Cervical Cancer and HPV Awareness: A Comparative Study of University Students in Lahore and Vienna

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Abstract

This study investigates the awareness and attitudes towards HPV vaccination and cervical cancer prevention among university students in Lahore, Pakistan and Pakistani students studying in Vienna, Austria. In Pakistan, cervical cancer remains one of the leading causes of preventable mortality because of insufficient awareness, limited access to vaccination and cultural stigmas. Using a quantitative, cross sectional research design, data was collected through structured online surveys from university students in each city. The research findings reveal a significant high awareness level and favorable attitudes towards HPV prevention among students in Vienna. This suggests that international exposure and difference in healthcare systems positively shape preventive health behaviours. To reduce the disease burden, this research's insights can inform evidence-based policy interventions and awareness campaigns in Pakistan to promote HPV vaccination, early detection through screening.

Table of Contents

COPYRIGHT NOTICE ii

Author's declaration iii

Abstract iv

1. Introduction 1

1.1 Background and Context 2

1.1.1 Cervical Cancer and HPV: A Global Concern 2

1.1.2 Situation in Pakistan 2

1.1.3 International Exposure and Health Awareness 3

1.2 Research Problem Statement 4

1.3 Research Objectives and Research Questions 5

3.1.1 Research Question 5

3.1.2 Specific Research Objectives 5

1.4 Rationale and Significance of the Study 6

4.1.1 Why is this research important? 6

4.1.2 Why compare Lahore and Vienna students? 7

4.1.3 Policy Implications 7

1.5 Conclusion 8

2. Literature Review 9

2.1 Introduction 9

2.2 Global Context of HPV and Cervical Cancer 9

2.3 Awareness and Knowledge of HPV 10

2.4 Attitudes Toward HPV Vaccination 12

2.5 Screening Practices and Barriers 13

2.6 Gaps in Literature 15
2.6.1 Conclusion and Link to Theoretical Framework 15
2.7 Theoretical Framework 16
2.7.1 Health Belief Model (HBM) 16
2.7.3 Theory of Planned Behavior (TPB) 18
2.8 Integration of HBM and TPB 19
2.8.1 Rationale for Integration 19
2.8.2 Conceptual Diagram 20
2.9 Contextual Factors Influencing Behavior 21
2.9.1 Socio-Cultural Differences 21
2.9.2 Healthcare Access 22
2.9.3 Role of Universities 23
2.10 Hypotheses Development 25
2.11 Conclusion 25
3. Methodology 26
3.1 Research Design 27
3.2 Data Collection 27
3.2.1 Target Population and Sampling Method 27
Key Variables 28
3.3 Data Collection Tools and Ethical Considerations 28
3.4 Data Analysis 29
3.4.1 Data Preparation and Analysis Technique 29
3.4.2 Validity and Reliability 29
4. Analysis and Results 31
4.1 Introduction 31

4.2 Descriptive Statistics 31
4.2.1 Demographic Summary 31
4.3 Awareness of HPV and Cervical Cancer 36
4.3.1 Knowledge of HPV 36
4.3.2 Knowledge of Cervical Cancer 36
4.3.3 Source of Information 37
4.3.4 Factors Leading to Cervical Cancer 37
4.4 Inferential Statistics 38
4.4.1 Analysis Method 38
4.4.2 Statistical Results 39
4.4.3 ANOVA Results 40
4.4.3.1 Coefficients 40
4.5 Conclusion 43
5. Discussion 44
5.1 Purpose 44
5.2 Interpretation of Key Findings 44
5.2.1 Awareness of HPV and Cervical Cancer 44
5.2.2 Socio-Demographic Influence 45
5.2.3 Predictive Factors and Regression Analysis 45
5.3 Comparison with Prior Studies 46
5.4 Explanation of Unexpected Findings 46
5.4.1 Age and Gender 47
5.4.2 Cultural Influences 47
5.5 Implications 48
5.6 Limitations of the Study 48

