the non-copyright laws of the Centers of Disease Control and Prevention

2.2.2 The Theory of Triadic Influence

The TTI was developed by Flay, Snyder and Petraitis in 1994, as an integrative theory for health related behaviors (Flay, Snyder & Petraitis, 2009). It borrows from and builds on the ideas of Bronfenbrenner and Bandura (Crosby, DiClemente & Salaza, 2011). The TTI assumes that the trail of a behavior is determined by one's decisions or intentions. It is organized in a 3×3 framework with three levels influence (causation) and three streams of influence (Flay et al., 2009).

The levels of causation include ultimate, distal, and proximal. Proximal or immediate variables are those that have direct effects on behavior and are under the control of an individual, although still influenced by the distal and ultimate factors. Distal level variables are divided into first level influences (social-personal nexus) and second level (evaluations and expectancies) and are composed of variables that individuals are likely to have some control over but not as much as proximal influences. Ultimate variables represent the underlying causes of behavior that are broad and relatively stable which individuals have little or no control over (Flay et al., 2009).

The types or streams of influence include: Intrapersonal influences which are characteristics that contribute to self-efficacy regarding specific behaviors; Interpersonal Social Influences which are the social situation/context or micro-environment that contribute to social normative beliefs about specific behaviors; and the Cultural-Environmental Influences which are multiple socio cultural macro-environmental factors that contribute to attitudes toward specific behaviors. Within each stream of influence are two sub streams, cognitive-rational and affective-emotional (Flay et al., 2009). The TTI not only considers major influences of behavior as those within the three streams, but it also considers the interactions between stream paths and behavioral experience feedback loops.

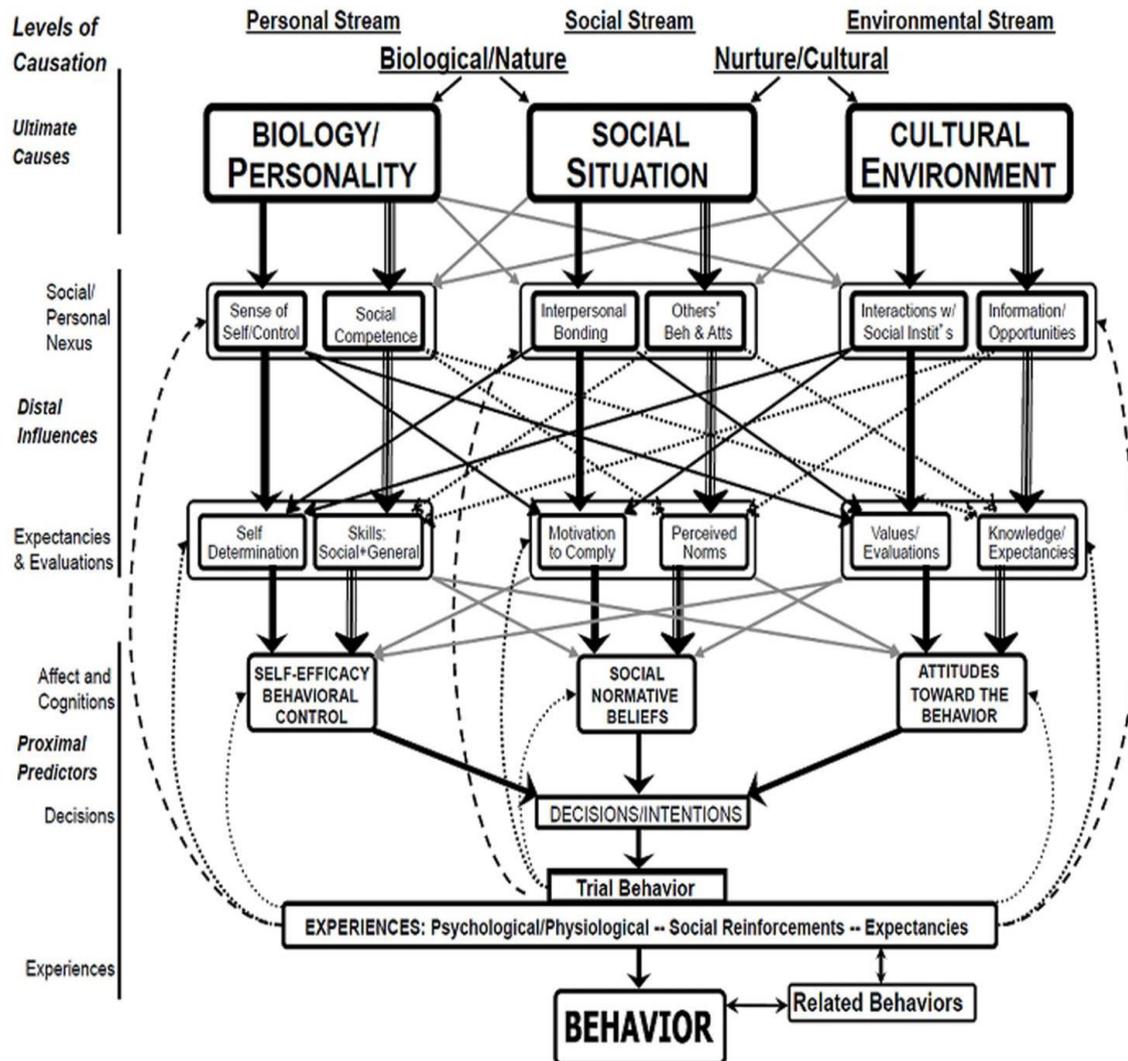


Figure 2.2: Theory of Triadic Influence (Flay et al., 2009). Published with permission from John Wiley and Sons through Copyright Clearance Center.

2.2.3 Relevance of a systematic review of SEM and TTI

The purpose of this systematic review was to identify the main differences and similarities of SEM and TTI regarding screening and vaccination in order to prepare potentially successful prevention programs for practice in general and cervical cancer prevention in Zambia in particular. By default, this systematic review benefits researchers who consider application of these models, by compiling the work of those authors who have had an opportunity to utilize them.

The SEM and TTI were selected for review because both models allow for the integration of multiple levels of influence to establish an overall view of health behavior change, in this case the uptake of vaccines and medical screening. Changing individual's behavior by providing them with the necessary skills and motivation is only possible if

environments and contexts are also considered. Both models target mechanisms of change at several different levels of influence involving both individual-level and environmental/policy-level interventions.

The SEM compared to TTI, is a more commonly utilized ecological model and has been applied for developing for example, screening interventions. For this reason, the SEM is an appropriate model to discuss in this review. In contrast, the TTI was selected because compared to other multi-level models, it appears to greatly differ in structure and complexity with the SEM. Flay et al. (2009), indicated that the TTI was used to conduct a screening study, suggesting this model is appropriate for studies focusing on screening and vaccination. The question is therefore justified, which of these models would be most effective in designing an effective screening and vaccination program.

Summarizing, this review addresses the research question: What are the main differences and similarities of the SEM and TTI regarding screening and vaccination programs?

2.3 Methods

2.3.1 Criteria for selecting studies for this review

The systematic review protocol was based on guidelines from the Cochrane Reviewer's Handbook (Higgins & Green, 2005), to determine the extent that screening and vaccination as proposed by the SEM and TTI are different. The inclusion criteria for articles in the systematic review were the following:

- Geography - Include any country. Priority given to Sub-Saharan African countries.
- Time - Include studies starting from the year 2000 to date.
- Participants - Includes all people with health behavior affected from intrapersonal, interpersonal, organizational, community and policy level, in accordance with the SEM. For the TTI, from ultimate, distal and proximal levels; as well as intrapersonal, interpersonal social and socio-cultural environment streams.
- Disease - Priority is given to cancers and diseases that can be screened or vaccinated against. Also include substance abuse/risk behavior if they illustrate the use of the TTI.
- Exposure/Intervention - Primary and secondary prevention procedures including vaccination, screening methods and control of risk behavior.

- Comparison - May not be applicable in this study but will include people who do not practice primary and secondary prevention measures.
- Study Model - Include Social Ecological Model and Theory of Triadic Influence.
- Outcome - Set of optimal preventive measures by SEM and TTI.
- Language - Include only studies that are in English language.

All types of study designs were included in this review as long as they fulfilled the inclusion criteria. This is due to the fact that there are few studies that utilize the SEM and even less studies the TTI. Studies were considered eligible for the review if they involved human participants and followed the SEM or the TTI i.e. the full conceptual frameworks or modified versions of the frameworks.

The focus was on all diseases or conditions that can be vaccinated and or screened. Special interest was given to cancer because of future research plans. Substance abuse/risk behavior studies were included if the study illustrated the use of the TTI, regardless of whether there was a primary or secondary prevention intervention. This was due to the fact that very few studies that utilize the TTI address screening and or vaccination. The TTI was initially developed for substance abuse studies, therefore inclusion of studies that focus on substance abuse was relevant to illustrate the use of the TTI. The geographic location was not a factor in this review.

We also took into account the types of outcome measures, that is, the factors that predict health behavior choices such as knowledge, access to health care facilities and personal beliefs. The SEM and the TTI frameworks state that health behavior choices are influenced by a number of factors. When these factors are considered, they should therefore be able to predict whether a health behavior is practiced in this case, screening and vaccination. For the review, it was expanded to include the acquisition and cessation of risk behavior and substance abuse, as mentioned earlier, for the sake of the TTI which has relatively few studies that address screening and vaccination.

Literature searches were performed using Medline, Ovid, Proquest, PubMed, University of Antwerp Discovery Service and Web of Science. Searches were conducted during January and February of the year 2015. The searches were generated for a time span from 2000 to the present. Other criteria specified were English language, academic journal/articles and for databases where it was possible, human participants was specified.

The SEM produced a vast number of results compared to the TTI. It was therefore decided to narrow down the search for SEM studies to include only screening and vaccination, while for TTI, all studies were searched for due to the low number of results produced. Therefore, the search terms for the SEM studies were, Social Ecological Model AND Screening, Social Ecological Model AND Vaccination, Social Ecological Model AND Vaccine, Social Ecological Model AND Immunisation, Social Ecological Model AND immunization. The Boolean search term was the word 'AND'. For TTI studies, the search term was Theory of Triadic Influence. The full search strategies for each database are summarized in Table 2.1 below.

Table 2.1: Search terms and data bases searched

Databases searched	Limitations	Search terms
Medline	Date Published:2000/01/01 to 2015/12/31 Language: English Document type: Academic Journals	Social Ecological Model AND* Screening Social Ecological Model
Ovid	Date Published: 2000/01/01 to 2015/12/31 Language: English Participants: Human	AND* Vaccination Social Ecological Model AND* Vaccine
Proquest	Date Published: 2000/01/01 to 2015/12/31 Language: English Document type: Scholarly Journals	Social Ecological Model AND* Immunisation Social Ecological Model
PubMed	Date Published: 2000/01/01 to 2015/12/31 Language: English Participants: Human	AND* Immunization Theory of Triadic Influence
University of Antwerp Discovery Service	Date Published: 2000/01/01 to 2015/12/31 Language: English Document type: Academic Journals	
Web of Science	Date Published: 2000/01/01 to 2015/12/31 Language: English Document type: Article	

*The range selected was between 2000 to present however, the database adjusts the dates when articles are available

*AND was the Boolean search term

2.3.2 Data collection and analysis

Prior to commencing the review, a Data Extraction Form was developed to assist with data extraction. The form was divided into two sections. Only studies that had adequate inclusion criteria were fully evaluated by the Data Extraction Form. All studies had to have the first section completed and it had two parts:

- i. General Information - This included date of data extraction, general publication information such as the title of the publication, the type of publication and source of the publication.
- ii. Inclusion/Exclusion Criteria - These were questions based on the criteria for including studies such as indicating the study model that is used whether SEM or TTI, type of participants and setting, whether it was a primary or secondary prevention study, the presence of conclusions and finally the decision to include the study or not. If the study was not included, then the reason for exclusion would be stated.

If the article fulfilled the inclusion criteria, then it will further be analyzed under the Characteristics of Included Studies section. This section was divided into seven parts:

- i. General Study Details - For information on aims, research questions, hypothesis, study setting, units of observation, level of analysis, target disease and category of treatment investigated.
- ii. Evaluation Design - Focused on indicating the type of study design, independent variables and the extent of use of the study model whether it is completely used or modified in some way.
- iii. Data Sources 1 (Facilitators) - This was filled in only for studies that used facilitators to assist in obtaining data from participants. If more than one type of facilitator was used, then this part was repeated to cover all facilitators. It included information on source, sample size, sampling design and recruitment method.
- iv. Data Sources 2 (Actual Participants) - This was information on actual participants of the study such as the target population, sample size, basic demographic characteristics, sampling strategy, data collection methods and finally main outcome measures that were assessed. This part was also repeated if more than one type of study participant was assessed in the study.

- v. Analysis and Evaluation - This part focused on indicating the analysis plan be it for qualitative or quantitative study plans. If bias was noticed in the study, it was indicated here.
- vi. Results and Evaluation - This part illustrated the positive and negative outcome measures assessed the overview of the effectiveness of the SEM/TTI and whether effect size and power calculation were considered in the study.
- vii. Other Information - Was a section to indicate whether ethical approval was obtained, if funding was available and whether references to other studies were given. A final question was to state whether further correspondence was necessary.

The form was pilot tested by two researches independently (JW & AN) to assess reliability and the final task of extracting the data was conducted by an independent researcher (AN). It was felt that having all this sections and parts was important to have a complete overview of the articles to be reviewed which were diverse in structure and content. A copy of the complete Data Extraction Form is found in the appendix [see Appendices].

In addition to systematically reviewing the articles for content matter, all articles passing the inclusion criteria were also screened for methodological consistency. This quality assessment addressed 7 issues vital for determining the empirical basis of the conclusions advanced in each article (see e.g., Kampen & Tamás, 2013), including the clarity of the research question(s), data collection methods, sampling plan, sample size, analysis method(s), conclusions, and limitations. Studies were not excluded from the review based on their quality rating. Quality assessment criteria can be found in Table 2.2.

The results of data extraction were input into a MS-Excel computer program. Basic descriptive statistics was utilized to summarize the general characteristics of the studies. This was facilitated with the use of IBM SPSS software. The main results of the review were identified and tabulated.

Table 2.2: Data extraction form for quality assessment

Indicator	Categorization	Criteria
1. Clarity of CRQ(s)/hypothesis	0. Missing	At best, only sub-questions specified
	1. Unclear	CRQs supplied inappropriately (e.g., only in abstract) or incomprehensively (e.g., as identification of a research gap)

	2. Clear	
2. Clarity of data collection methods	0. Missing	None specified
	1. Unclear	Incompletely specified (e.g., type of interview/observation; application)
	2. Clear	
3. Clarity of sampling plan	0. Missing	None specified
	1. Unclear	Missing for at least one reported data collection method
	2. Clear	
4. Clarity of sampling size	0. Missing	None specified
	1. Unclear	Imprecise (e.g., 'more than'), or missing for at least one reported data collection method
	2. Clear	
5. Clarity of analysis method	0. Missing	None specified
	1. Present	At least some description of data handling after collection (e.g., mention of transcription, CAQDA, grounded theory, content analysis, regression analysis, etc.)
6. Clarity of conclusions	0. Missing	None specified, or none with a relationship to research questions
	1. Present	At least one conclusion has a (however weak) link with one of the research questions
7. Clarity of limitations	0. Missing	None specified
	1. Unclear	Possible instrument effects and/or fallacies are mentioned but without further discussion
	2. Clear	research limitations are appropriately identified

2.4 Results

2.4.1 Description of studies

Separate literature searches were conducted for the SEM studies and TTI studies. The literature searches yielded 57 potentially relevant articles in Medline, 172 titles in Ovid, 21 titles in Proquest, 56 titles in PubMed, 75 titles in University of Antwerp Discovery

Service and 58 titles in Web of Science for SEM studies. A total of 439 articles, and without duplicates 290 potentially relevant articles were found.

As for the TTI studies, literature searches yielded 18 titles in Medline, 54 titles in Ovid, 23 titles in Proquest, 22 titles in PubMed, 65 titles in University of Antwerp Discovery Service and 46 titles in Web of Science. In a brief systematic review on the TTI, it was discovered that a study was conducted on colorectal cancer screening using this theory. Therefore, Google Scholar was used specifically to find this study because of its relevance for this research. A total of 229 articles, and without duplicates 131 potentially relevant articles were found.

Based on the number of potentially relevant articles, it was decided to find and evaluate all articles with the inclusion and exclusion criteria. Articles that could not be easily obtained were evaluated based on abstract and title. After strict evaluation of the articles 40 SEM studies and 46 TTI studies were included. A summary of these results is found below as Study Flow Diagrams 2.1 and 2.2.

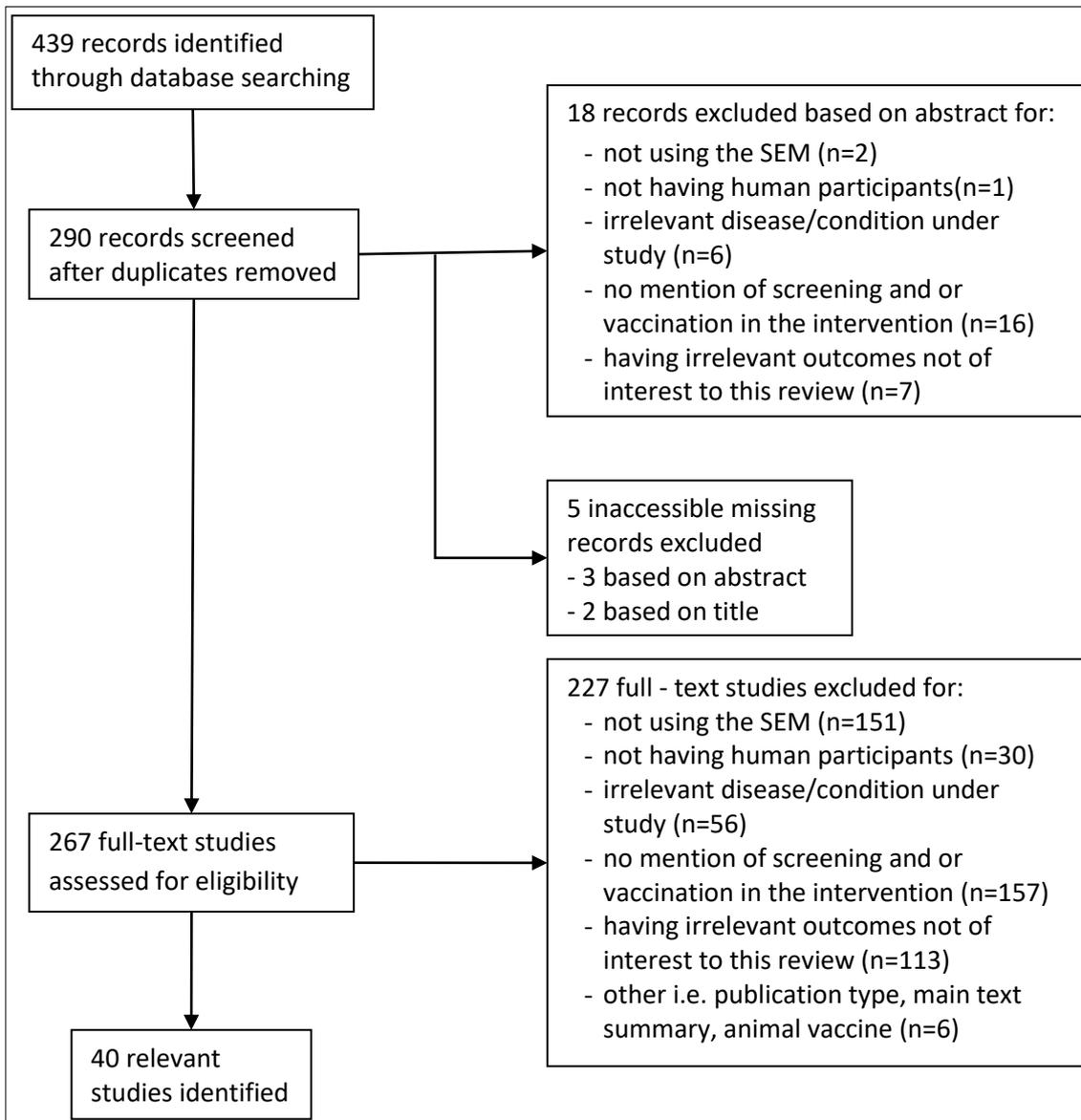


Diagram 2.1: Prisma study flow diagram of search results for SEM

Note: Some studies were excluded for more than one reason. For studies excluded based on abstract, 9 studies were excluded for 1 reason; 6 studies excluded for 2 reasons; 2 studies excluded for 3 reasons; and 1 study excluded for 4 reasons. For studies excluded based on full-text, 71 studies were excluded for 1 reason; 73 studies excluded for 2 reasons; 48 studies excluded for 3 reasons; 22 studies excluded for 4 reasons; and 13 studies excluded for 5 reasons.

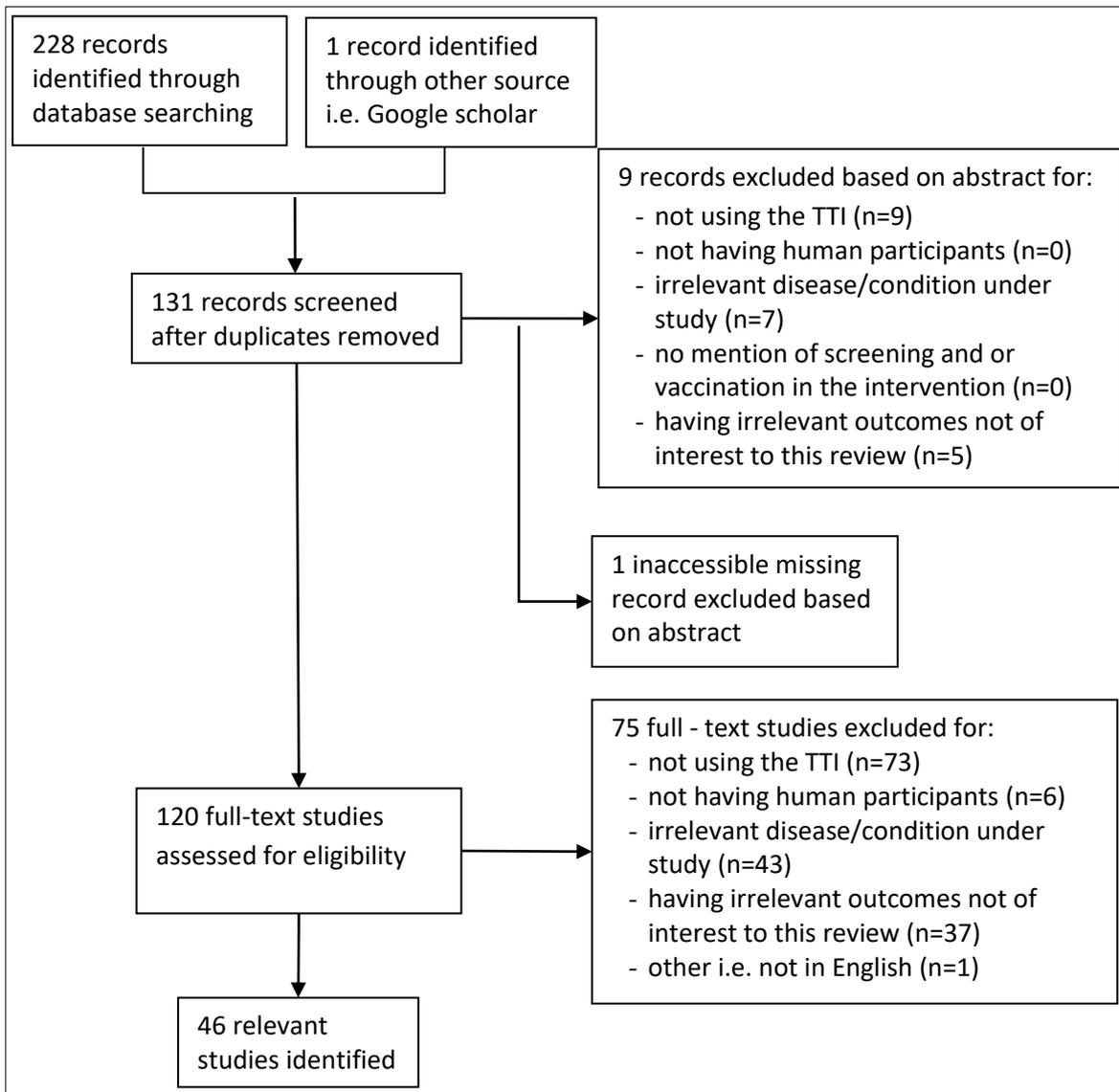


Diagram 2.2: Prisma study flow diagram of search results for TTI

Note: Some studies were excluded for more than one reason. For studies excluded based on abstract, 1 study was excluded for 1 reason; 4 studies excluded for 2 reasons; and 4 studies excluded for 3 reasons. For studies excluded based on full-text, 30 studies were excluded for 1 reason; 11 studies excluded for 2 reasons; 28 studies excluded for 3 reasons; and 6 studies excluded for 4 reasons.

There were five main reasons for studies not to be included in review. These reasons include not applying the SEM or the TTI in the research, having non-human participants, addressing an irrelevant disease or condition, for SEM studies specifically not addressing screening or vaccination, and finally having irrelevant outcomes. Most studies that were eliminated had a combination of these reasons. Studies that were eliminated for only a

single reason were for either not applying the models in the research or not having human participants.

There was a total of 251 possible SEM studies excluded. Majority were excluded for not being a study that addresses screening or vaccination (n=173), this is followed by studies were found but did not apply the SEM in the research (n=153). As for the possible articles involving the TTI, a total of 85 studies were excluded. Main reason being that the study did not apply the TTI in the research (n=82) and this is followed by assessing an irrelevant disease or condition in the study (n=50).

Another six studies (SEM n=5; TTI n=1) were not included in the review because of inaccessibility of the publication and are therefore still awaiting classification. The brief information provided by the titles and/or abstracts of these articles makes exclusion inconclusive. Efforts have been made to access the full text from the authors of these articles. However, there has not been any response up to the date of submission of this systematic review. These studies are listed in Table 2.5 in the appendix [see Appendices].

The Data Extraction Form used closed questions that focused on items that would be of interest to the review. The table below summarizes the top three most common items from the result fields in the articles based on frequency. The frequency of the results below the top three items is relatively low. The Data Extraction Form allowed for an option of “other” for items that did not fall under the predetermined items of interest. This table excludes the result “other” even if it had been in high frequency because it is composed of a combination of random items. The complete compilation of results in Tables 2.6 and 2.7 are found in the appendix [see Appendices].

Table 2.3: Summary of most common results

Field/Topic	Item(s)	Articles using SEM		Articles using TTI	
		<i>Frequency</i>	<i>Percent</i>	<i>Frequency</i>	<i>Percent</i>
<i>Location</i>	USA	25	62.5	17	37.0
	Canada	2	5.0	1	2.2
	India	2	5.0	-	0.0
	Netherlands	-	0.0	7	15.2
	Australia	1	2.5	3	6.5
<i>Study participants*</i>	Women	14	26.9	1	1.6
	Books/journal articles	10	19.2	4	6.3
	Men	7	13.5	-	0.0

	Students	-	0.0	22	34.9
	Parents/guardians	1	1.9	9	14.3
	Adolescents	-	0.0	8	12.7
<i>Aim/ Objective</i>	To form or evaluate interventions	12	30.0	14	30.4
	Determine the acceptance or non-acceptance of screening, vaccination or treatment	11	27.5	1	2.2
	Determine the cause of behavior	7	17.5	19	41.3
	Explore views	3	7.5	2	4.3
<i>Disease/ Condition</i>	Breast cancer	6	15	-	0.0
	Colorectal cancer	4	10	1	2.2
	Cervical cancer	3	7.5	-	0.0
	Substance abuse	-	0.0	23	50.0
	Skin cancer	-	0.0	1	2.2
<i>Intervention</i>	Screening	29	72.5	2	4.3
	Vaccination	9	22.5	-	0.0
	Substance Abuse/Risk Behavior	5	12.5	20	43.5
<i>Study design (primary)</i>	Cross-sectional	5	12.5	16	34.8
	Case study	4	10.0	1	2.2
	Cohort	2	5.0	4	8.7
	Longitudinal	0	0.0	9	19.6
	Randomized controlled trial	0	0.0	5	10.9
<i>Study design (secondary)</i>	Simple overviews	12	30.0	4	8.7
	Systematic reviews	3	7.5	2	4.3
	Guideline	1	2.5	3	6.5
<i>Sampling strategy*</i>	Judgmental	14	26.9	17	27.0
	Convenience	11	21.2	20	31.7
	Simple random	4	7.7	9	14.3
	Stratified	4	7.7	3	4.8
	Snowball	1	1.9	8	12.7
	Not reported	11	21.2	19	30.2
<i>Data collection</i>	Secondary data	15	28.8	12	19.0
	Interviews	14	26.9	9	14.3

<i>method*</i>	Questionnaires	13	25.0	41	65.1
	Not reported	1	1.9	1	1.6
<i>Outcome variables*</i>	Screening was practiced	19	36.5	2	3.2
	Screening is not practiced	3	5.8	-	0.0
	Vaccination is practiced	8	15.4	-	0.0
	Vaccination not practiced	5	9.6	-	0.0
	Risk behavior is practiced	1	1.9	40	63.5
	Risk behavior is not practiced	2	3.8	19	30.6
	Not reported	8	15.4	6	9.5
<i>Positive predictors</i>	Positive influences and surroundings	18	45.0	21	45.7
	Having knowledge or awareness	18	45.0	5	10.9
	Recommendations from health care providers	13	32.5	1	2.2
	Access to health care providers or facilities	13	32.5	3	6.5
	Personal beliefs	6	15.0	13	28.3
	enforcing policies/rules	9	22.5	6	13.0
	Not reported	10	25.0	13	28.3
<i>Negative predictors</i>	Negative personal beliefs	15	37.5	17	37.0
	Negative influences and surroundings	13	32.5	28	60.9
	Lack of access to health care providers or facilities	11	27.5	2	4.3
	Culture of the group of people	4	10.0	7	15.2
	Not reported	15	37.5	11	23.9

* For these items the percentage is calculated over 52 for the SEM and over 63 for the TTI due to multiple study participants. The percentage in general is calculated over the total number of accepted studies, which are 40 for the SEM and 46 for the TTI.

As seen from the table most studies for both SEM and TTI, were undertaken in the USA. However, it should be noted that some studies took place in multiple countries (SEM n=4; TTI n=3). When it came to study participants, some studies assessed more than one type of participant. For this review, sampling strategy, data collection method and outcome

measures for each unique participant group were considered. However, some this information especially from the additional study participants in both SEM and TTI studies was not as emphasized as the primary participant data resulting into some cases of missing or not reported data. In articles using the SEM, nine studies had more than one type of participant group. The reported sample sizes ranged from 1 to 70121. In TTI studies, a total of ten studies had more than one type of participant group. Reported sample size ranged from 10 to 36000.

Considering disease or condition under study, the Data Extraction Form focused on different types of cancers, cancer in general, substance abuse and then grouped all other diseases and conditions under the option "other". This was because cancer in particular cervical cancer is a disease of interest for future study and for the TTI substance abuse is the most common condition researched. In that regard, for the SEM, cancer in general was studied in 4 studies (7.7%) and this included studies that assessed both breast and cervical cancer. 22 studies (42.3%), focused on other diseases or conditions such as diabetes, HIV AIDS and Obesity. As for TTI studies, 21 studies (33.3%), focused on other diseases or conditions such as obesity, risk behavior and HIV AIDS.

The outcomes were divided into positive and negative predictors. Positive predictors were factors that would cause someone to go for screening, vaccination or to practice non-risk behavior. Negative predictors were the opposite of these. These factors were variable depending on the focus or nature of the study.

Finally, not all accepted studies using the SEM and the TTI reported on the overall effectiveness of these models. For studies that used the SEM, 17 studies (42.5%) reported on effectiveness of the model and they all considered the model to be efficient. From the studies that gave an overview of the effectiveness of the TTI, ten studies reported the TTI to be effective (21.7%), while seven reported it to be effective if modified (15.2%).

2.4.2 Quality Assessment

The studies were not checked for risk of bias in measurement because there was insufficient detail provided in all of the papers. Therefore, quality assessment was conducted in accordance to the data extraction form for quality assessment which allows for maximum amount of twelve points (see Table 2.2 for the scoring system). Table 2.4 below summarizes the overall quality of the SEM and TTI studies. In general, the mean overall result for studies using the SEM is 7.4 and for TTI studies 9.3. It is apparent that studies utilizing the TTI were of slightly better quality compared to studies using the SEM.

This may be due to the fact that more of the articles using the SEM were secondary simple overview articles and therefore did not elaborate much on methodology and study design compared to articles using the TTI. For both SEM and TTI, the majority of missing data is in the reporting of the sampling plan, analysis method and limitations. On the other hand, all studies reported conclusions to their research. These conclusions are trusted to give a comparison of the SEM and TTI, but it should be noted that the empirical basis on which authors based their conclusions remains unclear in most studies. Tables 2.8 and 2.9 which have a complete view of quality assessment of studies using the SEM and TTI respectively are found in the appendix [see Appendices].

Table 2.4: Summary results of the data extraction form for quality assessment

Indicator	Categorization	Articles using SEM		Articles using TTI	
		<i>Frequency</i>	<i>Percent*</i>	<i>Frequency</i>	<i>Percent*</i>
1. Clarity of CRQ(s)/ hypothesis	0. Missing	10	25.0	6	13.0
	1. Unclear	19	47.5	18	39.1
	2. Clear	11	27.5	22	47.8
2. Clarity of data collection methods	0. Missing	10	25.0	5	10.9
	1. Unclear	3	7.5	1	2.2
	2. Clear	27	67.5	40	87.0
3. Clarity of sampling plan	0. Missing	17	42.5	17	37.0
	1. Unclear	4	10.0	2	4.3
	2. Clear	19	47.5	27	58.7
4. Clarity of sampling size	0. Missing	13	32.5	7	15.2
	1. Unclear	3	7.5	8	17.4
	2. Clear	24	60.0	31	67.4
5. Clarity of analysis method	0. Missing	17	42.5	8	17.4
	1. Present	23	57.5	38	82.6
6. Clarity of conclusions	0. Missing	-	0.0	-	0.0
	1. Present	40	100.0	46	100.0
7. Clarity of limitations	0. Missing	16	40.0	8	17.4
	1. Unclear	6	15.0	2	4.3
	2. Clear	18	45.0	36	78.3

* The percentage is calculated over the total number of accepted studies, which are 40 for the SEM and 46 for the TTI.

2.5 Discussion

2.5.1 Characteristics of SEM

The SEM has been applied in a number of prevention method studies focusing on breast, colorectal and cervical cancers. The majority of the studies utilized the SEM developed by McLeroy et al. (2008). However, it should also be noted that, some studies modified the model by addressing only specific independent variables or integrating other models that were of interest to the researchers. Furthermore, the studies either involved a single or several types of study participants. Whereas, the researchers would either observe a single group and investigate their views in regard to the different constructs of the model, or they would observe the interaction between groups of participants.

In regard to study aims, most SEM studies looked at evaluating interventions followed by accessing the acceptance or non-acceptance of a preventive measure, for instance. In terms of outcomes, positive experiences lead to positive outcomes, while negative experiences lead to negative outcomes, as expected.

In practice, the SEM is advocated to be an effective model in determining vaccination and screening behavior. Perhaps this is due to the flexibility of the SEM in regard to individual variables within the levels. For instance, a study by Maar, Wakewich, Wood et al. (2014) applied the SEM to increase screening participation and concluded that cervical screening promotion needs to be implemented at multiple, culturally compatible levels. In regard to vaccination, a study by Kumar, Quinn, Kim et al. (2012) validated all levels of the SEM as determinants of vaccine uptake. Furthermore, according to another study, the SEM was said to provide a useful schematic to assess how systems facilitate or create barriers to vaccinate; how individual level factors and community discourse, beliefs, and practices shape a person's perceptions and decisions to vaccinate (Boerner, Keelan, Winton et al., 2013).

2.5.2 Characteristics of TTI

Studies that used the TTI mainly focused on substance abuse and risk behavior. This is not a surprise as the genesis of the TTI occurred after a careful review of the substance use literature (Flay et al., 2009). It should be noted that all studies used the TTI as developed by Flay et al., however, some authors modified the model to only assess variables of interest.

In regard to study aims, the TTI generally aims to determine the cause of behavior. In this case, what would cause someone to practice a preventive measure? Most studies were cross-sectional in nature. However, it was expressed that a longitudinal study may be more effective because a follow up determining whether the population of interest will practice the risk behavior is beneficial.

Studies either involved a single or several types of study participants in relation to constructs of the model. For instance, a study may primarily focus on adolescents and then might also question parents to identify if adolescents with parents who practice a certain behavior will emulate them. In terms of outcomes, as with the SEM, positive experiences lead to positive outcomes and vice versa, which is expected.

In practice, the TTI is advocated to effectively predict substance abuse and risk behavior. However, the TTI might prove to be too complex for screening or vaccination decision studies. As evident in the study by Kremers, Mesters, Pladdet et al. (2000), that applied the TTI to determine colorectal cancer screening participation and non-participation decisions. The model proved to be useful in explaining screening participation behavior, but it was recommended to redefine the operationalization of some variables to improve reliability. Nevertheless, the only other study that focused on screening for a HIV AIDS intervention (Leonard, Banfield, Riedel et al., 2013), did not specify the effectiveness of the TTI. None of the studies found by this systematic review focused on vaccination.

Other studies that specified that the TTI is better modified, found it was too complex for guidance in the field (Bell, Bhana, McKay et al., 2007), complexity in analysis of the relationship between cultural and social context (Nicolaou, Doak, van Dam et al., 2009), cultural stream factors were of less significance and the levels of influence were not hierarchical (Dusseldorp, Klein Veldermam, Paulussen et al., 2014), and further studies stated the lack of data to properly operationalize the model thus reducing its effectiveness (Donath, Grässer, Baier et al., 2012; Kaslow, Leiner, Reviere et al., 2010).

2.5.3 Similarities and Differences of SEM and TTI

The SEM and TTI are valuable theoretical frameworks that are relevant for several types of health behaviors. Generally, these frameworks share similar theoretical concepts. In terms of composition, the streams of influence of the TTI correspond with the levels of the SEM. Whereas, the TTI intrapersonal stream would be equated to the SEM intrapersonal level, the TTI social situation stream to the SEM interpersonal level and

finally the TTI cultural environmental stream to a combination of the SEM organizational, community and policy levels.

Basically, these theoretical frameworks differ in structure of the model and how the variables interact with each other. The TTI being a matrix while the SEM having a ring or level by level structure. In spite of most of the articles for both SEM and TTI, being from the USA, the basic function of these models has been expressed. However, depending on the society the model is being used in, some of the concepts and interactions may need to be modified to fit with the local situation. For instance, while it is common to have family doctors in the USA which places health care providers in a more interpersonal level, in third world countries this is not necessarily the norm and health care providers may be positioned at a different level of interaction.

The main difference consists of the division of the TTI into levels of causation (ultimate, distal and proximal) which are not considered within the levels of the SEM. The TTI separates levels of causation from ecological domains by making them independent dimensions within each ecological domain. This finding is consistent to the description by Flay et al. (2009), who also stated that the TTI overcomes problems of terminology and understanding by incorporating levels of causation. The importance of dividing behavior into levels of influence is probably dependent on the interest of the researcher. Based on an initial study on TTI by its developers Petraitis et al. (1998), the authors felt that some readers might disagree with the location of some variables within the levels of causation. To resolve the issue, the authors specified that the location of specific variables only affected the order in which findings were discussed and had no effect on conclusions drawn i.e. the relationship between peer drug use and illicit substance use, is the same whether peer drug use is considered an immediate or a distal influence.

In summary, the literature in this review provided information that compares and contrasts the SEM and TTI. However, the quality of the studies used in this review is compromised due to the lack of some information in the articles assessed. The data that is not reported may be attributed to some of the studies following a secondary study design which does not elaborate much on methodology. In addition, some studies involved the secondary analysis of primary data from another study or database and therefore did not effectively elaborate on how the primary data was obtained. Finally, a more precise assessment of the extent that screening and vaccination differ was not a factor that could clearly be assessed by the available articles due to the lack of relevant studies covering those topics of interest.

Limitations

A number of potential limitations may have affected the validity of our results. Mostly in terms of possible publication and selection biases as a result of having more strict inclusion criteria for one group of studies compared to the other. Despite the efforts to identify all relevant studies, it is possible that some may have been missed. Furthermore, because studies considered for inclusion were English language only, further data might have been excluded.

In spite of these limitations, the main strength of this study is that it assessed two multi-level models that researchers rarely have a chance to apply in research. This paper has outlined how these models have been implemented.

2.6 Conclusion

This review presented information on two multi-level prevention models, the SEM and TTI regarding screening and vaccination. The findings obtained in this review pointed to some general conclusions about the extent that screening and vaccination as determined by the SEM and TTI are different. In general, the theoretical constructs, concepts and composition of the models are similar, and the main difference is in structure and variable interaction. Additionally, the TTI is more specific to its application, compared to the SEM which tends to be more flexible.

This review has identified key considerations for potentially successful prevention programs. Since the SEM and TTI are similar in composition, the following points can be considered when selecting a model:

1. Information: If you think it is essential to divide the information you obtain into levels of causation then the TTI is best. The SEM does not consider levels of causation. Consider depth of the information you want.
2. Target group: The SEM differentiates the levels of society compared to the TTI that combines the higher levels of society into one group. Consider who you want information from.
3. Availability of information: In general, studies that lacked adequate information failed to conceptualize the TTI. Consider how much information is available to you and ease of obtaining the data.
4. Resources: If you have adequate resources and time to conduct a longitudinal study, then the TTI would be a good option for research. Longitudinal studies have been

proven to be more effective for research applying the TTI compared to cross-sectional studies. Consider the resources and time you have for the research.

Finally, when it comes to effectiveness, the SEM appears to be effective for screening and vaccination studies. Perhaps this is due to the fact that it has been applied more in prevention method studies compared to the TTI. Notwithstanding that many authors claim that the model they applied (either SEM or TTI) was effective, the empirical basis of such conclusions is inadequately explained in the articles we studied. In many studies, information about data collection, sampling, and data analysis were at best incomplete and often even lacking. These findings highlight the emerging nature of this research area and the need for more research to be conducted.

Competing Interests: The author(s) declare that they have no competing interests.

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CHAPTER 3: KNOWLEDGE, ATTITUDES AND PRACTICES OF CERVICAL CANCER PREVENTION AMONG ZAMBIAN WOMEN AND MEN

Anayawa Nyambe, Jarl K. Kampen, Stridutt K. Baboo, Guido Van Hal

BMC Public Health (under review)

3.1 Abstract

Background: In Zambia, cervical cancer screening was started in 2006 and the human papillomavirus vaccine was piloted in 2013. Nevertheless, cervical cancer remains the leading cancer. It is assumed that knowledge, social interaction, health behaviors and religion are factors that can influence screening and vaccination practices. This study addresses the question, what is the relationship between knowledge about cervical cancer, attitudes, self-reported behavior, and immediate support system, towards screening and vaccination of cervical cancer of Zambian women and men. The results of this study serve as a basis for future research, an input for improvement and adjustment of the existing prevention program and build on documented health behavior frameworks.

Methods: A cross-sectional mixed methods study was conducted from February to May 2016. Two separate questionnaires were used to collect data from women (N = 300) and men (N = 300) residing in Chilenje and Kanyama (two townships in the capital city Lusaka). Respondent's knowledge of cervical cancer was operationalized by grading their ability to correctly identify causes and protective factors if they were aware of cervical cancer. Besides providing descriptive statistics of all study variables, we tested four research hypotheses concerning the link between knowledge, attitudes and practices suggested by the literature, by applying appropriate statistical tests (chi square test, analysis of variance, logistic regression).

Results: Less than half of the respondents (36.8%) had heard of cervical cancer, 20.7% of women had attended screening and 6.7% of the total sample had vaccinated their daughter. Knowledge of causes and prevention was very low. There was a strong association between having awareness of cervical cancer and practicing screening (odds ratio = 20.5, 95% confidence interval = [9.214, 45.516]) and vaccination (odds ratio = 5.1, 95%

confidence interval = [2.473, 10.423]). Social interactions were also found to greatly influence screening and vaccination behaviors.

Conclusions: The low level of knowledge of causes and prevention of cervical cancer suggests a need to increase knowledge and awareness among both women and men. Interpersonal interactions have great impact on practicing prevention behaviors, for instance, vaccination of daughters.