5.7 Recommendations.....49
5.8 Conclusion 49
Appendix 1: 50
Reference list 55

1. Introduction

The World Health Organisation (WHO) reports that cervical cancer occurs frequently throughout the world since it causes over 300,000 deaths per year (World Health Organisation: WHO 2024). HPV represents the main basis for cervical cancer development and prevention relies on both vaccine protection and regular screening programs. Although prevention is possible, cervical cancer causes more than 3,200 deaths each year in Pakistan (Globocan, 2020). Although it may appear modest compared to Pakistan's very large population, it is higher than the annual death toll from cervical cancer in both Indonesia and Brazil. Moreover, after breast cancer, cervical cancer is the most frequent type of cancer for Pakistani women, amounting to many deaths and a strong threat to women's health. The many deaths in Pakistan occur because people lack sufficient healthcare resources and information combined with cultural obstacles preventing early cancer prevention and detection.

The prevention of cervical cancer depends on HPV vaccination together with periodic screenings. HPV vaccination protects individuals from the most harmful HPV strains and cervical screenings identify early abnormalities which minimises cancer development possibilities. The preventative measures including vaccination and regular check-ups remain unknown to most residents of Pakistan as they lack sufficient awareness about their essential nature. Most residents of Pakistan do not know about the importance of HPV vaccination or routine cervical screenings. According to a survey at a national level, only 20% of women had ever heard of HPV and only about 5% understood that the HPV vaccine helps stop cervical cancer (Singh et al. 2022).

The goal of this study is to assess HPV and cervical cancer awareness between students attending universities in Lahore and those in Vienna. Particularly, it explores what they learn about HPV and cervical cancer, their feelings about steps to prevent the disease and the effects of social and educational backgrounds on their actions. Using a survey-based method, the research collects and studies responses from 100 participants living in both cities to discover important differences. It seems that students in Vienna are more attentive to preventing infection, probably because they benefit from thorough health education and open talks about sexual health. The results are expected to help create solutions and programs that lower cultural and awareness barriers to cervical cancer prevention in Pakistan.

1.1 Background and Context

1.1.1 Cervical Cancer and HPV: A Global Concern

According to World Health Organization data from 2020, there were 604,000 new cases and 342,000 deaths from cervical cancer around the world in 2020 (WHO, 2024). Persistent infection from specific strains of human papillomavirus transmitted during sexual contact leads to this disease (Singh et al., 2022). Reductions in cervical cancer of up to 70% have been seen where countries such as Australia and the UK have effective HPV vaccination and screening. In contrast, places with the majority of cervical cancer deaths are characterized by little access to healthcare, bad infrastructure and little awareness, leading to the deaths of many sufferers from this disease (WHO, 2024).

1.1.2 Situation in Pakistan

Cervical cancer represents the second most frequent cancer diagnosed in Pakistani women who experience more than 3,200 yearly deaths (Globocan, 2020). Awkward attitudes about sexual

health matter and cancer prevention block both awareness development and public willingness toward preventive approaches. Health education levels in the country are seriously deficient because many people lack knowledge about the HPV vaccine and regular screening procedures (Zhang et al. 2022). The Pakistani government has introduced programs yet the acceptance rates for HPV vaccinations and regular screenings continue to stay low because of inadequate awareness and minimal healthcare facilities combined with traditional social barriers. Reasons for the high number of cervical cancer diagnoses occur during advanced stages stem from insufficient awareness that limits treatment options.

1.1.3 International Exposure and Health Awareness

The healthcare services in European nations such as Austria offer extensive preventive care alongside educational initiatives to stop diseases to students who study abroad. Austrian health systems give their inhabitants broad access to vaccination and screening services through extensive public health promotional programs. Since students in Austria can get HPV vaccines and screening at school or covered by insurance, they receive complete education about preventing cervical cancer and protecting themselves from HPV (Halat et al., 2023). Pakistan may apply these solutions by immunizing all students and teaching cervical health as part of college courses. The acceptance of preventive health measures may increase through open discussions about sexual health which are socially accepted in these countries. The assumption is established that Pakistani students studying in Vienna possess superior cervical cancer prevention awareness because they encounter multiple healthcare messages during their time in the country.