Keywords: *Cervical cancer, Zambia, screening, vaccination, knowledge, attitude, practices, Social Ecological Model, Theory of Triadic Influence*

3.2 Background

Cervical cancer prevention programs provide services that prevent and reduce mortality of cervical cancer cases. For a health program at the level of a community or a nation to be administered, it must be feasible. Aspects of feasibility include having adequate infrastructure (e.g., equipment, institutions, know-how, etc.) on the one hand, and support from the necessary stakeholders, including women from the target group and their partners, on the other. This study on the topic of cervical cancer and its prevention is part of a larger research project that aims to identify the most optimal prevention and screening procedures practicable in Zambia (see Nyambe, Van Hal & Kampen, 2016).

In this paper, we focus on Zambian women as stakeholders, assessing the relationship between their knowledge about cervical cancer, attitudes and self-reported behavior towards screening and vaccination, as well as their immediate support system including men, other family members and friends. We noted that existing studies of populations in Zambia are limited in availability and incomplete. The available literature on cervical cancer prevention in Zambia did not cover the acceptability of the vaccination of boys, or the willingness to self-screen, etc. Moreover, while various studies in other countries have assessed factors such as knowledge, social interaction, culture and religion, as well as alternative methods of screening, their applicability for the populations in urban and peri-urban townships in Lusaka (Zambia) is unknown. Accordingly, we conducted an empirical study that covers these and other factors that influence cervical cancer prevention practices in the Zambian populations residing in Lusaka. This extensive data that was gathered and

assessed was used to develop an intervention study targeting knowledge and can be used as the basis for the development of other future research.

The development of our instrument (a questionnaire) and the selection of study groups were guided by the Social Ecological Model (SEM) by McLeroy, Bibeau, Steckler et al. (1988), and the Theory of Triadic Influence (TTI) by Flay, Snyder and Petraitis (2009). The SEM considers intrapersonal, interpersonal, institutional, community and public policy as levels of influence for health related behaviors (McLeroy, Bibeau, Steckler et al., 1988). The TTI however, is organized in a 3×3 framework with intrapersonal, interpersonal and environmental streams of influence, crossed by ultimate, distal and proximal levels of influence (Flay, Snyder & Petraitis, 2009). These frameworks though differing in structure and variable interaction, share many theoretical concepts. Thus, allowing them to be integrated in this study. For a systematic review on the SEM and TTI in relation with cervical cancer prevention, see Nyambe, Van Hal and Kampen (2016).

Literature Review and Hypotheses

Most women are at risk of contracting cervical cancer. Unlike most other cancers, cancer of the cervix is one of the most preventable by both primary and secondary prevention methods. In Zambia, the see-and-treat cervical cancer screening program was started in 2006 initially only targeting Human immunodeficiency virus (HIV) positive women before being made available to all women regardless of HIV status (Centre for Infectious Disease Research in Zambia, CIDRZ, 2014). To enhance coverage, nurses were trained to conduct cervical screening and the electronic cervical cancer control (eC3) was developed to assist their consultation with health professionals using internet and SMS technology (Parham, Mwanahamuntu, Pfaendler, et al, 2010) Cervical cancer screening via Visual Inspection with Acetic acid (VIA) is provided free of charge at government clinics in every province of the country where screening services are available (Cervical Cancer Prevention Program Zambia, CCPPZ, n.d; CIDRZ, 2014). Then in 2013, the human papillomavirus (HPV) vaccine was launched as a demonstration in Lusaka Province (World Health Organization, WHO, 2015), as another means of preventing the spread of cervical cancer in the country. Funded by Gavi, the HPV vaccine Gardasil was administered using a school-based strategy targeting girls in grade 4 (aged 9 to 13 years old) and out of school girls aged 10 years old (WHO, 2015). Despite these developments, cervical cancer remains the leading cancer in Zambia. According to the Cancer Disease

Hospital in Lusaka, approximately 35% of all cancers managed are cervical cancers (Ministry of Health, MoH, 2016).

Though little research has been conducted in Zambia, studies in various other countries have identified factors that can supposedly predict screening and vaccination practices. Research conducted in Uganda and Tanzania, suggested that one of the reasons women do not practice screening is lack of knowledge of cervical cancer and its prevention (Ndejjo, Mukama, Musabyimana, et al., 2016; Cunningham, Skrastins, Fitzpatrick, et al., 2015). Similarly, familiarity to vaccines made acceptance of the HPV vaccine higher among Zambian women, for themselves as well as for their daughters (Liu, Vwalika, Hacker, et al., 2012). Zambian parents/guardians who had some knowledge of cervical cancer have positive attitudes towards the vaccine (Milimo, Daka, Sikuyuba, et al., 2015). On the basis of these studies, we assumed that women who know of cervical cancer are more likely to practice screening and agree to vaccination.

Several studies have suggested that support from immediate social circles can influence likelihood of women practicing screening and agreeing to the vaccination of their children. For instance, women in Uganda who know someone who has screened have a higher chance of practicing screening themselves (Ndejjo, et al., 2016). Research conducted in Tanzania (Cunningham, et al., 2015) and Nigeria (Anyebe, Opaluwa, Muktar, et al., 2014; Mbamara, Ikpeze, Okonkwo, et al., 2011), found that decision making was influenced by a woman's partner/husband, who must support, or help make, the decision to practice prevention. In Zambia, it was found that most women discussed their screening decisions with members of their social network (White, Mulambia, Sinkala et al., 2012). This evidence suggests that women who believe they have support from their immediate social circles (partner, friends, family) are more likely to be in favor of practicing cervical cancer prevention methods.

Studies in the USA and England have also shown the influence of women's behavior towards preventive measures on HPV vaccine uptake in their children. It was found that daughters with mothers who practice screening were more likely to be vaccinated than those who had mothers that did not screen (Chao, Slezak, Coleman, et al., 2009) or personally decided to stop screening (Spencer, Brabin, Verma, 2013). It was therefore reasonable to assume that women who practice screening are more likely to want to vaccinate their children.

Finally, factors such as religion and cultural beliefs were also identified to influence health practices. A study in Nigeria found that barriers to cervical screening vary by

religion (Modibbo, Dareng, Bamisaye, et al., 2016). Additionally, a study on school teachers in Kenya found that some religious beliefs were against vaccinations (Masika, Ogembo, Chabeda, et al., 2015). This made us assume that religious beliefs limit the uptake of screening and vaccination.

3.3 Methods

3.3.1 Study Design, Site and Population

A cross-sectional study was designed employing both quantitative and qualitative data collection methods. In this study, emphasis is on quantitative data collected by means of a questionnaire. The study was carried out from February to May 2016. Inclusion criteria for respondents from the general public to participate in this research were that they must: i) be a resident of Lusaka City in Chilenje or Kanyama, ii) be at least 18 years old, and iii) have at least one primary/secondary school going child.

The target population of women and men from the general public resided in either Chilenje Township or Kanyama Compound of Lusaka City. These two neighborhoods were selected because of their comparable availability of cervical screening services and population density, and their difference in living standards (Chilenje being relatively richer than Kanyama). These respondents who included women and men of Chilenje or Kanyama were also a parent/legal guardian of at least one child in primary or secondary school. This was because the vaccine was administered in a school based program. Children in higher education (college, university) are in most cases considered adults, and are able to decide on having a vaccination without parental consent. The identities of the respondents and the information they provided were treated as confidential. Approval for conducting this study was obtained from Eres Converge (Lusaka, Zambia).

Conventional strategies for computing sample size in empirical studies lead to the conclusion that a sample of size $n = 100$ (50 in each group) would be sufficient to detect a difference between two groups of 1 standard deviation with 99% power at 1% level of significance by an independent sample t test (see e.g., Cohen, 1988). For the purpose of our survey, it was decided to take a much bigger sample that would cover the heterogeneity of the target population in terms of relative wealth, gender, education and levels of knowledge. The sample size was disproportionally stratified for the number of households in Chilenje and Kanyama. The Zambian Demographic Health Survey of 2007 defined a household as “a person or a group of persons, related or unrelated, who live together and

share common cooking and eating arrangements.” In Zambia, about three quarters of households are male headed, and the remaining are female headed (Central Statistical Office, CSO, et al., 2009). The total numbers of households in Chilenje was 10,330 according to the last official national census of 2010, and 35,682 households in Kanyama (CSO, 2010). After considering the variables under study and likely response rate, we decided on a sample size of 100 women and 100 men in Chilenje, and 200 women and 200 men in Kanyama.

3.3.2 Questionnaires and Measures

Two separate but similar questionnaires administered by face-to-face interview, were developed for female and male respondents. The questionnaires were designed based on the indicators of health behavior as suggested by the TTI and SEM at the intrapersonal, interpersonal and environmental levels. In order to combine these study frameworks, the environmental level integrated the institutional, community and public policy levels of the SEM. Each question was either adapted from other studies or developed by the authors of this research.

To ease application, the wide range of information covered in the questionnaires, was arranged into the sections demographics (14 items at intrapersonal, interpersonal and environmental levels), general information (8 items at intrapersonal and interpersonal levels), cervical cancer (35 items for females, 34 items for males, with indicators at intrapersonal, interpersonal and environmental levels), and interview quality assessment (5 items). The section on cervical cancer was subdivided into (a) general cervical cancer, (b) cervical cancer screening, and (c) cervical cancer vaccination. At the end of the sub-section general cervical cancer, all respondents were given basic information on cervical cancer to bridge the knowledge gap. In regard to cervical cancer screening, female respondents were probed on their screening practices while male respondents were directed toward their support role and ability to enable their partner to practice screening. The cervical cancer vaccination section focused on the views of the parents towards vaccinating their children and not themselves.

Interview quality assessment questions were answered by the interviewer to help determine the quality of the interview. These questions were either adapted from the World Value Survey by Nevitte (2008) or developed by the authors. They included assessing the interest of the respondent (Nevitte, 2008), privacy of the interview (Nevitte, 2008), if it ran

smoothly, if problems were faced, and if they had any other remarks. The complete female and male questionnaires are found in the appendix [see Appendices].

The indicators of behavior at intrapersonal level under consideration included age, education level (Nevitte, 2008), awareness of cervical cancer, knowing causes and protective factors, sources of information, screening attendance, having a vaccinated daughter, willingness to vaccinate children. Interpersonal level items included, living status (Velderman, Dusseldorp, van Nieuwenhuijzen et al., 2015), knowing someone who practices screening (Kremers et al., 2000), accompanying someone for screening (Kremers et al., 2000), perceived approval and disapproval of members of the social circle towards screening and vaccination, knowing someone who has gone for vaccination (Kremers et al., 2000), and approval of others regarding vaccination. Lastly, environmental level items included employment, money use (Nevitte, 2008), religion and frequency of attending religious meetings (Nevitte, 2008), importance of religion in daily life (Bavarian, Flay, Ketcham et al., 2013), knowledge about the availability of screening services, knowing that the government provided free screening services, and knowing the government provided HPV vaccination to school girls.

3.3.3 Operationalization of Knowledge of Cervical Cancer

Knowledge of cervical cancer was only assessed if a respondent said that they had awareness of cervical cancer which is merely stating that one knows about or has heard about cervical cancer. The knowledge of the respondent with respect to the possible causes (HPV infection, practicing unsafe sex, becoming sexually active at a young age, having a Sexually Transmitted Infection (STI), having many sexual partners, smoking, using contraceptives, vaginal douching) and protective factors (attending regular screening, HPV vaccination, practicing safe sex, being circumcised, not becoming sexually active at a young age, being faithful to one sexual partner, not smoking, not taking contraceptives, no vaginal douching) of cervical cancer was given a knowledge grade ranging from 1 to 10 points. These causes and protective factors of cervical cancer were identified on the basis of the scientific literature (WHO, 2014 & 2016; Centers for Disease Control and Prevention, n.d.; Martino, Youngpairoj & Vermund, 2004; Ekpenyong, Daniel & Akpan, 2014; CIDRZ, 2009). For further information on the calculation of the knowledge grade, see Nyambe, Kampen, Baboo, et al. (2018).

3.3.4 Sampling Design

To avoid problems with illiteracy and possible language barriers, the questionnaires were administered as an interview by data collectors. Four data collectors were assigned to Kanyama and two data collectors to Chilenje. The data collectors worked male and female in pairs, with the male data collector collecting data from men and the female from women. Men and women were interviewed separately. Effort was made to interview both husband and wife, but this failed because of the general lack of interest in men to participate and the unavailability of husbands at home due to work or other reasons for absenteeism. Single parents were not excluded from the research. All respondents were read an information sheet about the study and signed a consent form. Participation was voluntary.

Due to inadequate naming of roads and house numbers, sampling was conducted using the random walk technique (Turner, 2003). Maps of Chilenje and Kanyama were provided to the data collectors. The main roads were divided into sections, the data collectors would start from a section of the road and work their way inside the community using a spinning pointer when at crossroads. Data collection was targeted at every second house on a road. The data collectors were also equipped with GPS devices from the University of Zambia, School of Mines, which they used to mark every house they collected data from on the map. This ensured that they covered a great area of the townships. Data collectors knocked on doors or gates to ask parents if they had time and were interested in participating in the research. A leaflet with information on cervical cancer from the local clinic was given to all study respondents after the interview as a form of educating the public. The effect of handing out these leaflets was not evaluated in this study.

3.3.5 Data Analysis

To summarize and characterize the data, descriptive statistics of categorical data were reported in frequencies and percentages. Chi-square tests and Fisher's exact tests were used to report between-group comparisons of categorical variables. Odds ratios (OR) were given for chi-square tests with binominal data. Ordinal variables were expressed using the median. Means and Standard Deviation (SD) with 95% confidence intervals (CI) were used to report normally distributed continuous variables. Between-group comparisons of continuous variables were done using independent samples t-tests. Binominal logistic regression analyses were conducted to find the most important predictors identified in the bivariate analyses of the dependent variables "having practiced screening" i.e. since

inception of screening services, “having a vaccinated daughter” i.e. during the running of the pilot vaccination program, “intention to vaccinate a daughter”, and “intention to vaccinate son”. The independent variables were included in the regression equation by forward Wald. To see if accessibility of services affects practice, distances between houses and local clinic were calculated using Google Maps (2017). The locations were mapped using Global Positioning System (GPS) devices in the Universal Transverse Mercator (UTM) coordinate format which was converted to latitude and longitude coordinates using GPS Geo Planner (2014). In order to control for capitalization on chance, the statistical significance level was set at a relatively conservative level of 1%. All quantitative data was entered into excel and then transferred to Statistical Package for the Social Sciences, IBM SPSS 23 software for windows where it was checked for data that was incorrectly entered or skipped.

3.4 Results

3.4.1 Sample Composition and Practices

The sociodemographic characteristics and cervical cancer practices of the respondents are summarized in Table 3.1. The respondents were recruited from Chilenje and Kanyama, and their ages were distributed between 18 and 67 years ($M = 35.9$, $SD = 9.09$). The population aged 15 to 64 years is 59.1% of the urban population of Lusaka Province (Central Statistical Office, 2012). In the sample, as to level of education, the largest group (26.8%) had attended secondary school without completion, 23.0% had completed higher secondary education, and 7.2% had obtained a university degree. Two out of five (43.3%) respondents were unemployed; students ($N = 5$, 0.8%), retired/pensioned ($N = 9$, 1.5%) were included into category ‘other’ (3.3%). Over half of the respondents (61.8%) were Christian Protestants, and 20.3% were Catholics. Other religious groups (2.2%) included orthodox ($N = 1$, 0.2%) and Muslim ($N = 7$, 1.2%). The majority (63.2%) were not aware of cervical cancer. Many women had not attended cervical screening (79.3%) and furthermore, 93.3% of total population had reported not having their daughters vaccinated. When it came to having interest in vaccinating children in the future if given a chance, 82.7% said they would vaccinate their daughters and 84.0% would vaccinate their sons. Both women and men showed an interest in having the possibility of self-screening with a total of 80.2%. The results for interest in self-screening and distance to the clinic, showed no significance.

Factors that could potentially affect the quality of the interviews varied depending on the area the respondents resided. In Kanyama, 81.5% of the respondents were very interested in the interview compared to Chilenje where only 23.5% were very interested. A substantial part of the respondents in Chilenje were somewhat interested (N = 80, 40.0%). The data collectors in both areas tried to ensure that interviews were conducted in private with no other people (N = 397, 66.2%) and they equally reported the interviews to have run smoothly (N = 559, 93.2%). Data collectors stated that the difficulties they faced were due to others intruding while the interview was taking place, language barriers, respondents expecting further assistance because they participated, and respondents' general non-interest or ignorance of the topic which greatly lengthened the time of the interview.

Table 3.1: Socio-demographic information

		Total sample (N = 600)	Kanyama (N = 400)		Chilenje (N = 200)	
		%	Female %	Male %	Female %	Male %
Age	24 years and below	9.7	20.5	7.0	3.0	0.0
	25 – 29 years	16.3	21.0	17.5	21.0	0.0
	30 – 34 years	21.8	18.0	28.0	17.0	22.0
	35 – 39 years	19.8	12.0	19.0	23.0	34.0
	40 – 44 years	17.2	15.0	16.0	19.0	22.0
	45 – 49 years	8.7	6.0	7.0	12.0	14.0
	50 – 54 years	2.7	3.0	1.5	1.0	6.0
	55 years and above	3.8	4.5	4.0	4.0	2.0
<i>Total N (%)</i>		600 (100.0)	200 (100.0)	200 (100.0)	100 (100.0)	100 (100.0)
Education level	No formal education	3.7	3.5	4.0	3.0	4.0
	Incomplete primary school	9.8	19.5	9.0	1.0	1.0
	Complete primary school	12.7	18.0	18.0	2.0	2.0
	Incomplete secondary school	26.8	46.5	25.5	6.0	11.0

	Complete secondary school	23.0	10.5	36.5	23.0	21.0
	Incomplete college, without diploma	3.7	0.0	1.0	11.0	9.0
	Complete college, with diploma	10.2	1.5	5.5	22.0	25.0
	Some university-level education, without degree	3.0	0.0	0.5	10.0	7.0
	University-level education, with degree	7.2	0.5	0.0	22.0	20.0
	<i>Total N (%)</i>	600 (100.0)	200 (100.0)	200 (100.0)	100 (100.0)	100 (100.0)
Employment	Full time employee	20.5	6.0	18.5	33.0	41.0
	Part time employee	9.5	0.0	18.0	9.0	12.0
	Self employed	23.3	19.0	38.0	10.0	16.0
	Unemployed/ housewife	43.3	71.0	23.5	44.0	27.0
	Other	3.3	4.0	2.0	4.0	4.0
	<i>Total N (%)</i>	600 (100.0)	200 (100.0)	200 (100.0)	100 (100.0)	100 (100.0)
Income	Save money	28.3	17.5	46.0	17.0	26.0
	Just get by	74.0	83.5	58.0	80.0	81.0
	Spent some savings	7.8	7.5	2.0	11.0	17.0
	Spent savings and borrowed money	3.3	1.0	4.0	4.0	6.0
	<i>Total N (%)</i>	600 (100.0)	200 (100.0)	200 (100.0)	100 (100.0)	100 (100.0)
Religion	None	15.7	1.5	16.5	24.0	34.0
	Catholic	20.3	9.0	17.0	36.0	34.0
	Christian Protestant	61.8	89.0	62.0	37.0	32.0
	Other	2.2	0.5	4.5	3.0	0.0

	<i>Total N (%)</i>	600 (100.0)	200 (100.0)	200 (100.0)	100 (100.0)	100 (100.0)
Living Status	Alone	3.3	1.0	5.5	0.0	7.0
	Partner	71.2	61.5	78.0	65.0	83.0
	Stepchildren	4.3	3.0	3.5	6.0	7.0
	Bio-children	83.3	82.0	78.0	88.0	92.0
	Other children	43.0	43.0	16.0	69.0	71.0
	Other family	46.7	29.5	45.0	71.0	60.0
	Other	0.7	1.0	0.5	1.0	0.0
	<i>Total N (%)</i>	599 (99.8)	200 (100.0)	199 (99.5)	100 (100.0)	100 (100.0)
Do you know cervical cancer? (awareness)	Yes	35.8	33.5	36.5	46.0	29.0
	No	63.2	66.0	63.5	51.0	69.0
	Not sure	1.0	0.5	0.0	3.0	2.0
	<i>Total N (%)</i>	600 (100.0)	200 (100.0)	200 (100.0)	100 (100.0)	100 (100.0)
Have you screened?	Yes	20.7	17.0	-	28.0	-
	No	79.3	83.0	-	72.0	-
	<i>Total N (%)</i>	300 (100.0)	200 (100.0)	-	100 (100.0)	-
Interest in self-screening	Yes	80.2	83.5	84.5	79.0	69.0
	No	13.0	14.0	9.5	19.0	12.0
	Not sure	6.8	2.5	6.0	5.0	19.0
	<i>Total</i>	600 (100.0)	200 (100.0)	200 (100.0)	100 (100.0)	100 (100.0)
Have you vaccinated your daughter?	Yes	6.5	5.5	4.0	10.0	10.0
	No	93.3	94.5	95.5	90.0	90.0
	<i>Total N (%)</i>	599 (99.8)	200 (100.0)	199 (99.5)	100 (100.0)	100 (100.0)
Future vaccination of daughter	No	4.7	4.5	9.0	1.0	0.0
	Yes, if given a chance	82.7	83.0	79.5	86.0	85.0
	I do not have a daughter but if I did I would vaccinate her	6.7	7.0	7.5	3.0	8.0

	<i>Total N (%)</i>	564 (94.0)	189 (94.5)	192 (96)	90 (90.0)	93 (93.0)
Vaccination of son	No	7.0	6.0	10.5	5.0	4.0
	Yes, if given a chance	84.0	84.0	78.0	90.0	90.0
	I don't have a son but if I did I would vaccinate him	8.0	9.0	10.0	5.0	5.0
	I don't have a son but if I did I would not vaccinate him	0.3	0.0	0.5	0.0	1.0
	<i>Total N (%)</i>	596 (99.3)	198 (99.0)	198 (99.0)	100 (100.0)	100 (100.0)

3.4.2 Knowledge, Practices and Intentions

Table 3.2 reports the relationship between awareness of cervical cancer and practicing screening and having vaccinated the daughter. Having awareness of cervical cancer and conducting these practices, shows strong significance. Screening accompaniment refers to whether a woman had an escort or was invited to be taken for screening. There was an association between being aware of cervical cancer and being invited or inviting someone for screening (see Table 3.2). It was further found that the greater majority of the population that is aware of cervical cancer and its prevention services will vaccinate their children if given a chance in the future. Of the very few parents who expressed disinterest in vaccinating children in the future, the majority of them resided in Kanyama. In Chilenje, all men expressed interest in vaccinating their daughters. Significant associations were found for women who know about screening at government clinics and future vaccination of daughter ($\chi^2 = 12.8$, $df = 2$, $p < 0.01$), women who know about schools that vaccinated and future vaccination of daughter ($\chi^2 = 15.6$, $df = 4$, $p < 0.01$), men who know about screening in government clinics and vaccination of sons ($\chi^2 = 12.3$, $df = 3$, $p < 0.01$).

Table 3.2: Awareness of cervical cancer and knowing about prevention services in relation to practicing prevention

Have you screened*	Yes	No	Chi-square test					
			OR	95% CI	χ^2	df	p	
Do you know cervical cancer (awareness)								
Yes	54	59	20.5	[9.214,	81.3	1	0.000	
No	8	179		45.516]				
Know where to screen								
Yes	58	89	24.3	[8.523,	62.1	1	0.000	
No	4	149		69.140]				
Know about screening in clinics								
Yes	58	91	23.3	[8.170,	59.8	1	0.000	
No	4	146		66.246]				
Know about vaccination of school girls								
Yes	28	28	6.2	[3.267,	36.1	1	0.000	
No	34	210		11.678]				
Know schools that participated in vaccination								
Yes	17	18	4.6	[2.211,	18.8	1	0.000	
No	45	220		9.642]				
Screening accompaniment								
Do you know cervical cancer (awareness)								
Female								
Yes	17	45	8.5	[1.855,	10.0	1	0.002	
No	2	45		38.954]				
Male								
Yes	17	85	13.0	[3.711,	24.8	1	0.000	
No	3	195		45.535]				
Know where to go for screening								
Female								
Yes	17	51	6.5	[1.417,	7.2	1	0.007	
No	2	39		29.818]				
Male								
Yes	15	76	8.1	[2.830,	20.2	1	0.000	
No	5	204		22.916]				
Know about screening in clinics								
Female								
Yes	18	50	14.0	[1.795,	10.0	1	0.002	
No	1	39		109.799]				
Male								
Yes	16	100	7.2	[2.343,	15.4	1	0.000	
No	4	180		22.124]				
Know about vaccination of school girls								

Female	Yes	10	22	3.4	[1.237,	6.0	1	0.014
	No	9	68		9.532]			
Male	Yes	6	65	1.4	[0.524,	0.5	1	0.490
	No	14	215		3.837]			
Know schools that participated in vaccination								
Female	Yes	7	13	3.5	[1.148,	5.3	1	0.022
	No	12	77		10.400]			
Male	Yes	6	24	4.6	[1.610,	9.5	1	0.002
	No	14	256		12.984]			
Have vaccinated their daughter								
Do you know cervical cancer (awareness)								
Female	Yes	17	96	8.1	[2.652,	18.0	1	0.000
	No	4	183		24.752]			
Male	Yes	11	91	3.3	[1.231,	6.2	1	0.013
	No	7	190		8.742]			
Know where to go for screening								
Female	Yes	18	129	7.0	[2.009,	12.2	1	0.000
	No	3	150		24.223]			
Male	Yes	8	82	1.9	[0.740,	1.9	1	0.171
	No	10	199		5.094]			
Know about screening in clinics								
Female	Yes	20	129	23.1	[3.058,	18.6	1	0.000
	No	1	149		174.516]			
Male	Yes	10	106	2.1	[0.790,	2.3	1	0.132
	No	8	175		5.392]			
Know about vaccination of school girls								
Female	Yes	16	40	19.1	[6.634,	49.2	1	0.000
	No	5	239		55.107]			
Male	Yes	9	62	3.5	[1.344,	7.3	1	0.007
	No	9	219		9.281]			
Know schools that participated in vaccination								
Female	Yes	12	23	14.8	[5.661,	46.3	1	0.000
	No	9	256		38.908]			
Male	Yes	5	25	3.9	[1.298,	6.7	1	0.010
	No	13	256		11.953]			

*Only women asked. (No/not sure) for all variables.

Strong associations were found regarding respondent's awareness of cervical cancer in relation to presumed support and possible support provided by their partner to allow screening attendance. For partner's support, the categories 'completely disagree', 'disagree' and 'neither' were combined due to scarcity of results. Results were significant for awareness of cervical cancer and partners support when responses 'no' and 'not sure' were combined due to scarcity (female respondents median = 2, $\chi^2 = 24.4$, $df = 1$, $p < 0.01$; male respondents median = 2, $\chi^2 = 9.4$, $df = 1$, $p < 0.01$), for women who know where to go for screening and partners support when responses 'no' and 'not sure' were combined due to scarcity (median = 2, $\chi^2 = 64.3$, $df = 1$, $p < 0.01$), and for women who know about screening in government clinics (median = 2, $\chi^2 = 63.8$, $df = 1$, $p < 0.01$).

The results of the knowledge grade analysis are summarized in Table 3.3 below. The knowledge grade of men ($M = 4.24$) was slightly higher than of women ($M = 3.03$), but grades were very low relative to maximum of 10 that could be achieved if all causes and protective factors are correctly identified. The most commonly correctly identified causes are "having many sexual partners" (correctly identified by 42% of women and 60% of men), "practicing unsafe sex" (correctly identified by 38% of women and 50% of men, "HPV infection" (correctly identified by 38% of women and 44% of men), and "vaginal douching" (correctly identified by 47% of women and 41% of men). The most commonly correctly identified protective factors are "no vaginal douching" (correctly identified by 40% of women and 49% of men), "being circumcised" (correctly identified by 43% of women and 56% of men), and "attending regular screening" (correctly identified by 51% of women and 47% of men). The other causes and protective factors are only sporadically correctly identified. Quite surprisingly, the degree of knowledge (by grade or separate factors) does not differ between those screened and did not screen, or those that vaccinated or did not vaccinate.

Table 3.3: Means (sd) of cervical cancer Knowledge Grades by gender, screening and vaccination*

	Gender		Screening practice		Vaccination practice	
	Female (N = 117)	Male (N = 104)	Yes (N = 54)	No (N = 63)	Yes (N = 28)	No (N = 193)
Causes						
Smoking	.06 (.24)	.14 (.35)	.07 (.26)	.05 (.21)	.04 (.19)	.11 (.31)
Becoming sexually active at a young age	.21 (.41)	.52 (.50)	.20 (.41)	.22 (.42)	.29 (.46)	.37 (.48)
Having many sexual partners	.42 (.50)	.60 (.49)	.46 (.50)	.38 (.49)	.46 (.51)	.51 (.50)
Becoming pregnant at a young age	.02 (.13)	.14 (.35)	.00 (.00)	.03 (.18)	.04 (.19)	.08 (.28)
Using contraceptives	.05 (.22)	.10 (.30)	.00 (.00)	.10 (.30)	.04 (.19)	.08 (.27)
Having many pregnancies	.03 (.19)	.12 (.32)	.00 (.00)	.06 (.25)	.04 (.19)	.08 (.27)
Being old	.03 (.18)	.02 (.14)	.04 (.19)	.03 (.18)	.04 (.19)	.03 (.16)
Vaginal douching	.47 (.50)	.41 (.49)	.52 (.50)	.43 (.50)	.61 (.50)	.42 (.49)
Heredity	.03 (.18)	.06 (.23)	.02 (.14)	.05 (.21)	.07 (.26)	.04 (.20)
Having a STI	.23 (.42)	.44 (.50)	.28 (.45)	.19 (.40)	.43 (.50)	.32 (.47)
Practicing unsafe sex	.38 (.49)	.50 (.50)	.44 (.50)	.33 (.48)	.54 (.51)	.42 (.50)
HPV infection	.38 (.49)	.44 (.50)	.50 (.50)	.29 (.46)	.54 (.51)	.39 (.49)
Protective Factors						
Not smoking	.05 (.22)	.17 (.38)	.06 (.23)	.05 (.21)	.04 (.19)	.12 (.32)
Not becoming sexually active at a young age	.18 (.39)	.55 (.50)	.17 (.38)	.19 (.40)	.25 (.44)	.37 (.48)
Being faithful to one	.29	.58	.35	.24	.54	.41

sexual partner	(.46)	(.50)	(.48)	(.43)	(.51)	(.49)
Not taking contraceptives	.01	.10	.00	.02	.00	.06
No vaginal douching	(.09)	(.30)	(.00)	(.13)	(.00)	(.23)
Practicing safe sex	.40	.49	.50	.32	.57	.42
	(.48)	(.50)	(.50)	(.47)	(.50)	(.49)
Being circumcised	.24	.51	.28	.21	.39	.36
	(.43)	(.50)	(.45)	(.41)	(.50)	(.48)
HPV vaccination	.43	.56	.44	.41	.57	.48
	(.50)	(.50)	(.50)	(.50)	(.50)	(.50)
Attending regular screening	.36	.45	.48	.25	.54	.38
	(.48)	(.50)	(.50)	(.44)	(.51)	(.49)
	.51	.47	.59	.44	.46	.50
	(.50)	(.50)	(.50)	(.50)	(.51)	(.50)
Knowledge grade	3.03	4.24	3.55	2.58	4.02	3.54
	(2.69)	(2.81)	(2.64)	(2.67)	(2.80)	(2.81)

* Numbers in bold signify statistical significance of t-test at $p < 0.01$. Only women were asked about practicing screening. Respondent who said they did not hear about cervical cancer were not asked about causes and protective factors.

Respondents in Kanyama, reported that their information on cervical cancer was mostly obtained from health care providers (N = 93, 66.0%) and television/radio (N = 73, 51.8%). Equally, in Chilenje health care providers provided most information (N = 62, 78.5%), followed by internet (N = 28, 35.4%). The majority of the respondents identified health care providers (N = 576, 96.2%), internet (N = 256, 42.7%) and television/radio (N = 249, 41.6%) as good sources to gain future information on cervical cancer.

3.4.3 Impact of Social Support on Practice and Intentions

Women who practiced screening were highly likely to also know someone who has screened (OR = 18.7, 95% CI = [9.270, 37.554], $\chi^2 = 91.3$, $df = 1$, $p < 0.01$). Regarding perceived approval of practicing a preventive measure, we found strong associations between perceived approval of screening and actually practicing screening: women are much more likely to have practiced screening if they enjoy support of their partner ($\chi^2 = 11.4$, $df=1$, $p < 0.01$), family ($\chi^2 = 11.8$, $df = 1$, $p < 0.01$), or friends ($\chi^2 = 8.6$, $df = 1$, $p < 0.01$). The intention to vaccinate daughters in the future if given a chance, is positively related with women's perceived approval from their partners ($\chi^2 = 10.8$, $df = 2$, $p < 0.01$).

Intention to vaccinate sons was not significantly associated with support of any kind. For both men (OR = 14.2, 95% CI = [4.889, 41.166], $\chi^2 = 36.4$, $df = 1$, $p < 0.01$) and women (OR = 29.0, 95% CI = [10.402, 80.852], $\chi^2 = 74.3$, $df = 1$, $p < 0.01$), the probability of having daughters vaccinated increases when knowing someone who has vaccinated. No relationship between practicing vaccination of daughters and social support was found. When it comes to intentions to vaccinate, there is a significant relationship between women who know someone who has practiced vaccination and the intention of vaccinating their daughter in the future if given a chance ($\chi^2 = 15.8$, $df = 2$, $p < 0.01$). No significant relationship was found between women who know someone who has vaccinated and the intention to vaccinate sons in the future.

Concerning the relationship between women who practice screening and whether they are willing to vaccinate their children, there was a strong relationship found between women who have screened and have vaccinated their daughters (OR = 9.6, 95% CI = [3.689, 25.114], $\chi^2 = 29.1$, $df = 1$, $p < 0.01$). In fact, 22.6% of women had vaccinated her daughter if she herself was screened, against 2.9% if she herself had not screened. On the other hand, whether women practiced screening or not showed no association with interest in vaccinating daughters in the future and the vaccination of sons.

3.4.4 Impact of Religious Beliefs on Knowledge, Practice and Intentions

Religion in relation to practice of screening suggested no significance. A respondent's religious affiliation was significant in terms of having a vaccinated daughter ($\chi^2 = 16.2$, $df = 3$, $p < 0.01$). Furthermore, unlike religious affiliation, the more important a respondent regarded religion determined their intention to vaccinate their son in future, ($\chi^2 = 33.8$, $df = 12$, $p < 0.01$). Religious importance and having heard of cervical cancer also showed significance, ($\chi^2 = 24.7$, $df = 8$, $p < 0.01$). A total of 33 respondents stated that they had gained information on cervical cancer from their religious group. Where 30 of them recalled the different types of information they acquired, which included information on cervical screening (N = 15, 50.0%), vaccination (N = 7, 23.3%), abstinence from sex (N = 7, 23.3%), and practice of safe sex (N = 3, 10.0%).

3.4.5 Multivariate Analysis

A logistic regression analysis use general social demographic characteristics (gender, age, education, employment, income, religion, living status), awareness (knowing/having heard about cervical cancer, knowing where women can go for screening, knowing

government clinics provide free screening, knowing about the HPV vaccine, knowing about vaccination in schools), knowing someone who has screened or vaccinated, being accompanied for screening, perceived approval of screening (from partner, family and friends), and vaccination approval from partners. The knowledge grade was not included in the regression analysis because it was not calculated for respondents who were not aware of cervical cancer and since these were the majority it would cause error in the overall analysis. Predictors of behavior were found for screening, having a vaccinated daughter and future vaccination of daughters. There were no significant results for the outcome of intention to vaccinate sons in the future if given a chance.

Significant predictors for the outcome of practicing screening, were “having heard about cervical cancer” (Wald 16.1, $df = 2$, $p < 0.01$), the interpersonal indicators of “knowing someone who has practiced screening” and “living with other children (not biological or step-children)”. For the outcome of having had a vaccinated daughter, the interpersonal indicators of “living with other children” and “knowing someone who has vaccinated” are statistically significant. When it came to intention to vaccinate daughters, perceived vaccination approval from partners (Wald 28.7, $df = 4$, $p < 0.01$) contributed to the equation overall. Such that, when a respondent perceived that their partner would agree to have their daughter vaccinated, there was a higher chance of willingness to have their daughter vaccinated in the future if given a chance. Living with others who are not family (e.g. friends), reduced the chance of intending to vaccinate daughters in the future. Table 3.4 below, summarizes the significant results of the regression analysis.

Table 3.4: Summary of significant logistic regression results

Predictor	Screening*			Vaccination of daughter(s)			Future vaccination of daughter(s)		
	β	OR	95% CI	β	OR	95% CI	β	OR	95% CI
Know someone who has screened	2.571	13.1	[4.042, 42.308]	-	-		-	-	
Living with other children	1.451	4.3	[1.531, 11.883]	1.432	4.2	[1.753, 10.007]	-	-	
Know someone who has vaccinated	-	-		3.257	26.0	[10.780, 62.624]	-	-	
Living with others	-	-		-	-		-4.2	0.0	[0.001, 0.310]

Support from partner to vaccinate (completely disagree)	-	-		-	-		-5.2	0.0	[0.000, 0.158]
Pseudo R2	0.612			0.310			0.247		
% cor pred.	87.7			94.2			95.3		

*Only women were asked about practicing screening

3.5 Discussion

3.5.1 Knowledge, Practices and Intentions

The presumption was that, women who know of cervical cancer are more likely to practice screening and agree to vaccination. The results in Table 3.2 support the hypothesis when a respondent says they are aware of cervical cancer and know places providing preventive services. This was the case for both women and men. In particular, men who stated they are aware of cervical cancer were more likely to provide support to their partners in practicing screening. This demonstrates that respondents will practice screening and vaccination if they are aware of cervical cancer and the availability of prevention services. The overall awareness of respondents was low. This is similar to a study in Zambia where 52.2% (N =203) of the respondents had never heard of cervical cancer (Simaubi & Ngoma, 2013).

In our study, it was only the few respondents who stated they were aware of cervical cancer that were asked further questions on knowledge of causes and preventive factors. As seen from Table 3.3, men were found to have a slightly higher level of knowledge of cervical cancer than women. Men were difficult to recruit into the study and perhaps it was men who were aware of cervical cancer that were more likely to agree to participate. Having knowledge of cervical cancer causes and protective factors as calculated by the knowledge grade, did not show any association with the practice of preventive measures. In depth knowledge of cervical cancer may not be necessary since having awareness is enough for a respondent to practice prevention. Reverse casualty may be also assumed in that having practiced prevention perhaps by opportunistic contact like during the school based vaccination program or during screening outreach programs, knowledge levels are increased.

There is no denying that general knowledge is fundamental in increasing the practice of prevention methods. This is in accordance to the regression results for the SEM at intrapersonal level where having heard about cervical cancer was a main predictor of behavior. Health care providers, internet and television/radio were identified as good sources of information. Thus, proposing possible targets for conducting interventions aimed at increasing cervical cancer knowledge.

3.5.2 Impact of Social Support on Practice and Intentions

It was assumed that, women who believe they have support from their immediate social circles (partner) are more likely to be in favor of practicing cervical cancer prevention methods. The results support this hypothesis in regard to women practicing screening. For vaccination practices, this hypothesis is supported only in the decision making of women concerning vaccinating daughters in the future. It was found that women's perceived approval of partners, family and friends influenced their screening practices. This finding is similar as in a study in Zambia which determined that women's decision to screen was often prompted by peers and family members (White, et al., 2012). Other studies (Cunningham, et al., 2015; Anyebe, et al., 2014; Mbamara, et al., 2011), also suggested the influence of husbands on decision making. Furthermore, unlike men, only women were more likely to want to vaccinate their daughters if they thought their partners would approve. It can be suggested that there is a relationship between practicing preventive measures and having support especially for women. This implies that Zambian society may be a rather patriarchal society, where men have a big impact in the household. Meaning that for effectiveness of cervical cancer prevention programs, men must be included as a target population.

In addition, there was an association between knowing someone who has practiced screening and actually screening as well as knowing someone who has practiced vaccination and actually vaccinating daughters. This corresponds with the results of the study by Ndejjo, et al. (2016), which found that knowing someone who had ever been screened was a predictor of cervical screening. This suggests that interaction with people who practice certain behaviors can influence behavior such that anyone associated with the group behaves according to the group. This hypothesis is further supported by the results of the regression analysis in Table 3.4, which indicates that living conditions, social support and influence are the overall main predictors of practice of prevention behaviors as suggested by the SEM and TTI at interpersonal level.

Finally, data provided for the evidence of validity of the hypothesis that women who practice screening are more likely to want to vaccinate their children. It was found that there was a strong relationship between women who practice screening and actually had their daughters vaccinated. Apparently, these women, who are obviously aware of cervical cancer, also see the importance of vaccinating their children.

3.5.3 Impact of Religious Beliefs on Knowledge, Practice and Intentions

It was assumed that, religious beliefs limit the uptake of screening and vaccination. The findings go against this theory in that religion showed no influence on screening decisions and showed a positive influence on vaccination acceptance. This is contrary to other countries where religion was found to limit the uptake of vaccines (Spencer, Roberts, Brabin, et al., 2014; Masika, Ogembo, Chabeda, et al., 2015).

A total of 82.1% of the population professed to be Christians and this increased the chances of having a vaccinated daughter. The more important the respondent regarded their religion proved to be a possible indicator of intending to vaccinate sons. This suggests that churches in Zambia may play a role in improving vaccination practices. One possible explanation is that some Christian denominations are known to actively educate their members on health issues including cervical cancer. These interpretations are limited because the Christian denominations of the respondents were not assessed. Beliefs between different churches vary. Equally, the accuracy of the information provided by the churches needs to be further investigated.

3.6 Conclusions

The relationship of knowledge, attitudes and self-reported behavior of Zambians residing in Chilenje and Kanyama towards screening and vaccination of cervical cancer is complicated. While factual knowledge of cervical cancer among them is low, knowing about cervical cancer does increase both probability of the women practicing screening, and the intention to have daughters vaccinated. When women had actually screened for cervical cancer the odds that they vaccinated their daughters increased tenfold. When we consider that the most important actor in the immediate social circle of a young girl is her mother, this strongly supports the hypothesis that social interaction is an important factor for the practice of cervical cancer prevention.

Many Zambians in our sample attest to belong to the Christian faith. In most cases churches are accused of rejecting modern medicine due to moral and biblical beliefs. With support from the clergy vaccine coverage can be improved, as is evident from having a higher number of vaccinated daughters belonging to Christian families.

Central clinics with screening services were accessible for women in Chilenje and Kanyama but there was still low attendance. Awareness and ultimately knowledge was found to be one of the main factors for non-attendance considering the availability of accessible and free screening services. Positive attitudes towards self-screening suggest another possible way to maximize coverage for cervical cancer screening. Granted, outreach programs would be necessary to educate the public on cervical cancer and self-sampled screening. Vaccination was only available to grade 4 girls and therefore, not only knowledge, but availability may have affected the low coverage. Nonetheless, the high level of interest in vaccination shows that a full-scale vaccination program may be successful if launched in the future. Identifying this lack of awareness and knowledge is an important step for implementing a successful primary and secondary cervical cancer prevention program focused on increased screening practice and vaccine administration.

Low awareness and knowledge of cervical cancer and cervical cancer prevention highlight the need for sensitization of the general public in order to emphasize the importance of vaccination and screening for cervical cancer. Men were found to influence the practices of women and the acceptability of the HPV vaccine. Interventions involving public health communication on cervical cancer should be targeted to both women and men. Outreach should also be made to churches to ensure the correct information on prevention is disseminated and to encourage church-goers to practice cervical cancer prevention. Considering the low level of awareness and consequently knowledge obtained in this study, an intervention study targeting women and men in churches aimed at enhancing knowledge levels among Zambians living in Lusaka was conducted as part of our larger research project.

The frameworks provided by the SEM and TTI were useful in providing a basis for instrument development and selection of study groups. The main predictor of behavior found at intrapersonal level was having awareness of cervical cancer. Based on the SEM, interventions aimed at improving screening should aim at increasing awareness of cervical cancer. Knowledge influences behavior but most predictors were at the interpersonal level for both the SEM and TTI. Knowing people who have practiced cervical cancer prevention methods and support from family play a role in influencing the health behaviors of a

society. According to the SEM and TTI, the impact of the people a person may live with should be considered because they may influence whether screening and vaccination will be practiced. Once people are aware of cervical cancer, perhaps by observing the actions of others, practice of prevention methods will increase resulting in a reduction in the spread of this cancer.

Limitations and Outlook

There are limitations to the findings of this study. Participation in the study was voluntary. Therefore, the majority of the respondents may have been those who showed more interest in the topic. Since the questionnaires were not self-administered, it may have led to dishonesty in respondents because cervical cancer may be considered a sensitive topic. The study participants were limited to parents/guardians of at least one school going child. This helped reduce asking respondents without children questions that are hypothetical but still not all respondents had both daughter and son which may affect the final result. Therefore, questions referring to intention to vaccinate were included to cover parents who did not have a chance to vaccinate their children. These questions on intention to vaccinate have not been followed-up to see whether respondents will actually practice what they said. In addition, it was also not assessed if women had intentions to practice screening or continue practicing screening in the future. A follow up study could be considered to assess respondent's actual future behavior.

Another limitation would be restricting the location of the study to Chilenje and Kanyama townships which are not representative of the whole of Lusaka, Zambia. Perhaps another study focusing on different residential areas within Lusaka or rural areas may yield different results. Furthermore, the distances from place of residence to local clinic were established using Google maps. The accuracy of using Google maps to determine distances is not clear.

Self-screening kits for cervical cancer were considered acceptable to most of the study respondents, including women who have practiced screening. This indicates that self-screening can be an acceptable alternative for women under-screened for cervical cancer. Future studies can assess the implementation of self-screening to help reduce the incidence of cervical cancer and the barriers to routine screening.

Considering the results of this study, some policy recommendations can be suggested. Firstly, there is a need to ensure that cervical cancer screening services are available at all clinics. Due to low levels of knowledge, perhaps having these services at all clinics may

lead to a better outreach between health care practitioners and women who may attend the clinic even for other health reasons. Regarding vaccination, the overall interest in vaccination was a positive finding. Since, reproductive activities start very early in Zambia, it is therefore crucial to start vaccines early during adolescence. Cancer vaccines can either be included in the normal immunization schedule as cost effective solution or community based vaccine drives can be initiated through the MoH. In general, improvements in screening attendance and vaccine acceptance along with behavior change will have a major impact in the prevention of cervical cancer in Zambia.

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CHAPTER 4: THE IMPACT OF THE SOCIAL ENVIRONMENT ON ZAMBIAN CERVICAL CANCER PREVENTION PRACTICES

Anayawa Nyambe, Jarl K. Kampen, Stridutt K. Baboo, and Guido Van Hal

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4.1 Abstract

Background: Cervical cancer which is preventable by screening and vaccination is the most common cancer in Zambia among both the female and male population. In this article we aim to determine how the key players of the sociocultural and political environment recognize cervical cancer as a public health problem and therefore impact the provision of cervical cancer prevention services (screening and vaccination).

Methods: Qualitative data in the form of interviews with stakeholders (health care providers, teachers and religious leaders), special interest groups (advocacy groups and non-governmental organizations) and policy makers, was collected as part of a mixed methods study from February to May 2016.

Results: The views expressed by the respondents were coded into predetermined themes (cervical cancer in general, screening, vaccination) and an organizational chart of the administration of cervical cancer prevention services in Zambia was developed.

Conclusions: It is evident that the Zambian cervical cancer prevention system has targeted several areas and multiple sectors of society to reduce cervical cancer cases. However, awareness, knowledge, social support and facilities are factors that can be improved.

Keywords: *Zambia, Cervical Cancer, Screening, Vaccination, Social Ecological Model, Theory of Triadic Influence*

4.2 Background

Most women worldwide are at risk of cervical cancer which is relatively easy to prevent by both primary (vaccination) and secondary (screening) prevention methods. To

prevent the spread of cervical cancer in Zambia, the Cervical Cancer Prevention Program (CCPPZ) was started in 2006 (CCPZ, 2011; Mwanahamuntu, Sahasrabudde, Kapambwe et al., 2011). Under this program, nurses were trained to provide free cervical screening via visual inspection with acetic acid (VIA) and treatment with cryotherapy if indicated (Mwanahamuntu et al., 2011). Women with complex cervical cancer lesions are referred to the University Teaching Hospital (UTH) for further evaluation (Mwanahamuntu et al., 2011; Parham & Mwanahamuntu, 2004). Peer educators are employed to facilitate community awareness, counteract misconceptions and myths, and provide patient support functions (Chirwa, Mwanahamuntu, Kapambwe et al., 2010; Mwanahamuntu et al., 2011). In addition to this, screening services are also provided by Planned Parenthood Association of Zambia (PPAZ) (PPAZ, n.d.), Project Concern International (PCI) for mobile screening (Mulenga, Mulenga, Makoane et al., 2012) and in chiefdoms for village-based screening approaches (Pinder, Mwanahamuntu, Chisele et al., 2017). Currently, cervical screening has been made available in all ten provinces of Zambia (Ministry of Health [MoH], 2016).

During 2013, Zambia launched the Human papillomavirus (HPV) vaccine Gardasil as a demonstration (WHO, 2015). This pilot program primarily targeted girls in grade 4 using a school-based vaccination strategy which also included girls aged 10 years old who were not in schools (Ministry of Community Development Maternal and Child Health [MCDMCH], n.d.). Male circumcision is also being encouraged because the cancer is sexually transmitted, and it reduces HPV infection in men by 30% (Stop Cervical Cancer in Africa, 2012).

Regardless of these initiatives, cervical cancer is estimated to be diagnosed in 2330 Zambian women every year and 1380 die from the disease (Bruni, Barrionuevo-Rosas, Albero et al., 2017). Unfortunately, the true size of the problem is unknown because of under reporting and lack of reliable data (CCPZ, 2011; WHO Africa, 2012). Nevertheless, the Zambian cervical cancer prevention program may be more effective if support from stakeholders (professional groups, policy makers) and adequate infrastructure (equipment, institutions, capital) are considered.

Purpose of this study

Existing studies of populations in Zambia are very few and are limited because they only focus on women's screening practices (Milimo, Daka, Sikuyuba et al., 2015; Simaubi & Ngoma, 2013; White, Mulambia, Sinkala et al., 2012) and views on vaccination (Liu, Vwalika, Hacker, et al., 2012). These studies have not considered how the environment

that women reside, facilitates the provision of these prevention services. The purpose of this study is to determine how the key players of the sociocultural and political environment recognize cervical cancer as a public health problem and therefore impact the provision of cervical screening and vaccination services. The data is used to sketch an organizational chart on the administration of cervical cancer prevention services in Zambia.

The Social Ecological Model (SEM) and the Theory of Triadic Influence (TTI) are the theoretical frameworks that guided this study. These models were selected because they cover multiple ecological levels of influence, share similar concepts and can be used to assess screening and vaccination health behaviors. The SEM is composed of the intrapersonal, interpersonal, organizational, community, and policy levels (McLeroy, Bibeau, Steckler et al., 1998). The TTI comprises of the ultimate, distal, and proximal levels of influence as well as intrapersonal, interpersonal social, and sociocultural environmental streams of influence (Flay, Snyder & Petraitis, 2009). The Environmental level of the TTI is comparable to a combination of the organizational, community and policy levels of the SEM. For a systematic review on the SEM and TTI about how these models have been applied in health behavior studies and recommendations for their usage in screening and vaccination research, see Nyambe, Van Hal & Kampen, 2016. The SEM and TTI suggest factors that predict/influence health behavior, in this case screening and vaccination practices, which were used to develop study instrument topics based on the three predetermined themes (cervical cancer in general, screening, and vaccination). (The term *general* refers to anything parting to cervical cancer which is not related to screening and vaccination services; *screening* refers to any activities in relation to cervical screening; *vaccination* refers to any activity in relation to vaccination of cervical cancer). The predetermined themes were selected because this research focuses on screening, vaccination and all other aspects of cervical cancer. The factors of health behaviour as applied in this study are in Table 4.1. In accordance to these frameworks, the implementation and availability of cervical cancer services to the general public was assessed by considering the contribution of health care providers, teachers and pastors; advocacy groups and nongovernmental organizations (NGOs); (The terms *advocacy groups* and *nongovernmental organizations* are used to refer to any organization or group that is not affiliated to the government of Zambia); and policy makers.

Table 4.1: Factors of the SEM and TTI modified and applied in this study

SEM*	TTI ** Environment level (Stakeholders, Special interest groups, Policy makers)	Factors that influence behaviour as applied in the interview guides of the current study
Organizational (Stakeholders) - Social institutions with organizational characteristics, and formal/informal rules and regulations for operation.	Ultimate Aspects of women’s immediate surroundings, neighbourhoods, social institutions, and culture that, although beyond the personal control of women, put them at risk	<ul style="list-style-type: none"> • availability of services⁺ • employment rates⁺ • inadequate schools⁺ • media depictions⁺ • (worksite) policies that vaccination and screening⁺⁺
Community (Special interest groups) - Relationships among organisations, institutions and informal networks within defined boundaries.	Distal Values and behaviours of women that contribute to their attitudes toward screening and vaccination	<ul style="list-style-type: none"> • information opportunities (media and advertisements) • interaction with social institutions (conducting campaigns) • knowledge⁺ • stigma, values and evaluations (religious beliefs, cultural norms, barriers/uptake, priority, prevalence)
Public policy (Policy makers) - Local, state, and national laws and policies	Proximal Beliefs and evaluations about the benefits of cervical cancer prevention	<ul style="list-style-type: none"> • age recommendations of screening and vaccination • possibility of self-screening and cost • possibility of vaccinating girls and boys

*SEM definitions of levels from CDC, 2013; McLeroy, et al., 1998

**TTI definitions of levels from Petraitis, Flay, Miller, et al., 1998

⁺Only the TTI mentions this factor.

⁺⁺The factor “policy”, is mentioned in the SEM at both organizational and public policy level.

4.3 Method

4.3.1 Study Design, Site and Population

A cross-sectional mixed methods study was carried out from February to May 2016. In this article, emphasis is only on qualitative data obtained by means of interviews because of the large amount of data collected (by focus group discussion and quantitative questionnaires). The qualitative interview data was collected as a more effective way to dialogue with the respondents on the phenomena of human health behaviour regarding cervical cancer and its prevention. In accordance with a qualitative phenomenological approach (Patton, 2002), interviews were conducted with respondents who are familiar with cervical cancer to gain an in-depth understanding. The design involved triangulation of data sources by collecting information from different groups of people as well as theory triangulation (Turner & Turner, 2009), by applying both the SEM and TTI (see Table 4.1) instead of only a single model to improve validity of results.

The criterion required for respondents to participate in this research was that they were located in Lusaka City and be at least 18 years old. Based on the SEM and TTI, the respondents included stakeholders (health care providers, teachers, pastors), special interest groups (NGOs, advocacy groups), and policy makers. Media and educational administration offices were included to fill-in gaps on the functioning and organization of the cervical cancer prevention program. It was decided to focus on Chilenje and Kanyama for information from stakeholders at clinics, schools, and churches. These areas were chosen because of the availability of cervical screening services at the local clinic, the population density, and the difference in living standards between the two areas with Chilenje being more developed than Kanyama. The groups that were targeted are summarized in Table 4.2.

Table 4.2: Summary of target groups

Group	Location	Target*	Method
Stakeholders	Chilenje, Kanyama & other areas in Lusaka	Health care providers (UTH, CDH, Kanyama and Chilenje Clinics)	Interviews (N = 17)
	Chilenje & Kanyama	Head teachers (schools)	Interviews (N = 13)
	Chilenje &	Religious leaders (churches)	Interviews (N = 7)

Kanyama			
Special Interest groups	Other areas in Lusaka	Non-governmental organizations, advocacy groups (CIDRZ/ACEWCC, DDMU, INESOR, MUVI TV, PCI, PPAZ, Q TV/Radio, THPAZ, WHO, Zambia Daily Mail, ZICTA, ZNBC)	Interviews (N = 20)
Policy makers	Other areas in Lusaka	Government officials (DEB, MCDMCH, MoH)	Interviews (N = 4)

*Abbreviations in order of appearance in the table: University Teaching Hospital (UTH), Cancer Disease Hospital (CDH), Centre for Infectious Disease Research in Zambia (CIDRZ), African Centre of Excellence for Women’s Cancer Control (ACEWCC), District Disaster Management Unit (DDMU), Institute of Economic and Social Research (INESOR), Project Concern International (PCI), Planned Parenthood Association of Zambia (PPAZ), Traditional Health Practitioners Association of Zambia (THAPZ), World Health Organization (WHO), Zambia Information and Communications Technology Authority (ZICTA), Zambia National Broadcasting Association (ZNBC), District Education Board (DEB), Ministry of Community Development Maternal and Child Health (MCDMCH), Ministry of Health (MoH).

4.3.2 Study Instruments and Development

The authors of this research developed semistructured interview guides based on the health behavior factors of the SEM and TTI as mentioned in Table 4.1 in the background. Each factor mentioned by the models was operationalized into a research question, the questions were either available from previous literature or developed by the authors. The topics included information about the institution, cervical cancer in general, effectiveness of services provided, school-based vaccination program, information sources, and finally views on cervical screening and vaccination. These topics then formed the basis for three predetermined themes of cervical cancer in general, screening, and vaccination used for analysis. The interview guides are found in the appendix [see Appendices].

4.3.3 Sampling Design

Sampling was conducted in two steps, first selecting the target institution and then selection of study participants. Judgmental sampling methods were used to select institutions for participation in the research so that information is from knowledgeable

individuals. This was facilitated by reviewing literature to determine which institutions have been involved in cervical cancer prevention. Meeting with these institutions also provided further information on other target institutions. Once an institution was selected, in person visits were made to describe the study and schedule interviews. Interviews at clinics and hospitals were conducted by random selection of health care providers in permitted departments once permission was obtained from authorities. The random selection was done conveniently by approaching everyone who was available and interviewing those who were willing to participate. At schools, churches, NGOs/advocacy groups, media, and government offices, interviews were conducted with key informants based on referral from the institutional authorities. One-on-one semistructured interviews lasting approximately 30 minutes on average were conducted at the workplace of the respondent for convenience and safety. If a respondent refused to have their interview voice recorded it was written. Effort was made to ensure that the written reports were as accurate as possible, and questions were repeated to verify the written responses. All interviews were conducted in person except for one interview guide that was left as a drop-off form.

4.3.4 Data Analysis

All interview data was compiled in the computer program NVivo. Some interviews were voice recorded and transcribed. Interviews that were not voice recorded (N = 35) were because of requests made by respondents. Guided by the topics of the interviews, the data was read and coded into three predetermined themes (cervical cancer in general, screening, and vaccination). The transcribed data, written interviews and notes were reviewed by identifying the key words and phrases under the theme. The key phrases and words that fit together were grouped into emerging categories. These categories were then refined and reduced by grouping similar categories together. Findings were then reported based on these categories. In addition, the reported role that a respondent/department played in the cervical cancer prevention was used to create the organizational chart of the administration of cervical cancer prevention services in Zambia.

4.4 Results

A total of N = 61, interviews were conducted. The respondents were above legal age of 18 years old and resided in Lusaka City. The reported involvement of the respondents

created the organizational chart (Figure 4.1). The three predetermined themes are used to present the results of the analysis as reported by policymakers, special interest groups (advocacy groups, NGOs, media) and stakeholders (health care providers, teachers, church leaders).

4.4.1 Administration of cervical cancer prevention services in Zambia

Figure 4.1 illustrates the organizational chart of the administration of cervical cancer prevention services in Zambia with consideration given to the social and ecological levels of influence (intrapersonal, interpersonal, organizational, community and policy level). This figure was developed based on the reported involvement of respondents and their institutions in providing cervical cancer prevention services in Zambia. An explanation on the components of Figure 4.1 and how each item interacts is found in the appendix [see Appendices].

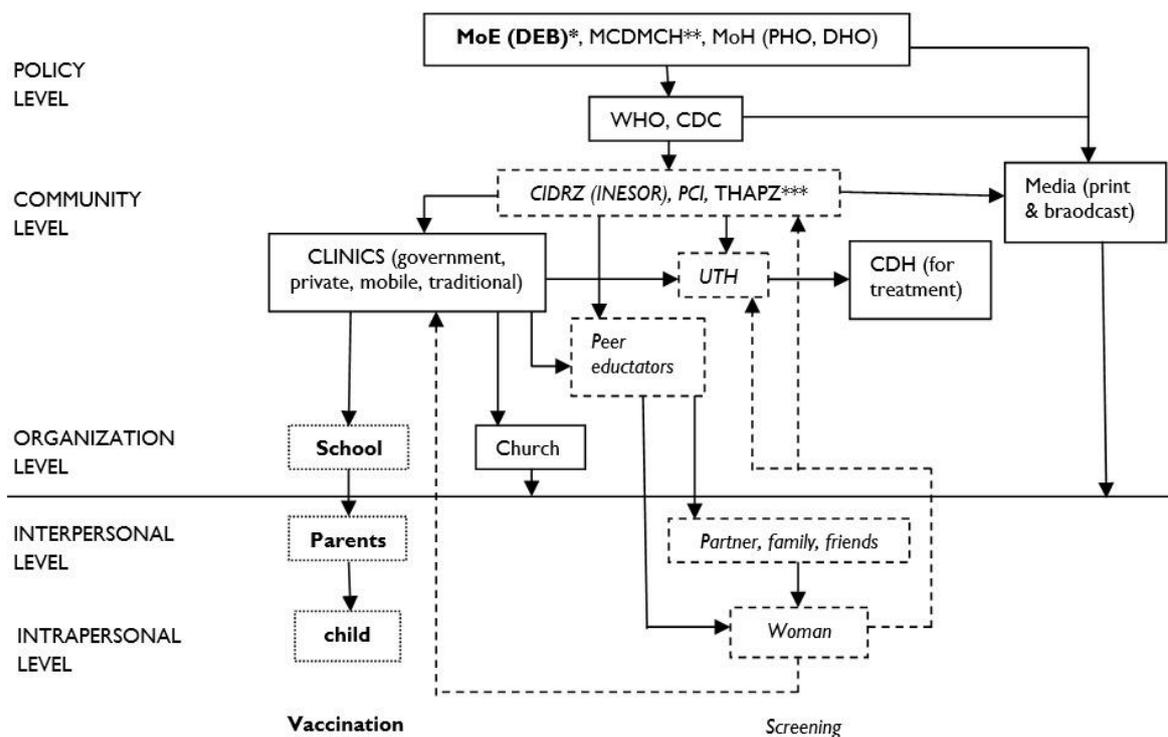


Figure 4.1: Organizational chart outlining the administration of cervical cancer prevention services in Zambia (according to departments visited)

See footnote in Table 4.1 for abbreviations. Regular text facilitated both screening and vaccination; Bold text-dotted box only facilitated vaccination; Italic text-dashed box only facilitated screening.

*Ministry of Education (MoE) were key partners in vaccination only.

** MCDMCH has currently been changed to the Ministry of Community Development and Social Welfare and the departments of maternal and child health are back under the MoH.

***THPAZ does not provide screening or vaccination services but traditional health practitioners might refer possible cervical cancer cases to health care providers.

4.4.2 Cervical Cancer in General

Importance of Cervical Cancer

According to policy makers and special interest groups, cervical cancer is an important health issue in Zambia as evident from statistics. Special interest person 1 said, “[Looking at] the number of people with HIV since the two diseases go together, [cervical cancer] is a big problem. [It is] not as common as malaria but the outcome is normally death.” Similarly, some stakeholders said there are other health problems of equal importance to cervical cancer as illustrated by quote 1 in box 1 in the appendix [see Appendices]. For health care providers, this view depended on their department: “I think cervical cancer is not given enough attention [considering] on average about 5 cases of cervical cancer [are detected] everyday by biopsy. When you are away from [cervical cancer] you don’t see it.” (Health care provider 1)

Worksite Policy

Policymakers reported that there is no policy concerning cervical cancer prevention only a strategic plan which was being finalized. Only teachers and health care providers at clinics said there is a policy for the provision of the vaccine. Clinics were actively involved in both screening and vaccination compared to hospitals that were more involved in screening.

Workforce

Apart from a few health care providers who said that the number of staff in their department is enough for vaccination provision, the majority of the respondents (policymakers, special interest groups and stakeholders) said that the workforce for provision of screening and vaccination services was limited and overworked (quote 2 & 3 box 1, appendices). Policy makers further reported that lack of finances makes it difficult to employ more nurses. They suggested that having a way of informing the community when nurses work outside the clinic (e.g. in schools, training programs) might improve the management system. Traditional healers suggested that collaborations are needed since

they cannot provide blood transfusions, drip, oxygen or operations and equally doctors cannot provide exorcisms, treat demons and ghosts (quote 4, box 1, appendices).

Information Sources

Policy makers stipulated that they inform the public on cervical cancer through the media, meetings at schools for vaccine awareness, the mHealth project which will use SMS text messages and through existing community structures (traditional marriage counselors) (quote 5, box 1, appendices). Special interest groups further included running community outreach programs, social media sites (Facebook), using brochures and brand ambassadors. Churches reported having health talks, health departments and encouraging members seek health care (quote 6, box 1, appendices). Whether health care providers provided information on cervical cancer depended on their department or their patient's signs (quote 7, box 1, appendices). Teachers had meetings with health care providers and were given materials (handbooks, posters) for talking to pupils and parents though some had a different experience (quote 8, box 1, appendices). "The girls were not given leaflets about the HPV vaccine. [The nurses] only left a poster to stick in the class and we wrote memos to the parents about the vaccine," said teacher 1.

The respondents (policy makers, special interest groups, stakeholders) believe that the general public gains information by word-of-mouth (quote 9, box 1, appendices). Policy makers also mentioned informal meetings (kitchen parties, church gatherings) and social media, while stakeholders mentioned peer educators, media, brochures, posters, workshops and public announcements (in churches, schools, markets).

Effectiveness of Sensitization

Special interest groups and stakeholders agreed that more was needed for sensitization (quote 10, 11, & 12, box 1, appendices):

The media is not doing enough. People should go into the community and sensitize the country. People don't (. . .) screen unless they have symptoms. In fact, even among nurses (. . .) there is not enough sensitization. [Nurses] don't know the cost of screening, (. . .) if it's free or if doctors recommend [it]. (Health care provider 1)

Respondents from special interest groups suggested that brochures should be printed in local languages and not only English to maximize coverage. The media (television, radio) was generally considered effective. The media reported having health related programs and some networks also had a health desk devoted to covering health related

topics. They requested that health experts should have a more permanent partnership with the media by making themselves available when needed, assisting in program sponsorship and building capacity in health care reporters. Stakeholders recommended sensitizing the community by having workshops, hospital consultations and using public figures (quote 13, box 1, appendices). Health care provider 2 said, “The former first lady [used to be] on television all the time talking about cervical cancer and we had an overwhelming response. The [patients] who were coming told us that [they] heard about it from the first lady.”

Policy makers thought that Zambians living in urban areas like Lusaka are more informed about cervical cancer than those in rural areas. They suggested that providing excellent services at clinics might improve practice.

Knowledge

During discussions with the public, special interest groups reported talking about symptoms (bleeding), causes (HPV, traditional practices including douching and intravaginal insertion of herbs in particular tobacco), prevention (male circumcision, washing of foreskin, condoms, behavior change, screening, monogamy), and treatment (temporal break from sexual activity, clinical treatment, herbal remedies for early stages) (quote 14, box 1, appendices). Traditional healers included more causes of cervical cancer as mentioned by special interest person 2, “causes I mention[ed are] witchcraft, (. . .) unhygienic conditions, (. . .) bad sexual habits, bad methods of sex, and sometimes drugs. Herbal drugs which a woman inserts [in her vagina] that cause friction during [intercourse] and bruises the cervix.” Some churches had unique views on cervical cancer causes (diet i.e. meat eating, spiritual attack, allowed by God), prevention (by having the spirit of God, faith) and treatment (by faith, prayers, divine healing, trusting the will of God, casting out spirits of sickness, using anointed items).

Social Support

Special interest groups reported that men were interested in cervical cancer prevention and offering support to women (quote 15, box 1, appendices). Health care providers had a contrary view (quote 16, box 1, appendices):

There are [a] few [women] that are supported by [their] husband. The few that I have seen are those that have post-coital bleeding. The husband gets concerned and escorts his wife to find out why she is bleeding after sex all of a sudden. Otherwise most women walk in by themselves. (Health care provider 2)

“Most men are uncircumcised and the uncircumcised carry the virus. Men should be involved but not everyone is willing to be circumcised though most are doing so now,” said health care provider 3.

4.4.3 Screening

Screening Age Recommendation

Unlike health care providers, the stakeholders at churches and schools had no involvement in the screening program. Policy makers specified that screening age will be from 25 to 59 years old. This is based on the natural history of the disease, country level data over the past few years and HIV/AIDS prevalence:

HIV infected [women] should start screening as soon as they become sexually active. [There is] no age range or screening interval [for them]. For HIV unknown or negative screening starts at 25. Previously we used to say, ‘As long as you are sexually active.’ (Policy maker 1)

In spite of these guidelines, special interest groups and health care providers were not fully aware on the screening age recommendations. Some health care providers specified that screening should be started from puberty (10, 12 or 15 years old) because of the difficulty of certifying virginity or from reproductive ages. Most respondents from special interest groups and health care providers said screening should be conducted as long as a woman was sexually active or from age 25 to 55 and above (quote 17 & 18, box 2, appendices). Special interest group respondents further said that screening should be done every year regardless of HIV status, though it used to be every 2 or 3 years for HIV negative women.

Screening Uptake and Barriers

Policy makers stated that screening coverage in Lusaka was low and fear of dying drives screening uptake. The respondents (policy makers, special interest groups and stakeholders) generally agreed that screening uptake was facilitated by having awareness and knowledge. Policy makers and health care providers also said that knowing someone who had cervical cancer and partners support increases uptake of screening. Special interest groups and health care providers said women usually come for screening if they were curious about their health and if they have symptoms:

Zambians don’t go for health care if nothing hurts. (. . .) So people who have themselves checked are usually those who feel pain or something. [Then] because of

sensitization and people learning about the cancer they can't feel, they [decide] to get checked. That was the case for me. I was like, 'Oh my gosh! You can have it and not feel it? Let me go check it.' (Special interest person 3)

Apart from having limited screening facilities/programs (quote 19, box 2, appendices), lack of awareness, lack of knowledge and fear (of dying, pain, unknown, stigma, a positive result) was sighted by most respondents (policy makers, special interest groups and stakeholders) as barriers to uptake of screening. Policy makers further said that partner's influence in decision making (e.g. husband might refuse to abstain during treatment) as a barrier (quote 20, box 2, appendices). Special interest groups and health care providers also added lack of symptoms and beliefs (cultural, religious, misconceptions) as barriers. Respondents from special interest groups further mentioned feeling shy of male doctors, procrastination and refusal to return for call-back as reasons of low uptake (quote 21, box 2, appendices).

Self-Sampled Screening

According to policy makers and a few special interest groups, low resource HPV deoxyribonucleic acid (DNA) testing and self-sampling kits are being considered for introduction if they pass future feasibility trials. However, most respondents from special interest groups and health care providers had never heard about self-sampled screening and their views were varied. Their main concern was the ease of use (quote 22 & 23, box 2, appendices).

4.4.4 Vaccination

Unlike policy makers, District Health Office respondents, WHO respondents, health care providers at clinics and most teachers, respondents from other target sectors stated that they did not have any involvement in the pilot of the HPV vaccine and therefore did not have much information. Furthermore, vaccination for cervical cancer is beyond the scope of traditional healers although there are traditional ways of vaccination against measles and other diseases using herbs, tattoos, steaming, and/or talismans. All churches interviewed agreed that vaccination must be encouraged.

Vaccine Administration

Policy makers reported learning several lessons in administration, vaccine handling and cost cutting by running the two vaccination demonstrations (quote 24, box 3, appendices).

They found that public schools were more likely to participate than private schools (quote 25, box 3, appendices), and stakeholders noticed that not all schools participated in the vaccination program (quote 26 & 27, box 3, appendices). Policy makers further noted that school based vaccination had a higher coverage and cost compared to facility based with the biggest challenge being accessing out of school girls:

Health seeking behavior in Zambia is not the best. [A woman] will not go to the clinic unless she is sick. (. . .) So expecting healthy people to voluntarily come for vaccination is difficult. [Furthermore], people are [protective of] their children and won't voluntarily bring them. So we said it's better we follow them. (Policy maker 2)

Vaccination Age Recommendation

Respondents from special interest groups and stakeholders were aware that the vaccine was administered to grade 4 girls and out of school girls age 10. Nevertheless, some schools were strict on vaccinating only 9 or 10 year old grade 4 girls (quote 28, box 3, appendices). Health care providers at the hospital who gave their opinion on age had mixed views, ranging from only vaccinating virgins to giving adults the option (quote 29, box 3, appendices): "It is better to be administered as a choice at adult ages," said health care provider 1.

Vaccination Uptake and Barriers

It was reported by policy makers and stakeholders that uptake of the vaccine was due to having awareness, knowledge, fear of having or dying from cancer and knowing someone who had cancer. Policy makers also mentioned that well travelled people were more likely to request the vaccine. Stakeholders noticed that people who saw others practice vaccination without experiencing side effects made them want to have the vaccine (quote 30 & 31, box 3, appendices). Policy makers believe that uptake of the vaccine will increase over time when people start seeking the vaccine themselves because of seeing the benefits.

Policy makers said sensitization on vaccination was effective but there was poor social mobilization because of low funds which lead to misunderstandings (age limit, side effects). Policy makers and stakeholders agreed that lack of awareness and knowledge was a barrier to vaccination uptake. Special interest groups and stakeholders further added fear of side effects (myth of infertility). Policy makers and stakeholders also said that religious beliefs (quote 32 & 33, box 3, appendices) and policy restrictions (on age, gender) reduced

uptake (quote 34, note 3, appendices): “Even parents with children in older grades wanted the vaccine. Others were even tried to reduce their [age] to 10 years old. They were very much willing.” (Teacher 2)

Vaccination Coverage

According to policy makers, vaccination coverage was higher in Zambia compared to other countries. Special interest groups commended the work of the MoH in sensitization that resulted to a relatively good vaccination uptake. Therefore, there are plans to do a national rollout as reported by policy maker 2, “When we do a national rollout because of the lessons that were learnt and scien[tific evidence]. We will not be using the 3 dose [vaccine. This] (. . .) will reduce cost. We will be doing the 2 dose [vaccine].” Limited resources make it difficult to remove restrictions on age range as well as gender even though special interest groups and some stakeholders supported the vaccination of boys (quote 35, 36 & 37, box 3, appendices). Teachers in particular disapproved the vaccination of boys because of nurses’ instruction (quote 38, box 3, appendices), “[Parents] were encouraged to take boys for circumcision [and] most of them did it during the holiday that year. [Some boys] came to report that they had been circumcised. I gave them books and other materials for motivation,” said teacher 2.

4.5 Discussion

Based on the results, the main factors influencing cervical cancer prevention practices in Zambia include policy, availability or lack of facilities and services, information sources and knowledge, as indicated by the SEM and TTI in Table 4.1. Knowledge is affected by religious beliefs that may not support some medical practices, cultural practices like intravaginal insertion of tobacco, and stigma expressed as fear e.g. cancer means death. Other factors that were found were social interactions which are at the interpersonal levels of the SEM and TTI (McLeroy, et al., 1998; Flay, et al, 2009; Nyambe, et al, 2016).

Policy

The more involved a person was in cervical cancer and its prevention, the more likely they believe that cervical cancer is a main health concern in Lusaka. However, during the time of the research, there was no policy governing cervical cancer prevention and the MoH was finalizing the strategic plan for improving Zambian health care. The lack of a

functional strategic plan or policy has affected service provision and limited the information that is available to stakeholders. For instance, there were obvious inconsistencies in screening age recommendations. However, the vaccine was administered in an elaborate pilot program and most respondents generally accepted that vaccination was limited to grade 4 and 10-year-old girls as policy (MCDMCH, n.d.). It should be noted that some respondents had interest in vaccinating other ages and this could increase coverage. The effectiveness of vaccine program in comparison to the inconsistencies of administration of screening services, supports the evidence that organized health programs facilitate cervical prevention services (Gu, Chan, Chow, et al, 2018).

Facilities and Services

Most respondents stated that there was also a lack of adequate facilities and workforce for provision cervical cancer services. The vaccine, was at the time of this research administered as a pilot and some eligible schools did not participate in the vaccination program possibly because of poor registration of schools. Perhaps more efforts should be put into involving volunteers (youth from the community), using existing structures (traditional marriage counselors) and introducing other methods that might reduce the interval of screening (low cost HPV DNA test) or the need for personnel (self-screening kits). The introduction of self-sampled screening is being considered by the government and some NGOs, but there is need for sensitization because of lack of awareness. It is suggested to use provider directed self-sampled screening along with VIA, to supplement the existing equipment, solve problems of literacy, reduce fears of pain and give providers contact with women who might have other health problems.

Information Sources and Knowledge

Although it was reported that the public is sensitized on cervical cancer, some nurses, teachers and church leaders do not even practice prevention or know where services are provided. Lack of awareness, fear and misconceptions greatly limited uptake of prevention practices as identified by previous studies (Chirwa, et al., 2010, Liu, Vwalika, Hacker et al., 2012; Milimo, Daka, Sikuyuba et al., 2015). This has probably reason it was reported women seek screening services in late stages of cervical cancer development when symptoms are present. It was also reported that parents were hesitant to vaccinate their daughters because of fear of future sterility and religious beliefs. Clearly, there is a need for more information sharing among stakeholders who have contact with the public to

ensure that incorrect facts, religious and cultural beliefs that might increase the risk of cervical cancer are not encouraged.

Social Interactions

As evident from the results, very few men support their partners during cervical treatments. It is recommended to include men in cervical cancer campaigns because they affect decision making and influence the behavior of women (Cunningham, Skrastins, Fitzpatrick, et al., 2015; Gu, et al, 2018). Furthermore, since vaccination of boys will not be considered at a national level, more emphasis should be given to circumcising boys. Then at an appropriate age, boys should be made aware of cervical cancer, taught condom use and remaining faithful to their partners when in relationships.

Limitations and outlook

The limitations include location of the study which was limited to Lusaka which is not representative of the whole of Zambia. The views of the churches, schools and clinics might have been different if selected from other areas within Lusaka. Sampling bias could have occurred by using judgmental and volunteer sampling methods. Some of the targeted participants were not willing or available to participate. Regardless of this, these were suitable sampling methods as they allowed easy access to respondents who were interested in contributing their views in a short period of time. The triangulation of data also helped to increase confidence in the data collected. Once the strategic plan is functional, a follow-up study is recommended to see if views and practices have changed.

4.6 Conclusions

The Zambian cervical cancer prevention system has targeted several areas and multiple sectors of society to reduce cervical cancer cases. The SEM and TTI were effective in selection of study groups and determining factors that influence health seeking behavior. The effectiveness of these models is evident in the illustration of the organizational chart of cervical cancer prevention services in Zambia, that can be arranged according to these frameworks most especially the SEM. However, the application of these models in this study was limited because social interactions which were identified during interviews when respondents mentioned their interactions with women and men were not targeted. Furthermore, certain study groups were not able to comment on screening and/or

vaccination because they were not actively involved in service provision. This was most especially noticed on the topic of self-screening, where lack of information made it difficult for respondents to give their opinion on cost and acceptability.

The research question was what is the impact of the sociocultural and political environment on facilitating and hindering the practice of cervical screening and vaccination in Zambia? The sociocultural and political environments form the basis of the cervical cancer prevention program and they play an integral role in facilitating and supporting women in the uptake of screening. They make it possible for parents to allow their daughters to be vaccinated against HPV. However, this is limited by having insufficient staff, facilities and the lack of policy. The general low health seeking behavior among Zambians is a hindrance to cervical cancer prevention. In spite of all sectors agreeing that cervical cancer is an important health issue, being a silent infection makes it difficult to fight.

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CHAPTER 5: USING FILM TO DISSEMINATE INFORMATION ON CERVICAL CANCER PREVENTION IN LUSAKA: RESULTS FROM A SMALL INTERVENTION STUDY

Anayawa Nyambe, Jarl K. Kampen, Stridutt K. Baboo, Guido Van Hal

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5.1 Abstract

In order to prevent the spread of cervical cancer people must be aware and knowledgeable about the available preventive practices such as screening and vaccination. The purpose of this study was to determine the extent that film is effective in disseminating information on cervical cancer and its prevention to women and men in Lusaka. A pilot intervention study was carried out at churches in Lusaka city from August to September 2017. A sample size of 38 women and 43 men filled in both baseline and follow-up questionnaires. A knowledge grade (range: 1 – 10 points) which linked causes to risk factors for cervical cancer was used to assess the knowledge of a respondent. Significant results ($p < 0.01$) were obtained at follow-up for watching the film and having awareness and knowledge. The main finding is that a short informational film can be an effective means of disseminating information on cervical cancer and its prevention to women and men.

Keywords: *Cervical Cancer, Intervention, Knowledge, Film, Zambia*

5.2 Introduction

In Zambia, cervical cancer remains the most common cancer among women (Stop Cervical Cancer in Africa [SCCA], 2012). Approximately 35% of all cancers managed at the Cancer Disease Hospital are cervical cancers (Ministry of Health, 2016). Screening and vaccination serve as the main secondary and primary preventive measures against cervical cancer. In 2006, free cervical screening, primarily via visual inspection with acetic acid, was introduced in Zambia (Centre for Infectious Disease Research in Zambia, 2014). Then, in 2013, the Human papillomavirus (HPV) vaccine Gardasil was piloted, targeting grade 4 schoolgirls and 10-year-old out of school girls (World Health Organization

[WHO], 2015; Ministry of Community Development, Mother and Child Health, n.d.). Furthermore, since cervical cancer is sexually transmitted, male circumcision (SCCA, 2012) and practicing safe sex are also encouraged (WHO, 2014 & 2018; Centers for Disease Control and Prevention [CDC], 2017). Other forms of prevention include behavior change, such as not practicing vaginal douching (Martino, Youngpairoj & Vermund, 2004; Ekpenyong, Daniel & Akpan, 2014), not smoking and limiting oral contraceptive use to reduce promiscuity (WHO, 2014 & 2018; CDC, 2017).

Among the main factors that inhibit the use of cervical cancer prevention methods as identified by the Social Ecological Model (SEM) and the Theory of Triadic Influence (TTI) are lack of awareness and knowledge of cervical cancer and the availability of prevention services (Anonymous, 2016). The general public of Zambia has been sensitized by using peer educators, the media (television, radio) and printed materials (leaflets). However, studies have shown that the levels of awareness and knowledge of cervical cancer among Zambian populations are low (Simaubi & Ngoma, 2013). It has been demonstrated that film may be an effective way of disseminating information on cervical cancer. An intervention study in Nigeria found that the level of awareness of cervical cancer and screening increased to 100%, and the proportion of women with very good knowledge rose from 2% to 70.5%, following structured health education based on a movie (Abiodun, Olu-Abiodun, Sotunsa, et al., 2014). A study conducted in the USA among deaf and hearing women found that knowledge for both groups was improved by watching a graphic cervical cancer education video in American Sign Language with English open captioning and voice overlay (Yao, Merz, Nakaji, et al., 2012). Another study in the USA found that knowledge increased when watching a narrative and non-narrative film containing cervical cancer facts (Murphy, Frank, Chatterjee, et al., 2015). From these studies, the following can be suggested:

- (a) Watching a short film on cervical cancer will increase awareness of cervical cancer,
- (b) Watching a short film on cervical cancer can increase knowledge about risk factors and the prevention of cervical cancer.

Our study aims to determine the extent to which film is effective in disseminating information on cervical cancer and its prevention to women and men who reside in Lusaka City. It will contribute to improving future health promotion campaigns by providing evidence that showing a short film containing important information on cervical cancer prevention from different sources is an effective means of sensitizing the general public.

5.3 Method

5.3.1 Study design, site and population

A pilot intervention study was carried out from August to September 2017. The respondents included women and men from the general public. According to the last national census, in 2010, 75.3% and 20.2% of Zambians above the age of 15 are Protestants and Catholics, respectively (Central Statistical Office [CSO], 2012), making Christians a key target group. The study participants were randomly assigned to one of two groups: the experimental group receiving the intervention (i.e., watching a short six minute film on cervical cancer and its prevention) and a comparison group (controls) that did not watch the film. These groups were followed prospectively to assess the effectiveness of the intervention, comparing those who received the intervention with those who did not.

To allow for easy recruiting, the study took place at churches located in suburban (one catholic and three protestant) and compound (one catholic and one protestant) neighborhoods of Lusaka City. The suburbs are considered to have a higher standard of living than compounds. These six churches were chosen based on size, accessibility and Christian denomination to ensure variety of views. Inclusion criteria for respondents to participate in this research were that they must be either female or male adults, aged 18 years and above, and attending one of the selected churches. Women with cervical cancer or respondents with relatives with cervical cancer were not specifically targeted in this study. This resulted in a sample size of 52 women and 49 men at baseline, when 51 of them received the intervention. At follow-up, 38 women and 43 men returned to fill in follow-up questionnaires. As a pilot study, this small sample size number was chosen in order to assess feasibility and detect effect size. The identities of the respondents and the information they provided were treated as confidential. Approval for conducting this study was obtained from Eres Converge (Lusaka, Zambia).

5.3.2 Instruments and measures

Baseline surveys and follow-up questionnaires were used to collect data from the study participants with indicators of behavior at intrapersonal, interpersonal and environmental levels as suggested by the SEM and TTI. The baseline survey was used to assess the initial level of knowledge of participants before participation in the intervention and consisted of 11 questions. The follow-up questionnaires were an extended version of the baseline survey. They were divided into a 6 question demographics section (2

intrapersonal items, 1 interpersonal item and 3 environmental items) and a cervical cancer section with 17 questions for women (13 intrapersonal and 4 environmental items) and 16 questions for men (10 intrapersonal items, 2 interpersonal items and 4 environmental items). The cervical screening questions focused on women's screening practice and men's support of a partner; while vaccination questions were directed towards views on vaccinating children and not themselves. The complete baseline and follow-up questionnaires are found in the appendix [see Appendices].

The questions were primarily closed questions with a few open questions where respondents were required to briefly explain their answer. The instruments were self-administered and designed based on the indicators of health behavior as suggested by the TTI and SEM. Each question was either adapted from other studies or developed by the authors of this research. The indicators of behavior at intrapersonal level under consideration in this article included age, education level (Nevitte, 2008), awareness of cervical cancer, as well as knowing the risk factors/causes and preventive factors of cervical cancer. At interpersonal level only living status was assessed (Klein Velderman, Dusseldorp, van Nieuwenhuijzen et al., 2015). Lastly, environmental level items included employment, money use (Nevitte, 2008) and religion (Nevitte, 2008).

5.3.3 Operationalization of knowledge of cervical cancer

Knowledge was only assessed if a respondent said that they had awareness of cervical cancer and was operationalized by being given a knowledge grade. The knowledge grade (range: 1 – 10 points) linked risk factors/causes to protective factors of cervical cancer. The risk factors (HPV infection, practicing unsafe sex, becoming sexually active at a young age, having a STI, having many sexual partners, smoking, using contraceptives, vaginal douching) and protective factors (attending regular screening, HPV vaccination, practicing safe sex, being circumcised, not becoming sexually active at a young age, being faithful to one sexual partner, not smoking, not taking contraceptives, no vaginal douching) were identified on the basis of the scientific literature as seen in the introduction.

The knowledge grade was set up in such a way that respondents were awarded points when they correctly identified risk and protective factors and penalized for erroneously assigned risk or protective factors. The fundamental cause (HPV infection) and protective factors (screening, vaccination and practicing safe sex) were given a higher reward or penalty of three points. The remaining risk and protective factors were rewarded or penalized by one point. Only the items of becoming pregnant at a young age, being old,

and heredity are neither a (real) protective nor a (real) risk factor for cervical cancer and given a negative point if selected. The knowledge grade was computed as the sum of all 'knowledge grades', and then adjusted by adding the lowest possible total grade (28), dividing the result by the maximal grade (56), and finally multiplying by 10, so that the knowledge grade ranged between 0 (lowest) and 10 (highest). The knowledge grade formula is available in the appendix [see Appendices]. Respondents who did not know about cervical cancer were not asked questions about risk and protective factors and excluded from analyses concerning the knowledge grade.

5.3.4 Development of the film

The film for the intervention was created by combining sections of YouTube health promotion video clips on cervical cancer in Zambia with subtext or added captions (333JOMC, 2013; Media365Zambia, 2016; Kapekele, 2014). Efforts were made to get permission from the owners of the YouTube video clips, but they did not respond. The film was therefore made exclusively for the research without distribution, even though the YouTube clips are available online for public viewing. Information on risk and prevention factors that were lacking from the YouTube clips was added to the film. This additional text information on risk factors and protective factors came from the cervical cancer leaflet developed by the Cervical Cancer Prevention Program in Zambia (CCPPZ) (CCPPZ, n.d.). The film was in English, which is the official language of Zambia (CSO, 2012).

The six minute film was divided into six topics. The first topic explained what cervical cancer is, in the form of a narrative with subtext given by a Zambian medical doctor (Media365Zambia, 2016). The next topic was cervical cancer in Zambia, which was narrated with subtext by specialists (333JOMC, 2013). This topic was followed by risk factors which were written as text only from the CCPPZ leaflet (CCPPZ, n.d.). The section on symptoms was narrated by a specialist, with added captions (Kapekele, 2014). The topic on cervical cancer prevention was text only, from the CCPPZ leaflet (CCPPZ, n.d.). At the end, there was a true life story narrated with subtext by a Zambian lady whose mother had passed away from the cancer (Media365Zambia, 2016). A projector was used to air the film from a laptop. The intervention groups only watched the film once.