1.2 Research Problem Statement

The preventable disease of cervical cancer continues to kill large numbers of Pakistani women because it remains uncontrolled. The existence of the HPV vaccine alongside screening tests remains unknown to many individuals due to poor public awareness levels. Information scarcity about preventive measures leads to delayed detection of cervical cancer which becomes more challenging to treat effectively (Watkins 2021). Multiple factors create this knowledge deficit which combines restricted access to education with societal cultural beliefs that block sexual health dialogue and insufficient government-backed public health initiatives.

The educational system in Pakistan fails to educate its students about preventive health matters such as cervical cancer which impairs health awareness development among students. People within a specific socio-cultural environment show varying levels of motivation to obtain information about preventive health practices. Students at foreign universities face better odds to access clear information about HPV vaccination and screening due to their education in healthcare systems with more progressive sexual health policies. (Singh et al. 2022). Students who experience foreign exposure tend to develop more proactive cervical cancer prevention behaviors because of their changed attitudes.

This study aims to compare the levels of HPV and cervical cancer awareness between university students in Lahore, Pakistan, and those studying abroad in Vienna. The study evaluates prevention awareness and attitudes by comparing local Pakistan students with their international counterparts based abroad in Vienna. The research findings between two groups will help develop public health policy in Pakistan. The knowledge acquired from studying abroad will aid policymakers in designing awareness programs that target the educational and healthcare deficiencies to lower cervical cancer statistics in Pakistan.

1.3 Research Objectives and Research Questions

3.1.1 Research Question

How do awareness levels of cervical cancer and its prevention differ between university students in Lahore and Pakistani students studying in Vienna?

3.1.2 Specific Research Objectives

1. **To assess awareness of HPV and cervical cancer prevention among university students.**

The aim is to determine how much university students understand about HPV and the different strategies for reducing their risk of cervical cancer. The information gathered allows for the detection of areas lacking in understanding and future plans for promoting health.

2. **To compare attitudes toward HPV vaccination and screening between students in Lahore and those in Vienna.**

The main aim is to study how the understanding, willingness and attitudes towards HPV vaccination and cervical cancer screening programs differ among students living in two contrasting cities. The study examines these attitudes side by side to discover how local and health system factors shape preventive behavior.

3. **To examine the role of socio-cultural norms in influencing preventive behaviors.**

The objective examines if feelings about culture, traditions and social rules affect students' willingness to have HPV vaccinations and screenings. The factors it takes into account include stigma, the position of gender roles and the effect of a family on people.

4. **To evaluate whether international exposure impacts health awareness and proactive health behaviors.**

This objective investigates whether students who have studied or traveled in foreign countries or been exposed to world media are more informed about and less negative about stopping HPV. The underlying idea is that experiencing other cultures can encourage individuals to learn about and practice preventive care.

Theoretical Background and Hypotheses

Austria and similar countries benefit from higher HPV vaccine and cervical cancer screening rates due to their strong public health systems and health education programs. According to Kumatongo et al. (2021) education about sexual health and prevention comes from the combination of open culture and organized vaccine programs in Austria. Alternatively, Jamieson et al. (2023) demonstrate that a lack of proper health awareness, fewer support for screenings and cultural hurdles may discourage students from being proactive about their health.

According to these findings, it is hypothesised that university students in Vienna will outperform those in Lahore in their awareness of HPV and cervical cancer prevention and have better views toward vaccination and screening.

1.4 Rationale and Significance of the Study

4.1.1 Why is this research important?

The prevalence of cervical cancer in Pakistan has led to 3,200 annual fatalities because this disease is preventable (Shamsi et al. 2024). The high mortality rate from cervical cancer in Pakistan exists mainly because of insufficient awareness regarding preventive measures and inadequate screening programs despite the availability of HPV vaccines. The deficiency of understanding regarding

HPV virus and vaccination roles and screening significance creates delayed diagnoses resulting in less effective treatment methods. The reduction of cervical cancer impact and better health results for Pakistani women requires comprehensive efforts to eliminate the prevailing knowledge deficits.