5.3.5 Sampling design

Permission was obtained from churches and meeting dates were arranged. Respondents volunteered to be part of the study. As an ethics requirement, on the first day

all respondents were informed about the research, which would require filling in a baseline survey and after approximately three weeks a follow-up questionnaire. Half of the respondents were randomly selected to watch the film by picking every second person according to gender. The intervention groups stayed behind and watched the film after the control group had left. The baseline survey and the follow-up questionnaires were self-administered, and data collectors provided assistance if necessary without giving information which might influence the awareness or knowledge.

5.3.6 Data analysis

The quantitative data collected from the baseline survey and follow-up questionnaire was entered into excel for ease of entry. The open ended questions were grouped into themes and coded to simplify analysis. The data was then transferred to Statistical Package for the Social Sciences (SPSS) software for windows, where it was cleaned for any errors in entry, and statistical analysis was carried out. Descriptive statistics were used to characterize the data. Chi square and independent t-tests were run to test the composition of the control and experimental groups as to eliminate any possible confounding variables. The variables for knowledge of cervical cancer risk factors/causes and protective factors were assessed as a combined knowledge grade. To do this, the dependent variables of cervical cancer awareness and knowledge (risk factors, prevention factors) in relation to participating in the intervention were analyzed, using independent and paired t-tests to see the relationships between and within groups. The statistical significance level was set at 1%.

5.4 Results

5.4.1 Socio-demographics and cervical cancer practices

Socio-demographic characteristics (age, education level, employment, income, religion, and living status) were collected during the follow-up questionnaires. A total of 20 respondents (women N = 14, men N = 6) did not return for follow-up. Only 40.0% (N = 8) of them watched the intervention film. No significant differences were found between the respondents who dropped out of the study and those who participated at both baseline and follow-up.

The ages of the respondents who participated at both base line and follow- up (women N = 40, men N = 43) were distributed between 20 and 73 years ($M = 37.83$, $SD = 15.68$).

The largest group (N = 22, 26.5%) had attended university education without completion, 19.3% (N = 16) had completed secondary education and 14.5% (N = 12) had obtained a college diploma. Furthermore, 34.9% (N = 29) of respondents were students and 27.7% (N = 23) were full-time employees. Income level was expressed as the availability of income in the past year, where respondents reported either saving money (N = 30, 36.1%), just getting by (N = 25, 30.1%), spending some savings (N = 29, 34.9%) or spending savings and borrowing money (N = 10, 12.0%). Over half of the population identified as Christian Protestants (N = 53, 63.9%) and 30.1% (N = 25) as Catholics. Only 30.0% (N = 12) of women had attended cervical screening. Only a few men (N = 8, 18.6% at baseline; N = 13, 30.2% at follow-up) reported being aware that their partners had undertaken screening. Equally, very few women (N = 8, 20.0%) and men (N = 6, 14.0% at baseline; N = 10, 23.3% at follow-up) reported having their daughters vaccinated. Regarding the intervention, 51.8% (N = 43) of the respondents who participated at both baseline and follow-up watched the film. There were no significant results found between the social demographic characteristics of the control group and the experimental group.

5.4.2 Film and awareness of cervical cancer

Awareness of cervical cancer was assessed by asking, “*Do you know what cervical cancer is?*” and responses were “*yes*”, “*no*” and “*not sure*” for all respondents. In analysis, the responses “*no*” and “*not sure*” were combined for the analysis because of scarcity. The results in Table 5.1 show the relationship between watching the film and having awareness of cervical cancer. At the baseline measurement, the experimental group (watched the film) and the control group (didn’t watch the film) have the same level of awareness (independent sample t statistic is not significant). The experimental group has significantly higher awareness than the controls at second measurement (N = 43, independent sample $t = 3.4$, $p = 0.001$), while awareness for controls has not changed between baseline and follow-up measurement (N = 40, paired sample t statistic is not significant). Watching the film significantly increases awareness (N = 43, paired sample $t = 4.3$, $p < 0.001$).

Table 5.1: Effects of watching the film on having awareness of cervical cancer

		Do you know what cervical cancer is?		Paired sample t-test			
Intervention		Baseline <i>M</i> (SD)	Follow-up <i>M</i> (SD)	<i>t</i>	<i>df</i>	<i>p</i>	95% CI
Watched film (N = 43)		0.65 (0.48)	0.95 (0.21)	-4.3	42	<0.001	[-0.45, -0.16]
Did not watch film (N = 40)		0.68 (0.47)	0.68 (0.47)	0.001	39	1.000	[-0.07, 0.07]
Independent sample t-test	<i>t</i>	-0.2	3.4*				
	<i>df</i>	81	53.3*				
	<i>p</i>	0.821	0.001*				
	95% CI	[-0.23, 0.19]	[0.12, 0.44]				

* Equal variance not assumed

5.4.3 Film and knowledge of risk factors and protective factors

Only respondents who said “yes” and “not sure” for having awareness of cervical cancer were asked questions on knowledge of cervical cancer risk and protective factors. Table 5.2 shows the results of the effect of watching the film on knowledge by way of the knowledge grade that links risk factors to protective factors for cases where measurements were made at both baseline and follow-up.

Table 5.2: Effects of watching the film on knowledge of cervical cancer

		Knowledge		Paired sample t-test			
Intervention		Baseline <i>M</i> (SD)	Follow-up <i>M</i> (SD)	<i>t</i>	<i>df</i>	<i>p</i>	95% CI
Watched film (N = 37)		4.59 (2.16)	6.53 (2.00)	-6.0	36	<0.001	[-2.58, -1.28]
Did not watch film (N = 35)		3.69 (1.95)	3.80 (2.26)	-0.5	34	0.639	[-0.54, 0.34]
Independent sample t-test	<i>t</i>	1.9	5.4				
	<i>df</i>	70	70				
	<i>p</i>	0.068	<0.001				
	95% CI	[-0.07, 1.87]	[1.72, 3.73]				

5.5 Discussion

The data provide strong evidence in favor of Hypothesis (a), that watching a short film on cervical cancer will increase the awareness of cervical cancer. As seen from the differences of levels of awareness between baseline and follow-up measurement in the experimental group (Table 5.1), awareness of participants increased after watching the film. A similar increase is not observed in the control group who had comparable levels of awareness at the start of the experiment.

Hypothesis (b), stating that watching a short film on cervical cancer can increase knowledge on the risk factors and protective factors was also found to be true in our experiment. As seen in Table 5.2, respondents who did not know about cervical cancer learned new information, and those who already knew something increased their level of overall knowledge. These findings support previous literature (Yao, et al., 2012; Murphy, et al., 2015; Abiodun, et al., 2014). Nevertheless, it is suggested that a future study should be conducted that specifically assesses the relationship between watching an informational film and the practice of screening and vaccination. The increase in the number of correctly identified factors may have been affected by the format and amount of data available in the film. Risk factors and protective factors were placed as text that was read by respondents, while other information (definition, symptoms, and life experience) were narrated. Although data collectors were available to assist respondents when needed, a modified film would be necessary to effectively reach those who may be illiterate or more comfortable using one of the seven main local languages other than English.

5.6 Conclusion

Our small intervention study supports the overall conclusion that a short informational film is an effective means of disseminating information on cervical cancer and its prevention to women and men. The main limitations of the study are due to sampling and location. The low rate of volunteering could have been improved by increasing the research time span and perhaps providing participant remuneration. Participants were recruited from churches in Lusaka, but this is not representative of all Zambians. A future wide scale study targeting churches, schools and other places is recommended to assess knowledge and actual practice of cervical cancer prevention measures. The film should be made in the local language of the target group to avoid any language barriers.

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CHAPTER 6: GENERAL DISCUSSION AND CONCLUSION

6.1 Main Findings

This chapter outlines the main findings according to the research questions (see Chapter 1). This is followed by a general discussion and conclusion of all the results from Chapters 2 to 5 of this doctoral dissertation. The overall purpose of this doctoral dissertation was to identify the optimal cervical cancer prevention procedures that can be practiced in Zambia. With respect to the first question, to what extent are the SEM and TTI different in proposing optimal measures for cervical cancer prevention, it was found that the theoretical constructs, concepts and composition of the SEM and TTI are similar (see Chapter 2). The main difference is in structure and variable interaction. Additionally, the TTI is more specific to its application, compared to the SEM which tends to be more flexible. In selecting the appropriate model for research considerations should be made regarding information depth and availability, target groups and resources.

With respect to the second question, to what extent is the execution of the two respective prevention frameworks (SEM, TTI) feasible in Zambia, both frameworks provided a basis for instrument development, selection of study groups and explaining participant behavior. The structure of the SEM corresponds with the organization of the Zambian cervical cancer prevention system. The TTI which was made to predict substance abuse behavior had some indicators of behavior that were difficult to conceptualize for a cancer prevention study. However, when the TTI is integrated with the SEM it works well in suggesting target areas of improvement. Based on the results obtained in this study, the key target areas were as follows:

- Awareness and knowledge – SEM intrapersonal, TTI environment distal level (see Chapters 3, 4 & 5)
- Living situation –SEM interpersonal, TTI interpersonal ultimate level (see Chapter 3)
- Interpersonal bonding and motivation to comply – TTI interpersonal distal level (see Chapter 3)
- Knowing others who practice prevention – SEM interpersonal, TTI interpersonal distal level (see Chapters 3 & 4)
- Support from partner, family, church – SEM interpersonal, TTI interpersonal proximal level (see Chapters 3 & 4)

- Beliefs (religious) and fears - SEM intrapersonal level, TTI environment distal level (see Chapters 3 & 4)
- Information sources - SEM community level, TTI environment ultimate level (see Chapters 3 & 4)
- Availability or lack of facilities and services - SEM organizational level, TTI environment ultimate level (see Chapter 4)
- Policy – SEM organizational, policy level, TTI environment ultimate level (see Chapter 4)

It was further found that the factors of awareness and knowledge can be improved by watching a short informational film. (see Chapter 5)

6.2 General Discussion

6.2.1 Academic assessment of the SEM and TTI

This research provided evidence that supports the usefulness of multi-level health behavior frameworks (SEM, TTI) in academic research. These frameworks provided an interesting perspective into understanding health related behaviors. In support of the outcomes of Chapter 2, the SEM appears to be more effective for application in screening and vaccination studies compared to the TTI. This was evident when it was applied during the research conducted in Zambia as outlined in Chapters 3, 4 and 5.

The study instruments used for the research in Zambia were developed based on the indicators of behavior as suggested by the SEM and the TTI. It was easier to conceptualize the concepts of the SEM because of its flexibility and use in previous prevention studies. Since the TTI was initially made for studies that predict substance abuse, some of the indicators of behavior were quite difficult to conceptualize. For instance, the indicator “*risk-taking*” at the intrapersonal level ultimate stream of the TTI was conceptualized by asking “*Do you feel that you have the power to make important decisions that change the course of your life (for instance, changing jobs or moving to different city)?*” with responses on a five point Likert Scale from “*totally unable to change life*” to “*totally able to change life*”, where it could be assumed that higher risk takers would be more willing to try self-screening or attend screening and have daughters vaccinated. It is interesting to note that intrapersonal level factors as suggested by the TTI were not found to influence

behavior. These are factors that relate to the personality of a person such as risk-taking, self-determination and self-efficacy. Perhaps these are factors that are more suited in predicting future substance abuse rather than the practice of prevention. Nevertheless, other factors of the TTI were found to influence screening and vaccination behavior such as interpersonal bonding and motivation to comply. Furthermore, the full extent of the TTI was not utilized in this research because a follow-up assessment of the study population was not conducted to see if behavior changes over time. Equally, the intervention study only focused on the awareness and knowledge without emphasizing the actual practice of screening and vaccination.

The ring structure of the SEM and the matrix structure of the TTI are illustrated in Chapter 2 as Figure 2.1 on page 37 and 2.2 on page 39 respectively. It can be seen that the streams of influence of the TTI (intrapersonal, social situation, cultural environmental) correspond with the levels of the SEM (intrapersonal, interpersonal, organizational, community and policy). Furthermore, the TTI can be considered to combine the organizational, community and policy levels of the SEM into a single environmental level. The division of the SEM into these separate levels proved to be beneficial. It was found that the interactions of the target groups of this research were in accordance to the frameworks in particular the SEM that differentiates the organizational, institutional and policy levels. This is well illustrated in Chapter 4, page 108 Figure 4.1 of the organizational chart of the cervical cancer prevention process in Zambia.

The ecological levels of the SEM and TTI provided guidelines for selection of target groups. Factors that influence behavior as listed in this chapter in section 6.1 were found at different ecological levels which also suggest the different target groups to consider for intervention. For instance, social interactions between women and men were found to influence the practice of prevention. Whereas, women were more likely to practice screening and were more willing to vaccinate their daughters in the future if they believed they had support from their partners. Social interactions might have not been assessed if this study used a model that only focused on intrapersonal factors. This would have resulted in neglecting the role that men play in encouraging their partners to practice prevention.

The position of the variables within the ecological levels differs between the SEM and TTI. For instance, it was found that awareness and knowledge were factors that influence behavior. Such that when a respondent said they were aware of cervical cancer they were more likely to practice prevention and support their partners. The SEM places knowledge

at the intrapersonal level and therefore considers these as an intrinsic primary factor that must be improved first. The TTI considers knowledge to be an environmental factor maybe based on the fact that knowledge is obtained from others. This difference in organization of the variables in the frameworks perhaps depends on the overall social situation of the community being studied and the discretion of the researcher to decide whether a variable is better situated at intrapersonal level or at another ecological level. Reverse causality may also be assumed regarding certain variables like knowledge whereas the practice of screening and vaccination may have occurred because of an outreach program that resulted into an increase levels of knowledge. Nevertheless, knowledge is a factor that affects behavior regardless of ecological level position.

The TTI further divides variables into levels of causation as ultimate, distal, and proximal within the ecological levels. This did not really affect the results of this study but provided an interesting perspective in understanding the level of control people have over their situation. For instance, knowledge is at the distal level of causation meaning that people have some control but not complete control over what they know. This is logical, in that people must be informed perhaps through outreach programs or the media. However, the position of some variables into levels of causation may be debatable e.g. views regarding age, cost and vaccination of boys as well as practice of self-screening were placed at the proximal level. Proximal level factors are factors that are under the direct control of an individual. It may be argued that these are factors that are not really under the direct control of the general public as suggested. Even though, most respondents showed interest in self-screening and vaccination of boys, policy makers dictate whether these things will be made available to the public. The respondents seemed aware of this fact e.g. teachers who were adamant on vaccinating only grade 4 girls aged 9 and 10 because of what they were told by nurses who obtained information from the government.

Even though multi-level health behavior frameworks are often thought to be complex and difficult to implement, utilizing these frameworks provided a comprehensive understanding of the health care system. The results of this study have shown that they can produce adequate results even when applied in low cost cross-sectional studies. Such that the results produced from using these models prompted the development of an intervention study on knowledge.

6.2.2 Development of a successful cervical cancer prevention strategy

Execution of the multi-level ecological frameworks (SEM and TTI) was successful in identifying areas that can be targeted to improve the Zambian Cervical Cancer Prevention Program from intrapersonal to environmental/policy levels. Since there is no policy governing cervical cancer and its prevention, these factors can be used to enhance the existing strategic plan.

In general, the study population had low levels of awareness and knowledge of cervical cancer even though awareness was found to increase the practice of prevention. This result was corroborated by policy makers, special interest groups (advocacy groups, Non-government Organizations) and stakeholders (health care providers, teachers, and pastors) who mentioned that the uptake of screening and vaccination was limited due to low levels of awareness and knowledge among the general public. It was also mentioned that beliefs (cultural, religious) and fears (of dying, future sterility of daughters) were also found to influence behavior. For instance, some teachers said that parents refused to vaccinate their daughters because they were afraid that their daughters would not be able to bare children the future. Special interest groups reported that cultural practices like intravaginal insertion of tobacco was a common practice among women in order to tighten their vagina and provide warmth to the body although it could increase their chances of developing cervical cancer. Fears and beliefs can be altered by increasing knowledge. A successful cervical cancer prevention strategy for Zambia should aim to increase levels of awareness and knowledge.

These overall low levels of awareness and knowledge of cervical cancer highlight the need for sensitization. The majority of the few respondents from the general public who knew about cervical cancer said they gained information from health care providers and depending on the residential area being either Kanyama or Chilenje this was followed by television or internet respectively. Policy makers, special interest groups and stakeholders reported that the general public is being informed about cervical cancer by a number of means including peer educators, media (television, radio) etc. To enhance the cervical cancer prevention program, work is needed to ensure that more people are being reached and that the information obtained by the general public is correct. Furthermore, during the intervention study it was found that short informational films on cervical cancer would be beneficial in educating the public. These films do not have to be shown only on television but can also be aired at different places where people may meet (churches, schools).

Sensitization programs should also target other stakeholders especially those in leadership positions and special interest groups (in particular traditional healers, marriage counselors) so that they may be able to provide the correct information to the general public. Unfortunately, during this study it was found that some health care providers were not aware of where cervical cancer services were offered. Furthermore, the guidelines for screening and vaccination administration were not clear to all respondents. For instance, some health care providers thought that screening should be started from puberty when according to policy makers the age range for cervical screening in Zambia is from 25 to 59 years old. This was attributed to the fact that there is no policy and the strategic plan which has a section outlining the cervical cancer prevention strategy was still being finalized during the time of this research. The guidelines for screening (age, frequency) and future vaccination services should be communicated to these groups of people to avoid any confusion.

Social interactions with partners, family and friends were found to influence health related behavior. Whereas practice screening and vaccination was more likely if a respondent knew someone who had practiced these procedures. Furthermore, if a woman practiced screening she was more likely to have had her daughter vaccinated. It was also found that encouragement from husbands greatly influenced the practice of screening and the uptake of vaccination. Unfortunately, health care providers reported that very few men offer support once a woman is found to have cervical cancer. It can therefore, be said that in order to have a successful outreach program both women and men should be targeted. Men should be informed of how they can help prevent the spread of cervical cancer by being faithful to their partners, getting circumcised, using condoms and just offering support.

Another area that needs to be targeted is the availability of services (facilities, service providers). Although the government of Zambia has invested in cheap screening methods (Visual Inspection with Acetic Acid), training nurses to provide screening services and sms technology for consultations, most respondents (policy makers, special interest groups, stakeholders) mentioned that the work force needed was enough to cater to the population. In order to improve the service availability all existing facilities should have screening services. Also, health care providers in charge of these departments should have a way of informing women who come to clinic of their absenteeism. This will ensure that women do not feel discouraged from going to the clinic.

Furthermore, it was found that the general public expressed interest in self-screening after they were informed of the existence of such a service in other countries. Only a few health care providers, and other stakeholders were aware of self-sampled screening and some of them assume that Zambian women would not be able to collect samples themselves because of illiteracy. However, policy makers and some advocacy groups have suggested that they have considered introducing self-screening kits. Perhaps to ease the views of health care providers, the kits should be made available as assisted self-screening kits. Additionally, women who feel able to collect a sample by themselves should be allowed that option. This may also decrease crowding at clinics and allow for more women to be attended to when screening instruments are being cleaned. To further improve services cheaper HPV DNA testing should be considered such that screening intervals would be extended, and it would reduce costs in the long run.

Lastly, it was found that parents were interested in vaccinating sons and daughters. Unfortunately, according to policy makers, the possibility of vaccinating both boys and girls is very unlikely due to costs. There are plans to make the vaccine available nationwide to girls only which would provide herd immunity. Perhaps to reduce costs the cervical cancer vaccine can either be included in the normal immunization schedule or administered through community based vaccine drives. Considering the success of the school-based vaccination program, schools can still be targeted with the possibility of the vaccine being made available at clinics for parents with daughters at schools which refuse to administer the vaccine. It was also found that health care providers at hospitals were not aware of the vaccine and the views of teachers on administration of the vaccine were not consistent. Once policy makers devise a plan for cervical cancer vaccination administration, the guidelines on the administration of the vaccine should be made clear to all stakeholders.

6.3 General Conclusion and Recommendations

The Zambian cervical cancer prevention program has covered a number of areas to control the spread of cervical cancer including screening, piloting of the HPV vaccine, encouraging male circumcision etc. To optimize this program, awareness, knowledge, social support and facilities can be improved. Since film was found to increase awareness and knowledge, sensitization campaigns can capitalize on this means of disseminating information. Interventions must include men because they greatly influence women in the

practice of prevention. Furthermore, with increased knowledge, the introduction of self-screening, cheaper alternatives to HPV DNA testing, and a future national roll-out of the vaccine will be more successful.

This research has identified key considerations for the development of academic research and improvement of the cervical cancer prevention program in Zambia.

Scientifically Oriented Methodological Recommendations

A summary of recommendations based on the experience of conducting research using the multi-level models of the SEM and TTI:

1. Considering the effectiveness of the SEM and TTI in determining factors that affect cervical cancer prevention in Zambia, more research should be conducted involving multi-level frameworks. Intervention studies that assess actual changes in practice of prevention will be very beneficial.
2. It is also recommended to integrate both the SEM and TTI as much as possible considering the guidelines (information depth and availability, target groups and resources) (Chapter 2).
3. The TTI should be modified to be applied in screening and vaccination studies. Intrapersonal factors should be re-evaluated to find out what aspects of a person's personality make them have a health-seeking behavior. Perhaps also repositioning indicators of behavior in the levels of causation (ultimate, distal, proximal) is desirable so that they more closely represent the interactions in a cervical cancer program.
4. During application of the SEM and TTI, the possibility of reverse causality should also be considered. Whether the factors suggested by the models result into screening and vaccination practice or if the initial practice of prevention perhaps by opportunistic contact, outreach of the service, or spontaneous presentation results into having/improving a factor that determines health behavior practice.
5. Diversify the target groups as much as possible to find out which groups could influence behavior. Future research should also target rural areas, to assess any differences in the views of the general public at intrapersonal, interpersonal, and organizational levels.

Policy Recommendations

A summary of recommendations for policy based on the experience gained from conducting this study. The recommendations are listed according to priority.

1. Guidelines for the administration of cervical cancer prevention procedures (screening and vaccination) should be made clear to all stakeholders either through the strategic plan or as a policy. In this way, all key players in cervical cancer prevention can assist the general public effectively.
2. As valuable information sources, leaders in places like schools (teachers) and churches (pastors, elders) should be informed of the basics of cervical cancer and its prevention. It is evident that certain Christian church denominations are believed to reject modern medicine. Communicating with these churches about cervical cancer may change their views and assist in reaching people who may have been reluctant to seek prevention services.
3. More sensitization is required to educate the public of cervical cancer and its prevention. Sensitization should target both women and men since women's decision making is greatly influenced by their husbands. It may be easier to target men by using male peer educators who may be able to raise the interest of men towards a disease that affects women. Showing short films at places where people meet like schools and churches, can also be used to sensitize the public.
4. All existing clinics should have screening services since these services are limited due to insufficient facilities and service providers. Also, health care providers in charge of these departments should have a way of informing the women if they are not available for a certain period of time. Creating a referral system between traditional health care providers and medical doctors is encouraged.
5. Depending on the nature of the self-screening kit, both self-administered and health care provider assisted self-screening may have to be implemented. Health care providers must be educated on self-screening. An intervention study could be conducted to assess the uptake of self-screening among Zambian women, focusing on ease of use.
6. Cancer vaccines can either be included in the normal immunization schedule as a cost effective solution or community-based vaccine drives can be initiated through the Ministry of Health.

There are clearly several factors that affect the practice of positive health behaviors. Once these areas are covered, Zambia will be a lot closer to controlling the spread the cervical cancer.

CHAPTER 7: EXECUTIVE SUMMARY

7.1 Background

Cancer of the cervix is caused by infection with the Human papillomavirus (HPV). This virus is often killed by the immune system but in some people, HPV can cause lesions that can turn cancerous years later. Developments in cervical screening and HPV vaccination have made it possible to prevent cancer of the cervix. Such that in some developed countries the levels of cervical cancer have significantly reduced.

In spite of these developments, Zambia has one of the highest rates of cervical cancer in the world. The high prevalence of cervical cancer in Zambia has been attributed to the high prevalence of HIV positive people (Kalima, Lishimpi, Meza et al., 2015), low levels of awareness, limited facilities (Ministry of Health [MoH], 2016), cultural practices (vaginal douching, intravaginal insertion of herbs) and poor health seeking behavior.

Looking at Zambia, the basic actions that are undertaken in cervical cancer prevention are screening and HPV vaccination. Screening for cervical cancer started in 2006 with the primary form being VIA following a screen and treat system (Centre for Infectious Disease Research in Zambia, 2013). Since Zambia lacks an adequate number of health care workers, centers for cervical cancer screening were created and nurses were trained to conduct screening. During May 2013, Zambia piloted the HPV vaccine Gardasil which was administered using a school-based strategy targeting girls in grade 4 and out of school girls aged 10 years old (African Centre of Excellence for Women's Cancer Control, 2014; World Health Organization [WHO], 2015). The main challenges in the HPV vaccination program were identified as data management, planning and co-ordination, social mobilization, logistics and service delivery (Chimba, 2014). It is also believed that male circumcision and condom use may offer some protection against HPV.

Purpose of the research study

The aim of the research was to identify the optimal cervical cancer prevention procedures that can be practiced in Zambia. With the specific objects being to determine the views of Zambians on screening (self-screening), on vaccination of boys and girls, as well as improve the current cervical cancer prevention program based on the best model between the SEM and TTI and determine whether watching a short film can increase knowledge levels. Even though the government of Zambia has invested in cervical

screening and piloted the HPV vaccine, Zambia has one of the highest rates of cervical cancer in the world. Very few studies have been done in Zambia focussing on cervical cancer prevention behaviours. In order to have an effective prevention program, views of the general public must be considered along with those of their environment.

In this study, cervical cancer prevention in Zambia was assessed using the Social Ecological Model (SEM) and the theory of triadic influence (TTI). These frameworks assisted in selection of target groups and instrument development. The SEM and TTI, are multilevel ecological models that not only assess intrapersonal attributes but also consider the influence of the outer environment on health behaviors. There are many variations of the SEM, this research focusses on the commonly used SEM by McLeroy et al. (1988). It is composed of the intrapersonal level, interpersonal level, organizational level, community level and policy level (Winch, 2012). The TTI by Flay, Snyder and Petraitis, 2009 is organized in a 3 × 3 framework. The independent variables that predict health behavior are characterized in three levels (ultimate, distal and proximal levels) and three streams of influence (intrapersonal, interpersonal and socio-cultural environmental streams) (Snyder & Flay, 2012).

On this basis the following research questions were developed:

- a) To what extent are the SEM and TTI different in proposing optimal measures for cervical cancer prevention?
- b) To what extent is the execution of the two respective prevention frameworks (SEM, TTI) feasible in Zambia?

7.2 Method

To answer the central research questions, the research was divided into a systematic review (see Chapter 2) and a study in Zambia (see Chapters 3, 4, & 5).

7.2.1 The Systematic Review

Criteria for selecting studies for this review

The systematic review protocol was based on guidelines from the Cochrane Reviewer's Handbook (Higgins & Green, 2005), to determine the extent that screening and vaccination as proposed by the SEM and TTI are different. Studies were considered eligible for the review if they involved human participants and followed the SEM or the TTI. The focus was on all diseases or conditions that can be vaccinated and or screened

with priority given to cancer. Substance abuse/risk behavior studies were included if the study illustrated the use of the TTI, regardless of whether there was a primary or secondary prevention intervention. This was due to the fact that very few studies that utilize the TTI address screening and or vaccination. Literature searches for articles published between the years 2000 to 2015 were performed using Medline, Ovid, Proquest, PubMed, University of Antwerp Discovery Service and Web of Science.

Data collection and analysis

Prior to commencing the review, a Data Extraction Form with two sections (inclusion criteria and characteristics of studies) was developed to assist with data extraction. The results of data extraction were input into a MS-Excel computer program. Basic descriptive statistics was utilized to summarize the general characteristics of the studies. This was facilitated with the use of IBM SPSS software.

7.2.2 Study in Zambia

Study Design and Site

A cross-sectional mixed methods study involving both qualitative and quantitative data collection methods was carried out from February to May 2016. It involved triangulation of theories by applying the concepts of the SEM and TTI as well as triangulation of data sources by collecting information from different groups of people. Methods of collection were triangulated by using questionnaires for the general public (men and women) in the quantitative phase, focus group discussions with general public as well as interviews with stakeholders, special interest groups and policy makers in the qualitative phase. The study site was Lusaka City. However, information from the general public and stakeholders at clinics, schools, and churches was collected from respondents in Chilenje and Kanyama in particular. These areas were chosen because of the availability of screening services and difference of standard of living (Chilenje being more developed than Kanyama).

The results of these studies were used to develop a pilot intervention study that was carried out from August to September 2017. The respondents included women and men of the general public that were selected from churches located in suburban (one catholic and three protestant) and compound (one catholic and one protestant) neighborhoods of Lusaka City. The suburbs are considered to have a higher standard of living than compounds. These six churches were chosen based on size, accessibility and Christian denomination to

ensure variety of views. The study participants were randomly assigned to one of two groups: the experimental group receiving the intervention (i.e. watching a short six minute film on cervical cancer and its prevention) and a comparison group (controls) which did not watch the film. These groups were followed prospectively to assess the effectiveness of the intervention compared with the ones that did not receive the intervention.

Quantitative phase (Chapter 3)

Population

Inclusion criteria for respondents from the general public to participate in this research were that they must: i) be a resident of Lusaka City in Chilenje or Kanyama, ii) be at least 18 years old, and iii) have at least one primary/secondary school going child. After considering the variables under study and likely response rate, the sample size was 100 women and 100 men in Chilenje, and 200 women and 200 men in Kanyama.

Questionnaires and Measures

Two separate but similar questionnaires administered by face-to-face interview, were developed for female and male respondents. The questionnaires were designed based on the indicators of health behavior as suggested by the TTI and SEM at the intrapersonal, interpersonal and environmental levels. Knowledge of cervical cancer was only assessed if a respondent said that they had awareness of cervical cancer which is merely stating that one knows about or has heard about cervical cancer. A knowledge score (range: 1 – 10 points) which linked causes to risk factors for cervical cancer was developed to assess the knowledge of a respondent. The causes and protective factors were identified on the basis of the scientific literature.

Sampling Design

To avoid problems with illiteracy and possible language barriers, the questionnaires were administered as an interview by data collectors. Due to inadequate naming of roads and house numbers, sampling was conducted using the random walk technique (Turner, 2003). The data collectors were also equipped with GPS devices from the University of Zambia, School of Mines, which they used to mark every house they collected data from on the map. This ensured that they covered a great area of the townships.

Data Analysis

To summarize and characterize the data, descriptive statistics were reported in frequencies and percentages. Appropriate statistical tests were applied based on study hypotheses. Chi-square tests and Fisher's exact tests were used to report between-group comparisons of categorical variables. Odds ratios (OR) were given for chi-square tests with binominal data. Ordinal variables were expressed using the median. Means and Standard Deviation (SD) with 95% confidence intervals (CI) were used to report normally distributed continuous variables. Between-group comparisons of continuous variables were done using independent samples t-tests. Binominal logistic regression analyses were conducted to find the most important predictors identified in the bivariate analyses of the dependent variables "having practiced screening", "having a vaccinated daughter", "intention to vaccinate a daughter" and "intention to vaccinate son". To see if accessibility of services affects practice, distances between houses and local clinic were calculated using Google Maps (2017). The statistical significance level was set at 1%.

Qualitative phase (Chapter 4)

Population

The criterion required for respondents to participate in this research was that they were located in Lusaka City and be at least 18 years old. Based on the SEM and TTI, the respondents included the general public (women and men), stakeholders (health care providers, teachers, pastors), special interest groups (NGOs, advocacy groups), and policy makers. Media and educational administration offices were included to fill-in gaps on the functioning and organization of the cervical cancer prevention program.

Study Instruments and Development

The authors of this research developed semi-structured interview guides based on the health behavior factors of the SEM and TTI. The topics included general information about the institution (church, school, clinic, NGO, ministry) being interviewed, cervical cancer in general, effectiveness of services provided, school-based vaccination program, information sources, and finally views on cervical screening and vaccination. These topics then formed the basis for three predetermined themes of cervical cancer in general, screening, and vaccination used for analysis.

Sampling Design

A total of 11 focus group discussions were conducted with groups of women and men. The discussions were supposed to be with the respondents who participated in filling-in the questionnaire but very few respondents returned. So the Environmental Health Department of Chilenje and Kanyama clinics assisted in organizing participants.

Judgmental sampling methods were used to select institutions for participation in the research so that information is from knowledgeable individuals. Interviews at clinics and hospitals were conducted by random selection of health care providers in permitted departments once permission was obtained from authorities. At schools, churches, NGOs/advocacy groups, media, and government offices, interviews were conducted with key informants based on referral from the institutional authorities.

Data Analysis

All interview and focus group discussion data was compiled in the computer program NVivo. Focus group discussions and some interviews were voice recorded and transcribed. Interviews that were not voice recorded (N = 35) were because of requests made by respondents. The data was read and coded into three predetermined themes (cervical cancer in general, screening, and vaccination). The transcribed data, written interviews and notes were reviewed by identifying the keywords and phrases under the theme. The key phrases and words that fit together were grouped into emerging categories. These categories were then refined and reduced by grouping similar categories together. Findings were then reported based on these categories. In addition, the reported role that a respondent/department played in the cervical cancer prevention was used to create the organizational chart of the administration of cervical cancer prevention services in Zambia. The results of focus group discussions were like those obtained from the questionnaires during the quantitative phase.

Intervention (Chapter 5)

Population

The respondents included women and men from the general public selected from two Catholic and four Protestant churches in Lusaka City. Inclusion criteria for respondents to participate in this research were that they must be either female or male adults, aged 18 years and above, and attending one of the selected churches. Women with cervical cancer or respondents with relatives with cervical cancer were not specifically targeted in this

study. This resulted in a sample size of 52 women and 49 men at baseline, when 51 of them received the intervention. At follow-up, 38 women and 43 men returned to fill in follow-up questionnaires. As a pilot study, this small sample size number was chosen in order to assess feasibility and detect effect size.

Instruments and measures

Self-administered baseline surveys to assess initial levels of knowledge and follow-up questionnaires were used to collect data from the study participants with indicators of behavior at intrapersonal, interpersonal and environmental levels as suggested by the SEM and TTI.

The six minute film for the intervention was created by combining sections of public domain YouTube health promotion video clips on cervical cancer in Zambia with subtext or added captions (333JOMC, 2013; Media365Zambia, 2016; Kapekele, 2014). Information on risk factors and prevention from the cervical cancer leaflet developed by the Cervical Cancer Prevention Program in Zambia (CCPPZ) (CCPPZ, n.d.) was added in the film.

Knowledge was only assessed if a respondent said that they had awareness of cervical cancer. It was operationalized by being given a knowledge grade (range: 1 – 10 points) for linking risk factors/causes to protective factors of cervical cancer. The risk factors (HPV infection, practicing unsafe sex, becoming sexually active at a young age, having a STI, having many sexual partners, smoking, using contraceptives, vaginal douching) and protective factors (attending regular screening, HPV vaccination, practicing safe sex, being circumcised, not becoming sexually active at a young age, being faithful to one sexual partner, not smoking, limiting contraceptive use, no vaginal douching) were identified on the basis of the scientific literature (Centers for Disease Control and Prevention, 2017; Ekpenyong, Daniel & Akpan, 2014; Martino, Youngpairoj & Vermund, 2004; WHO, 2014 & 2018).

Sampling design

Permission was obtained from churches and meeting dates were arranged. Convenience sampling was performed by allowing possible study participants to choose to be part of the study. On the first day of meeting, all respondents were informed of the nature of the research as required by ethics. The respondents filled in the baseline survey and then half of them were randomly selected to watch a film by picking every second

person according to gender. The respondents were also informed about a second meeting taking place about three weeks later at the church where they fill in the follow-up questionnaire. The meetings lasted approximately 30 minutes for groups which were conversant with English language.

Data analysis

The open ended questions were grouped into themes and coded to simplify analysis. Descriptive statistics were used to characterize the data. Chi square and independent t-tests were run to test the composition of the control and experiential groups as to eliminate any possible confounding variables. The variables for knowledge were assessed as a combined knowledge grade and analysis was by using independent and paired t-tests to see the relationships between and within groups. The statistical significance level was set at 1%.

7.3 Overview of findings

7.3.1 The Systematic Review

A total of 40 SEM and 46 TTI studies were included in the systematic review after strict evaluation. The SEM is advocated to be an effective model in determining screening and vaccination behavior as it has been applied in a number of such studies. This is unlike the TTI, which has been mostly used in substance abuse and risk behavior studies. In spite of being different in structure, with the TTI being a matrix while the SEM has rings/levels, they both share similar concepts. The main difference consists of the division of the TTI into levels of causation (ultimate, distal and proximal) within each ecological domain which are not considered within the levels of the SEM.

7.3.2 Study in Zambia

These frameworks were effective in determining that awareness, knowledge, social interaction, availability of facilities and services, information sources, beliefs, fears and policy as factors that influence health behavior in Zambia.

Having awareness and knowledge about cervical cancer and its prevention proved to be among the factors with the greatest influence on the practice of prevention methods. The overall awareness of respondents in this study was low. Lack of awareness and knowledge also contributes to the prevailing fears of vaccination and delays in accessing screening services until symptoms are present. Nevertheless, it was found that respondents

(women and men) were more likely to practice and support prevention methods when they were aware of cervical cancer and places that provide prevention services. It was further found that watching a short educational film on cervical cancer increases the awareness and knowledge (of risk and protective factors) of cervical cancer.

Social influence also played a big role in the acceptance and practice of screening and vaccination. Such that women who think their partners, family and friends approve of screening and vaccination were more likely to support and practice prevention. Equally, knowing some who practiced prevention increased the chance of practice.

There is no doubt that policy also plays a role in the provision of prevention services. At the time of the research the strategic plan for improving Zambian health care was being finalized and the HPV vaccine was only administered as a pilot. According to the Ministry of Health, there is no policy governing cervical cancer prevention only a strategic plan (MoH, 2016). This clearly affected the information that was available at the places that provide cervical cancer services e.g. conflicting views between health care providers on age recommendations. This is also affected by lack of funding making it difficult to provide vaccination of boys or increase the workforce for service provision, despite the interest in such developments. However, the future looks promising with the possibility of the induction of self-sampled screening that is supported by the general public.

7.4 Recommendations

Considering the effectiveness of the SEM and TTI in determining factors that affect the cervical cancer prevention process in Zambia, it is recommended that more studies use these frameworks. In particular intervention studies that will assess actual changes in practice. Such as a large scale intervention study that specifically assesses the relationship between practice of screening and vaccination and knowledge obtained from watching an informational film. Studies should also aim to cover rural and other urban areas in Zambia.

The overall low levels of awareness and knowledge of cervical cancer highlight the need for sensitization of the general public. Outreach programs targeting both women and men to increase awareness because men were found to influence the screening practices of women and the acceptability of the HPV vaccine. Sensitization programs should also target other stakeholders especially those in leadership positions (pastors, health care providers, teachers) so that they may be able to provide the correct information to the general public if the need arises.

Uptake of screening and vaccination is limited by having insufficient facilities and service providers. There is need to ensure that cervical cancer screening services are available at all existing clinics. The positive attitudes towards self-screening suggest that it may assist in maximizing coverage. Granted, outreach programs are necessary to educate the public on self-sampled screening and perhaps assisted self-sampled screening may be more effective.

The overall interest in vaccination was a positive finding suggesting that a country-wide vaccination program may be successful. Cancer vaccines can either be included in the normal immunization schedule as cost effective solution or community based vaccine drives can be initiated through the Ministry of Health.

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APPENDICES

Chapter 2 (Systematic Review)

Data Extraction Form

Table 2.5: Studies awaiting classification which not included in this review because on inaccessibility

Table 2.6: Characteristics of included SEM studies

Table 2.7: Characteristics of included TTI studies

Table 2.8: Quality assessment of studies using the SEM

Table 2.9: Quality assessment of studies using the TTI

Chapter 3 (Quantitative Data)

Cervical cancer prevention methods questionnaire for females

Cervical cancer prevention methods questionnaire for males

Chapter 4 (Qualitative Data)

Interview Guides

Supporting Results (Administration of the Cervical Cancer Prevention Program in Zambia, Result Boxes)

Chapter 5 (Intervention)

Study questionnaires

Knowledge grade operation and calculation

SYSTEMATIC REVIEW: DATA EXTRACTION FORM

GENERAL INFORMATION

ID#:	Date form completed:	<input type="checkbox"/> Excluded <input type="checkbox"/> Included
Title:		
Author(s):		
Publication type	<input type="checkbox"/> Full text article / <input type="checkbox"/> Abstract / <input type="checkbox"/> Dissertation / <input type="checkbox"/> Progress report / <input type="checkbox"/> Letter/ <input type="checkbox"/> Book <input type="checkbox"/> Other	
Source of information		
Year:	Volume:	Issue:
Page(s):		Country:
Journal title:		#of citations Web of Science:

INCLUSION/EXCLUSION CRITERIA

Geography	Include any country. Priority given to Sub-Saharan African countries.
Time	Include studies starting from the year 2000 to date.
Participants	Includes all people with health behavior affected from intrapersonal, interpersonal, organizational, community and policy level, in accordance with the SEM. Or the TTI where behavior is influenced from the ultimate, distal, and proximal levels. As well as the intrapersonal, interpersonal social and socio-cultural environment streams.
Disease	Priority given to cancers and diseases that can be screened or vaccinated against. Also include substance abuse/risk behavior if they illustrate the use of the TTI.
Exposure/Intervention	Primary and secondary prevention procedures including vaccination, screening methods and control of risk behavior.
Comparison	May not be applicable in this study but will include people who do not practice primary and secondary prevention measures
Study Model	Include Social Ecological Model and Theory of Triadic Influence
Outcome	Set of optimal preventive measures by SEM and set of measures by TTI
Language	English

STUDY ELIGIBILITY

FACTORS	ASSESSMENT	Location in text or source (pg & ¶/fig/table)
STUDY MODEL		
Social Ecological Model	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear	
Theory of Triadic Influence	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear	
PARTICIPANTS AND SETTING		
Are the participants of the study human?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear	
Is the study located in sub-Saharan Africa?	<input type="checkbox"/> Yes <input type="checkbox"/> No	

	<input type="checkbox"/> Unclear	
Is the disease under study cancer or any disease or condition that can be screened or vaccinated or a risk behavior?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear	
INTERVENTIONS		
Primary prevention (Vaccination, health education)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear	
Secondary Prevention (Screening, medical treatment)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear	
OUTCOMES		
Conclusions?	<input type="checkbox"/> Present <input type="checkbox"/> Missing	
FINAL DECISION		
	<input type="checkbox"/> Include <input type="checkbox"/> Exclude	

REASONS FOR EXCLUSION OF STUDY FROM REVIEW

What are the reason(s) for exclusion?	<input type="checkbox"/> Different theory/model used <input type="checkbox"/> Non-human participants <input type="checkbox"/> irrelevant disease/condition <input type="checkbox"/> irrelevant intervention <input type="checkbox"/> irrelevant outcomes assessed <input type="checkbox"/> Duplicate publication <input type="checkbox"/> Other
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DO NOT PROCEED IF STUDY EXCLUDED FROM REVIEW

CHARACTERISTICS OF INCLUDED STUDIES

Part 1: GENERAL STUDY DETAILS

	Descriptions as stated in report/paper	Location in text or source (pg & ¶/fig/table)
Study aims	<input type="checkbox"/> To explore views (attitudes, practices, knowledge and beliefs) of vaccination, screening and disease/condition <input type="checkbox"/> To explore the promotion of vaccination, screening or treatment <input type="checkbox"/> To examine participation/acceptance and non-acceptance of vaccination, screening or treatment <input type="checkbox"/> To determine the cause of behavior <input type="checkbox"/> To form/evaluate interventions <input type="checkbox"/> Other	
Research Question(s)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear <input type="checkbox"/> Not reported	
Conclusion addressing RQ	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear	

	<input type="checkbox"/> Not reported	
Hypothesis	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear <input type="checkbox"/> Not reported	
Conclusion addressing Hypothesis	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear <input type="checkbox"/> Not reported	
Study setting	<input type="checkbox"/> High income country/ <input type="checkbox"/> Middle income country/ <input type="checkbox"/> Low income country/ <input type="checkbox"/> National/ <input type="checkbox"/> Urban/ <input type="checkbox"/> Rural/ <input type="checkbox"/> Region/ <input type="checkbox"/> Province (state)/ <input type="checkbox"/> County/ <input type="checkbox"/> City (town)/ <input type="checkbox"/> Community/ <input type="checkbox"/> Unclear <input type="checkbox"/> Other <input type="checkbox"/> Not reported	
Unit of Observation	<input type="checkbox"/> Individual/Intrapersonal (patient)/ <input type="checkbox"/> Interpersonal/ social situation (family, friends, peers)/ <input type="checkbox"/> Organizational (Churches, stores, community orgs.)/ <input type="checkbox"/> Community (Social networks)/ <input type="checkbox"/> Policy/National (Local, state, federal) <input type="checkbox"/> Unclear <input type="checkbox"/> Other	
Level of Analysis	<input type="checkbox"/> Individual/Intrapersonal (patient)/ <input type="checkbox"/> Interpersonal/ social situation (family, friends, peers)/ <input type="checkbox"/> Organizational (Churches, stores, community orgs.)/ <input type="checkbox"/> Community (Social networks)/ <input type="checkbox"/> Policy/National (Local, state, federal) <input type="checkbox"/> Unclear <input type="checkbox"/> Other	
Target Disease	<input type="checkbox"/> Bladder Cancer/ <input type="checkbox"/> Breast Cancer / <input type="checkbox"/> Colon and Rectal Cancer/ <input type="checkbox"/> Endometrial Cancer/ <input type="checkbox"/> Kidney Cancer/ <input type="checkbox"/> Leukemia/ <input type="checkbox"/> Lung Cancer/ <input type="checkbox"/> Liver Cancer/ <input type="checkbox"/> Melanoma/ <input type="checkbox"/> Non-Hodgkin Lymphoma/ <input type="checkbox"/> Pancreatic Cancer/ <input type="checkbox"/> Prostate Cancer/ <input type="checkbox"/> Thyroid Cancer/ <input type="checkbox"/> Cancer (general) <input type="checkbox"/> Cervical Cancer <input type="checkbox"/> Drug/substance abuse <input type="checkbox"/> Other	
Category of treatment investigated	<input type="checkbox"/> Screening <input type="checkbox"/> Vaccination <input type="checkbox"/> Substance abuse/risk behavior intervention <input type="checkbox"/> Other	

Part 2: EVALUATION DESIGN

	Descriptions as stated in report/paper	Location in text or source (pg & ¶/fig/table)
Type of Study	<input type="checkbox"/> Qualitative <input type="checkbox"/> Quantitative <input type="checkbox"/> Mixed <input type="checkbox"/> Unclear	
Primary research	<input type="checkbox"/> Randomized Controlled Trial/ <input type="checkbox"/> Nonrandomized intervention/ <input type="checkbox"/> Case-control/ <input type="checkbox"/> Case study/ <input type="checkbox"/> Cross-	

	sectional/ <input type="checkbox"/> Descriptive/ <input type="checkbox"/> Correlation/ <input type="checkbox"/> Longitudinal <input type="checkbox"/> Cohort <input type="checkbox"/> Unclear <input type="checkbox"/> Other <input type="checkbox"/> N/A	
Secondary research	<input type="checkbox"/> Metaanalysis / <input type="checkbox"/> Systematic review / <input type="checkbox"/> Simple overview / <input type="checkbox"/> Guideline <input type="checkbox"/> Unclear <input type="checkbox"/> Other <input type="checkbox"/> N/A	
INCLUSION CRITERIA		
Independent variables	<input type="checkbox"/> Constructs of the TTI by Petraitis & Flay (1994/95, 2009) <input type="checkbox"/> Constructs of the TTI other <input type="checkbox"/> Constructs of the TTI not referenced <input type="checkbox"/> Constructs of the SEM by Sweat and Denison (1995) <input type="checkbox"/> Constructs of the SEM by McLeroy (1988) <input type="checkbox"/> Constructs of the SEM by Stokols(1992, 2003) <input type="checkbox"/> Constructs of the SEM by Bronfenbrenner (1979/89, 2004) <input type="checkbox"/> Constructs of the SEM other <input type="checkbox"/> Constructs of the SEM not referenced	
Independent variables TTI	<input type="checkbox"/> intrapersonal stream (demographics, biology and personality that influence self-efficacy) <input type="checkbox"/> social situation/context stream (interpersonal/normative, characteristics in an individual's immediate social setting(s) that influence behavioral norms) <input type="checkbox"/> socio-cultural environment stream (attitudinal, broader social and cultural environmental factors that influence attitudes toward a behavior) <input type="checkbox"/> ultimate causes (demographics, individual has the least control over) <input type="checkbox"/> distal influences (fear, self-efficacy) <input type="checkbox"/> proximal predictors (support, response, severity) <input type="checkbox"/> immediate precursors (individual has most control over) <input type="checkbox"/> Other <input type="checkbox"/> Unclear <input type="checkbox"/> Not reported <input type="checkbox"/> Not Applicable	

Independent variables SEM	<input type="checkbox"/> Intrapersonal/Individual level (demographics, knowledge, attitude, perceptions, self-efficacy) <input type="checkbox"/> Micro-system/Interpersonal level (peers, family, school, work) <input type="checkbox"/> Mesosystem (interrelation between microsystems) <input type="checkbox"/> Exosystem (enviro. settings causing indirect influence) <input type="checkbox"/> Macrosystem (culture, political systems, societies) <input type="checkbox"/> Organizational/Institutional level (Social institutions and organization characteristics, formal/informal rules for operations) <input type="checkbox"/> Community level (relationships among organization, institutions and informal networks with defined boundaries) <input type="checkbox"/> Public Policy (Local, State and national laws and policies) <input type="checkbox"/> Technological level (treatment/vaccines etc.) <input type="checkbox"/> Relational/Dyadic (family, couple, may also include household, community) <input type="checkbox"/> Environmental (physical/social changes in environment) <input type="checkbox"/> Structural (laws and policies) <input type="checkbox"/> Super-structural (social justice, class, race, gender, equity) <input type="checkbox"/> Other <input type="checkbox"/> Unclear <input type="checkbox"/> Not reported <input type="checkbox"/> Not Applicable	
Is it a modified/incomplete version of the SEM or TTI?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear	
If it is modified, how?	<input type="checkbox"/> Different number of levels/constructs from that of the original author <input type="checkbox"/> Different names/contents <input type="checkbox"/> Incorporates another model/theory <input type="checkbox"/> Other <input type="checkbox"/> Not Applicable	
Demographic Data (requirements for participation)	<input type="checkbox"/> Sex/ <input type="checkbox"/> Age/ <input type="checkbox"/> Race/ <input type="checkbox"/> Social Economic Status/ <input type="checkbox"/> Health Status/Practices/ <input type="checkbox"/> Education Level/ <input type="checkbox"/> Religion/ <input type="checkbox"/> Marital Status <input type="checkbox"/> Other <input type="checkbox"/> Not Applicable	

Part 3: DATA SOURCES 1 – FACILITATORS

Repeat section if more than one type of facilitator was used. If the study did not use facilitators skip to Part 4.

	Descriptions as stated in report/paper	Location in text or source (pg & ¶/fig/table)
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Source/ Target Population	<input type="checkbox"/> Government/ <input type="checkbox"/> Parents, Guardians / <input type="checkbox"/> Health care Professionals/facilities/ <input type="checkbox"/> Community leaders/sites (churches, workplace)/ <input type="checkbox"/> Researchers, Mediators/ <input type="checkbox"/> Educational institutions (teachers, schools) / <input type="checkbox"/> Databases (online, offline) <input type="checkbox"/> Other <input type="checkbox"/> Not applicable	
Sample size	No.:	
Withdrawals and exclusions	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	
Follow-up	<input type="checkbox"/> No / <input type="checkbox"/> Yes / <input type="checkbox"/> Unclear/ <input type="checkbox"/> Not applicable <input type="checkbox"/> Not reported	
SAMPLING		
Sampling Design/Strategy	<input type="checkbox"/> Convenience / <input type="checkbox"/> Judgmental / <input type="checkbox"/> Quota / <input type="checkbox"/> Snowball / <input type="checkbox"/> Simple Random / <input type="checkbox"/> Systematic / <input type="checkbox"/> Stratified / <input type="checkbox"/> Cluster <input type="checkbox"/> Other <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	
Method of recruitment of participants	<input type="checkbox"/> Phone/ <input type="checkbox"/> Mail / <input type="checkbox"/> Advertisement (Posters, Brochures)/ <input type="checkbox"/> Word of Mouth/ <input type="checkbox"/> Other <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	

Part 4: DATA SOURCES 2 – ACTUAL PARTICIPANTS

Repeat section if more than one type of participant participated.

	Descriptions as stated in report/paper	Location in text or source (pg & ¶/fig/table)
Source/ Target Population	<input type="checkbox"/> Men/ <input type="checkbox"/> Women/ <input type="checkbox"/> Adults/ <input type="checkbox"/> Youth/ <input type="checkbox"/> Adolescents/ <input type="checkbox"/> Children/ <input type="checkbox"/> Policymakers/ <input type="checkbox"/> Parents and Guardians/ <input type="checkbox"/> Doctors/ <input type="checkbox"/> Patients/ <input type="checkbox"/> Nurses / <input type="checkbox"/> Other Health care Professionals / <input type="checkbox"/> Community leaders / <input type="checkbox"/> Teachers/ <input type="checkbox"/> Students/ <input type="checkbox"/> Book, journal articles <input type="checkbox"/> Other <input type="checkbox"/> Not applicable	
Sample size (final study participants)	No.:	
Withdrawals and exclusions	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	
Follow-up	<input type="checkbox"/> No / <input type="checkbox"/> Yes / <input type="checkbox"/> Unclear/ <input type="checkbox"/> Not reported/ <input type="checkbox"/> Not applicable	
Min. age	No.:	
Max. age	No.:	
Mean age	No.:	

Sex	<input type="checkbox"/> Male <input type="checkbox"/> Female <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	
Race	<input type="checkbox"/> Black <input type="checkbox"/> White/Caucasian <input type="checkbox"/> Hispanic/Latino <input type="checkbox"/> Asian <input type="checkbox"/> Arabic <input type="checkbox"/> Native <input type="checkbox"/> Mixed/biracial <input type="checkbox"/> Other <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	
Social Economic Status	<input type="checkbox"/> Upper-class <input type="checkbox"/> Middle-class <input type="checkbox"/> Lower-class <input type="checkbox"/> Other <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	
Education Level	<input type="checkbox"/> Higher than secondary/ Degree education <input type="checkbox"/> Secondary/ high school <input type="checkbox"/> Primary school and less <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	
Religion	<input type="checkbox"/> Christian Protestant/Catholic <input type="checkbox"/> Muslim <input type="checkbox"/> Hindu <input type="checkbox"/> Jewish <input type="checkbox"/> None <input type="checkbox"/> Other <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	
Marital Status	<input type="checkbox"/> Married/Cohabiting/Dating <input type="checkbox"/> Single/Never Married <input type="checkbox"/> Divorced/Separated <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	
Vaccination Status	<input type="checkbox"/> Not vaccinated <input type="checkbox"/> Vaccinated <input type="checkbox"/> Incomplete vaccination <input type="checkbox"/> Mixed vaccinated and not vaccinated <input type="checkbox"/> Not applicable <input type="checkbox"/> Not reported	
Screening Status	<input type="checkbox"/> Not screened <input type="checkbox"/> Screened <input type="checkbox"/> Mixed screened and not screened <input type="checkbox"/> Not applicable <input type="checkbox"/> Not reported	
SAMPLING		

Sampling Design/Strategy	<input type="checkbox"/> Convenience / <input type="checkbox"/> Judgmental / <input type="checkbox"/> Quota / <input type="checkbox"/> Snowball / <input type="checkbox"/> Simple Random / <input type="checkbox"/> Systematic / <input type="checkbox"/> Stratified / <input type="checkbox"/> Cluster <input type="checkbox"/> Other <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	
Method of recruitment of participants	<input type="checkbox"/> Phone/ <input type="checkbox"/> Mail / <input type="checkbox"/> Advertisement (Posters, Brochures)/ <input type="checkbox"/> Word of Mouth/ <input type="checkbox"/> Other <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	
Informed consent obtained	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	
COLLECTION		
Data Collection Method/Tools	<input type="checkbox"/> Observation / <input type="checkbox"/> Questionnaires / <input type="checkbox"/> Standardized tests / <input type="checkbox"/> Interviews / <input type="checkbox"/> Focus groups / <input type="checkbox"/> Diaries / <input type="checkbox"/> Think-a-loud protocols / <input type="checkbox"/> Physical and biophysical measurements / <input type="checkbox"/> System measurements / <input type="checkbox"/> Secondary data <input type="checkbox"/> Other/ <input type="checkbox"/> Not reported/ <input type="checkbox"/> Not applicable	
Data collection tool	<input type="checkbox"/> Developed by the researchers <input type="checkbox"/> Based on another study <input type="checkbox"/> Unclear <input type="checkbox"/> Not reported	
Reliability check performed e.g. Cronbach alpha (α)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear <input type="checkbox"/> not reported <input type="checkbox"/> Not applicable	
MAIN OUTCOME MEASURE(S)		
Dependent Variables	<input type="checkbox"/> Screening practiced <input type="checkbox"/> Vaccination practiced <input type="checkbox"/> Screening not practiced <input type="checkbox"/> Vaccination not practiced <input type="checkbox"/> Non-risk behavior, Rehabilitation, therapy practiced <input type="checkbox"/> Smoking, Drug, risk behavior practiced <input type="checkbox"/> Other <input type="checkbox"/> Not reported	

Part 5: ANALYSIS AND EVALUATION

	Descriptions as stated in report/paper	Location in text or source (pg & ¶/fig/table)
Analysis Plan - Qualitative	<input type="checkbox"/> Grounded theory / <input type="checkbox"/> Constant comparison / <input type="checkbox"/> Phenomenological approach / <input type="checkbox"/> Thematic content analysis / <input type="checkbox"/> Framework analysis / <input type="checkbox"/> Content analysis <input type="checkbox"/> Other <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	
Effect of intervention	<input type="checkbox"/> Totally effective <input type="checkbox"/> Partly effective	

	<input type="checkbox"/> Ineffective <input type="checkbox"/> Unclear <input type="checkbox"/> Not reported <input type="checkbox"/> Not applicable	
Analysis Plan - Statistical Methods	<input type="checkbox"/> Chi-square / <input type="checkbox"/> Mann-Whitney U-Test / <input type="checkbox"/> Regression / <input type="checkbox"/> ANOVA / <input type="checkbox"/> Baron and Kenny's test / <input type="checkbox"/> Sobel test / <input type="checkbox"/> Descriptive statistics / <input type="checkbox"/> T-tests/ <input type="checkbox"/> Wilcoxon test / <input type="checkbox"/> Correlation/ <input type="checkbox"/> Z test/ <input type="checkbox"/> Tailed tests <input type="checkbox"/> Other <input type="checkbox"/> Not reported <input type="checkbox"/> Not Applicable	
Bias	<input type="checkbox"/> Selection bias/ <input type="checkbox"/> Information/measurement/observer bias/ <input type="checkbox"/> Interviewer/ <input type="checkbox"/> Recall/Report <input type="checkbox"/> Migration / <input type="checkbox"/> Confounding <input type="checkbox"/> Other <input type="checkbox"/> Unclear <input type="checkbox"/> Not Reported	

Part 6: RESULTS AND EVALUATION

	Descriptions as stated in report/paper	Location in text or source (pg & ¶/fig/table)
OUTCOMES ASSESSED		
Positive Predictors of practicing Screening/Vaccination /Intervention and not using drugs or following risk behavior	<input type="checkbox"/> Positive influences and surroundings i.e. family, peers, community involvement <input type="checkbox"/> Personal beliefs <input type="checkbox"/> Recommendation from health care provider(s) <input type="checkbox"/> Access to health care providers, facilities <input type="checkbox"/> Health knowledge, information, awareness <input type="checkbox"/> Having health insurance <input type="checkbox"/> Polices/Law enforcing behavior <input type="checkbox"/> Medical status/practices <input type="checkbox"/> Culture <input type="checkbox"/> Other <input type="checkbox"/> Not Reported	
Negative Predictors of i.e. causing people not to practice Screening/Vaccination /Intervention, and using drugs/practicing risk behavior	<input type="checkbox"/> Negative influences and surroundings i.e. family, peers, community involvement <input type="checkbox"/> Negative personal beliefs (fear, nervous, painful, wrongly informed) <input type="checkbox"/> Lack of recommendation from health care provider(s) <input type="checkbox"/> Lack of access to health care providers, facilities <input type="checkbox"/> Lack of knowledge, information, awareness <input type="checkbox"/> Lack of health insurance <input type="checkbox"/> Polices/Law <input type="checkbox"/> Medical status/practices <input type="checkbox"/> Culture <input type="checkbox"/> Other <input type="checkbox"/> Not Reported	
Overall view of model	<input type="checkbox"/> SEM/TTI is good model <input type="checkbox"/> SEM/TTI is not a good model <input type="checkbox"/> SEM/TTI is better if modified	

	<input type="checkbox"/> Not Reported	
STATISTICAL RESULTS		
Effect Size	<input type="checkbox"/> Odds Ratio <input type="checkbox"/> Relative Risk <input type="checkbox"/> Relative risk reduction <input type="checkbox"/> Absolute risk reduction <input type="checkbox"/> Not Reported <input type="checkbox"/> Not applicable	
Power calculation	<input type="checkbox"/> Significance criterion (p-values) specified <input type="checkbox"/> Alpha error (α) specified <input type="checkbox"/> Beta error (β) specified <input type="checkbox"/> Power calculation <input type="checkbox"/> Not Reported <input type="checkbox"/> Not applicable	

Part 7: OTHER INFORMATION

	Descriptions as stated in report/paper	Location in text or source (pg & ¶/fig/table)
Ethical approval needed/ obtained for study	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear <input type="checkbox"/> Not Reported	
Funding Sources	<input type="checkbox"/> Industry/Organization/ <input type="checkbox"/> Public/ <input type="checkbox"/> mixed/ <input type="checkbox"/> travel / <input type="checkbox"/> self-funded / <input type="checkbox"/> educational institute/ <input type="checkbox"/> other <input type="checkbox"/> Unclear <input type="checkbox"/> Not Reported	
References to other relevant studies	<input type="checkbox"/> Present <input type="checkbox"/> Missing	
Correspondence required for further study information	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear	

SYSTEMATIC REVIEW: RESULT TABLES

Table 2.5: Studies awaiting classification which not included in this review because on inaccessibility

Study (author(s), year)	Study Model	Participants	Setting	Disease or Condition	Intervention	Outcomes
Possible SEM studies						
Eastern Nursing Research Society 27th Annual Scientific Sessions Abstracts. (ENRS, 2015)	Unclear	Human	Unclear	Unclear	Unclear	Present
The Heart of the Matter: Reducing CVD Risk. (Hayman LL, et al.; 2009)	Unclear	Unclear	Unclear	Cardiovascular Disease	Unclear	Missing
Screening for Psychosocial Risk at Pediatric Cancer Diagnosis: The Psychosocial Assessment Tool. (Kazak AE, et al.; 2011)	Unclear	Human	Unclear	Cancer	Screening	Present
Community Participation in Health Initiatives for Marginalized Populations. (Larson C, et al.; 2009)	SEM	Human	Unclear	Unclear	Unclear	Present
Factors Influencing the Prostate Cancer Screening Behavior in African American Men.: DI. (Song L, et al.; 2009)	Unclear	Human	USA	Cancer	Screening	Missing
Possible TTI studies						
Why do Some Teens Turn to Drugs? A Focus Group Study of Drug Users' Experiences. (Nakhaee N, et al.; 2009)	Unclear	Human	Iran	Risk behavior	None	Present

Table 2.6: Characteristics of included SEM studies

Study (author(s), year)	Aim	Study Location	Target disease/condition, treatment	Study Type	Model, Variables	Participants	Analysis	Outcomes
Factors Contributing to Filipinos' Resistance to Preventive	Examine acceptance and non- acceptance of vaccination, screening or	National Philippines	D: Colon and Rectal Cancer T: screening	Mixed methods Unclear primary	SEM not referenced	Facilitator(s) 1. Databases - Sample size 5 2. Government - Sample size 3 Participant(s)	NA	Positive predictors - positive influences and surroundings Negative predictors -

Screening. (Atassi K, et al.; 2010)	treatment			study Systematic review		1. Books, journals Sample size 5; Data collection method Secondary data; 2. Other Data collection method Interviews;		negative influences and surroundings Overall view of model - good
Factors Predicting BCG Immunization Status in Northern Nigeria: A Behavioral-ecological Perspective. (Babalola S & Lawan U; 2009)	Determine the cause of behavior	Nigeria	D: Other T: Vaccination	Unclear primary study Other secondary study	SEM by McLeroy Not modified	Inclusion criteria - other Facilitator(s) 1. Databases - sample size 1; Participant(s) 1. Women Sampling strategy simple random, stratified; Collection method interview and secondary data; reliability check NR; Outcome measure vaccination practiced and vaccination not practiced 2. Men Sampling strategy snowball; Data collection method interview and secondary data; reliability check NR; Outcome measure: vaccination practiced and vaccination not practiced 3. Health care professionals Sample size 255; Data collection method secondary data; reliability check NR; Outcome measure: other	Regression	Positive predictors - positive influences and surroundings, health care provider recommendations, access to health care providers/facilities, knowledge/awareness, policies/rules, medical status/practices, other Negative predictors - lack of access to health care providers/facilities, other Overall view of model - good
Enhancing Benefits or Increasing Harms: Community Responses for HIV among Men Who have Sex with Men, Transgender Women, Female Sex Workers, and People Who Inject Drugs. (Baral S, et al.; 2014)	Other	Middle income Low income Multiple countries	D: Other T: Other	Mixed methods Systematic review	SEM by other author Modified version - different number of levels	Inclusion criteria - other Facilitator(s) 1. databases Sample size 1; Participant(s) 1. Books, journal articles Sample size 22; sampling strategy judgmental; Data collection method other; reliability check NR; Outcome measure: other	NR	Positive predictors - positive influences and surroundings, access to health care providers/facilities, policies/rules Negative predictors - negative influences and surroundings, negative personal beliefs, lack of access to health care providers/facilities, lack of knowledge/awareness,

								<p>policies/rules</p> <p>Overall view of model - NR</p>
<p>Understanding the Interplay of Factors Informing Vaccination Behavior in Three Canadian Provinces. (Boerner F, et al; 2013)</p>	<p>Examine acceptance and non- acceptance of vaccination, screening or treatment</p>	<p>Canada</p>	<p>D: Other</p> <p>T: vaccination</p>	<p>Mixed methods</p> <p>Case study</p>	<p>SEM by other author</p> <p>Modified version - different names/contents; incorporates another model</p>	<p>Inclusion criteria - age, SES, education, marital, other</p> <p>Facilitator(s)</p> <p>1. other</p> <p>Participant(s)</p> <p>1. Other</p> <p>Sample size 143; min age 18; male and female; upper, middle, lower SES; degree, secondary, primary education; mixed vaccinated and not vaccinated; Sampling strategy judgmental and stratified; Data collection method questionnaire and focus groups; reliability check NR; Outcome measure: vaccination practiced and vaccination not practiced</p>	<p>Thematic analysis</p> <p>Framework analysis</p> <p>Descriptive</p>	<p>Positive predictors - positive influences and surroundings, personal beliefs, other</p> <p>Negative predictors - negative influences and surroundings, negative personal beliefs, lack of knowledge/awareness, other</p> <p>Overall view of model - good</p>
<p>Theorizing Social Context: Rethinking Behavioral Theory (Burke NJ, et al.; 2009)</p>	<p>Other</p>	<p>USA</p>	<p>D: Breast cancer</p> <p>T: Screening</p>	<p>Qualitative</p> <p>Unclear primary study</p> <p>Simple overview</p>	<p>SEM by Stokols</p> <p>Not modified</p>	<p>Participant(s)</p> <p>1. Women</p> <p>Ethnicity Latin, Asian;</p> <p>Outcome measure: screening practiced</p>	<p>NA</p>	<p>Positive predictors - NR</p> <p>Negative predictors - NR</p> <p>Overall view of model - good</p>
<p>Willingness to Participate in HIV Vaccine Trials among Men Who have Sex with Men in Chennai and Mumbai, India: A Social Ecological Approach (Chakrapani V, et al.; 2012)</p>	<p>Examine acceptance and non- acceptance of vaccination, screening or treatment</p>	<p>India</p>	<p>D: Other</p> <p>T: vaccination</p>	<p>Qualitative</p> <p>Unclear primary study</p>	<p>SEM not referenced</p>	<p>Inclusion criteria - sex, age, other</p> <p>Facilitator(s)</p> <p>1. community leaders/sites</p> <p>Participant(s)</p> <p>1. Men</p> <p>Sample size 68; min age 20, max age 46, mean age 28; vaccinated; Sampling strategy judgmental and stratified; Data collection method focus groups; reliability check unclear; Outcome measure: vaccination practiced</p> <p>2. Other</p> <p>Sample size 14; min age 29, max age 60; mean age 40; Sampling strategy judgmental; Data collection method interview; reliability check unclear;</p>	<p>Constant comparison</p> <p>Thematic analysis</p>	<p>Positive predictors - positive influences and surroundings, health care provider recommendations, access to health care providers/facilities, knowledge/awareness, insurance, other</p> <p>Negative predictors - negative influences and surroundings, negative personal beliefs, lack of health care provider recommendations, lack of access to health care</p>

						Outcome measure: vaccination practiced		providers/facilities, lack of knowledge/awareness, medical status/practices, other Overall view of model - good
American Heart Association Childhood Obesity Research Summit Report. (Daniels RS, et al.; 2009)	Other	USA	D: Other T: Screening other	Simple overview	SEM not referenced	Inclusion criteria - age	NA	Positive predictors - NR Negative predictors - NR Overall view of model - good
Perspectives of African American, Amish, Appalachian and Latina women on Breast and Cervical Cancer Screening: Implications for Cultural Competence. (Documét PI, et al.; 2008)	Determine the cause of behavior Other	Urban Rural USA	D: Cancer (breast, cervical) T: screening	Qualitative Case study	SEM by other author Modified version - incorporates another model	Inclusion criteria - sex, race Facilitator(s) 1. Researchers, mediators - sample size 12 2. databases - sample size 4 Participant(s) 1. Women Sample size 210 and then 102; follow-up was conducted; Ethnicity black, white, Latin, other race; Data collection method focus groups; reliability check performed; Outcome measure: screening practiced 2. Health care professionals Sample size 168; follow up was conducted; degree education; Sampling strategy judgment, simple random and stratified; Data collection method questionnaires and interviews; reliability check performed; Outcome measure: screening practiced	Thematic analysis Framework analysis	Positive predictors - positive influences and surroundings, health care provider recommendations, knowledge/awareness, policies/rules, culture Negative predictors - negative personal beliefs, lack of health care provider recommendations, other Overall view of model - NR
Increasing Use of Mammography among Older, Rural African American Women: Results from a Community Trial. (Earp JA et al,	Form or evaluate interventions	Rural USA	D: Breast cancer T: Screening	Non-randomized intervention Cohort	SEM by McLeroy Not modified	Inclusion criteria - sex, age, race, SES, health Participant(s) 1. Women Sample size 801; follow up was conducted; min age 50; Ethnicity - black race; mixed screened and not screened; Sampling strategy simple random, systematic; Data collection method interview; reliability check performed; Outcome measure: screening practiced	Framework analysis Chi-square Regression Correlation Other	Positive predictors - health care provider recommendations, other Negative predictors - NR Overall view of model - NR

2002)								
Beyond Effectiveness: Evaluating the Public Health Impact of the WISEWOMAN Program. (Farris RP, et al.; 2007)	Form or evaluate interventions	USA	D: Other T: Screening other	Unclear primary study Other secondary study	SEM not referenced Modified version - incorporates another model	Inclusion criteria - other Participant(s) 1. Other Sample size 14; Data collection method secondary data; Outcome measure: other	Correlation	Positive predictors - NR Negative predictors - NR Overall view of model - NR
Barriers and Facilitators to HPV Vaccination of Young Women in High-income Countries: A Qualitative Systematic Review and Evidence Synthesis. (Ferrer HB, et al.; 2014)	Examine acceptance and non- acceptance of vaccination, screening or treatment	Multiple countries	D: Cervical cancer T: vaccination	Qualitative Systematic review	SEM by McLeroy Not modified	Inclusion criteria - sex, age, health, other Facilitator(s) 1. Databases - Sample size 6 Participant(s) 1. Books/journal articles Sample size 41; Sampling strategy judgmental; Data collection method secondary data and other; Outcome measure: vaccination practiced and vaccination not practiced	Thematic analysis	Positive predictors - positive influences and surroundings, personal beliefs, health care provider recommendations, policies/rules Negative predictors - negative personal beliefs, lack of health care provider recommendations, lack of insurance, culture, other Overall view of model - NR
Behavioral Science Research in the Prevention of Diabetes: Status and Opportunities. (Fisher EB, et al.; 2002)	Explore the promotion of vaccination, screening or treatment Other	NR	D: Other T: Screening Substance abuse/risk behavior	Simple overview	SEM not referenced	Participant(s) 1. Books, journals Data collection method secondary data;	NA	Positive predictors - positive influences and surroundings, knowledge/awareness Negative predictors - negative influences and surroundings, negative personal beliefs Overall view of model - NR
Applying core principles to the design and evaluation of the 'Take Charge. Take the Test'	Explore views on vaccination, screening or disease/condition Examine	USA	D: Other T: screening	Case study	SEM by other author Modified version - different	Inclusion criteria - sex, age, race, SES, health, education, marital, other Facilitator(s) 1. Health care professionals/facilities 2. Community leaders/sites - sampling strategy judgmental;	Qualitative NR Quantitative Other	Positive predictors - knowledge/awareness Negative predictors - other

campaign: what worked and lessons learned. (Fraze JL et al., 2009)	acceptance and non- acceptance of vaccination, screening or treatment Form or evaluate interventions				names/contents; incorporates another model	Participant(s) 1. women Ethnicity black; lower SES; Data collection method observation, interview; reliability check NR; Outcome measure: other 2. other Data collection tool interview; reliability check NR; Outcome measure: other		Overall view of model - NR
"I Connect with the Ringleader:" Health Professionals' Perspectives on Promoting the Sexual Health of Adolescent Males. (Garcia MC, et al.; 2014)	Explore the promotion of vaccination, screening or treatment	Urban USA	D: Other T: Intervention Other	Qualitative Unclear primary study	SEM not referenced	Inclusion criteria - other Facilitator(s) 1. Health care professionals/facilities - Sample size 1; Participant(s) 1. Other Sample size 9; male and female; Sample strategy judgmental; Data collection method interviews; reliability check NR; Outcome measure: other	Qualitative other	Positive predictors - positive influences and surroundings, access to health care providers/facilities, knowledge/awareness, medical status/practices, other Negative predictors - negative influences and surroundings, negative personal beliefs, lack of knowledge/awareness Overall view of model - NR
Health Disparities in Colorectal Cancer Screening in the United States: An Application of the Social Ecological Model (Greene DM; 2011)	Form or evaluate interventions	National USA	D: Colon and Rectal Cancer T: Screening	Simple overview	SEM by McLeroy Modified version - different names/contents	Participant(s) 1. Books, journal articles Data collection method secondary data;	NA	Positive predictors - positive influences and surroundings, knowledge/awareness, insurance Negative predictors - negative influences and surroundings, negative personal beliefs, lack of access to health care providers/facilities, other Overall view of model - good
Social Context	Determine the	Rural	D: Other	Qualitative	SEM by other	Inclusion criteria - health	Grounded	Positive predictors -

and Drivers of Intimate Partner Violence in Rural Kenya: Implications for the Health of Pregnant Women. (Hatcher AM, et al.; 2013)	cause of behavior Form or evaluate interventions	Kenya	T: Screening	Unclear primary study	author Modified version - different number of levels	Facilitator(s) 1. Health care professionals/facility - sample size 4; sampling strategy judgmental; 2. Community leaders/sites - sample size 2; sampling strategy judgmental; Participant(s) 1. Women Sample size 39; min age 18, max age 35; Sampling strategy convenience; Data collection method focus groups; reliability check NR; Outcome measure: other 2. Men Sample size 32; min age 18, max age 59; Data collection method focus groups; reliability check NR; Outcome measure: other 3. Other Sample size 20; min age 23, max age 64; male, female; Sampling strategy judgmental; Data collection method interviews; reliability check NR; Outcome measure: other	theory	positive influences and surroundings Negative predictors - negative influences and surroundings, negative personal beliefs, medical status/practices, culture, other Overall view of model - good
Using Technology to Expedite Screening and Intervention for Domestic Abuse and Neglect. (Hawkins JW, et al.; 2009)	Form or evaluate interventions Other	USA	D: Other T: screening	Simple overview	SEM by other author Not modified	Facilitator(s) 1. Health care professionals/facilities Participant(s) 1. Parents/guardians Follow up was done; sampling strategy convenience; data collection tool questionnaire, interview; reliability check NR; outcome measure risk no treatment	NA	Positive predictors - NR Negative predictors - NR Overall view of model - NR
Lay Health Advisors: Promoting Cancer Screening and Reducing Disparities. (Hilaire DM; 2011)	Explore the promotion of vaccination, screening or treatment	Rural USA	D: Cancer T: screening	Simple overview	SEM by McLeroy Not modified	Inclusion criteria - sex, race Participant(s) 1. Books, journal article Female; Ethnicity black, Latin, Asian; Data collection method secondary data; Outcome measure: screening practiced	NA	Positive predictors - knowledge/awareness, other Negative predictors - negative personal beliefs, lack of knowledge/awareness Overall view of model - NR

Considerations for National Public Health Leadership in Advancing Sexual Health. (Ivankovich MB, et al.; 2013)	Other	National World-wide	D: Other T: Screening Vaccination Substance abuse/risk behavior other	guideline	SEM not referenced	Participant(s) 1. Book, journal articles Data collection method secondary data;	NA	Positive predictors - access to health care providers/facilities, knowledge/awareness, policies/rules, other Negative predictors - NR Overall view of model - NR
Chiropractic Care and Public Health: Answering Difficult Questions About Safety, Care Through the Lifespan, and Community Action. (Johnson, C, et al., 2012)	Other	Unclear	Disease: Other Screening Vaccination Substance abuse/risk behavior other	Simple overview	SEM by McLeroy Not modified	Participant(s) 1. Books, journal articles Data collection tool secondary data;	NA	Positive predictors - NR Negative predictors - NR Overall view of model - good
The Social Ecological Model as a Framework for Determinants of 2009 H1N1 Influenza Vaccine Uptake in the United States (Kumar S, et al.; 2012)	Examine acceptance and non- acceptance of vaccination, screening or treatment	National USA	D: Other T: vaccination	Quantitative Cross- sectional	SEM by McLeroy Not modified	Inclusion criteria - age, other Facilitator(s) 1. Other - sample size 1; recruitment other Participant(s) 1. Adults Sample size 3689, min age 18, mean age 46.9; male and female; Ethnicity black, white, Latin and other; upper, middle, lower SES; degree, secondary and primary education; mixed vaccinated and not vaccinated; sampling strategy simple random; Data collection tool questionnaires; reliability check performed; Outcome measure: vaccination practiced	Regression t-test correlation other	Positive predictors - personal beliefs, health care provider recommendations, access to health care providers/facilities, insurance, other Negative predictors - lack of health care provider recommendations, lack of knowledge/awareness Overall view of model - good
Issue Editor's Preface: Linkages to Leverage Improvement in Health.	Other	USA	D: Other T: Screening Vaccination Substance abuse/risk	Simple overview	SEM by Bronfenbrenner Not modified	NA	NA	Positive predictors - positive influences and surroundings, health care provider recommendations, access to health care

(Larson CO, 2004)			behavior other					providers/facilities, knowledge/awareness, other Negative predictors - NR Overall view of model - good
Public Education and Targeted Outreach to Underserved Women Through the National Breast and Cervical Cancer Early Detection Program. (Levano W, et al.; 2014)	Other	USA	D: Cancer (breast and cervical) T: screening	Simple overview	SEM by other author Not modified	Participant(s) 1. Other Sample size 5; Outcome measure: screening practiced;	NA	Positive predictors - access to health care providers/facilities, knowledge/awareness, other Negative predictors - other Overall view of model - good
Theoretical Approaches to Motivating Change: A Farm Family Case Example (Lund CH, et al.; 2005)	Other	National Rural USA	D: Other T: Other	Simple overview	SEM by other author Not modified	Participant(s) 1. Men Sample size 1; age 50; married/dating; screened; outcome measure other; 2. Women Sample size 1; age 48; married/dating; screened; Outcome measure: other 3. Children Sample size 1; age 18; male; secondary education; screened; Outcome measure: other	NA	Positive predictors - NR Negative predictors - NR Overall view of model - good
Strategies for Increasing Cervical Cancer Screening Amongst First Nations Communities in Northwest Ontario, Canada. (Maar M, et al.;	Examine acceptance and non- acceptance of vaccination, screening or treatment	Canada	D: Cervical cancer T: screening	Mixed methods Unclear primary study	SEM by Stokols Modified version - different number of levels	Inclusion criteria - other Facilitator(s) 1. Community site/leaders Participant(s) 1. Other Sampling strategy judgmental; Data collection method interview; reliability NR; Outcome measure: screening practiced	Thematic analysis Quantitative NR	Positive predictors - positive influences and surroundings, health care provider recommendations, knowledge/awareness, medical status/practices, culture, other

2014)								Negative predictors - NR Overall view of model - good
Prevalence and Correlates of Breast and Cervical Cancer Screening among a Midwest Community Sample of Low-Acculturated Latinas (Martínez - Donate AP, et al.; 2013)	Examine acceptance and non- acceptance of vaccination, screening or treatment	USA	D: Cancer (breast and cervical) T: screening	Cross-sectional	SEM by McLeroy Modified version - different number of levels	Inclusion criteria - sex, age, race, health status, other Facilitator(s) 1. Health care professionals/facilities Participant(s) 1. Women Sample size 278; min age 18; Ethnicity Latin/Hispanic; mixed screened and unscreened; Sampling strategy convenience; Data collection tool questionnaires; reliability check performed; Outcome measure: screening practiced and screening not practiced	Chi-square Regression Descriptive Correlation	Positive predictors - health care provider recommendations, access to health care providers/facilities, knowledge/awareness, other Negative predictors - negative personal beliefs, lack of access to health care providers/facilities, lack of insurance, other Overall view of model - NR
Factors Influencing Frontline Health Service Providers' Likelihood to Recommend a Future, Preventive HIV Vaccine to Key Populations in Karnataka, South India (McClarty LM, et al.; 2015)	Explore views on vaccination, screening or disease/condition Determine the cause of behavior	India	D: Other T: vaccination	Mixed methods Unclear primary study	SEM by McLeroy Modified version- incorporates another model	Inclusion criteria - age, other Facilitator(s) 1. Health care professionals/facilities - Sample size 7; sampling strategy stratified; Participant(s) 1. Health care professionals Sample size 375; min age 18; male and female; mixed vaccinated and not vaccinated; Sampling strategy quota; Data collection method questionnaire and interviews; reliability check NR; Outcome measure: vaccination practiced and not practiced	Qualitative NR Chi-square Descriptive	Positive predictors - NR Negative predictors - negative influences and surroundings, negative personal beliefs, lack of health care provider recommendations, lack of access to health care providers/facilities, lack of knowledge/awareness, other Overall view of model - NR
Barriers and Facilitators to Testing, Treatment Entry, and Engagement	Examine acceptance and non- acceptance of vaccination, screening or	USA	D: Other T: Screening other	Mixed methods Unclear primary	SEM by McLeroy Modified version -	Inclusion criteria - sex, age, race, health Facilitator(s) 1. health care professionals/facilities - Sample size 1;	Grounded theory Quantitative NR	Positive predictors - positive influences and surroundings, personal beliefs, health care provider

in Care by HIV-positive Women of Color. (Messer LC, et al.; 2013)	treatment			study	different names/contents	Participant(s) 1. Women Sample size 30; Ethnicity - black, Latin and mixed; not screened; Sampling strategy convenience and judgmental; Data collection method interviews, focus groups; reliability check unclear; Outcome measure: screening practiced and other		recommendations, access to health care providers/facilities, knowledge/awareness, medical status/practices, other Negative predictors - negative influences and surroundings, negative personal beliefs, lack of health care provider recommendations, lack of access to health care providers/facilities, other Overall view of model - NR
Social Determinants Associated with Colorectal Cancer Screening in an Urban Community Sample of African-American Men (Mitchell JA, et al.; 2013)	Determine the cause of behavior	High income USA	D: Colon and Rectal Cancer T: Screening	Cross-sectional study	SEM by McLeroy Modified version - different number of levels	Inclusion criteria - sex, race, other Facilitator(s) 1. Community leaders/sites - Sample size 1; sampling strategy judgmental; Participant(s) 1. Men Sample size 558; mean age 54.4; Ethnicity black race; Sampling strategy convenience; Data collection method questionnaire; reliability check NR; Outcome measure: screening practiced	Chi-square Regression Descriptive other	Positive predictors - health care provider recommendations, insurance, other Negative predictors - lack of health care provider recommendations, lack of access to health care providers/facilities Overall view of model - NR
Mammography Facilities are Accessible, so Why is Utilization so Low? (Mobley LR et al., 2009)	Determine the cause of behavior	USA	D: Breast cancer T: Screening	Unclear Cross-sectional Other secondary	SEM by Bronfenbrenner Modified version - different number of levels; different names/contents; incorporates another model	Inclusion criteria - sex, age Facilitator(s) 1. Database - Sample size 2; Participant(s) 1. Women Sample size 70129; min age 65, max age 104; Ethnicity - black, white, Latin, Asian, native and other; mixed vaccinated and not vaccinated; mixed screened and not screened;	Regression other	Positive predictors - positive influences and surroundings, insurance, medical status/practices, culture, other Negative predictors - negative influences and surroundings, lack of access to

						Data collection method secondary data; reliability check NR; Outcome measure: screening practiced		health care providers/facilities, medical status/practices, culture, other Overall view of model - NR
The Role of Religious Values in Decisions about Genetics and the Public's Health (Modell SM, et al.; 2014)	Other	USA	D: Breast cancer T: screening	Qualitative Simple overview	SEM by other author Not modified	Participant(s) 1. Book, journal article Data collection method secondary data; Outcome measure: other	Qualitative NR	Positive predictors - NR Negative predictors - NR Overall view of model - good
A Community-based Participatory Research Approach to Understanding Pap Testing Adherence among Vietnamese American Immigrants. (Nguyen-Truong CKY, et al.; 2012)	Examine acceptance and non- acceptance of vaccination, screening or treatment	Urban USA	D: Cervical cancer T: screening	Quantitative Descriptive study	SEM by other author Modified version - different number of levels	Inclusion criteria - sex, age, race, health, other Facilitator(s) 1. Community leaders/sites - Sample size 12; sampling strategy judgmental; Participant(s) 1. Women Sample size 211; min age 12, max age 87, mean age 49.85; Ethnicity - Asian; mixed screened and not screened; Sampling strategy convenience; Data collection method questionnaires; reliability check performed; Outcome measure: screening practiced	Chi-square Regression descriptive	Positive predictors - positive influences and surroundings, health care provider recommendations, insurance, other Negative predictors - negative influences and surroundings, lack of knowledge/awareness, culture, other Overall view of model - NR
Applying the Social Ecological Model to Evaluate a Demonstration Colorectal Cancer Screening Program in Louisiana (Nuss HJ, et al.; 2012)	Form or evaluate interventions	USA	D: Colon and Rectal Cancer T: Screening	Unclear primary study	SEM by other author Not modified	Inclusion criteria - age, SES, health Facilitator(s) 1. Researchers/mediators - sampling strategy judgmental; recruitment other; Participant(s) 1. Patients Sample size 975; mean age 55; male and female; Ethnicity black, white, Asian, native and other race; mixed screened and not screened; Sampling strategy judgmental; Data collection method questionnaire and biophysical measurements; reliability check NR;	Chi-square, descriptive, t-test, other	Positive predictors - personal beliefs, access to health care providers/facilities, knowledge/awareness, law, other Negative predictors - NR Overall view of model - good