4.1.2 Why compare Lahore and Vienna students?

The research compares Pakistani university students in Lahore against their counterparts in Vienna who attend school abroad to study how educational and healthcare systems affect cervical cancer prevention knowledge and acceptance. The health education received by students in Vienna includes Western guidelines together with proactive screening initiatives and structured HPV vaccination programs that build their knowledge of health concerns. The students from Lahore who remained in their home country lacked equivalent access to a complete health education system and preventive medical resources.

4.1.3 Policy Implications

The research design with its comparative framework helps measure if experiencing a healthcare system with standardised structure enables better understanding and attitudes about cervical cancer prevention. The assessment of significant awareness differences enables policy makers to establish informed public health platforms within Pakistan. The research results can guide development of improved education policies and HPV vaccination methods along with more efficient public awareness programs. A positive transformation of public healthcare through this research could result in improved cervical cancer prevention methods and earlier detection and lower mortality rates across Pakistan.

1.5 Conclusion

The research plays a pivotal role in fixing cervical cancer awareness deficiencies in Pakistan which stands as the principal female killer in the country. The study assesses health awareness and preventive behavior between Lahore university students and Vienna students to produce modern research about how study-abroad experience shapes health care understanding. This analysis assesses students who study abroad because they receive enhanced medical systems and educational programs related to cervical cancer prevention. The research design's comparative structure will enhance both knowledge regarding cultural and educational health behavior effects and produce essential policy recommendations. Research findings will direct Pakistani authorities to create purposeful HPV vaccination and cervical cancer screening campaigns.

2. Literature Review

2.1 Introduction

Based on the global and integrated regional review of existing research, this review seeks to establish the level of knowledge, attitude and barriers to preventive measures. It increases specific attention to students in Pakistan and students studying internationally i.e., recognising the way in which exposure to going international affects awareness and attitude. This review gathers research focusing on HPV and cervical cancer, including global information and a regional analysis of the South Asian context, and educational initiatives. It also considers perceptions of HPV vaccination and challenges to achieving optimal screening behaviours, and identifies areas within these topics which have been less researched. This section provides the background for the comparison of university students in Lahore and Vienna to be made later on in this research.

Research Question: How do awareness levels of cervical cancer and its prevention differ between university students in Lahore and Pakistani students studying in Vienna?

2.2 Global Context of HPV and Cervical Cancer

HPV is the primary cervical cancer risk factor, accounting for nearly all the cases reported around the world, accounting for 99% (Okunade 2020). The focus on cervical cancer in this review is intentional. Cervical cancer remains one of the most prevalent and preventable forms of cancer worldwide, particularly among women, and it disproportionately affects younger populations, such as university students. Understanding their awareness, prevention practices, and behaviors is critical to addressing this specific public health challenge. Vaccines and screening for cervical cancer have greatly reduced its incidence in countries with higher income. Nevertheless, significantly higher percentages of cervical cancer mortality are recorded in developing LMICs

such as Pakistan owing to low literacy levels and availability of prophylaxis. International campaigns like the WHO's initiative to eliminate cervical cancer through vaccination, screening, and treatment also recognise the need for awareness creation. Of interest, in high-income countries, national vaccination programs have shown a reduction in HPV-related cancers (Altobelli et al. 2019). However, in areas such as South Asia, sociocultural norms practises act as a barrier to the advancement of such goals and the resources are scarce. Huge comparative analyses stress that students in HI settings have a better level of awareness and are more perceptive in their health-related behaviors than students in LMICs (Ahmed et al. 2023).