						Outcome measure: screening practiced and screening not practiced		
PCNA 19th Annual Symposium: Poster Abstracts. (PCNA, 2013)	Explore views on vaccination, screening or disease/condition Other	High income Middle income Multiple countries	D: Other T: Screening	Unclear primary study	SEM not referenced	Inclusion criteria - other Facilitator(s) 1. Health care professionals/facilities - sample size 5; Participant(s) 1. Patients Sample size 941; mean age 50.4; male and female; mixed screened and not screened; Sampling strategy convenience; Data collection method biophysical measurements; reliability check NR; Outcome measure: other	Quantitative NR	Positive predictors - NR Negative predictors - NR Overall view of model - NR
Public Policy Approaches to the Prevention of Heart Disease and Stroke. (Pearson AT, 2011)	Form or evaluate interventions	National Community USA	D: Other T: Intervention: Other	Simple overview	SEM by Stokols Modified version-incorporates another model	Outcome measure: screening practiced, non-risk behavior/treatment and other	NA	Positive predictors - policies/rules Negative predictors - NR Overall view of model - NR
Linkages Between Clinical Practices and Community Organizations for Prevention: A Literature Review and Environmental Scan. (Porterfield SD, et al., 2012)	Form or evaluate interventions	Unclear	D: Other T: Substance abuse/risk behavior other	Other secondary study	SEM by McLeroy Modified version-incorporates another model	Facilitator(s) 1. Databases - sample size 4; 2. Other - sample size 14; sampling strategy judgmental; Participant(s) 1. Books, journal articles Sample size 49; Sampling strategy judgmental; Data collection method secondary data; reliability check NR; Outcome measure: screening practiced, non-risk behavior/treatment and other	NA	Positive predictors - NR Negative predictors - NR Overall view of model - NR
Social Work in the Emergency Department-implementation of a Domestic and Family Violence Screening Program (Power C, et al.; 2011)	Form or evaluate interventions	Urban Australia	D: Other T: screening	Mixed methods Other primary study	SEM by other author Modified version - unclear	Inclusion criteria - sex, age Facilitator(s) 1. Health care professionals/facility - sample size 109; sampling strategy convenience and judgmental; Participant(s) 1. Women not screened; sampling strategy convenience; Data collection method questionnaire; reliability check NR; Outcome measure: other	Thematic analysis Descriptive	Positive predictors - positive influences and surroundings, knowledge/awareness, other Negative predictors - negative influences and surroundings Overall view of model

						2. health care professionals Sample size 40; male and female; Data collection method questionnaire; reliability check NR; Outcome measure: other		- NR
Determinants of Mammography in Women with Intellectual Disabilities (Wilkinson JE, et al.; 2011)	Form or evaluate interventions Other	USA	D: Breast cancer T: screening	Unclear primary study Other secondary study	SEM by McLeroy Modified version - different number of levels	Inclusion criteria - sex, age, health Facilitator(s) 1. Databases Sample size 1; Participant(s) 1. Women Sample size 2907; mean age 57.70; Data collection method secondary data; reliability check performed; Outcome measure: screening practiced and not practiced	Chi-square Regression Correlation other	Positive predictors - access to health care providers/facilities, medical status/practices, other Negative predictors - medical status/practices, other Overall view of model - NR
Social Ecological Predictors of Prostate-specific Antigen Blood Test and Digital Rectal Examination in Black American Men (Woods VD, et al.; 2006)	Examine acceptance and non- acceptance of vaccination, screening or treatment	USA	D: Prostate Cancer T: Screening	Quantitative Cross-sectional cohort	SEM by Stokols Modified version - different names/contents	Inclusion criteria - sex, race, health Facilitator(s) 1. Health care professionals/facilities 2. Community leaders/sites Participant(s) 1. Men Sample size 11; max age 39, mean age 53; ethnicity - black; mixed screened and not screened; Sample strategy convenience, judgmental; Data collection method questionnaires; reliability check performed; Outcome measure: screening practiced 2. Men Sample size 265; min age 40, max age 60, mean age 53; Ethnicity - black; mixed screened and not screened; Sample strategy convenience, judgmental; Data collection method questionnaires; reliability check performed; Outcome measure: screening practiced	Chi-square Regression Descriptive Correlation Z-test tailed test other	Positive predictors - personal beliefs, health care provider recommendations, knowledge/awareness, insurance, policies/rules, other Negative predictors - negative personal beliefs, lack of access to health care providers/facilities, lack of knowledge/awareness, other Overall view of model - NR
A Community-based Approach to Translational Research Addressing	Determine the cause of behavior Form or evaluate	Rural USA	D: Breast cancer T: Screening other	Qualitative Case study	SEM by McLeroy Modified version -	Inclusion criteria - sex, age, race Facilitator(s) 1. Community site/leaders - Sample size 6;	Constant comparison Thematic analysis	Positive predictors - positive influences and surroundings, access to health care providers/facilities,

Breast Cancer Disparities. (Yeary K, et al.; 2011)	interventions				different names/contents	Participant(s) 1. Women Sample size 56; min age 40, mean age 69; Ethnicity - black, white, mixed; Christian religion; mixed screened and not screened; Sample strategy convenience; Data collection method focus groups; reliability check NR; Outcome measure: screening practiced and other		knowledge/awareness, policies/rules, medical status/practices, other Negative predictors - negative personal beliefs, lack of health care provider recommendations, lack of access to health care providers/facilities, lack of knowledge/awareness, lack of insurance, other Overall view of model - Good
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NA = Not Applicable; NR = Not Reported; SES = Social Economic Status; D = Disease/condition; T = Treatment

Characteristics of study participants are indicated if the data was available in the study, if the data was of significance to the research

Table 2.7: Characteristics of included TTI studies

Study (author(s), year)	Aim	Study Location	Target disease/condition, treatment	Study Type	Model, Variables	Participants	Analysis	outcomes
Design of a School-based Randomized Trial to Reduce Smoking among 13 to 15-year olds, the X:IT Study. (Andersen A, et al.; 2014)	Form or evaluate interventions other	Denmark	D: Drug/substance abuse T: Substance abuse/risk behavior	Quantitative Randomized controlled trial	TTI by Petraitis & Flay Modified version - different number of levels; different names/contents	Inclusion criteria - education Facilitator(s) 1. Educational institute - sample size 94; sampling strategy stratified; Participant(s) 1. Students Sample size 4161; follow up was conducted; male, female; Ethnicity native, other; upper, middle, lower SES; secondary education; Sampling strategy convenience; Data collection method questionnaires; reliability check NR; Outcome measure: non-risk behavior practiced/treatment and	descriptive	Positive predictors - NR Negative predictors - NR Overall view of model - NR

						<p>risk behavior practiced/no treatment</p> <p>2. Parents Follow up was conducted; male, female; upper, middle, lower SES; Sampling strategy snowball; Data collection method questionnaires; reliability check NR; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment</p> <p>3. Teachers follow up was conducted; Data collection method questionnaires; reliability check NR; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment</p>		
Motivational and Social Cognitive Predictors of Doping Intentions in Elite Sports: An Integrated Approach. (Barkoukis V, et al.; 2013)	other	unclear	D: Drug/substance abuse T: Other	Quantitative Cross-sectional study	TTI by Petraitis & Flay Modified version - different number of levels; incorporates another model	<p>Inclusion criteria - SES, other</p> <p>Facilitator(s) 1. Community leaders/sites - sampling strategy stratified;</p> <p>Participant(s) 1. Other Sample size 750; mean age 25; male, female; Data collection method questionnaire; reliability check performed; Outcome measure: risk behavior practiced/no treatment</p>	Regression sobel test	<p>Positive predictors - NR</p> <p>Negative predictors - negative influences and surroundings, other</p> <p>Overall view of model - NR</p>
Illicit Use of Prescription Stimulants in a College Student Sample: A Theory-Guided Analysis (Bavarian N, et al.; 2013)	Determine the cause of behavior other	USA	D: Drug/substance abuse T: Substance abuse/risk behavior	Quantitative Cross-sectional study	TTI by Petraitis & Flay Not modified	<p>Inclusion criteria - age, education</p> <p>Facilitator(s) 1. Education facility - Sample size 1; sampling strategy cluster;</p> <p>Participant(s) 1. Students Sample size 520; min age 18; male, female; Ethnicity white, Latin, Asian, other; degree education; Sampling strategy convenience; Data collection method questionnaires; reliability check NR; Outcome measure: risk behavior practiced/no treatment</p>	Regression Descriptive	<p>Positive predictors - positive influences and surroundings, other</p> <p>Negative predictors - negative influences and surroundings, negative personal beliefs, other</p> <p>Overall view of model - NR</p>
An Exploratory Multilevel Analysis of Nonprescription Stimulant Use in a Sample of College	other	USA	D: Drug/substance abuse T: other	Quantitative Cross-sectional Other secondary study	TTI by Petraitis & Flay Not modified	<p>Inclusion criteria - education</p> <p>Facilitator(s) 1. Educational institute - sample size 18;</p> <p>Participant(s) 1. Students</p>	Chi-square, regression	<p>Positive predictors - NR</p> <p>Negative predictors - negative influences and surroundings, medical</p>

Students (Bavarian N, et al.; 2014)						Sample size 10220; min age 18; male, female; Ethnicity black, white, Latin, Asian, mixed, native, other; degree education; Sampling strategy convenience, simple random; Data collection method secondary data; reliability check performed; Outcome measure: risk behavior practiced/no treatment		status/practices, culture, other Overall view of model - good
Using Structural Equation Modeling to Understand Prescription Stimulant Misuse: A Test of the Theory of Triadic Influence (Bavarian N, et al.; 2014)	Determine the cause of behavior Other	USA	D: Drug/substance abuse T: Substance abuse/risk behavior	Quantitative Cross-sectional study	TTI by Petraitis & Flay Not modified	Inclusion criteria - age, education Facilitator(s) 1. Educational institutions - sample size 1; sampling strategy simple random, cluster; Participant(s) 1. Students 554 sample size; min age 18; male, female; Ethnicity black, white, Latin, Asian, other; degree education; Sampling strategy convenience; Data collection method questionnaire; reliability check performed; Outcome measure: risk behavior practiced/no treatment	Descriptive, other	Positive predictors - positive influences and surroundings Negative predictors - negative influences and surroundings, lack of access to health care providers/facilities Overall view of model - NR
A Commentary on the Triadic Theory of Influence as a Guide for Adapting HIV Prevention Programs for New Contexts and Populations: The CHAMP-South Africa Story. (Bell CC, et al.; 2007)	Form or evaluate interventions	Urban Rural South Africa	D: Other T: Other	Unclear primary study	TTI by Petraitis & Flay Not modified	Inclusion criteria - other Facilitator(s) 1. Educational institute Participant(s) 1. Other Sample size 124; Sampling strategy convenience, snowball; reliability check performed Outcome measure: other	Qualitative NR Quantitative other	Positive predictors - NR Negative predictors - NR Overall view of model - better modified
The Critical Role of Nurturing Environments for Promoting Human Well-being. (Biglan A, et	other	NR	D: other T: Substance abuse/risk behavior	systematic review	TTI by Petraitis & Flay Modified version - different number of levels	Participant(s) 1. Books, journal articles Data collection method secondary data;	NA	Positive predictors - access to health care providers/facilities, knowledge/awareness, policies/rules, other Negative predictors - NR

al.; 2012)								Overall view of model - NR
Theories of How the School Environment Impacts on Student Health: Systematic Review and Synthesis. (Bonell CP, et al.; 2013)	other	NR	D: Other T: Other	Mixed methods Systematic review	TTI by Petraitis & Flay Modified version - incorporates another model	Inclusion criteria - age, health, education, other Facilitator(s) 1. Database - sample size 16; Participant(s) 1. Books, journal articles Sample size 37; Sampling strategy judgmental; Data collection method secondary data; Outcome measure: other	NA	Positive predictors - NR Negative predictors - NR Overall view of model - better modified
Family First: The Development of an Evidence-based Family Intervention for Increasing Participation in Psychiatric Clinical Care and Research in Depressed African American Adolescents (Breland-Noble AM, et al; 2006)	Form or evaluate interventions	USA	D: Other T: Other	Guideline	TTI by Petraitis & Flay Modified version - incorporates another model	Inclusion criteria - race Outcome measure: non-risk behavior practiced/treatment	NA	Positive predictors - NR Negative predictors - NR Overall view of model - NR
Psychological and Social Risk Factors in Adolescent Smoking Transitions: A Population-based Longitudinal Study. (Bricker JB, et al.; 2009)	Determine the cause of behavior	USA	D: Drug/substance abuse T: Other	Quantitative Longitudinal cohort	TTI by Petraitis & Flay Modified version - different number of levels/constructs	Inclusion criteria - education, other Facilitator(s) 1. Educational institute Participant(s) 1. Adolescents Sample size 4218; follow up was conducted; male, female; Ethnicity white, NR race; secondary, primary education; Data collection method questionnaires; reliability check performed; Outcome measure: risk behavior practiced/no treatment 2. Parents follow up not conducted; male, female;	Quantitative other	Positive predictors - positive influences and surroundings Negative predictors - negative influences and surroundings, negative personal beliefs Overall view of model - good

						Sampling strategy snowball; Collection tool questionnaires; reliability check performed; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment		
Determinants of Tobacco Use among Korean Female Adolescents: Longitudinal Test of the Theory of Triadic Influence (Chun J; 2014)	other	National South Korea	D: Drug/substance abuse T: Substance abuse/risk behavior	Longitudinal study Other secondary study	TTI by Petraitis & Flay Not modified	Inclusion criteria - sex, education Facilitator(s) 1. Databases Participant(s) 1. Adolescents Sample size 1594; follow up was conducted; female; secondary education; Sampling strategy stratified, cluster; consent NR; Data collection method questionnaire, secondary data; reliability check performed; Outcome measure: risk behavior practiced/no treatment	Chi-square Regression Descriptive statistics other	Positive predictors - positive influences and surroundings, personal beliefs Negative predictors - negative influences and surroundings, culture Overall view of model - good
Gender Differences in Factors Influencing Smoking, Drinking, and Their Co-occurrence among Adolescents in South Korea. (Chun J & Chung II; 2013)	Determine the cause of behavior	South Korea	D: Drug/substance abuse T: Substance abuse/risk behavior	Unclear primary study Other secondary study	TTI by Petraitis & Flay Modified version - different number of levels	Inclusion criteria - education Facilitator(s) 1. Databases - Sample size 1; sampling strategy judgmental; Participant(s) 1. Students Sample size 3188 follow up was conducted; mean age 15; male and female; Ethnicity native; secondary education; Sampling strategy stratified, cluster; Data collection method questionnaires, secondary data; reliability check performed; Outcome measure: risk behavior practiced/no treatment	Chi-square Regression Descriptive statistics	Positive predictors - positive influences and surroundings, personal beliefs, policies/rules Negative predictors - negative influences and surroundings, negative personal beliefs, culture, other Overall view of model - NR
The Grady Nia Project: A Culturally Competent Intervention for Low-income, Abused, and Suicidal African American Women (Davis SP; 2009)	Form or evaluate interventions	USA	D: other T: Substance abuse/risk behavior	guideline	TTI by Petraitis & Flay Modified version - different number of levels/constructs; incorporates another model	Inclusion criteria - sex, race NA	NA	Positive predictors - positive influences and surroundings, personal beliefs, access to health care providers/facilities, culture Negative predictors - NR Overall view of model - NR
Determinants of Adolescent Bicycle Use for	Determine the cause of behavior	Netherlands	D: Other T: Other	Quantitative Cross-sectional	TTI by Petraitis & Flay	Inclusion criteria - education Facilitator(s)	Regression, correlation	Positive predictors - culture, other

Transportation and Snacking Behavior (de Bruijn G, et al.; 2005)	other			study	Modified version - different number of levels/constructs; incorporates another model	1. Educational institute - sample size 75; sampling strategy simple random; Participant(s) 1. Students Sample size 3859; mean age 14.8; male, female; Ethnicity native, other; secondary, degree education; Data collection tool questionnaires; reliability check performed; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment		Negative predictors - culture, other Overall view of model - NR
Predictors of Binge Drinking in Adolescents: Ultimate and Distal Factors - a Representative Study (Donath C, et al.; 2012)	Determine the cause of behavior	Urban Rural Germany	D: Drug/substance abuse T: Other	Quantitative Cross-sectional study	TTI by Petraitis & Flay Modified version - different number of levels/constructs	Inclusion criteria - education Facilitator(s) 1. Educational institute - sample size 2131; sampling strategy stratified; Participant(s) 1. Adolescents Sample size 44610; mean age 15.3; male, female; secondary education; Sampling strategy convenience; Data collection method questionnaire; reliability check performed; Outcome measure: risk behavior/no treatment	Chi-square, regression, correlation, other	Positive predictors - personal beliefs Negative predictors - negative influences and surroundings, negative personal beliefs, other Overall view of model - better modified
Targets for Primary Prevention: Cultural, Social and Intrapersonal Factors Associated with Co-occurring Health-related Behaviors. (Dusseldorp E, et al.; 2014)	Form or evaluate interventions	National Netherlands	D: Other T: Other	Cross-sectional study	TTI by Petraitis & Flay Modified version - different number of levels/constructs	Inclusion criteria - other Facilitator 1. Database - sample size 1; Participants 1. other Sample size 3497; min age 19, max age 40, mean age 30.64; male, female; Ethnicity native, other; degree, secondary, primary education; married/dating, single, divorced; Sampling strategy stratified; Data collection method questionnaire and interviews; reliability check NR; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment	Regression, correlation	Positive predictors - positive influences and surroundings, personal beliefs Negative predictors - NR Overall view of model - good
Effects of 2 Prevention Programs on High-risk Behaviors	Form or evaluate interventions	USA	D: other T: Substance abuse/risk behavior	Randomized controlled trial cohort	TTI by Petraitis & Flay Modified version - unclear	Inclusion criteria - race, SES, education, other Facilitator(s) 1. Education institution - sample size 12; sampling strategy judgmental, stratified, other;	Regression tailed test other	Positive predictors - positive influences and surroundings, personal beliefs, other

among African American Youth: A Randomized Trial. (Flay BR, et al.; 2004)						Participant(s) 1. Students Sample size 664; follow up was conducted; mean age 10.8; male, female; Ethnicity black, Latin, NR; primary education; Sampling strategy convenience; Data collection method questionnaires; reliability check performed; Outcome measure: risk behavior practiced/no treatment		Negative predictors - other Overall view of model - NR
A Culturally-informed Approach to Trauma, Suicidal Behavior, and Overt Aggression in African American Adolescents (Graves KN, et al.; 2010)	Determine the cause of behavior	USA	D: Other T: Other	Simple overview	TTI by Petraitis & Flay Modified version - different number of levels	Inclusion criteria - age, race Participant(s) 1. Book, journal articles Data collection method secondary data; Outcome measure: other;	NA	Positive predictors - positive influences and surroundings, personal beliefs Negative predictors - negative influences and surroundings, negative personal beliefs, other Overall view of model - NR
Influences Affecting Adolescent Smoking Behavior in China. (Grenard JL, et al.; 2006)	other	China	D: Drug/substance abuse T: other	Quantitative Longitudinal Other secondary study	TTI by Petraitis & Flay Not modified	Inclusion criteria - education Facilitator(s) 1. Educational institute - sample size 147; follow up was conducted; Sampling strategy stratified; Participant(s) 1. Students Sample size 11583; follow up was conducted; male, female; Ethnicity native, other, NR; secondary, primary education; Sampling strategy convenience; Data collection method secondary data; reliability check performed; Outcome measure: risk behavior practiced/no treatment 2. Parents follow up was conducted; Sampling strategy snowball; Data collection method secondary data; reliability check performed Outcome measure: NR	Chi-square t-test other	Positive predictors - NR Negative predictors - negative influences and surroundings, other Overall view of model - NR
Concurrent Predictors of Cigarette and	other	USA, Russia	D: Drug/substance abuse	Quantitative Cross-sectional	TTI by Petraitis & Flay	Inclusion criteria - sex, age, race, education Facilitator(s)	Regression, correlation, tailed test,	Positive predictors - personal beliefs

Alcohol Use among U.S. and Russian Adolescents (Gunning M, et al.; 2009)			T: other	study	Modified version - different number of levels	<p>1. Education institutions - sample size 10; sampling strategy convenience;</p> <p>Participant(s)</p> <p>1. Students Sample size 365; mean age 15.65; male, female; Ethnicity white, Asian, mixed, other; secondary education; Data collection method questionnaires; reliability check performed; Outcome measure: risk behavior practiced/no treatment</p> <p>2. students Sample size 965; mean age 15.14; male, female; Ethnicity black, white, Latin, Asian, mixed, native, other; secondary education; Data collection method questionnaires; reliability check conducted; Outcome measure: risk behavior practiced/no treatment</p>	other	<p>Negative predictors - negative influences and surroundings, other</p> <p>Overall view of model - good</p>
A Multilevel-based Study of School Policy for Tobacco Control in Relation to Cigarette Smoking among Children in Elementary Schools: Gender Differences. (Huang HL, et al.; 2010)	<p>Explore views on vaccination, screening or disease/condition</p> <p>other</p>	<p>Urban Rural Taiwan</p>	<p>D: Drug/substance abuse</p> <p>T: Substance abuse/risk behavior</p>	Cross-sectional study	<p>TTI by Petraitis & Flay</p> <p>Modified version - different number of levels</p>	<p>Inclusion criteria - education</p> <p>Facilitator(s)</p> <p>1. Education institution - sample size 26; sampling strategy cluster;</p> <p>Participant(s)</p> <p>1. Students Sample size 2350; min age 10.9; male, female; primary education; Sampling strategy convenience; Data collection method questionnaires; reliability check NR; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment;</p> <p>2. Parents Sampling strategy snowball; Data collection method questionnaires; reliability check NR; Outcome measure: NR</p> <p>3. Teachers Sample size 52; Sampling strategy judgmental; Data collection method questionnaires; reliability check NR; Outcome measure: other</p>	regression	<p>Positive predictors - knowledge/awareness, policies/rules</p> <p>Negative predictors - negative influences and surroundings, lack of knowledge/awareness, culture, other</p> <p>Overall view of model - NR</p>
School-level	Determine the	Taiwan	D:	Quantitative	TTI by Petraitis	Inclusion criteria - race, other	regression	Positive predictors -

Contextual Factors Associated with Betel Quid Chewing among Schoolchildren in Taiwan. (Huang HL, et al.; 2009)	cause of behavior		Drug/substance abuse T: Substance abuse/risk behavior	Cross-sectional study Other secondary study	& Flay Modified version - different number of levels/constructs	Facilitator(s) 1. Educational institute - sample size 13; sampling strategy simple random; Participant(s) 1. Students Sample size 1585; mean age 8.9; male, female; upper, middle, lower SES; primary education; Sampling strategy convenience; Data collection method questionnaires, secondary data; reliability check unclear; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment 2. Parents male, female; upper, middle, lower SES; degree, secondary, primary; Sampling strategy snowball; Data collection method questionnaires, secondary data; reliability check unclear; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment		NR Negative predictors - negative influences and surroundings, culture, other Overall view of model - NR
Starting to Smoke: A Qualitative Study of the Experiences of Australian Indigenous Youth. (Johnston V, et al.; 2012)	Determine the cause of behavior	Urban Rural Australia	D: Drug/substance abuse T: Substance abuse/risk behavior	Qualitative Unclear primary study	TTI by Petraitis & Flay Not modified	Inclusion criteria - age, race Facilitator(s) 1. Researchers, mediators - sample size 6 Participant(s) 1. Youth Sample size 65; min age 13, max age 20, mean age 15.6; male, female; Ethnicity native, other; Sampling strategy convenience, cluster; Data collection method interviews, focus groups, other; reliability check NR; Outcome measure: risk behavior practiced/no treatment	Constant comparison Thematic analysis	Positive predictors - positive influences and surroundings, policies/rules, other Negative predictors - negative influences and surroundings, negative personal beliefs, policies/rules, other Overall view of model - NR
Suicidal, Abused African American Women's Response to a Culturally Informed Intervention (Kaslow NJ, et	Form or evaluate interventions	Urban USA	D: Other T: Substance abuse/risk behavior	Randomized controlled trial	TTI by Petraitis & Flay Modified version - different number of levels/constructs	Inclusion criteria - sex, race, health Facilitator(s) 1. Health care professionals/facility - sample size 1; Participant(s) 1. Women Sample size 131; follow up was conducted; min age 18; max age 64;	Chi-square, regression, other	Positive predictors - positive influences and surroundings, culture Negative predictors - NR Overall view of model

al.; 2010)						Ethnicity black race; lower SES; married/dating; Sampling strategy simple random; Data collection method interviews; reliability check performed; Outcome measure: risk behavior/no treatment		- better modified
Cultural, Social and Intrapersonal Factors Associated with Clusters of Co-occurring Health-related Behaviors among Adolescents. (Klein Velderman M, et al.; 2015)	Determine the cause of behavior other	National Netherlands	D: Other T: Other	Quantitative Cross-sectional study	TTI by Petraitis & Flay Modified version - different number of levels	Inclusion criteria - sex, age, education Participant(s) 1. Adolescents Sample size 898; min age 12, max age 18; male, female; Data collection method questionnaire, interview; reliability check performed; Outcome measure: risk behavior practiced/no treatment;	Regression, descriptive, correlation	Positive predictors - positive influences and surroundings, personal beliefs Negative predictors - other Overall view of model - NR
Brief Report: The Adaptation of Project Northland for Urban Youth. (Komro KA, et al.; 2004)	Form or evaluate interventions	Urban USA	D: Drug/substance abuse T: Substance abuse/risk behavior	Randomized controlled trial Simple overview	TTI by Petraitis & Flay Modified version - different number of levels/constructs; incorporates another model	Inclusion criteria - education Facilitator(s) 1. Educational institutes - sample size 61; Participant(s) 1. Students Sample size 4164, follow up conducted; Ethnicity black, white, Latin, Asian, mixed, native; primary education; Data collection method observation, questionnaire, focus groups; reliability check NR; Outcome measure: risk behavior practiced/no treatment 2. Parents Data collection method questionnaire, interviews; reliability check NR; Outcome measure: other 3. Community leaders Data collection method questionnaire; reliability check NR; Outcome measure: NR	NR	Positive predictors - NR Negative predictors - NR Overall view of model - NR
Participation in a Sigmoidoscopic Colorectal Cancer Screening	Examine acceptance and non- acceptance of vaccination, screening or treatment	Netherlands	D: Colon and Rectal Cancer T: Screening	Quantitative Other primary study	TTI by Petraitis & Flay Modified version - different number of levels	Inclusion criteria - age, health Facilitator(s) 1. Health care professionals/facilities - sample size 2; Participant(s)	Chi-square, regression, descriptive, z-test	Positive predictors - positive influences and surroundings, knowledge/awareness, medical status/practices

Program: A Pilot Study (Kremers SP, et al.; 2000)						1. Patients Sample size 200; min age 50, max age 60, mean age 55.4; male and female; degree, secondary, primary education; mixed screened and not screened; Sampling strategy convenience, judgmental; Data collection method questionnaires, biophysical tests; reliability check performed; Outcome measure: screening practiced		Negative predictors - negative personal beliefs, medical status/practices, other Overall view of model - better modified
Description of an Efficacious Behavioral Peer-driven Intervention to Reduce Racial/Ethnic Disparities in AIDS Clinical Trials. (Leonard NR, et al.; 2013)	Form or evaluate interventions	USA	D: Other T: screening	Guideline	TTI by Petraitis & Flay Modified version - different number of levels; different names/contents; incorporates another model	Inclusion criteria - race Outcome measure: screening practiced	NA	Positive predictors - access to health care providers/facilities, other Negative predictors - other Overall view of model - NR
Health-promoting and Health-risk Behaviors: Theory-driven Analyses of Multiple Health Behavior Change in Three International Samples (Lippke S, et al.; 2012)	other	National USA, Germany	D: Other T: Other	Quantitative Cross - sectional study	TTI by Petraitis & Flay Modified version - unclear	Inclusion criteria - health, other Participant(s) 1. Adults Sample size 3519; min age 18, max age 91, mean age 46.31; male, female; degree, secondary, primary education; Sampling strategy simple random; Data collection method interviews; reliability check not performed; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment 2. Other Sample size 961; min age 15, max age 81, mean age 39.21; male, female; degree, secondary, primary education; Sampling strategy convenience; Data collection method questionnaires; reliability check not performed; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment 3. Adults Sample size 310; min age 18, max age 75, mean age 43.52; male, female;	Correlation, other	Positive predictors - other Negative predictors - other Overall view of model - NR

						degree, secondary education; Sampling strategy convenience, snowball; Data collection method questionnaires; reliability check not performed; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment		
Predicting Self-initiated Marijuana Use Cessation among Youth at Continuation High Schools. (Little MA, et al.; 2013)	Determine the cause of behavior	USA	D: Drug/substance abuse T: Substance abuse/risk behavior	Quantitative Longitudinal study	TTI by Petraitis & Flay Modified version - different number of levels	Inclusion criteria - education Facilitator(s) 1. Educational institutions - sample size 24; follow up was conducted; sampling strategy convenience; Participant(s) 1. Students Sample size 522; follow up was conducted; min age 14, max age 20, mean age 16.7; male and female; Ethnicity black, white, Latin, Asian, mixed, native, other; secondary education; Sampling strategy convenience; Data collection method questionnaire; reliability check performed; Outcome measure: non-risk behavior practiced/treatment	Chi-square, regression, t-test, tailed test, other	Positive predictors - positive influences and surroundings, personal beliefs Negative predictors - negative influences and surroundings, negative personal beliefs Overall view of model - NR
The Development and Implementation of Theory-driven Programs Capable of Addressing Poverty-impacted Children's Health, Mental Health, and Prevention Needs: CHAMP and CHAMP+, Evidence-informed, Family-based Interventions to Address HIV Risk and Care. (McKay MM,	Form or evaluate interventions	High income Middle income Multiple countries	D: Other T: Other	Simple overview	TTI by Petraitis & Flay Modified version - different number of levels	Inclusion criteria - race NA	NA	Positive predictors - NR Negative predictors - NR Overall view of model - good

et al.; 2014)								
A Multilevel Analysis Examining the Association Between School-based Smoking Policies, Prevention Programs and Youth Smoking Behavior: Evaluating a Provincial Tobacco Control Strategy. (Murnaghan DA, et al.; 2008)	Determine the cause of behavior	Canada	D: Drug/substance abuse T: Substance abuse/risk behavior	Quantitative Cross-sectional study	TTI by Petraitis & Flay Modified version - different number of levels	Inclusion criteria - education Facilitator(s) 1. Education institution - sample size 10; no exclusions; sampling strategy judgmental; Participant(s) 1. Students Sample size 4732; male, female; Data collection method questionnaires; reliability check NR; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment;	Chi-square, regression, descriptive	Positive predictors - positive influences and surroundings, knowledge/awareness, policies/rules Negative predictors - negative influences and surroundings, policies/rules Overall view of model - NR
Cultural and Social Influences on Food Consumption in Dutch Residents of Turkish and Moroccan Origin: A Qualitative Study. (Nicolaou M, et al.; 2009)	Determine the cause of behavior Form or evaluate interventions	Netherlands	D: Other T: Other	Qualitative Unclear primary study	TTI by Petraitis & Flay Modified version - different number of levels/constructs	Inclusion criteria - sex, age, race Facilitator(s) 1. Community leaders/sites - sample size 6; Participant(s) 1. Other Sample size 79; male and female; Ethnicity Arab; degree, secondary, primary education; Muslim religion; Sampling strategy convenience; Data collection method focus group; reliability check NR; Outcome measure: other	Framework analysis	Positive predictors - culture, other Negative predictors - negative influences and surroundings, negative personal beliefs Overall view of model - better modified
Adolescent Psychological and Social Predictors of Young Adult Smoking Acquisition and Cessation: A 10-Year Longitudinal Study. (Otten R, et al.;	Determine the cause of behavior	USA	D: Drug/substance abuse T: other	Longitudinal cohort	TTI by Petraitis & Flay Modified version - different number of levels	Inclusion criteria - age, health Participant(s) 1. Adolescents Sample size 2970; follow up was conducted; male, female; Data collection method questionnaires; reliability check NR; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment;	Chi-square, other	Positive predictors - positive influences and surroundings Negative predictors - negative influences and surroundings, negative personal beliefs Overall view of model - good

2011)								
Project Northland: Long-term Outcomes of Community Action to Reduce Adolescent Alcohol Use. (Perry CL, et al.; 2002)	Form or evaluate interventions	Rural USA	D: Drug/substance abuse T: Substance abuse/risk behavior	Randomized controlled trial	TTI by Petraitis & Flay Modified version - unclear	Inclusion criteria - SES, education Facilitator(s) 1. Educational institutes - sample size 24; exclusions were made; Participant(s) 1. Students Sample size 3151; follow up was conducted; middle and low SES; primary education; Data collection method questionnaire; reliability check performed; Outcome measure: risk behavior practiced/no treatment 2. Parents Sample size 2048 in 1996; 1793 in 1998; follow up was conducted; middle and low SES; Data collection tool questionnaire; reliability check conducted; Outcome measure: risk behavior practiced/no treatment	Regression other	Positive predictors - positive influences and surroundings, other Negative predictors - negative influences and surroundings, other Overall view of model - NR
A Review of Similarities between Domain-specific Determinants of Four Health Behaviors among Adolescents. (Peters LWH, et al.; 2009)	Determine the cause of behavior Form or evaluate interventions	Netherlands	D: other T: Substance abuse/risk behavior other	Systematic review	TTI by Petraitis & Flay Not modified	Inclusion criteria - age, other Facilitator(s) 1. Databases - Sample size 2; sampling strategy judgmental Participant(s) 1. Book, journal articles Sample size 87; Sampling strategy judgmental; Data collection method secondary data; Outcome measure: other	Qualitative other	Positive predictors - positive influences and surroundings, personal beliefs Negative predictors - negative influences and surroundings, negative personal beliefs, other Overall view of model - NR
Effects of Transfer-oriented Curriculum on Multiple Behaviors in the Netherlands. (Peters LWH, et al.; 2015)	other	Netherlands	D: other T: Substance abuse/risk behavior other	Cross-sectional study Other primary study	TTI by Petraitis & Flay Modified version - unclear	Inclusion criteria - race, education Facilitator(s) 1. Educational institute - sample size 23; sampling strategy simple random; Participant(s) 1. Students follow up was conducted; mean age 13.5; male, female; Ethnicity mixed, native; secondary education; Sampling strategy convenience; Data collection method questionnaires; reliability check performed;	Regression t-test other	Positive predictors - other Negative predictors - NR Overall view of model - NR

						Outcome measure: other		
Sexual Violence and Youth in South Africa: The Need for Community-based Prevention Interventions (Petersen I, et al.; 2005)	Determine the cause of behavior	Rural South Africa	D: other T: Substance abuse/risk behavior	Qualitative Case-study	TTI by Petraitis & Flay Modified version - different names/contents	Inclusion criteria - age Facilitator(s) 1. Educational institute - sample size 1; Participant(s) 1. Adolescents Sample size 10 and 10; follow up was conducted; min age 13, max age 16; male, female; Ethnicity black; Sampling strategy convenience; Data collection method interview, focus groups; reliability check NR; Outcome measure: risk behavior practiced/no treatment	Constant comparison Thematic analysis other	Positive predictors - NR Negative predictors - negative influences and surroundings, negative personal beliefs, culture, other Overall view of model - good
Youth Culture and Smoking: Integrating Social Group Processes and Individual Cognitive Processes in a Model of Health-Related Behaviors. (Schofield PE, et al.; 2003)	other	Australia	D: Drug/substance abuse T: other	cohort	TTI by Petraitis & Flay Modified version - different number of levels/constructs; incorporates another model	Inclusion criteria - other Facilitator(s) 1. Educational institute - sample size 93; sampling strategy stratified; Participant(s) 1. Adults Sample size 1584, 1423, 1379; follow up was conducted; male, female; secondary education; Sampling strategy simple random; Data collection method questionnaires; reliability check performed; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment	Chi-square, z-test, other	Positive predictors - NR Negative predictors - negative influences and surroundings, other Overall view of model - better modified
Maternal Expectations, Mother-Child Connectedness, and Adolescent Sexual Debut. (Sieving RE, et al.; 2000)	other	USA	D: Other T: Other	Longitudinal study	TTI by Petraitis & Flay Modified version - different number of levels/constructs	Inclusion criteria - education, other Facilitator(s) 1. Educational institute - sampling strategy stratified; Participant(s) 1. Adolescents Sample size 3322; follow up was conducted; male, female; Ethnicity black, white, Latin, other race; secondary education; Sampling strategy interviews; reliability check performed; Outcome measure: risk behavior practiced/no treatment and other 2. Parents follow up was conducted; female;	Regression Correlation other	Positive predictors - positive influences and surroundings Negative predictors - other Overall view of model - NR

						Sampling strategy interviews; reliability check performed; Outcome measure: other		
Community Perceptions of Adequate Levels and Reasons for Skin Protection. (Stanton WR, et al.; 2005)	Explore views on vaccination, screening or disease/condition Determine the cause of behavior	Australia	D: Melanoma T: other	Quantitative Unclear primary study	TTI by Petraitis & Flay Modified version - different number of levels/constructs	Inclusion criteria - age Participant(s) 1. Adults Sample size 36000; min age 18; male, female; sampling strategy simple random; Data collection tool questionnaire; reliability check performed; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment;	ANOVA	Positive predictors - positive influences and surroundings, personal beliefs, health care provider recommendations, medical status/practices Negative predictors - negative influences and surroundings, negative personal beliefs, lack of knowledge/awareness, medical status/practices, other Overall view of model - NR
The One-year Prospective Prediction of Substance Abuse and Dependence among High-risk Adolescents. (Sussman S, et al.; 2000)	Determine the cause of behavior	USA	D: Drug/substance abuse T: Substance abuse/risk behavior	Quantitative Longitudinal study	TTI by Petraitis & Flay Modified version - different number of levels/constructs	Inclusion criteria - sex, race, SES Facilitator(s) 1. Educational institutions - Sample size 21; Participant(s) 1. Students Sample size 702; follow up was conducted; mean age 16.8; male, female; Ethnicity black, white, Latin; secondary education; Data collection method questionnaires; reliability check performed; Outcome measure: other	Regression	Positive predictors - NR Negative predictors - negative influences and surroundings, negative personal beliefs, other Overall view of model - NR
Concurrent Predictors of Drug Use Consequences among U.S. and Russian Adolescents. (Sussman S, et al.; 2009)	other	USA, Russia	D: Drug/substance abuse T: other	Quantitative Cross-sectional study	TTI by Petraitis & Flay Modified version - different number of levels/constructs	Inclusion criteria - sex, age, race, education Facilitator(s) 1. Education institution - sample size 10; sampling strategy convenience; Participant(s) 1. students Sample size 365; mean age 15.65; male, female; Ethnicity white, Asian, mixed, other; secondary education; Data collection method questionnaires; reliability check	Regression, tailed test other	Positive predictors - personal beliefs Negative predictors - negative influences and surroundings, negative personal beliefs Overall view of model - NR

						<p>performed; Outcome measure: risk behavior practiced/no treatment</p> <p>2. Student(s) Sample size 965; mean age 15.14; male, female; Ethnicity black, white, Latin, Asian, mixed, native, other; secondary education; Data collection method questionnaires; reliability check performed; Outcome measure: risk behavior practiced/no treatment</p>		
<p>Prospective Predictors of Technology-Based Sexual Coercion by College Males. (Thompson MP & Morrison DJ; 2013)</p>	<p>Determine the cause of behavior other</p>	unclear	<p>D: Other T: Other</p>	Unclear primary study	<p>TTI by Petraitis & Flay Modified version - different number of levels/constructs</p>	<p>Inclusion criteria - sex, age, education</p> <p>Facilitator(s) 1. Education institute - sample size 1;</p> <p>Participant(s) 1. Students Sample size 571, follow up was conducted; male; degree education; religion none and other; sampling strategy convenience; Data collection method questionnaires; reliability check performed; Outcome measure: risk behavior practiced/no treatment</p>	Regression, correlation	<p>Positive predictors - other</p> <p>Negative predictors - negative influences and surroundings, negative personal beliefs, other</p> <p>Overall view of model - good</p>
<p>Obesity Prevention in Low Socioeconomic Status Urban African-American Adolescents: Study Design and Preliminary Findings of the Health-Kids Study. (Wang Y, et al.; 2006)</p>	Form or evaluate interventions	USA	<p>D: Other T: Other</p>	<p>Mixed methods Cross-sectional cohort</p>	<p>TTI by Petraitis & Flay Modified version - other</p>	<p>Inclusion criteria - race, education, SES</p> <p>Facilitator(s) 1. Educational institutions - sample size 4, follow up conducted; sampling strategy judgmental;</p> <p>Participant(s) 1. Students Sample size 450; follow up was conducted; male and female; Ethnicity black, white, Latin; primary education; Sampling strategy convince, judgmental, simple random; Data collection method focus groups; reliability check performed; Outcome measure: other</p> <p>2. Parents Sample size 230; Sampling strategy judgmental, snowball, simple random; Data collection method questionnaires, focus groups; reliability check performed; Outcome measure: other</p> <p>3. Other</p>	<p>Thematic analysis Quantitative other</p>	<p>Positive predictors - knowledge/awareness, other</p> <p>Negative predictors - negative influences and surroundings, lack of access to health care providers/facilities, other</p> <p>Overall view of model - good</p>

						Sampling strategy judgmental, simple random; Data collection method observation, focus groups; reliability check performed; Outcome measure: other		
Developmental Trajectories of Cigarette Use and Associations with Multilayered Risk Factors among Chinese Adolescents. (Xie B, et al.; 2013)	Other	Urban Rural China	D: Drug/substance abuse T: other	Quantitative Longitudinal Other secondary study	TTI by Petraitis & Flay Modified version - different number of levels/constructs	Inclusion criteria - education Facilitator(s) 1. Educational institute - sample size 22; Participant(s) 1. Adolescents Sample size 3521; follow up was conducted; min age 12, max age 15; male, female; primary education; Sampling strategy simple random; Data collection method secondary data; reliability check performed; Outcome measure: non-risk behavior practiced/treatment and risk behavior practiced/no treatment	Descriptive, other	Positive predictors - positive influences and surroundings, policies/rules Negative predictors - negative influences and surroundings, negative personal beliefs Overall view of model - NR

NA = Not Applicable; NR = Not Reported; SES = Social Economic Status; D = Disease/Condition; T = Treatment

Characteristics of study participants are indicated if the data was available in the study, if the data was of significance to the research

Table 2.8: Quality assessment of studies using the SEM

Study (author(s), year)	Clarity of CRQ(s)/ hypothesis	Clarity of data collection methods	Clarity of sampling plan	Clarity of sampling size	Clarity of analysis method	Clarity of conclusions	Clarity of limitations	Overall quality of study
Factors Contributing to Filipinos' Resistance to Preventive Screening. (Atassi K, et al.; 2010)	1	1	0	1	0	1	0	4
Factors Predicting BCG Immunization Status in Northern Nigeria: A Behavioral-ecological Perspective. (Babalola S & Lawan U; 2009)	1	2	1	1	1	1	0	7
Enhancing Benefits or Increasing Harms: Community Responses for HIV among Men Who have Sex with Men, Transgender Women, Female Sex Workers, and People Who Inject Drugs. (Baral S, et al.; 2014)	1	2	2	2	0	1	0	8
Understanding the Interplay of Factors Informing Vaccination	2	2	2	2	1	1	2	12

Behavior in Three Canadian Provinces. (Boerner F, et al; 2013)								
Theorizing Social Context: Rethinking Behavioral Theory (Burke NJ, et al.; 2009)	0	0	0	0	0	1	0	1
Willingness to Participate in HIV Vaccine Trials among Men Who have Sex with Men in Chennai and Mumbai, India: A Social Ecological Approach (Chakrapani V, et al.; 2012)	1	2	2	2	1	1	2	11
American Heart Association Childhood Obesity Research Summit Report. (Daniels RS, et al.; 2009)	2	0	0	0	0	1	2	5
Perspectives of African American, Amish, Appalachian and Latina women on Breast and Cervical Cancer Screening: Implications for Cultural Competence. (Documét PI, et al.; 2008)	1	2	1	2	1	1	2	10
Increasing Use of Mammography among Older, Rural African American Women: Results from a Community Trial. (Earp JA et al, 2002)	0	2	2	2	1	1	2	10
Beyond Effectiveness: Evaluating the Public Health Impact of the WISEWOMAN Program. (Farris RP, et al.; 2007)	2	2	0	2	1	1	2	10
Barriers and Facilitators to HPV Vaccination of Young Women in High-income Countries: A Qualitative Systematic Review and Evidence Synthesis. (Ferrer HB, et al.; 2014)	2	2	2	2	1	1	2	12
Behavioral Science Research in the Prevention of Diabetes: Status and Opportunities. (Fisher EB, et al.; 2002)	2	0	0	0	0	1	0	3
Applying core principles to the design and evaluation of the 'Take Charge. Take the Test' campaign: what worked and lessons learned. (Fraze JL et al., 2009)	0	1	0	0	1	1	1	4
"I Connect with the Ringleader:" Health Professionals' Perspectives on Promoting the Sexual Health of Adolescent Males. (Garcia MC, et al.; 2014)	2	2	2	2	1	1	0	10
Health Disparities in Colorectal Cancer Screening in the United States: An Application of the Social Ecological Model	0	0	0	0	0	1	1	2