2.3 Awareness and Knowledge of HPV

Understanding of and information about Human Papillomavirus (HPV) among university students remains a mixture and generalised depending on area and status. The comprehensive awareness observed in high-income countries, particularly in North America and Europe, can largely be attributed to the implementation of effective sex education programs (Altbach, Reisberg and Rumbley 2019). According to Rashid, Labani and Das (2016), student knowledge is even more advanced and a majority of those in those regions understand what HPV is and how it leads to cervical cancer. The same research found that over 70% of university students in these areas were aware of HPV as a sexually transmitted infection and understood its role in causing cervical cancer. This awareness has been associated with integrated education, which focuses on reproductive health as part of education. Furthermore, mass media and educational interventions, as well as healthcare provider promotion and awareness programs, have enhanced awareness of HPV, vaccination, and cervical cancer among Mass media campaigns, educational interventions, and healthcare providers. These efforts have reached diverse groups, including parents, educators,

and the wider community, fostering a broader awareness that supports informed decision-making and public health outcomes.

To provide a meaningful comparison, studies from Western countries highlight significantly higher awareness levels among university students. For example, a survey conducted in the United States found that approximately 75% of university students were aware of HPV and its vaccine (Gerend and Magloire 2008). Similarly, research in Europe indicated that over 80% of students in universities had heard of HPV and understood its link to cervical cancer (Patel et al. 2010). These figures starkly contrast with the findings from Pakistani universities, where less than 10% of students were aware of HPV or its vaccine (Khan et al. 2016), underscoring the disparity in awareness between high-income and low- and middle-income countries. This is because sex health is a taboo and is not well discussed due to lack of health education. While it is relatively easy to discuss these problems in Western countries, South Asian societies do avoid the topics, leading to a vast information deficit. The absence of governmental and institutional concern for the problem of health awareness prolongs these gaps. This problem has been found to be effectively addressed by targeted educational interventions. In a study, Lambert (2001) explained that peer-centred health education interventions led to higher knowledge among students about HPV issues. Likewise, the campaigns that were devised for the concern of health risks from HPV rather than sexually transmitted approaches to the campaign have been beneficial in reducing cultural barriers (Ferrer et al. 2014). Research conducted in other LMICs, including India and Bangladesh, supports these findings and reveals that culturally appropriate strategies are essential for enhancing HPV knowledge.

It is also noteworthy that technology and social networks are gradually entering the foreground in terms of filling awareness gaps. In the process of HPV information sharing, Web 2.0 applications

and mHealth interventions have been used to reach out to the population, focusing on younger people (Kim et al. 2014). For instance, a pilot study of WhatsApp-based health education groups among school-going female students in India has reported improved health literacy regarding HPV and cervical cancer among the students. These outcomes re-emphasise the importance of searching for novel methods and approaches in targeting global HPV knowledge disparities.

2.4 Attitudes Toward HPV Vaccination

Overall beliefs and perceptions considered within this work comprise cultural beliefs, economic predispositions, and the correct knowledge about HPV vaccine. Overall, high-income countries have had a positive attitude towards vaccination due to the promotion of health and safety of vaccination and its efficacy. Social media platforms, political polarisation, and anti-vaccination movements have contributed to skepticism and fear surrounding vaccines, including the HPV vaccine, even in Western countries. For instance, misinformation regarding vaccine side effects and distrust in pharmaceutical companies have led to declining vaccination rates in some regions. Addressing this backlash requires renewed efforts to counter misinformation with accurate, accessible, and culturally sensitive communication strategies. Looking at the role of presentations, Mignozzi et al. (2024) observed that students in France had a high level of confidence when HPV vaccines were presented to them as Cancer prevention angles rather than utilising it for sexual-related issues. The same thing was observed in the United States, where governmental endorsement and cheap and easy availability of vaccines have enhanced the confidence level of the people (Brewer et al. 2017).

On the other hand, the extent to which investment is a priority in LMICs is significantly lower. In Pakistan, there are several myths relating to HPV vaccination. In Pakistan, some students and their families think that it leads to promiscuity or are in doubt as to the safety of the vaccine owing to

lack of information (Kisa and Kisa 2024). Moreover, religious and cultural beliefs are constraints because talking about sexual health and vaccines is shameful. Other research reveals that women in Pakistan tend to rely on male family members in their health decision-making, which makes vaccines an even harder option. These challenges have therefore been singled out as being best addressed by the use of community-based interventions. For instance, using religious and community leaders in convincing the society to go for vaccinations have been seen to have the possibility of decreasing resistance to the vaccine. As Wong et al. (2020) have shown that if religious leaders in rural areas of Pakistan support HPV vaccination, the rates of vaccination rises. In Indonesia, literally translated, messaging was culturally sensitive and stressed its role in preventing cancers, not the sexual implication of the vaccine, which proved helpful in the conservative community's acceptance (Vicentini et al. 2022).