(Greene DM; 2011)								
Social Context and Drivers of Intimate Partner Violence in Rural Kenya: Implications for the Health of Pregnant Women. (Hatcher AM, et al.; 2013)	1	2	1	2	1	1	2	10
Using Technology to Expedite Screening and Intervention for Domestic Abuse and Neglect. (Hawkins JW, et al.; 2009)	1	2	2	0	0	1	2	8
Lay Health Advisors: Promoting Cancer Screening and Reducing Disparities. (Hilaire DM; 2011)	1	0	0	0	0	1	1	3
Considerations for National Public Health Leadership in Advancing Sexual Health. (Ivankovich MB, et al.; 2013)	0	0	0	0	0	1	0	1
Chiropractic Care and Public Health: Answering Difficult Questions About Safety, Care Through the Lifespan, and Community Action. (Johnson, C, et al., 2012)	2	2	0	0	0	1	1	6
The Social Ecological Model as a Framework for Determinants of 2009 H1N1 Influenza Vaccine Uptake in the United States (Kumar S, et al.; 2012)	2	2	2	2	1	1	1	11
Issue Editor's Preface: Linkages to Leverage Improvement in Health. (Larson CO, 2004)	0	0	0	0	0	1	0	1
Public Education and Targeted Outreach to Underserved Women Through the National Breast and Cervical Cancer Early Detection Program. (Levano W, et al.; 2014)	0	0	0	2	0	1	0	3
Theoretical Approaches to Motivating Change: A Farm Family Case Example (Lund CH, et al.; 2005)	0	0	0	2	0	1	0	3
Strategies for Increasing Cervical Cancer Screening Amongst First Nations Communities in Northwest Ontario, Canada. (Maar M, et al.; 2014)	1	2	2	0	1	1	0	7
Prevalence and Correlates of Breast and Cervical Cancer Screening among a Midwest Community Sample of Low-Acculturated Latinas (Martínez -Donate AP, et al.; 2013)	1	2	2	2	1	1	2	11

Factors Influencing Frontline Health Service Providers' Likelihood to Recommend a Future, Preventive HIV Vaccine to Key Populations in Karnataka, South India (McClarty LM, et al.; 2015)	1	2	2	2	1	1	2	11
Barriers and Facilitators to Testing, Treatment Entry, and Engagement in Care by HIV-positive Women of Color. (Messer LC, et al.; 2013)	1	2	2	2	1	1	2	11
Social Determinants Associated with Colorectal Cancer Screening in an Urban Community Sample of African-American Men (Mitchell JA, et al.; 2013)	1	2	2	2	1	1	2	11
Mammography Facilities are Accessible, so Why is Utilization so Low? (Mobley LR et al., 2009)	2	1	0	2	1	1	2	9
The Role of Religious Values in Decisions about Genetics and the Public's Health (Modell SM, et al.; 2014)	1	2	0	0	0	1	0	4
A Community-based Participatory Research Approach to Understanding Pap Testing Adherence among Vietnamese American Immigrants. (Nguyen-Truong CKY, et al.; 2012)	1	2	2	2	1	1	2	11
Applying the Social Ecological Model to Evaluate a Demonstration Colorectal Cancer Screening Program in Louisiana (Nuss HJ, et al.; 2012)	0	2	2	2	1	1	1	9
PCNA 19th Annual Symposium: Poster Abstracts. (PCNA, 2013)	1	2	2	2	0	1	0	8
Public Policy Approaches to the Prevention of Heart Disease and Stroke. (Pearson AT, 2011)	0	0	0	0	0	1	0	1
Linkages Between Clinical Practices and Community Organizations for Prevention: A Literature Review and Environmental Scan. (Porterfield SD, et al., 2012)	2	2	2	2	0	1	2	11
Social Work in the Emergency Department-implementation of a Domestic and Family Violence Screening Program (Power C, et al.; 2011)	2	2	1	1	1	1	0	8
Determinants of Mammography in Women with Intellectual Disabilities	1	2	0	2	1	1	2	8

(Wilkinson JE, et al.; 2011)								
Social Ecological Predictors of Prostate-specific Antigen Blood Test and Digital Rectal Examination in Black American Men (Woods VD, et al.; 2006)	1	2	2	2	1	1	2	11
A Community-based Approach to Translational Research Addressing Breast Cancer Disparities. (Yeary K, et al.; 2011)	1	2	2	2	1	1	0	9

Table 2.9: Quality assessment of studies using the TTI

Study (author(s), year)	Clarity of CRQ(s)/ hypothesis	Clarity of data collection methods	Clarity of sampling plan	Clarity of sampling size	Clarity of analysis method	Clarity of conclusions	Clarity of limitations	Overall quality of study
Design of a School-based Randomized Trial to Reduce Smoking among 13 to 15-year olds, the X:IT Study. (Andersen A, et al.; 2014)	1	2	1	1	1	1	1	8
Motivational and Social Cognitive Predictors of Doping Intentions in Elite Sports: An Integrated Approach. (Barkoukis V, et al.; 2013)	2	2	0	2	1	1	2	10
Illicit Use of Prescription Stimulants in a College Student Sample: A Theory-Guided Analysis (Bavarian N, et al.; 2013)	1	2	2	2	1	1	2	11
An Exploratory Multilevel Analysis of Nonprescription Stimulant Use in a Sample of College Students (Bavarian N, et al.; 2014)	2	2	2	2	1	1	2	12
Using Structural Equation Modeling to Understand Prescription Stimulant Misuse: A Test of the Theory of Triadic Influence (Bavarian N, et al.; 2014)	2	2	2	2	1	1	2	12
A Commentary on the Triadic Theory of Influence as a Guide for Adapting HIV Prevention Programs for New Contexts and Populations: The CHAMP-South Africa Story. (Bell CC, et al.; 2007)	0	0	2	2	1	1	0	6
The Critical Role of Nurturing Environments for Promoting Human Well-being. (Biglan A, et al.; 2012)	0	0	0	0	0	1	0	1

Theories of How the School Environment Impacts on Student Health: Systematic Review and Synthesis. (Bonell CP, et al.; 2013)	2	2	2	2	0	1	2	11
Family First: The Development of an Evidence-based Family Intervention for Increasing Participation in Psychiatric Clinical Care and Research in Depressed African American Adolescents (Breland-Noble AM, et al; 2006)	0	1	0	0	0	1	1	3
Psychological and Social Risk Factors in Adolescent Smoking Transitions: A Population-based Longitudinal Study. (Bricker JB, et al.; 2009)	2	2	1	1	1	1	2	10
Determinants of Tobacco Use among Korean Female Adolescents: Longitudinal Test of the Theory of Triadic Influence (Chun J; 2014)	1	2	2	2	1	1	2	11
Gender Differences in Factors Influencing Smoking, Drinking, and Their Co-occurrence among Adolescents in South Korea. (Chun J & Chung IJ; 2013)	1	2	2	2	1	1	2	11
The Grady Nia Project: A Culturally Competent Intervention for Low-income, Abused, and Suicidal African American Women (Davis SP; 2009)	0	0	0	0	0	1	0	1
Determinants of Adolescent Bicycle Use for Transportation and Snacking Behavior (de Bruijn G, et al.; 2005)	2	2	0	2	1	1	2	10
Predictors of Binge Drinking in Adolescents: Ultimate and Distal Factors - a Representative Study (Donath C, et al.; 2012)	1	2	2	2	1	1	2	11
Targets for Primary Prevention: Cultural, Social and Intrapersonal Factors Associated with Co-occurring Health-related Behaviors. (Dusseldorp E, et al.; 2014)	2	2	2	2	1	1	2	12
Effects of 2 Prevention Programs on High-risk Behaviors among African American Youth: A Randomized Trial. (Flay BR, et al.; 2004)	2	2	2	2	1	1	2	12
A Culturally-informed Approach to Trauma, Suicidal Behavior, and Overt Aggression in African American Adolescents (Graves KN, et al.; 2010)	1	2	0	0	0	1	0	4
Influences Affecting Adolescent Smoking Behavior in China. (Grenard JL, et al.; 2006)	2	2	2	1	1	1	2	11
Concurrent Predictors of Cigarette and Alcohol Use among U.S.	2	2	0	2	1	1	2	10

and Russian Adolescents (Gunning M, et al.; 2009)								
A Multilevel-based Study of School Policy for Tobacco Control in Relation to Cigarette Smoking among Children in Elementary Schools: Gender Differences. (Huang HL, et al.; 2010)	1	2	2	1	1	1	2	10
School-level Contextual Factors Associated with Betel Quid Chewing among Schoolchildren in Taiwan. (Huang HL, et al.; 2009)	1	2	2	1	1	1	2	10
Starting to Smoke: A Qualitative Study of the Experiences of Australian Indigenous Youth. (Johnston V, et al.; 2012)	1	2	2	2	1	1	2	11
Suicidal, Abused African American Women's Response to a Culturally Informed Intervention (Kaslow NJ, et al.; 2010)	2	2	2	2	1	1	2	12
Cultural, Social and Intrapersonal Factors Associated with Clusters of Co-occurring Health-related Behaviors among Adolescents. (Klein Velderman M, et al.; 2015)	1	2	0	2	1	1	2	9
Brief Report: The Adaptation of Project Northland for Urban Youth. (Komro KA, et al.; 2004)	0	2	0	1	0	1	0	4
Participation in a Sigmoidoscopic Colorectal Cancer Screening Program: A Pilot Study (Kremers SP, et al.; 2000)	1	2	2	2	1	1	2	11
Description of an Efficacious Behavioral Peer-driven Intervention to Reduce Racial/Ethnic Disparities in AIDS Clinical Trials. (Leonard NR, et al.; 2013)	2	0	0	0	0	1	2	5
Health-promoting and Health-risk Behaviors: Theory-driven Analyses of Multiple Health Behavior Change in Three International Samples (Lippke S, et al.; 2012)	2	2	2	2	1	1	2	12
Predicting Self-initiated Marijuana Use Cessation among Youth at Continuation High Schools. (Little MA, et al.; 2013)	2	2	2	2	1	1	2	12
The Development and Implementation of Theory-driven Programs Capable of Addressing Poverty-impacted Children's Health, Mental Health, and Prevention Needs: CHAMP and CHAMP+.	0	0	0	0	0	1	2	3

Evidence-informed, Family-based Interventions to Address HIV Risk and Care. (McKay MM, et al.; 2014)								
A Multilevel Analysis Examining the Association Between School-based Smoking Policies, Prevention Programs and Youth Smoking Behavior: Evaluating a Provincial Tobacco Control Strategy. (Murnaghan DA, et al.; 2008)	2	2	0	2	1	1	2	10
Cultural and Social Influences on Food Consumption in Dutch Residents of Turkish and Moroccan Origin: A Qualitative Study. (Nicolaou M, et al.; 2009)	1	2	2	2	1	1	2	11
Adolescent Psychological and Social Predictors of Young Adult Smoking Acquisition and Cessation: A 10-Year Longitudinal Study. (Otten R, et al.; 2011)	1	2	0	2	1	1	2	9
Project Northland: Long-term Outcomes of Community Action to Reduce Adolescent Alcohol Use. (Perry CL, et al.; 2002)	2	2	0	2	1	1	2	10
A Review of Similarities between Domain-specific Determinants of Four Health Behaviors among Adolescents. (Peters LWH, et al.; 2009)	2	2	2	2	1	1	2	12
Effects of Transfer-oriented Curriculum on Multiple Behaviors in the Netherlands. (Peters LWH, et al.; 2015)	2	2	2	0	1	1	2	10
Sexual Violence and Youth in South Africa: The Need for Community-based Prevention Interventions (Petersen I, et al.; 2005)	1	2	2	2	1	1	0	9
Youth Culture and Smoking: Integrating Social Group Processes and Individual Cognitive Processes in a Model of Health-Related Behaviors. (Schofield PE, et al.; 2003)	2	2	2	2	1	1	2	12
Maternal Expectations, Mother-Child Connectedness, and Adolescent Sexual Debut. (Sieving RE, et al.; 2000)	2	2	0	1	1	1	2	9
Community Perceptions of Adequate Levels and Reasons for Skin Protection. (Stanton WR, et al.; 2005)	1	2	2	2	1	1	2	11

The One-year Prospective Prediction of Substance Abuse and Dependence among High-risk Adolescents. (Sussman S, et al.; 2000)	1	2	0	2	1	1	2	9
Concurrent Predictors of Drug Use Consequences among U.S. and Russian Adolescents. (Sussman S, et al.; 2009)	2	2	0	2	1	1	2	10
Prospective Predictors of Technology-Based Sexual Coercion by College Males. (Thompson MP & Morrison DJ; 2013)	2	2	2	2	1	1	2	12
Obesity Prevention in Low Socioeconomic Status Urban African-American Adolescents: Study Design and Preliminary Findings of the Health-Kids Study. (Wang Y, et al.; 2006)	1	2	2	1	1	1	0	8
Developmental Trajectories of Cigarette Use and Associations with Multilayered Risk Factors among Chinese Adolescents. (Xie B, et al.; 2013)	1	2	2	2	1	1	0	9

Start time:

GPS location:

**QUANTITATIVE DATA: CERVICAL CANCER PREVENTION MEHTODS
QUESTIONNAIRE FOR FEMALES**

Name of interviewer	Date of interview	Identification code
<input type="text"/>	<input type="text"/>	<input type="text"/>

Instructions:

- This questionnaire has three sections.
SECTION A: Demographics (to know more about you)
SECTION B: General (to know about your personality)
SECTION C: Cervical cancer (covers general information, screening and vaccination)
- Answer questions by marking an “X” in the box that represents the desired response or by circling the number that represents the desired response. For questions without answer options, write the response in the box.

Examples:

i. Gender: Male Female

ii. Mark the response that represents your answer:

	Yes	No	Not sure
Do you know what cervical cancer is?	①	2	3

Read before starting the interview

The purpose of this study is to determine cervical cancer prevention methods that can be practiced in Zambia. The questionnaire will be primarily assessing the views of Zambian women and men on cervical cancer screening and vaccination. There are no right or wrong answers. We are only interested in what you are thinking. Your responses will be anonymous and will never be linked to you personally. Your participation is entirely voluntary. In case you wish to decline to take part in the study, you may do so and nothing will be made against you. Thank you for your cooperation.

Kindly answer all questions, without skipping any. Be as honest as possible with your answers.

SECTION A: DEMOGRAPHICS

A1. What is your year of birth?

Year

A2. What is the highest educational level that you have attained?

- 1 No formal education
- 2 Incomplete primary school

- 3 Complete primary school
- 4 Incomplete secondary school
- 5 Complete secondary school
- 6 Incomplete college, without diploma
- 7 Complete college, with diploma
- 8 Some university-level education, without degree
- 9 University-level education, with degree

A3. Are you employed now or not?

- 1 Full time employee
- 2 Part time employee
- 3 Self employed
- 4 Retired/pensioned
- 5 Housewife/unemployed
- 6 Student
- 7 Other

A4. During the past year, did your family: (mark all that apply)

- Save money
- Just get by
- Spent some savings
- Spent savings and borrowed money

A5. Do you belong to a religion or religious denomination?

- 1 No (do not belong to a denomination/religion) → go to question A9
- 2 Catholic → go to question A6
- 3 Christian Protestant → go to question A6
- 4 Orthodox → go to question A6
- 5 Jew → go to question A6
- 6 Muslim → go to question A6
- 7 Hindu → go to question A6
- 8 Buddhist → go to question A6
- 9 Other → go to question A6

If question A5 = Catholic, Christian, Orthodox, Jew, Muslim, Hindu, Buddhist or Other, continue from here

A6. Apart from weddings and funerals, about how often did you attend religious services during the past year?

- 1 More than once a week
- 2 Once a week
- 3 Once a month
- 4 Only on special holidays
- 5 Once a year
- 6 Less often
- 7 Never, practically never

A7. How important is it to you to rely on your religious beliefs as a guide for day-to-day living?

- 1 Not important at all
- 2 Of little importance

- 3 Moderately important
- 4 Important
- 5 Very important

A8. What kind(s) of religious activities do you practice?

	Yes	No
A8.1 Do you pray before you have a meal?	1	2
A8.2 Apart from meal times, do you regularly pray in your home?	1	2
A8.3 Do you burn candles for religious purposes?	1	2
A8.4 Do you regularly wear clothing that are symbolic of your faith?	1	2
A8.5 Are the choices you make about the food you eat based on your faith?	1	2
A8.6 Does your physical appearance (e.g. hair cut, tattoos, piercings) symbolize your faith?	1	2

If question A5 = No, continue from here

A9. With whom do you live? (mark all that apply)

- You live alone
- Partner
- Step children
- Biological children
- Children (not your biological/step children)
- Other family members
- Other (e.g. with friends)

A10. How many children live with you in total?

Number

A11. From the children in your household, how many are girls between 5 – 18 years old (school going)?

Number

A12. From the children in your household, how many are boys between 5 -18 years old (school going)?

Number

A13. How many of your biological children between 5 -18 years old (school going) live somewhere else, not with you?

Number

A14. What are the characteristics of the school your child/children go to? (mark all that apply)

- Private
- Public
- Religious
- Non-religious
- Boarding school

SECTION B: GENERAL

The following questions are general questions about your personality in terms of decision making and the control you feel you have over your life.

B1. On average during the past year, how many times have you met with other people at your or their homes or in a public place just for the sake of socializing?

- 1 Never, practically never
- 2 Once a month
- 3 Once a week
- 4 More than once a week
- 5 Once a day
- 6 More than once a day

Please rate the following questions about control and decision making.

B2. Do you feel that you have the power to make important decisions that change the course of your life (for instance, changing jobs or moving to different city)?	Totally unable to change life 1	Mostly unable to change life 2	Neither able nor unable to change life 3	Mostly able to change life 4	Totally able to change life 5
B3. How much control do you feel you have in making decisions that affect your everyday activities?	No control 1	Control over few decisions 2	Control over some decisions 3	Control over most decisions 4	Control over all decisions 5
B4. Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. How much freedom of choice and control you feel you have over the way your life turns out?	No choice at all 1	Mostly unable choose 2	Neither able nor unable 3	Mostly able to choose 4	A great deal of choice 5
B5. Some people complete the tasks they begin and others give up early. Do you consider yourself to be self-determined?	Disagree completely 1	Disagree 2	Neither agree nor disagree 3	Agree 4	Completely agree 5

B6. In general, who do you feel is mainly responsible for your health care?

- 1 You
- 2 Your family
- 3 Your work place
- 4 The local government
- 5 The national (Zambian) government
- 5 Your religious deity (God, Allah, higher power)
- 6 Other, namely:

B7. In general, who do you feel is mainly responsible for your children's health care?

- 1 You
- 2 Your partner/husband
- 3 Both you and your partner
- 4 Your extended family
- 5 The local government
- 6 The national (Zambian) government
- 7 Your religious deity (God, Allah, higher power)
- 8 Other, namely:

B8. Regarding decisions made in the household, who **usually** makes decisions about health care for the family (for instance, spending money for medicines, getting vaccinations)? (mark one)

- 1 You
- 2 Your partner/husband
- 3 Both you and your partner
- 4 Your parents
- 5 Your in-laws
- 6 Other

SECTION C: CERVICAL CANCER

C1. Do you know what cervical cancer is?

- 1 Yes → go to question C2
- 2 No → read introduction and go to question C5
- 3 Not sure → go to question C2

If question C1 = Yes or Unsure, continue from here

C2. According to you, what causes cervical cancer? I will give you several options to choose from. More than one answer is possible. (**show card with options**)

- Smoking
- Starting to be sexually active at a young age
- Having many sexual partners
- Being pregnant at a young age
- Using contraceptives
- Having many pregnancies
- Being old

- Bad hygienic habits
- Heredity, which means it's in the family
- Having a sexually transmitted disease
- Unsafe sexual practice (without a condom)
- Human papillomavirus (HPV) infection
- Other, explain:

C3. According to you, how can a person reduce the risk of getting cervical cancer? I will give you several options to choose from. More than one answer is possible. **(show card with options)**

- Not smoking
- Not becoming sexually active at a young age
- Being faithful to one sexual partner
- Not taking oral contraceptives
- Hygienic practices e.g. vaginal douching (washing/cleaning the inside of the vagina)
- Practicing safe sex (with a condom)
- Being circumcised (male circumcision)
- Being vaccinated against Human papillomavirus (HPV)
- Attending regular cervical cancer screening
- Other, explain:

C4. The following questions are about possible **sources** of information about cervical cancer.

Who supplied you with information about cervical cancer:			Can you tell me what type of information [fill in source] did supply: (tick all that apply)				
	Yes	No	Screening	Vaccination	Safe sex (condom, one partner)	No sex (abstinence)	Other
C4.1 Your husband/ partner	1	2	1	2	3	4	5
C4.2 Other family members/ friends	1	2	1	2	3	4	5
C4.3 Health care providers (doctor, nurse etc.)	1	2	1	2	3	4	5
C4.4 Schools	1	2	1	2	3	4	5
C4.5 Religious group (church, mosque)	1	2	1	2	3	4	5
C4.6 TV, radio	1	2	1	2	3	4	5
C4.7 Billboards, posters	1	2	1	2	3	4	5
C4.8 Print media (newspaper, magazines)	1	2	1	2	3	4	5
C4.9 Internet (social media, websites)	1	2	1	2	3	4	5

Information regarding cervical cancer for all participants

I am going to take a minute now to explain the most basic things about cervical cancer so that you will know what it is about.

Cervical cancer is a disease of the cervix, which is found at the bottom part of the womb (between womb and vagina). It is caused by an infection with a virus called Human Papillomavirus. The tissue of the cervix begins to grow and eventually it will start bleeding. As it continues to develop, the cancer can spread throughout the entire body and the woman will die.

Cancer of the cervix is a silent disease, this means you might have it for many years without even knowing. The Human Papillomavirus is transmitted sexually, and it is very common. There are many types of Human Papillomaviruses, some cause cervical cancer, others cause genital warts: small, innocent yet very annoying deformations of the skin. Fortunately, not every woman who becomes infected develops cancer of the cervix or genital warts. Sometimes the woman is strong/healthy enough to halt the viruses. There are however viruses that are very strong/aggressive and very difficult to stop.

Through a gynecologist examination called cervical screening, a health care provider might see the changes of the cervix and treat the disease before it becomes fatal. Unfortunately, many women in Zambia still die of cervical cancer because they do not go for regular screening.

There is a vaccine that prevents infection with Human Papillomaviruses, the ones that definitely cause cervical cancer or genital warts. The vaccines also offer some protection against other kinds of vaginal, anal and oral cancers. Vaccination ensures that you won't develop cervical cancer nor genital warts caused by these viruses. The vaccine is recommended for young girls who are not yet sexually active because they have not been infected with the virus yet. The vaccine can also be used by boys. However, because of the many types of Human Papillomaviruses, even if you are vaccinated it is still necessary to get screened.

If question C1 = No, continue from hereafter reading information

C5. Does the topic of cervical cancer make you feel uncomfortable/nervous?

- 1 Not uncomfortable at all
- 2 A little uncomfortable
- 3 Rather uncomfortable
- 4 Very uncomfortable

Interviewer: please rate your own observation

- 1 Not uncomfortable at all
- 2 A little uncomfortable
- 3 Rather uncomfortable
- 4 Very uncomfortable

I thank you that you are bearing with me. Your participation in the questionnaire on this sensitive issue is greatly appreciated. The information you are providing is important for the betterment of the country's cervical cancer prevention program. Now to continue with the rest of the interview:

C6. The following questions are about possible **sources** of information about cervical cancer. Suppose you wanted to learn more about this topic than just the brief introduction I just supplied to you.

Do you consider [fill in source] as a good source of information about cervical cancer:	Yes	No
C6.1 Your husband/ partner	1	2
C6.2 Other family members/friends	1	2
C6.3 Health care providers (doctor, nurse etc.)	1	2
C6.4 Schools	1	2
C6.5 Religious group (church, mosque)	1	2
C6.6 TV, radio	1	2
C6.7 Billboards, posters	1	2
C6.8 Print media (newspaper, magazines)	1	2
C6.9 Internet (social media, websites)	1	2

Please answer the following questions about cervical cancer in your neighborhood.

C7. Do you think that cervical cancer is an important issue in your neighborhood?	Yes 1	No 2	Not sure 3
C8. Is it easy to find a health care provider (i.e. nurse or doctor) to provide you with cervical cancer prevention services in your neighborhood?	Yes 1	No 2	Not sure 3
C9. Cervical cancer prevention programs have been organized in my neighborhood.	Yes, at least once 1	No, none 2	Not sure 3

C10. What is your estimate of the chance that you will ever get cervical cancer?

- 1 Very low (a 1 in 100000 shot)
- 2 Low (a 1 in 10000 shot)
- 3 Not low/not high (a 1 in 1000 shot)
- 4 High (a 1 in 100 shot)
- 5 Very high (a 1 in 10 shot)

C11. In general, what are your views about Sexually Transmitted Diseases (STDs) and cancer? Please rate whether you agree or disagree with the following statements:

To what extent do you agree or disagree with the following statements:	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
C11.1 When someone has a sexually transmitted disease it is because of their behavior and they deserve to be judged	1	2	3	4	5
C11.2 It is more shameful to have a sexually transmitted disease compared to having cancer	1	2	3	4	5
C11.3 It is normal to feel sorry for someone who has cancer	1	2	3	4	5
C11.4 It is shameful to have cancer	1	2	3	4	5
C11.5 When someone has cancer it means they will die	1	2	3	4	5

Cervical cancer screening

C12. Do you know where to go to get cervical screening?

- 1 Yes
- 2 No
- 3 Not sure

C13. Do you know about screening services in government clinics?

- 1 Yes
- 2 No

C14. Do you know someone who has gone for cervical cancer screening?

- 1 Yes
- 2 No

C15. Out of every 10 women in your neighborhood, how many do you think attend cervical screening?

- 1 None of them
- 2 Less than 5 but not none
- 3 Half of them
- 4 More than 5 but not all
- 5 All of them

C16. Have you ever had cervical screening?

- 1 Yes → go to question C17
- 2 No → go to question C18
- 3 Not sure → go to question C18

C17. Did someone ever offer to accompany you to cervical screening?

- 1 Yes → go to question C19
- 2 No → go to question C19

If question C16 = No or Not sure, continue from here

C18. If you never went for screening or you are not sure. Can you tell me what keeps you from going?

To what extent do you agree or disagree with the following statements:	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
C18.1 Finding time to go for screening is difficult	1	2	3	4	5
C18.2 Transportation to go for screening is difficult to find	1	2	3	4	5
C18.3 It's too expensive to get to the clinic	1	2	3	4	5
C18.4 I am nervous about being screened	1	2	3	4	5
C18.5 I expect cervical screening to be painful	1	2	3	4	5

If question C17 = Yes or No, continue from here

C19. Which of the following **sources** would approve or disapprove with you on going for cervical cancer screening? Does their opinion affect your final decision?

	Will [fill in source] approve/disapprove:					Does it affect your decision:	
	Completely disapprove	Disapprove	Neither approve nor disapprove	Approve	Completely approve	Yes	No
C19.1 Husband/partner	1	2	3	4	5	1	2
C19.2 Other family members	1	2	3	4	5	1	2
C19.3 Friends	1	2	3	4	5	1	2
C19.4 Religious group (church)	1	2	3	4	5	1	2

C20. If you had the chance to screen yourself at home with a self-screening kit, would you be willing to do it this way if it was easy to do?

- 1 Yes
- 2 No
- 3 Not sure

C21. If you had to pay, how much would you pay to buy a self-testing kit for routine cervical cancer screening?

- 1 I am not able to pay
- 2 At most 10 Kwacha
- 3 At most K20
- 4 At most K30
- 5 At most K40
- 6 At most K50
- 7 Above K50
- 8 Not sure

C22. At what age do you think women should start screening?

Number

C23. What age do you think women stop screening?

Number

C24. What do you think of the following statement: When the results of cervical cancer screening show that something is wrong, the chance for cure is high

- 1 Completely disagree
- 2 Disagree
- 3 Neither agree nor disagree
- 4 Agree
- 5 Completely agree

Cervical cancer vaccination

- C25. Did you know about free cervical cancer vaccination for school age girls?
 1 Yes
 2 No
- C26. Schools in my neighborhood have participated in the cervical cancer vaccination program
 1 Yes, at least one
 2 No, none
 3 Not sure
- C27. Do you know someone who has gone for cervical cancer vaccination?
 1 Yes
 2 No
- C28. Did you have one or more of your daughters vaccinated against cervical cancer?
 1 Yes, I have vaccinated my daughter(s) → go to question C30
 2 No → go to question C29

If question C28 = No, continue from here

- C29. If not, would you have your daughter(s) vaccinated in the future?
 1 No
 2 Yes, if given a chance
 3 I do not have a daughter, but if I did I would vaccinate her
 4 I do not have a daughter, but if I did I would not vaccinate her

If question C28 = Yes, continue from here

- C30. Some countries have allowed the vaccination of boys as well as girls seeing that the vaccine not only prevents cervical cancer, but it can also prevent the development of oral cancers, genital warts etc. Knowing this information, would you vaccinate your son(s) against the carrier of cervical cancer, if that option was available to you?
 1 No
 2 Yes, if given a chance
 3 I do not have a son, but if I did I would vaccinate him
 4 I do not have a son, but if I did I would not vaccinate him

C31. Which of the following **sources** would approve or disapprove with you on cervical cancer vaccination? Does their opinion affect your final decision?

	Will [fill in source] approve/disapprove:					Does it affect your decision:	
	Completely disapprove	Disapprove	Neither approve nor disapprove	Approve	Completely approve	Yes	No
C31.1 Your child	1	2	3	4	5	1	2
C31.2 Husband/partner	1	2	3	4	5	1	2
C31.3 Other family members	1	2	3	4	5	1	2
C31.4 Friends	1	2	3	4	5	1	2
C31.5 Religious group (church)	1	2	3	4	5	1	2

End time:

The vaccine is recommended to be taken before one becomes sexually active. However, it can be administered from age of 9 to 26 years old. Considering this age range, answer the following questions:

C32. At what age would you consider having your daughter(s) vaccinated? Briefly explain your reason why.

C33. At what age would you consider having your son(s) vaccinated? Briefly explain your reason why.

C34. What are the reasons for vaccinating or not vaccinating your children? Please rate how much you agree or disagree with the following statements:

	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
C34.1 Using vaccines shows a lack of faith in the healing power of God	1	2	3	4	5
C34.2 The knowledge to create vaccines was given to people by God or a higher power	1	2	3	4	5
C34.3 The cervical cancer vaccine is harmful to health	1	2	3	4	5
C34.4 If you vaccinate young girls they will be sexually active too early	1	2	3	4	5
C34.5 Vaccination is an effective way of preventing cervical cancer	1	2	3	4	5
C34.6 It is morally wrong to vaccinate girls for cervical cancer	1	2	3	4	5
C34.7 It is morally wrong to vaccinate boys for cervical cancer	1	2	3	4	5

C35. Would you like to take part in a small group discussion about your views on cervical cancer? If yes, please provide your phone number and state when you have free time (day(s) and time range)

We have been discussion a tough subject. Here is a leaflet with further information on cervical cancer prevention from the local clinic. Thank you once again for your participation. Have a nice day.

OBSERVATION BY INTERVIEWER

D1.How interested was the respondent during the interview?

- 1 Respondent was very interested
- 2 Respondent was somewhat interested
- 3 Respondent was not interested

D2.Did the interview take place in privacy or not?

- 1 There were no other people around who could follow the interview
- 2 There were other people around who could follow the interview
- 3 There were other people around who intervened/answered questions instead of the respondent

D3.Did the interview run smoothly or not?

- 1 Yes→ go to question D5
- 2 No→ go to question D4

D4.If the interview did **not** run smoothly, what problems were met?

D5.Any other remarks about the interview:

Start time:

GPS location:

**QUANTITATIVE DATA: CERVICAL CANCER PREVENTION METHODS
QUESTIONNAIRE FOR MALES**

Name of interviewer	Date of interview	Identification code
<input type="text"/>	<input type="text"/>	<input type="text"/>

Instructions:

- This questionnaire has three sections.
SECTION A: Demographics (to know basic information about you)
SECTION B: General (to know about your personality)
SECTION C: Cervical cancer (covers general information, screening and vaccination)
- Answer questions by marking an “X” in the box that represents the desired response or by circling the number that represents the desired response. For questions without answer options, write the response in the box.

Examples:

i. Gender: Male Female

ii. Mark the response that represents your answer:

	Yes	No	Not sure
Do you know what cervical cancer is?	①	2	3

Read before starting the interview

The purpose of this study is to determine cervical cancer prevention methods that can be practiced in Zambia. The questionnaire will be primarily assessing the views of Zambian women and men on cervical cancer screening and vaccination. There are no right or wrong answers. We are only interested in what you are thinking. Your responses will be anonymous and will never be linked to you personally. Your participation is entirely voluntary. In case you wish to decline to take part in the study, you may do so and nothing will be made against you. Thank you for your cooperation.

Kindly answer all questions, without skipping any. Be as honest as possible with your answers.

SECTION A: DEMOGRAPHICS

A15. What is your year of birth?

Year

A16. What is the highest educational level that you have attained?

- 1 No formal education
- 2 Incomplete primary school
- 3 Complete primary school

- 4 Incomplete secondary school
- 5 Complete secondary school
- 6 Incomplete college, without diploma
- 7 Complete college, with diploma
- 8 Some university-level education, without degree
- 9 University-level education, with degree

A17. Are you employed now or not?

- 1 Full time employee
- 2 Part time employee
- 3 Self employed
- 4 Retired/pensioned
- 5 Unemployed
- 6 Student
- 7 Other

A4. During the past year, did your family: (mark all that apply)

- Save money
- Just get by
- Spent some savings
- Spent savings and borrowed money

A5. Do you belong to a religion or religious denomination?

- 1 No (do not belong to a denomination/religion) → go to question A9
- 2 Catholic → go to question A6
- 3 Christian Protestant → go to question A6
- 4 Orthodox → go to question A6
- 5 Jew → go to question A6
- 6 Muslim → go to question A6
- 7 Hindu → go to question A6
- 8 Buddhist → go to question A6
- 9 Other → go to question A6

If question A5 = Catholic, Christian, Orthodox, Jew, Muslim, Hindu, Buddhist or Other, continue from here

A6. Apart from weddings and funerals, about how often did you attend religious services during the past year?

- 1 More than once a week
- 2 Once a week
- 3 Once a month
- 4 Only on special holidays
- 5 Once a year
- 6 Less often
- 7 Never, practically never

A7. How important is it to you to rely on your religious beliefs as a guide for day-to-day living?

- 1 Not important at all
- 2 Of little importance
- 3 Moderately important

- 4 Important
- 5 Very important

A8. What kind(s) of religious activities do you practice?

	Yes	No
A8.1 Do you pray before you have a meal?	1	2
A8.2 Apart from meal times, do you regularly pray in your home?	1	2
A8.3 Do you burn candles for religious purposes?	1	2
A8.4 Do you regularly wear clothing that are symbolic of your faith?	1	2
A8.5 Are the choices you make about the food you eat based on your faith?	1	2
A8.6 Does your physical appearance (e.g. hair cut, tattoos, piercings) symbolize your faith?	1	2

If question A5 = No, continue from here

A9. With whom do you live? (mark all that apply)

- You live alone
- Partner
- Step children
- Biological children
- Children (not your biological/step children)
- Other family members
- Other (e.g. with friends)

A10. How many children live with you in total?

Number

A11. From the children in your household, how many are girls between 5 – 18 years old (school going)?

Number

A12. From the children in your household, how many are boys between 5 – 18 years old (school going)?

Number

A13. How many of your biological children between 5 -18 years old (school going) live somewhere else, not with you?

Number

A14. What are the characteristics of the school your child/children go to? (mark all that apply)

- Private
- Public
- Religious

- Non-religious
- Boarding school

SECTION B: GENERAL

The following questions are general questions about your personality in terms of decision making and the control you feel you have over your life.

B1. On average during the past year, how many times have you met with other people at your or their homes or in a public place just for the sake of socializing?

- 1 Never, practically never
- 2 Once a month
- 3 Once a week
- 4 More than once a week
- 5 Once a day
- 6 More than once a day

Please rate the following questions about control and decision making.

B2. Do you feel that you have the power to make important decisions that change the course of your life (for instance, changing jobs or moving to different city)?	Totally unable to change life 1	Mostly unable to change life 2	Neither able nor unable to change life 3	Mostly able to change life 4	Totally able to change life 5
B3. How much control do you feel you have in making decisions that affect your everyday activities?	No control 1	Control over few decisions 2	Control over some decisions 3	Control over most decisions 4	Control over all decisions 5
B4. Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. How much freedom of choice and control you feel you have over the way your life turns out?	No choice at all 1	Mostly unable choose 2	Neither able nor unable 3	Mostly able to choose 4	A great deal of choice 5
B5. Some people complete the tasks they begin and others give up early. Do you consider yourself to be self-determined?	Disagree completely 1	Disagree 2	Neither agree nor disagree 3	Agree 4	Completely agree 5

B6. In general, who do you feel is mainly responsible for your health care?

- 1 You
- 2 Your family

- 3 Your work place
- 4 The local government
- 5 The national (Zambian) government
- 6 Your religious deity (God, Allah, higher power)
- 7 Other, namely:

B7. In general, who do you feel is mainly responsible for your children's health care?

- 1 You
- 2 Your partner/wife
- 3 Both you and your partner
- 4 Your extended family
- 5 The local government
- 6 The national (Zambian) government
- 7 Your religious deity (God, Allah, higher power)
- 8 Other, namely:

B8. Regarding decisions made in the household, who **usually** makes decisions about health care for the family (for instance, spending money for medicines, getting vaccinations)?

- 1 You
- 2 Your partner/wife
- 3 Both you and your partner
- 4 Your parents
- 5 Your in-laws
- 6 Other

SECTION C: CERVICAL CANCER

C1. Do you know what cervical cancer is?

- 1 Yes → go to question C2
- 2 No → read information and go to question C5
- 3 Not sure → go to question C2

If question C1 = Yes or Unsure, continue from here

C2. According to you, what causes cervical cancer? I will give you several options to choose from. More than one answer is possible. **(show card with options)**

- Smoking
- Starting to be sexually active at a young age
- Having many sexual partners
- Being pregnant at a young age
- Using contraceptives
- Having many pregnancies
- Being old
- Bad hygienic habits
- Heredity, which means it's in the family
- Having a sexually transmitted disease
- Unsafe sexual practice (without a condom)

Human papillomavirus (HPV) infection

Other, explain:

C3. According to you, how can a person reduce the risk of getting cervical cancer? I will give you several options to choose from. More than one answer is possible. (**show card with options**)

Not smoking

Not becoming sexually active at a young age

Being faithful to one sexual partner

Not taking oral contraceptives

Hygienic practices e.g. vaginal douching (washing/cleaning the inside of the vagina)

Practicing safe sex (with a condom)

Being circumcised (male circumcision)

Being vaccinated against Human papillomavirus (HPV)

Attending regular cervical cancer screening

Other, explain:

C4. The following questions are about possible **sources** of information about cervical cancer.

Who supplied you with information about cervical cancer:	Can you tell me what type of information [fill in source] did supply: (tick all that apply)						
	No	Yes	Screening	Vaccination	(condom, one partner) Safe sex	No sex (abstinence)	Other
C4.1 Your wife/ partner	1	2	1	2	3	4	5
C4.2 Other family members/ friends	1	2	1	2	3	4	5
C4.3 Health care providers (doctor, nurse etc.)	1	2	1	2	3	4	5
C4.4 Schools	1	2	1	2	3	4	5
C4.5 Religious group (church, mosque)	1	2	1	2	3	4	5
C4.6 TV, radio	1	2	1	2	3	4	5
C4.7 Billboards, posters	1	2	1	2	3	4	5
C4.8 Print media (newspaper, magazines)	1	2	1	2	3	4	5
C4.9 Internet (social media, websites)	1	2	1	2	3	4	5

Information regarding cervical cancer for all participants

I am going to take a minute now to explain the most basic things about cervical cancer so that you will know what it is about.

Cervical cancer is a disease of the cervix, which is found at the bottom part of the womb (between womb and vagina). It is caused by an infection with a virus called Human Papillomavirus. The tissue of the cervix begins to grow and eventually it will start

bleeding. As it continues to develop, the cancer can spread throughout the entire body and the woman will die.

Cancer of the cervix is a silent disease, this means you might have it for many years without even knowing. The Human Papillomavirus is transmitted sexually, and it is very common. There are many types of Human Papillomaviruses, some cause cervical cancer, others cause genital warts: small, innocent yet very annoying deformations of the skin. Fortunately, not every woman who becomes infected develops cancer of the cervix or genital warts. Sometimes the woman is strong/healthy enough to halt the viruses. There are however viruses that are very strong/aggressive and very difficult to stop.

Through a gynecologist examination called cervical screening, a health care provider might see the changes of the cervix and treat the disease before it becomes fatal. Unfortunately, many women in Zambia still die of cervical cancer because they do not go for regular screening.

There is a vaccine that prevents infection with Human Papillomaviruses, the ones that definitely cause cervical cancer or genital warts. The vaccines also offer some protection against other kinds of vaginal, anal and oral cancers. Vaccination ensures that you won't develop cervical cancer nor genital warts caused by these viruses. The vaccine is recommended for young girls who are not yet sexually active because they have not been infected with the virus yet. The vaccine can also be used by boys. However, because of the many types of Human Papillomaviruses, even if you are vaccinated it is still necessary to get screened.

If question C1 = No, continue from here after reading information

C5. Does the topic of cervical cancer make you feel uncomfortable/nervous?

- 1 Not uncomfortable at all
- 2 A little uncomfortable
- 3 Rather uncomfortable
- 4 Very uncomfortable

Interviewer: please rate your own observation

- 1 Not uncomfortable at all
- 2 A little uncomfortable
- 3 Rather uncomfortable
- 4 Very uncomfortable

I thank you that you are bearing with me. Your participation in the questionnaire on this sensitive issue is greatly appreciated. The information you are providing is important for the betterment of the country's cervical cancer prevention program. Now to continue with the rest of the interview:

C6. The following questions are about possible **sources** of information about cervical cancer. Suppose you wanted to learn more about this topic than just the brief introduction I just supplied to you.

Do you consider [fill in source] as a good source of information about cervical cancer:	No	Yes
C6.1 Your wife/ partner	1	2
C6.2 Other family members/ friends	1	2

C6.3 Health care providers (doctor, nurse etc.)	1	2
C6.4 Schools	1	2
C6.5 Religious group (church, mosque)	1	2
C6.6 TV, radio	1	2
C6.7 Billboards, posters	1	2
C6.8 Print media (newspaper, magazines)	1	2
C6.9 Internet (social media, websites)	1	2

Please answer the following questions about cervical cancer in your neighborhood.

C7. Do you think that cervical cancer is an important issue in your neighborhood?	Yes 1	No 2	Not sure 3
C8. Is it easy to find a health care provider (i.e. nurse or doctor) to provide you with cervical cancer prevention services in your neighborhood?	Yes 1	No 2	Not sure 3
C9. Cervical cancer prevention programs have been organized in my neighborhood.	Yes, at least once 1	No, none 2	Not sure 3

C10. What is your estimate of the chance that your partner will ever get cervical cancer?

- 1 Very low (a 1 in 100000 shot)
- 2 Low (a 1 in 10000 shot)
- 3 Not low/not high (a 1 in 1000 shot)
- 4 High (a 1 in 100 shot)
- 5 Very high (a 1 in 10 shot)

C11. In general, what are your views about Sexually Transmitted Diseases (STDs) and cancer? Please rate whether you agree or disagree with the following statements:

To what extent do you agree or disagree with the following statements:	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
C11.1 When someone has a sexually transmitted disease it is because of their behavior and they deserve to be judged	1	2	3	4	5
C11.2 It is more shameful to have a sexually transmitted disease compared to having cancer	1	2	3	4	5
C11.3 It is normal to feel sorry for someone who has cancer	1	2	3	4	5
C11.4 It is shameful to have cancer	1	2	3	4	5
C11.5 When someone has cancer it means they will die	1	2	3	4	5

Cervical cancer screening

C12. Do you know where women go to get cervical screening?

- 1 Yes
- 2 No
- 3 Not sure

- C13. Do you know about screening services in government clinics?
1 Yes
2 No
- C14. Do you know someone who has gone for cervical cancer screening?
1 Yes
2 No
- C15. Out of every 10 women in your neighborhood, how many do you think attend cervical screening?
1 None of them
2 Less than 5 but not none
3 Half of them
4 More than 5 but not all
5 All of them
- C16. Have you ever offered to take someone to cervical screening?
1 Yes
2 No
- C17. Would you approve or disapprove of your partner going for cervical cancer screening?
1 Completely disapprove
2 Disapprove
3 Neither approve nor disapprove
4 Approve
5 Completely approve
- C18. Do you think your approval or disapproval of your partner attending screening, will affect your partners final decision to go for screening?
1 Yes
2 No
- C19. Given a chance to support your partner, would you encourage her to self-screen i.e. screening herself at home with a self-screening kit if it was easy to do?
1 Yes
2 No
3 Not sure
- C20. If a self-screening kit could be bought for your partner, how much are you willing to pay for it?
1 I am not able to pay
2 At most 10 Kwacha
3 At most K20
4 At most K30
5 At most K40
6 At most K50
7 Above K50
8 Not sure

C21. At what age do you think women should consider starting screening?

Number

C22. What age do you think women should consider stopping screening?

Number

C23. What do you think of the following statement: When the results of cervical cancer screening show that something is wrong, the chance for cure is high

- 1 Completely disagree
- 2 Disagree
- 3 Neither agree nor disagree
- 4 Agree
- 5 Completely agree

Cervical cancer vaccination

C24. Did you know about free cervical cancer vaccination for school age girls?

- 1 Yes
- 2 No

C25. Schools in my neighborhood have participated in the cervical cancer vaccination program

- 1 Yes, at least one
- 2 No, none
- 3 Not sure

C26. Do you know someone who has gone for cervical cancer vaccination?

- 1 Yes
- 2 No

C27. Did you have one or more of your daughters vaccinated against cervical cancer?

- 1 Yes, I have vaccinated my daughter(s) → go to question C29
- 2 No → go to question C28

If question C27 = No, continue from here

C28. If not, would you have your daughter(s) vaccinated in the future?

- 1 No
- 2 Yes, if given a chance
- 3 I do not have a daughter, but if I did I would vaccinate her
- 4 I do not have a daughter, but if I did I would not vaccinate her

If question C27 = Yes, continue from here

C29. Some countries have allowed the vaccination of boys as well as girls seeing that the vaccine not only prevents cervical cancer, but it can also prevent the development of oral cancers, genital warts etc. Knowing this information, would you vaccinate your son(s) against the carrier of cervical cancer, if that option was available to you?

- 1 No

- 2 Yes, if given a chance
- 3 I do not have a son, but if I did I would vaccinate him
- 4 I do not have a son, but if I did I would not vaccinate him

C30. Which of the following **sources** would approve or disapprove with you on cervical cancer vaccination? Does their opinion affect your final decision?

	Will [fill in source] approve/disapprove:					Does it affect your decision:	
	Completely disapprove	Disapprove	Neither approve nor disapprove	Approve	Completely approve	Yes	No
C30.1 Your child	1	2	3	4	5	1	2
C30.2 Wife/partner	1	2	3	4	5	1	2
C30.3 Other family members	1	2	3	4	5	1	2
C30.4 Friends	1	2	3	4	5	1	2
C30.5 Religious group (church)	1	2	3	4	5	1	2

The vaccine is recommended to be taken before one becomes sexually active. However, it can be administered from age of 9 to 26 years old. Considering this age range, answer the following questions:

C31. At what age would you consider having your daughter(s) vaccinated? Briefly explain your reason why.

C32. At what age would you consider having your son(s) vaccinated? Briefly explain your reason why.

C33. What are the reasons for vaccinating or not vaccinating your children? Please rate how much you agree or disagree with the following statements:

	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
C33. 1 Using vaccines shows a lack of faith in the healing power of God	1	2	3	4	5
C33.2 The knowledge to create vaccines was given to people by God or a higher power	1	2	3	4	5
C33.3 The cervical cancer vaccine is harmful to health	1	2	3	4	5
C33.4 If you vaccinate young girls they will be sexually active too early	1	2	3	4	5

End time:

C33.5 Vaccination is an effective way of preventing cervical cancer	1	2	3	4	5
C33.6 It is morally wrong to vaccinate girls for cervical cancer	1	2	3	4	5
C33.7 It is morally wrong to vaccinate boys for cervical cancer	1	2	3	4	5

C34. Would you like to take part in a small group discussion about your views on cervical cancer? If yes, please provide your phone number and state when you have free time (day(s) and time range)

We have been discussion a tough subject. Here is a leaflet with further information on cervical cancer prevention from the local clinic. Thank you once again for your participation. Have a nice day.

OBSERVATION BY INTERVIEWER

D6.How interested was the respondent during the interview?

- 1 Respondent was very interested
- 2 Respondent was somewhat interested
- 3 Respondent was not interested

D7.Did the interview take place in privacy or not?

- 1 There were no other people around who could follow the interview
- 2 There were other people around who could follow the interview
- 3 There were other people around who intervened/answered questions instead of the respondent

D8.Did the interview run smoothly or not?

- 1 Yes → go to question D5
- 2 No → go to question D4

D9.If the interview did **not** run smoothly, what problems were met?

D10. Any other remarks about the interview:

QUALITATIVE DATA: INTERVIEW GUIDES

INTERVIEW FOR STAKEHOLDERS (health care providers, head teachers, pastors)

Date: _____

Interview round #: _____

Name of institution: _____

Occupation of participant: _____

Your institution:

1. a) Is this a private, public, religious or non-religious school/hospital?
- b) What Christian denomination is this church?

Cervical cancer:

2. a) How familiar are you with cervical cancer?
- b) How common is cervical cancer in Lusaka?
3. How familiar are you with cervical cancer screening? What is your experience?
4. How familiar are you with the vaccine to prevent cervical cancer? What is your experience?

Effectiveness of service:

5. What do you know about the availability of cervical screening and vaccination services in Lusaka? What resources (such as education, services, counseling, etc.) are you familiar with, if any?
6. a) In your opinion, do you think the number of doctors/nurses at your clinic is enough to cater to the population?
- b) In your opinion, do you think the number of churches, schools are enough to help facilitate and educate the public on cervical cancer prevention?
7. Are there any worksite policies/regulations/program that require you to:
Educate the public on cervical screening and vaccination
Participate in administering vaccination and screening services
Why/why not?

School based vaccination program:

8. a) Did this school participate in the school based cervical cancer vaccination program?
Why or why not?

b) Do you think the number of schools in this area was adequate enough to administer the school based vaccine? Why or why not?

c) In spite of the vaccination program being school based, did anyone else other than school girls request the vaccine including older women and men? What were the characteristics of those people?

Information and sources:

9. Do you recommend screening and vaccination to your patients/ congregation/ parents and students?
10. Do you feel that the current media depictions of cervical cancer prevention are effective in sensitizing the public? Why or why not?
11. What promotional and outreach strategies might increase screening and vaccination? Can you think of any creative strategies you've used that have worked well?

Views:

12. What factors facilitate decisions to seek screening and vaccination?
13. What barriers to seeking screening and vaccination exist? Can you think of a strategy you've used to overcome these barriers?
14. What age range do you recommend for screening? Why?
15. What are your views on self-screening? What are views on payment for self-screening?
16. What are your views on vaccinating girls as well as boys?
17. What age range would you recommend for cervical cancer vaccination?

Finally:

18. Do you consider cervical cancer to be one of the main health concerns in Lusaka? Why or why not?
19. Do you have any further information you would like to share, or any documents that you feel may be essential for this study?

INTERVIEW FOR SPECIAL INTEREST GROUPS

Date: _____

Interview round #: _____

Name of institution: _____

Occupation of participant: _____

Cervical cancer:

1. a) How familiar are you with cervical cancer?
b) How common is cervical cancer in Lusaka?
2. How familiar are you with cervical cancer screening? What is your experience?
3. How familiar are you with the vaccine to prevent cervical cancer? What is your experience?

Effectiveness of service:

4. What do you know about the availability of cervical screening and vaccination services in Lusaka? What resources (such as education, services, counseling, etc.) are you familiar with, if any?
5. In your opinion, is the workforce adequate enough to sensitize the public on cervical cancer prevention? If not, where is it lacking?
6. Are there any worksite policies/regulations/programs that require you to:
Educate the public on cervical screening and vaccination
Administer vaccination and screening services
Why/why not?

School vaccination program:

7. Do you feel that the school based vaccination program adequately covered Lusaka?
Why or why not?
8. In spite of the vaccination program being school based, did anyone else other than school girls request the vaccine including older women and men? What were the characteristics of those people?

Information and sources:

9. In your opinion, where do people in Lusaka generally get information about cervical cancer (church, school, clinics, media)?
10. Do you feel that the current media depictions of cervical cancer prevention are effective in sensitizing the public? Why or why not?

11. What promotional and outreach strategies might increase screening and vaccination?

Can you think of any creative strategies you've used that have worked well?

Views:

12. What factors facilitate decisions to seek screening and vaccination?

13. What barriers to seeking screening and vaccination exist? Can you think of a strategy you've used to overcome these barriers?

14. What age range do you recommend for screening? Why?

15. What are your views on self-screening? What are views on payment for self-screening?

16. What are your views on vaccinating girls as well as boys?

17. What age range would you recommend for cervical cancer vaccination?

Finally:

18. Do you consider cervical cancer to be one of the main health concerns in Lusaka?
Why or why not?

19. Do you have any further information you would like to share, or any documents that you feel may be essential for this study?

INTERVIEW FOR POLICYMAKERS

Date: _____

Interview round #: _____

Name of institution: _____

Occupation of participant: _____

Cervical cancer:

1. a) How familiar are you with cervical cancer?
b) How common is cervical cancer in Lusaka?
2. How familiar are you with cervical cancer screening? What is your experience?
3. How familiar are you with the vaccine to prevent cervical cancer? What is your experience?

Effectiveness of service:

4. In your opinion, is the workforce i.e. health care providers, educators (teachers, pastors), advocates in health care, adequate enough to sensitize the public on cervical cancer prevention? If not, where is it lacking?
5. Basically, what are the current policies in place for administering screening and cervical cancer vaccination (priority population, regulations)? How do you feel these policies could be made more effective?
6. What factors should be considered when recommending policies for cervical cancer vaccination and cervical screening among risk population groups?

School based vaccination program:

7. Do you feel that the school based vaccination program adequately covered Lusaka? Why or why not?
8. In spite of the vaccination program being school based, did anyone else other than school girls request the vaccine including older women and men? What were the characteristics of those people?

Information and sources:

9. In your opinion, where do people in Lusaka generally get information about cervical cancer (church, school, clinics, media)?
10. Do you feel that the current media depictions of cervical cancer prevention are effective in sensitizing the public? Why or why not?
11. What promotional and outreach strategies might increase screening and vaccination? Can you think of any creative strategies you've used that have worked well?

12. What do you know about the availability of cervical screening and vaccination services in Lusaka? What resources (such as education, services, counseling, etc.) are you familiar with, if any?

Views:

13. What factors facilitate decisions to seek screening and vaccination?

14. What barriers to seeking screening and vaccination exist? Can you think of a strategy you've used to overcome these barriers?

15. What age range do you recommend for screening? Why?

16. What are your views on self-screening and the possibility of introducing it to the Zambian population? What are views on payment for self-screening?

17. What are your views on vaccinating girls as well as boys?

18. What age range would you recommend for cervical cancer vaccination?

Finally:

19. Do you consider cervical cancer to be one of the main health concerns in Lusaka? Why or why not?

20. Do you have any further information you would like to share, or any documents that you feel may be essential for this study?

QUALITATIVE DATA: SUPPORTING RESULTS

Administration of cervical cancer prevention services in Zambia as Reported by Respondents

Policy Level

It was reported that the Ministry of Health (MoH) played the main role in organizing and implementing both screening and vaccination prevention programs. Collaborations were made with the Ministry of Education and the Ministry of Community Development Maternal and Child Health Child Unit for the vaccination program. Collaborations were also made with the departments of Mother Health, Clinical Care and diagnostic services and Mobile and Emergency Health Services for cervical screening. The District Health Office implements policies made by the MoH. The Lusaka Urban District Health Management Team operates the public health clinics in Lusaka and the University Teaching Hospital (UTH). The District Disaster Management Unit is only called if the MoH fails to contain a disease. Furthermore, developmental partners and United Nations agencies like World Health Organization primarily offered technical support. The Centers for Disease Control and Prevention through the United States *President's Emergency Plan for Acquired Immune Deficiency Syndrome (AIDS) Relief* was the major funder of this program.

Community Level (composed of Non-Governmental Organizations [NGOs], health care facilities and media)

It was reported that the Centre for Infectious Disease Research in Zambia (CIDRZ) has an e-hub department (for training health care providers, consultation), community department (for peer educators), data unit (for data analysts, call back system), and clinics. CIDRZ has played a major role by working with the Institute of Economic and Social Research to conduct cervical cancer research, collaborating with the MoH in cervical screening skills training of nurses, development of screening services at government clinics, provision of mobile clinics and the sensitization of the public by use of peer educators. Peer educators work under clinics or NGOs to educate the public on cervical cancer and its prevention.

Project Concern International works with the Zambia Defense Force through mobile clinic programs for the provision of free screening using Visual Inspection with Acetic Acid, HIV/AIDS testing and sensitization of the public. The Traditional Health

Practitioners Association of Zambia is the main organization in Zambia that unites traditional healers. The association works to ensure that traditional health practitioners deliver primary health care for women only up to early stages of cervical cancer infection and emphasizes the need of referral of their patients to clinics. Planned Parenthood Association of Zambia (PPAZ) has four family planning clinics in Zambia with nurses that provide fee paying screening services via pap smear. PPAZ also conducts community outreach programs to sensitize the public. The media through print (Zambia Daily Mail), television and radio (Zambia National Broadcasting Cooperation, QTV/radio, MUVI) is involved in sensitizing the public by either their own efforts or from the prompting of the policy makers and/or NGOs.

Government clinics provide screening and vaccination services. MoH in collaboration with CIDRZ started a cervical cancer screening program with 65 clinics nationwide that were chosen based on location, population, infrastructure (space, human resource). At clinics patients can only receive the diagnosis of a suspected cancer, if needed patients are then referred to the UTH for further analysis and the diagnosis of cervical cancer. Patients in provinces have their specimen sent for analysis at UTH. Once definitive diagnosis is made the patients are referred to the gynecology department or the Cancer Disease Hospital for treatment depending on the staging.

Organizational Level

It was reported that the vaccination program was conducted at schools. Churches might assist in sensitization of the public.

Interpersonal and Intrapersonal Level

It was reported that the main influence of behavior was parents that consent to have their children vaccinated. Additionally, partners, family and friends who heard about screening from churches, health care providers and the media influence women's decision to practice screening.

QUALITATIVE DATA: RESULT BOXES

Box 1: Cervical Cancer General

Importance of cervical cancer

1. “No [cervical cancer] is not the main health problem. There is malaria, HIV, and [currently] cholera outbreaks.” (Teacher 1)

Workforce

2. “When I'm on leave it is closed. So therefore anyone who comes will be told to wait [un]til I come back or go to other clinics within Lusaka that provide screening.” (Health care provider 2)
3. “The challenge was not many health personnel. They only considered big schools and they would tell those in smaller schools to bring the pupils to the big school for vaccination. It would have been better to follow them there.” (Teacher 2)
4. “If I know the cancer is in early stages and manageable then the prescription and treatment is my own. (...) A second opinion is recommended for advanced cases because we do not have equipment. So we refer to people with equipment, people who can examine, people who can verify and give us findings. Cervical cancer is claiming a lot of lives. If we had a three way referral mechanism: healer-to-healer, healer-to-clinic and maybe clinic-to-healer, we could be saving a lot of lives.” (Special interest person 2)

Information sources

5. “We tried especially [in the] rural setting [with] traditional marriage councilors who basically give information about marriage, (. . .) child bearing, [and] pregnancy, generally they talk about reproductive health and to the point, (. . .) was to increase their knowledge on cervical cancer. [They would then use this] to communicate to a community which is not openly talking about such things because the [community] knows this is a group that is legalized to talk about such things.” (Policy maker1)
6. “Two nurses at this church talk about health issues during the main service. They give talks once or twice a year usually on cholera. The nurses came and asked for permission and I as the pastor gave them the go ahead. I felt it would be good for the congregation. They do it only twice because people know it all.”(Church leader 1)
7. “Screening is recommended to those who have symptoms or are found to have a cervix that is not fine. Those who have a complication are referred.” (Health care provider 4)
8. “There was no explanation. The nurses came and told us to arrange our pupils for vaccination. Then we sent consent forms to parents. The parents that signed and agreed got their daughters

vaccinated.” (Teacher 3)

9. “We found that (. . .) the highest form of getting information is from a friend (. . .) like a family friend, somebody you talk to [e.g. if] I go for screening and tell somebody else about it or a mother goes and encourages the daughters to [screen].” (Policy maker 1)

Effectiveness of sensitization

10. “I think much has to be done. Look at the way HIV is being talked about, information is available almost everywhere. But we have clients who say they have never heard about cervical cancer [and the] client lives in Lusaka.” (Special interest person 4)
11. “The number of churches and schools are not enough to help facilitate and educate the public. The community has many pupils who do not go to school and may not even go to church. Therefore, a door to door campaign would do.” (Teacher 4)
12. “The hindrance is the culture. Especially as a priest to talk to the congregation about the cancer is culturally difficult to mention in church. As a priest I can say or talk about women’s health but not cervical cancer.” (Church leader 2)
13. “Some places are youth friendly. The youth can be used to sensitize schools and they will hear from fellow youth which would be easy to take.” (Health care provider 4)

Knowledge

14. “Apart from douching a lot of women like inserting herbs. At the moment the most common herb is ‘*nsukno*’ (tobacco). They drink it to make their bodies very warm. They insert it inside their vagina to make it very tight, warm [and] dry. But men tell us, ‘we don’t tell [women] to do that it’s on their own’. Women say, ‘our men want dry sex and our vaginas to be very tight’.” (Special interest person 4)

Social support

15. “[Men are told that] it is important to use condoms. But married men are very difficult (. . .), they say this is my wife and I cannot use a condom. So we tell them to be faithful to one another. (. . .) If you are married stick to your partner but if you are not married and you have multiple partners please try to use condoms.” (Special interest person 4)
16. “Most of the women who come [to the cancer ward] have already been left by their husbands before coming here. So three quarters of the [women] who are here were once married.” (Health care provider 5)

Box 2: Cervical Cancer Screening

Screening age recommendation

17. “I remember enrolling one client who was 15 years old because children of nowadays start having sex at a very tender age. For us, as long as you have slept with a man (. . .) then you have to come for screening. That’s what we normally tell them.” (Special interest person 4)
18. “The age is 25 and above. It’s up to 59 I think for our case. For me personally I would even screen a 70 year old if she has never been screened. I would screen because compared to advanced countries (. . .) we are a low resource setting. People have never had screening and they may only have a chance when they are 70.” (Health care provider 2)

Screening uptake and barriers

19. “We have about 17 [screening instrument] sets. So once we see (. . .) 17 clients it means we are done for the day. (. . .) We tell clients who arrive later to come the following day (. . .) because we have limited instruments that cannot be reused. Sometimes they take time to come again. Some clients will give excuse[s], ‘I started menstruating so I couldn’t come’ or, ‘yesterday I had this program’ but after some time they do come.” (Special interest person 4)
20. “We have still not reached screening target in Lusaka. Underserved women are most likely sick. Men and other factors affect decision making.” (Policy maker 1)
21. “At times our patients complain about us calling them just to remind them about screening. They say, ‘why are you calling me? Is it a satanic movement or what? (. . .) I went to church and the pastor prayed for me so I am OK I don’t need your services anymore’.” (Special interest person 5)

Self-sampled screening

22. “Though it is a good idea I don’t think it would be necessary at this time because most of the women that are screened are (. . .) illiterate. So (. . .) levels of education need to use that kind of test kit must be considered.” (Special interest person 5)
23. “I don’t think it would work for Zambian people. Maybe rich people, high class but for low and the middle class since it takes 15 minutes to screen at the clinic, I don’t know if anyone would like to trade that and buy [a kit]. I wouldn’t do it. I rather just go every 3 years and have myself checked.” (Special interest person 3)

Box 3: Cervical Cancer Vaccination

Vaccine administration

24. “We have done two demonstrations. The first demonstration was done from 2013 to 2014 with completed 3 doses given. Overall coverage of the fully immunized was 58%. A second demonstration was done [with consideration given to] the lessons [learned] (. . .) to see how it will work at the national [scale]. We also remained with enough vaccines to do a second demonstration and we didn’t want to waste them.” (Policy maker 2)
25. “Those are policy decisions that are going to be made. You have countries like South Africa which has basically decided they are not funding the private schools (. . .). The government has focused on government schools.” (Policy maker 1)
26. “We had a series of meetings with the school but they refused to the point they told us ‘Go vaccinate somewhere else not our school’. Some of the parents of children at that school brought their daughters straight to the clinic for the vaccine.” (Health care provider 4)
27. “Everyone (schools) just had to participate. Once the ministry sends out the circular, then the clinic made a time-table to say when they will be coming to that school to administer the vaccine.” (Teacher 5)

Vaccination age recommendation

28. “For the [entire] grade 4. Every one of them even if they are 16 years old they are vaccinated because they are in grade 4. The age of 16 is a bit rare but a 15 year old in grade 4 is more common and that is in government schools. In private schools mostly 9 to 10 years old. Government school children are older. [The nurses] just follow the policy but at 16 years old, they screen them by asking, ‘if they have ever met a man’ to see if they are virgins. They say they have not. If they have there is no use to vaccinate them. Age depends on how a person has kept herself.” (Health care provider 4)
29. “It should not be a choice but it should be mandatory to negate the negative beliefs or myths e.g. ‘I can’t get the virus so why should I be vaccinated?’ So it’s better mandatory.” (Health care provider 1)

Vaccination uptake and barriers

30. “The ones that agreed their parents were very willing. They were happy to say the government developed the program. Others were saying they lost their relative to the same disease so they agreed. One parent was undergoing chemotherapy that time who also decided to support the daughter.” (Teacher 2)
31. “No side effects reported only the usual, swelling of the infected area, pain, redness.” (Teacher 2)

32. “About maybe two complained that they were sick about five parents said that their kids will be infertile. The girls who got sick after where the ones who came on an empty stomach. They were told to eat.” (Teacher 6)
33. “[Some] grade 4 pupils started the vaccine but never finished the doses. Some transferred [and for] others their parents [didn’t allow] them to take the second dose. Then some refused completely because they feared the girls would be sterile in the future, ‘Zambia has a large population so you are trying to reduce the number’. Also, ‘They are just considering our children because we are poor in the compound and you are just trying to experiment on our children’. To combat the beliefs, we continued talking to them. One case (. . .) the father refused but the daughter wanted it. So we followed the daughter’s request but had to stop anyway. Others were religious beliefs, ‘We are Christians and we only believe in prayer and anointing water that’s all’.” (Teacher 2)
34. “Others wanted the vaccine but the policy blocked them. Some parents complained by saying, ‘My grade 4 child is 10 years old and my grade 7 child is also 10 years old but only the grade 4 child is vaccinated, why not both?’” (Health care provider 4)

Vaccination coverage

35. “Parents have asked about vaccinating boys and they have been told to take their male children for circumcision.” (Health care provider 4)
36. “It was targeting girls only because they have the cervix. Men have the virus and therefore it is better to vaccinate the women because she gets the disease. It is her to suffer.” (Health care provider 6)
37. “It would be a good idea to vaccinate boys as well because there are boys who are abused by older women in their homes.” (Teacher 2)
38. “No parents with boys wanted the vaccine because of the guidelines we were given. They were told boys infect girls so prevent the one who can get the HPV.” (Teacher 5)

INTERVENTION: BASELINE SURVEY

Identification code (initials and phone number):	Date:								
<p>Instructions: Answer questions by marking an “X” in the box that represents the desired response or by circling the number that represents the desired response. For questions without answer options, write the response in the box.</p> <p>Examples:</p> <p>i. Gender: <input type="checkbox"/> Male <input checked="" type="checkbox"/> Female</p> <p>ii. Mark the response that represents your answer:</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 60%;"></td> <td style="width: 15%;">Yes</td> <td style="width: 15%;">No</td> <td style="width: 10%;">Not sure</td> </tr> <tr> <td>Do you know what cervical cancer is?</td> <td>①</td> <td>2</td> <td>3</td> </tr> </table>			Yes	No	Not sure	Do you know what cervical cancer is?	①	2	3
	Yes	No	Not sure						
Do you know what cervical cancer is?	①	2	3						

Kindly answer all questions, without skipping any. Be as honest as possible with your answers.

A1. What is your gender?

- Male
 Female

A2. Do you know what cervical cancer is?

- 1 Yes → go to question 3
 2 No → end here
 3 Not sure → go to question 3

If question 2 = Yes or Unsure, continue from here to the end

A3. According to you, what causes cervical cancer?

- Smoking
- Starting to be sexually active at a young age
- Having many sexual partners
- Being pregnant at a young age
- Using contraceptives
- Having many pregnancies
- Being old
- Hygienic practices (e.g. vaginal douching, cleaning/washing inside the vagina)
- Heredity, which means it's in the family
- Having a sexually transmitted disease
- Unsafe sexual practice (without a condom)
- Human papillomavirus (HPV) infection
- Other, explain:

A4. According to you, how can a person reduce the risk of getting cervical cancer? I will give you several options to choose from. More than one answer is possible.

- Not smoking
- Not becoming sexually active at a young age
- Being faithful to one sexual partner
- Not taking oral contraceptives
- Not doing hygienic practices (e.g. vaginal douching, cleaning/washing inside the vagina)
- Practicing safe sex (with a condom)
- Being circumcised (male circumcision)
- Being vaccinated against Human papillomavirus (HPV)
- Attending regular cervical cancer screening
- Other, explain:

A5. The following questions are about possible **sources** of information about cervical cancer.

Who supplied you with information about cervical cancer:	Can you tell me what type of information [fill in source] did supply: (tick all that apply)		Screening	Vaccination	Safe sex (condom, one partner)	No sex (abstinence)	Other
	Yes	No					
5.1 Your partner (husband/wife)	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.2 Other family members/ friends	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.3 Health care providers (doctor, nurse etc.)	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.4 Schools	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.5 Religious group (church, mosque)	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.6 TV, radio	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.7 Billboards, posters	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.8 Print media (newspaper, magazines)	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.9 Internet (social media, websites)	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A6. Do you know where women go to get cervical screening?

- 1 Yes
- 2 No
- 3 Not sure

A7. Do you know about screening services in government clinics?

- 1 Yes
- 2 No

A8. If you are a woman, have you ever had screening, or if you are a man has your partner gone for cervical cancer screening?

1 Yes

2 No

3 Not sure

A9. Did you know about free cervical cancer vaccination for school age girls?

1 Yes

2 No

A10. Have schools in your neighbourhood participated in the cervical cancer vaccination programme?

1 Yes, at least one

2 No, none

3 Not sure

A11. Did you have one or more of your daughters vaccinated against cervical cancer?

1 Yes, I have vaccinated my daughter(s)

2 No

Thank you for your participation. Have a nice day. Please come for the next meeting.

INTERVENTION: CERVICAL CANCER PREVENTION MEHTODS QUESTIONNAIRE FOR FEMALES

Identification code (initials and phone number):	Date:		
<input style="width: 100%; height: 100%;" type="text"/>	<input style="width: 100%; height: 100%;" type="text"/>		
Instructions:			
<ol style="list-style-type: none"> 1. This questionnaire has three sections. SECTION A: Demographics (to know more about you) SECTION B: Cervical cancer (covers general information, screening and vaccination) 2. Answer questions by marking an “X” in the box that represents the desired response or by circling the number that represents the desired response. For questions without answer options, write the response in the box. 			
Examples:			
<ol style="list-style-type: none"> i. Gender: <input type="checkbox"/> Male <input checked="" type="checkbox"/> Female ii. Mark the response that represents your answer: 			
	Yes	No	Not sure
Do you know what cervical cancer is?	①	2	3

Read before starting

The questionnaire will be primarily assessing the views of Zambian women and men on cervical cancer screening and vaccination. There are no right or wrong answers. We are only interested in what you are thinking. Your responses will be anonymous and will never be linked to you personally. Your participation is entirely voluntary. In case you wish to decline to take part in the study, you may do so and nothing will be made against you. Thank you for your cooperation.

Kindly answer all questions, without skipping any. Be as honest as possible with your answers.

SECTION A: DEMOGRAPHICS

A1. What is your year of birth?

Year

A2. What is the highest educational level that you have attained?

- 1 No formal education
- 2 Incomplete primary school
- 3 Complete primary school
- 4 Incomplete secondary school
- 5 Complete secondary school
- 6 Incomplete college, without diploma
- 7 Complete college, with diploma
- 8 Some university-level education, without degree

9 University-level education, with degree

A3. Are you employed now or not?

- 1 Full time employee
- 2 Part time employee
- 3 Self employed
- 4 Retired/pensioned
- 5 Housewife/unemployed
- 6 Student
- 7 Other

A4. During the past year, did your family: (mark all that apply)

- Save money
- Just get by
- Spent some savings
- Spent savings and borrowed money

A5. Do you belong to a religion or religious denomination?

- 1 No (do not belong to a denomination/religion)
- 2 Catholic
- 3 Christian Protestant
- 4 Orthodox
- 5 Jew
- 6 Muslim
- 7 Hindu
- 8 Buddhist
- 9 Other

A6. With whom do you live? (mark all that apply)

- You live alone
- Partner
- Step children
- Biological children
- Children (not your biological/step children)
- Other family members
- Other (e.g. with friends)

SECTION B: CERVICAL CANCER

B1. Do you know what cervical cancer is?

- 1 Yes → go to question B2
- 2 No → read introduction and go to question B5
- 3 Not sure → go to question B2

If question B1 = Yes or Unsure, continue from here

B2. According to you, what causes cervical cancer?

- Smoking
- Starting to be sexually active at a young age
- Having many sexual partners
- Being pregnant at a young age

- Using contraceptives
- Having many pregnancies
- Being old
- Hygienic practices (e.g. vaginal douching, cleaning/washing inside the vagina)
- Heredity, which means it's in the family
- Having a sexually transmitted disease
- Unsafe sexual practice (without a condom)
- Human papillomavirus (HPV) infection
- Other, explain:

B3. According to you, how can a person reduce the risk of getting cervical cancer?

- Not smoking
- Not becoming sexually active at a young age
- Being faithful to one sexual partner
- Not taking oral contraceptives
- Not doing hygienic practices (e.g. vaginal douching, cleaning/washing inside the vagina)
- Practicing safe sex (with a condom)
- Being circumcised (male circumcision)
- Being vaccinated against Human papillomavirus (HPV)
- Attending regular cervical cancer screening
- Other, explain:

B4. The following questions are about possible **sources** of information about cervical cancer.

	Who supplied you with information about cervical cancer:		Can you tell me what type of information [fill in source] did supply: (tick all that apply)				
	Yes	No	Screening	Vaccination	Safe sex (condom, one)	No sex (abstinence)	Other
B4.1 Your husband/ partner	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.2 Other family members/ friends	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.3 Health care providers (doctor, nurse etc.)	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.4 Schools	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.5 Religious group (church, mosque)	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.6 TV, radio	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.7 Billboards, posters	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.8 Print media (newspaper, magazines)	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.9 Internet (social media, websites)	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If question B1 = No, continue from here

- B5. Does the topic of cervical cancer make you feel uncomfortable/nervous?
- 1 Not uncomfortable at all
 - 2 A little uncomfortable
 - 3 Rather uncomfortable
 - 4 Very uncomfortable

- B6. The following questions are about possible **sources** of information about cervical cancer. Suppose you wanted to learn more about this topic than the brief introduction supplied to you.

Do you consider [fill in source] as a good source of information about cervical cancer:	Yes	No
B6.1 Your husband/ partner	1	2
B6.2 Other family members/friends	1	2
B6.3 Health care providers (doctor, nurse etc.)	1	2
B6.4 Schools	1	2
B6.5 Religious group (church, mosque)	1	2
B6.6 TV, radio	1	2
B6.7 Billboards, posters	1	2
B6.8 Print media (newspaper, magazines)	1	2
B6.9 Internet (social media, websites)	1	2

Cervical cancer screening

- B7. Do you know where to go to get cervical screening?
- 1 Yes
 - 2 No
 - 3 Not sure

- B8. Do you know about screening services in government clinics?
- 1 Yes
 - 2 No

- B9. Have you ever had cervical screening?
- 1 Yes → go to question B11
 - 2 No → go to question B10
 - 3 Not sure → go to question B10

If question B9 = No or Not sure, continue from here

- B10. If you never went for screening or you are not sure. Can you tell me what keeps you from going?

To what extent do you agree or disagree with the following statements:	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
B10.1 Finding time to go for screening is difficult	1	2	3	4	5
B10.2 Transportation to go for screening is difficult to find	1	2	3	4	5
B10.3 It's too expensive to get to the clinic	1	2	3	4	5

B10.4 I am nervous about being screened	1	2	3	4	5
B10.5 I expect cervical screening to be painful	1	2	3	4	5

If question B9 = Yes, continue from here

B11. If you had the chance to screen yourself at home with a self-screening kit, would you be willing to do it this way if it was easy to do?

- 1 Yes
- 2 No
- 3 Not sure

Cervical cancer vaccination

B12. Did you know about free cervical cancer vaccination for school age girls?

- 1 Yes
- 2 No

B13. Did schools in your neighbourhood participate in the cervical cancer vaccination programme?

- 1 Yes, at least one
- 2 No, none
- 3 Not sure

B14. Did you have one or more of your daughters vaccinated against cervical cancer?

- 1 Yes, I have vaccinated my daughter(s) → go to question B16
- 2 No → go to question B15

If question B14 = No, continue from here

B15. If not, would you have your daughter(s) vaccinated in the future?

- 1 No
- 2 Yes, if given a chance
- 3 I do not have a daughter, but if I did I would vaccinate her
- 4 I do not have a daughter, but if I did I would not vaccinate her

If question B14 = Yes, continue from here

B16. Some countries have allowed the vaccination of boys as well as girls seeing that the vaccine not only prevents cervical cancer but it can also prevent oral cancers, genital warts etc. Knowing this information, would you vaccinate your son(s) against cervical cancer, if that option was available to you?

- 1 No
- 2 Yes, if given a chance
- 3 I do not have a son, but if I did I would vaccinate him
- 4 I do not have a son, but if I did I would not vaccinate him

B17. What are the reasons for vaccinating or not vaccinating your children? Please rate how much you agree or disagree with the following statements:

	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
<i>B17.1 Using vaccines shows a lack of faith in the healing power of God</i>	1	2	3	4	5
<i>B17.2 The knowledge to create vaccines was given to people by God or a higher power</i>	1	2	3	4	5
<i>B17.3 The cervical cancer vaccine is harmful to health</i>	1	2	3	4	5
B17.4 If you vaccinate young girls they will be sexually active too early	1	2	3	4	5
B17.5 Vaccination is an effective way of preventing cervical cancer	1	2	3	4	5
B17.6 It is morally wrong to vaccinate girls for cervical cancer	1	2	3	4	5
B17.7 It is morally wrong to vaccinate boys for cervical cancer	1	2	3	4	5

Thank you once again for your participation. Here is a leaflet with further information on cervical cancer prevention from the local clinic. Have a nice day.

INTERVENTION: CERVICAL CANCER PREVENTION METHODS QUESTIONNAIRE FOR MALES

Identification code (initials and phone number):

Date:

Instructions:

1. This questionnaire has three sections.
SECTION A: Demographics (to know basic information about you)
SECTION B: Cervical cancer (covers general information, screening and vaccination)
2. Answer questions by marking an “X” in the box that represents the desired response or by circling the number that represents the desired response. For questions without answer options, write the response in the box.

Examples:

i. Gender: Male Female

ii. Mark the response that represents your answer:

	Yes	No	Not sure
Do you know what cervical cancer is?	①	2	3

Read before starting

The questionnaire will be primarily assessing the views of Zambian women and men on cervical cancer screening and vaccination. There are no right or wrong answers. We are only interested in what you are thinking. Your responses will be anonymous and will never be linked to you personally. Your participation is entirely voluntary. In case you wish to decline to take part in the study, you may do so and nothing will be made against you. Thank you for your cooperation.

Kindly answer all questions, without skipping any. Be as honest as possible with your answers.

SECTION A: DEMOGRAPHICS

A1. What is your year of birth?

Year

A2. What is the highest educational level that you have attained?

- 1 No formal education
- 2 Incomplete primary school
- 3 Complete primary school
- 4 Incomplete secondary school
- 5 Complete secondary school
- 6 Incomplete college, without diploma
- 7 Complete college, with diploma
- 8 Some university-level education, without degree

9 University-level education, with degree

A3. Are you employed now or not?

- 1 Full time employee
- 2 Part time employee
- 3 Self employed
- 4 Retired/pensioned
- 5 Unemployed
- 6 Student
- 7 Other

A4. During the past year, did your family: (mark all that apply)

- Save money
- Just get by
- Spent some savings
- Spent savings and borrowed money

A8. Do you belong to a religion or religious denomination?

- 1 No (do not belong to a denomination/religion)
- 2 Catholic
- 3 Christian Protestant
- 4 Orthodox
- 5 Jew
- 6 Muslim
- 7 Hindu
- 8 Buddhist
- 9 Other

A6. With whom do you live? (mark all that apply)

- You live alone
- Partner
- Step children
- Biological children
- Children (not your biological/step children)
- Other family members
- Other (e.g. with friends)

SECTION B: CERVICAL CANCER

B1. Do you know what cervical cancer is?

- 1 Yes → go to question B2
- 2 No → read information and go to question B5
- 3 Not sure → go to question B2

If question B1 = Yes or Unsure, continue from here

B2. According to you, what causes cervical cancer?

- Smoking
- Starting to be sexually active at a young age
- Having many sexual partners
- Being pregnant at a young age

- Using contraceptives
- Having many pregnancies
- Being old
- Hygienic practices (e.g. vaginal douching, cleaning/washing inside the vagina)
- Heredity, which means it's in the family
- Having a sexually transmitted disease
- Unsafe sexual practice (without a condom)
- Human papillomavirus (HPV) infection
- Other, explain:

B3. According to you, how can a person reduce the risk of getting cervical cancer?

- Not smoking
- Not becoming sexually active at a young age
- Being faithful to one sexual partner
- Not taking oral contraceptives
- Not doing hygienic practices (e.g. vaginal douching, cleaning/washing inside the vagina)
- Practicing safe sex (with a condom)
- Being circumcised (male circumcision)
- Being vaccinated against Human papillomavirus (HPV)
- Attending regular cervical cancer screening
- Other, explain:

B4. The following questions are about possible **sources** of information about cervical cancer.

Who supplied you with information about cervical cancer:			Can you tell me what type of information [fill in source] did supply: (tick all that apply)				
	Yes	No	Screening	Vaccination	Safe sex (condom, one partner)	No sex (abstinence)	Other
B4.1 Your wife/ partner	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.2 Other family members/ friends	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.3 Health care providers (doctor, nurse etc.)	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.4 Schools	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.5 Religious group (church, mosque)	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.6 TV, radio	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.7 Billboards, posters	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.8 Print media (newspaper, magazines)	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B4.9 Internet (social media, websites)	1	2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If question B1 = No, continue from here

B5. Does the topic of cervical cancer make you feel uncomfortable\nnervous?

- 1 Not uncomfortable at all
- 2 A little uncomfortable
- 3 Rather uncomfortable
- 4 Very uncomfortable

B6. The following questions are about possible **sources** of information about cervical cancer. Suppose you wanted to learn more about this topic than just the brief introduction I just supplied to you.

Do you consider [fill in source] as a good source of information about cervical cancer:	Yes	No
B6.1 Your wife/ partner	1	2
B6.2 Other family members/ friends	1	2
B6.3 Health care providers (doctor, nurse etc.)	1	2
B6.4 Schools	1	2
B6.5 Religious group (church, mosque)	1	2
B6.6 TV, radio	1	2
B6.7 Billboards, posters	1	2
B6.8 Print media (newspaper, magazines)	1	2
B6.9 Internet (social media, websites)	1	2

Cervical cancer screening

B7. Do you know where women go to get cervical screening?

- 1 Yes
- 2 No
- 3 Not sure

B8. Do you know about screening services in government clinics?

- 1 Yes
- 2 No

B9. Has your partner gone for cervical cancer screening?

- 1 Yes
- 2 No
- 3 Not sure

B10. Given a chance to support your partner, would you encourage her to self-screen i.e. screening herself at home with a self-screening kit if it was easy to do?

- 1 Yes
- 2 No
- 3 Not sure

Cervical cancer vaccination

B11. Did you know about free cervical cancer vaccination for school age girls?

- 1 Yes
- 2 No

B12. Did schools in your neighbourhood participate in the cervical cancer vaccination programme?

- 1 Yes, at least one
- 2 No, none
- 3 Not sure

B13. Did you have one or more of your daughters vaccinated against cervical cancer?

- 1 Yes, I have vaccinated my daughter(s) → go to question B15
- 2 No → go to question B14

If question B13 = No, continue from here

B14. If not, would you have your daughter(s) vaccinated in the future?

- 1 No
- 2 Yes, if given a chance
- 3 I do not have a daughter, but if I did I would vaccinate her
- 4 I do not have a daughter, but if I did I would not vaccinate her

If question B13 = Yes, continue from here

B15. Some countries have allowed the vaccination of boys as well as girls seeing that the vaccine not only prevents cervical cancer, but it can also prevent the development of oral cancers, genital warts etc. Knowing this information, would you vaccinate your son(s) against the carrier of cervical cancer, if that option was available to you?

- 1 No
- 2 Yes, if given a chance
- 3 I do not have a son, but if I did I would vaccinate him
- 4 I do not have a son, but if I did I would not vaccinate him

B16. What are the reasons for vaccinating or not vaccinating your children? Please rate how much you agree or disagree with the following statements:

	Completely disagree	Disagree	Neither agree nor disagree	Agree	Completely agree
B16.1 Using vaccines shows a lack of faith in the healing power of God	1	2	3	4	5
B16.2 The knowledge to create vaccines was given to people by God or a higher power	1	2	3	4	5
B16.3 The cervical cancer vaccine is harmful to health	1	2	3	4	5
B16.4 If you vaccinate young girls they will be sexually active too early	1	2	3	4	5
B16.5 Vaccination is an effective way of preventing cervical cancer	1	2	3	4	5
B16.6 It is morally wrong to vaccinate girls for cervical cancer	1	2	3	4	5
B16.7 It is morally wrong to vaccinate boys for cervical cancer	1	2	3	4	5

Thank you once again for your participation. Here is a leaflet with further information on cervical cancer prevention from the local clinic. Have a nice day.

QUANTITATIVE DATA/ INTERVENTION: KNOWLEDGE GRADE CALCULATION

The table shows the corresponding risk factors/causes to their protective factors as they were analyzed in calculating knowledge grade.

Table: Corresponding risk factors and protective factors in knowledge grade calculation

Risk Factor [value]	Protective Factor [value]	Grade Correct	Grade Incorrect
-	Attending regular screening [correct]	3	-3
HPV infection [correct]	HPV vaccination [correct]	3	-3
Practicing unsafe sex [correct]	Practicing safe sex [correct]	3	-3
-	Being circumcised [correct]	1	-1
Becoming sexually active at a young age [correct]	Not becoming sexually active at a young age [correct]	1	-1
Having a STI [correct]	-	1	-1
Having many pregnancies [correct]	-	1	-1
Having many sexual partners [correct]	Being faithful to one sexual partner [correct]	1	-1
Smoking [correct]	Not smoking [correct]	1	-1
Using contraceptives [correct]	Not taking contraceptives [correct]	1	-1
Vaginal douching [correct]	No vaginal douching [correct]	1	-1
Becoming pregnant at a young age [incorrect]	-	-1	1
Being old [incorrect]	-	-1	1
Heredity [incorrect]	-	-1	1

The formula used to calculate the knowledge grade in SPSS was as follows:

IF (C1 =1 OR C1 = 3) KG = 0.

IF (RF1 = 1) KG = KG + 1.

IF (RF2 = 1) KG = KG + 1.

IF (RF3 = 1) KG = KG + 1.

IF (RF5 = 1) KG = KG + 1.

IF (RF6 = 1) KG = KG + 1.

IF (RF8 = 1) KG = KG + 1.

IF (RF10 = 1) KG = KG + 1.

IF (RF11 = 1) KG = KG + 3.

IF (RF12 = 1) KG = KG + 3.

IF (PF1 = 1) KG = KG + 1.

IF (PF2 = 1) KG = KG + 1.

IF (PF3 = 1) KG = KG + 1.

IF (PF5 = 1) KG = KG + 1.

IF (PF8 = 1) KG = KG + 1.

IF (PF11 = 1) KG = KG + 3.

IF (PF12 = 1) KG = KG + 3.

IF (PF13 = 1) KG = KG + 1.

IF (PF14 = 1) KG = KG + 3.

IF (RF1 = 2) KG = KG - 1.

IF (RF2 = 2) KG = KG - 1.

IF (RF3 = 2) KG = KG - 1.

IF (RF5 = 2) KG = KG - 1.

IF (RF6 = 2) KG = KG - 1.

IF (RF8 = 2) KG = KG - 1.

IF (RF10 = 2) KG = KG - 1.

IF (RF11 = 2) KG = KG - 3.

IF (RF12 = 2) KG = KG - 3.

IF (PF1 = 2) KG = KG - 1.

IF (PF2 = 2) KG = KG - 1.

IF (PF3 = 2) KG = KG - 1.

IF (PF5 = 2) KG = KG - 1.

IF (PF8 = 2) KG = KG - 1.

IF (PF11 = 2) KG = KG - 3.

IF (PF12 = 2) KG = KG - 3.

IF (PF13 = 2) KG = KG - 1.

IF (PF14 = 2) KG = KG - 3.

COMPUTE KG = 10*(KG + 28)/56.

Where:

C1 = cervical cancer awareness with variables code 1 = yes and 3 = not sure;

KG = knowledge grade;

RF = risk factor with numerical codes for each risk factor;

PF = protective factor with numerical codes for each protective factor;