Even more significant is the existence of economic factors that are also deemed crucial in influencing the mission and achievement of goals. Lack of insurance coverage to HPV vaccines and costly vaccines limit the availability of HPV vaccination in LMICs. There is evidence that supported programs and compared government activities can solve this problem. For instance, a pilot implementation of HPV vaccines in Indian governmental school recipient population was over 85% (Rani et al. 2022). All these suggest that cost complemented by easy vaccine access may greatly enhance HPV prevention perceptions.

2.5 Screening Practices and Barriers

Screening is a well-established practice in high-income countries as a part of preventive health care which has greatly contributed to early detection and reduction in the mortality rates of cervical cancer. Castanon et al. (2018) have reported that extensive annual Pap smear screening implemented in the United States and the United Kingdom has contributed to a 70% reduction in

cervical cancer incidences in the past few decades. Such outcomes are explained by effective healthcare networks, widespread promotional programs, and the accessibility of screenings, which are either free at the point of care or covered by public health insurance in countries like the UK and Austria. Unfortunately, in Pakistan cervical cancer screening is still not a common practice. According to Salehiniya et al. (2021), less than 5% of women get screened, a situation attributed to system and culture barriers. One of the challenges is restricted access to health facilities especially in the rural area. It was established that women have to walk long distances in order to access screening services, and the costs incurred acts a disincentive for most of them to access screening services. In addition, shortages of qualified personnel, which reduce the number of healthcare facilities to which sufferers can gain access, compound these problems.

Cultural and social factors to do with cervical cancer screening are equally as important. Lack of acceptance, poor information on the procedure and people's overall lack of willingness to speak about reproductive health are some of the factors that cause many women not to go for screenings. This reluctance could affect the accuracy and completeness of responses. To mitigate this, it's crucial to ensure confidentiality, use non-judgmental language, and foster a comfortable environment that encourages open participation, while also emphasizing the importance of the study in improving public health. Qureshi (2023) conducted a qualitative study with Pakistani women in which they found that women are embarrassed to take Pap smears because they are associated with promiscuity, so they need culturally appropriate awareness programs. Interventions aimed at increasing uptake of screening services in LMICs have been targeted at community and low-cost programs. Husbands & Johnson, for example, suggest that mobile health clinics that may either provide or refer women to obtain free or inexpensive Pap smears in areas frequently classified as underserved can help reduce many barriers. For example, in Kenya, a pilot

project showed that mobile clinics boosted the rates of up-screening by 60% among women who had never been screened before (Kabukye et al. 2023).

Furthermore, community awareness programs supporting the encouragement of talks about cervical cancer, as well as creating awareness of the benefits of cervical cancer screening exercises, have been effective. New strategies that include self-sampling HPV tests are slowly becoming promising strategies to advancing screenings in LMICs. Research conducted in India and Thailand has shown that using self-sampling kits alongside teleconsultations can enhance access to the service and obviate a number of prejudices characteristic of traditional screenings (Zhang 2022). Such measures are a call for the use of multifaceted, sustainable, and culturally sensitive interventions to overcome the barriers towards cervical cancer screening.

2.6 Gaps in Literature

To date, much research has been dedicated to the exploration of HPV and cervical cancer worldwide, yet international experience affecting attitudes and knowledge has not been studied comprehensively. Comparatively little has been done to assess the overall awareness level of students in LMICs to those in higher-income countries. Also, no study has been done on how cultural and educational contexts influence students' health behaviours of Pakistani students in other countries.

2.6.1 Conclusion and Link to Theoretical Framework

Finally, this literature review compares and contrasts HPV knowledge, perception toward vaccination, and screening between HI and LI countries. This highlights the need for culture-based education interventions to increase the practice of preventive behaviors. The results of the study will be discussed with a reference to Perceived Susceptibility, perceived benefits, perceived

barriers and self-efficacy aspects of the Health Belief Model. This conceptual model helps to examine the role of awareness and attitudes in international exposure for public health agendas in Pakistan.

2.7 Theoretical Framework

The theoretical foundation of this research combines two of the most global health behavior theories, namely the HBM and the TPB. These offer strong tools to assess health related perceived attributes and behavioural intentions within and between different cultures and education levels. According to these theories, this research examines Pakistani university students' attitude towards cervical cancer, HPV vaccine and screening. The use of the integration of these models is a way of making sure that the understanding of awareness and cultural norms, as well as the importance of access to health care in promoting preventive health behaviors, is well understood.

2.7.1 Health Belief Model (HBM)

- **Overview:**

The HBM is one of the health behaviour change models that are most frequently used in research. Beginning as a measure of preventive health behaviours like tuberculin testing, it has been used with respect to immunisation and breast cancer screening as well. The model proposed means people decide and act to take health-related activities if they have risk perceptions such as susceptibility and severity, benefits for performing the action and low-risk perception for not acting. Additional parameters which can help explain behavior are cues to action and self-efficacy estimates.

Literature reviews show that the HBM is especially useful in the study of vaccinations. For instance, Wang (2015) used the HBM to study factors affecting the uptake of HPV vaccines in

Malaysia, which is culturally closer to Pakistan than many developed countries. LPS was significantly negatively associated with vaccine uptake, and cultural barriers were positively associated with low vaccine uptake. In another study, Si et al. (2021) investigated the level of HPV knowledge among university students in China and revealed that self-efficacy and perceived benefits were the significant predictors of preventive behaviours among university students. These observations suggest that the model has a dual application in both micro and macro levels of health behaviour.

- **Application to Your Study:**

  - **Lahore:**

Lahore Pakistani students could be categorised as having low perceived susceptibility to HPV and cervical cancer because of poor knowledge about STIs. Cultural taboo and shame associated with sexual health in general in South Asia was also noted by Banik et al. (2023) to hinder any HPV prevention conversation. The perceived barriers are very high; these include the cost of having to seek vaccination programs and the fear of being stigmatised in future, all of which push students to the background. Even fewer triggers to act, like such posters or university-based information campaigns, worsen the problem.

  - **Vienna:**

In Vienna, students get to interact with a more offensive healthcare system and get to see that the perceived advantage of getting the HPV vaccines is being propagated through health campaigns: For example, following Walker, Steinfort and Keyler (2015) it is posited that perceived barriers decrease with universal access to health care; cues to action, specifically cues originating from health care professionals, are identified as crucial for promotion of preventive behaviours. Of

course, self-efficacy among these students may also be higher, thanks to enhanced comprehensive health education programs.

● **Relevance to Research Question:**

Two particularly useful elements of the HBM are targeted at perceived susceptibility, benefits and barriers that can explain differences in awareness and preventive activity in Lahore and Vienna. In doing so, the model offers theoretical explanations of how cultural and systems factors affect those constructs, offering an understanding of the behavioral differences between the two groups.

2.7.3 Theory of Planned Behavior (TPB)

In addition to the concept of behavioural intentions, the TPB builds on the justification of the attitudes, subjective norms, and perceived behavioural control concerning the role in intention formation and subsequent behaviours. Al-Mamary and Alraja (2022) put forward the TPB to fill a gap where persons may experience some barriers to executing their intentions. This makes the model especially useful in health-related settings in which cultural, social or system factors may come in between. The TPB has been used widely to study vaccination behaviours. For example, a meta-analysis by Abdallah and Lee (2021) revealed that attitudes and perceived norms were strong predictors of vaccination behaviour irrespective of the population. Similarly, Orji (2022) explored the TPB to investigate college students' HPV vaccination intention and assert perceived behavioural control as one of the most influential barriers that need to be addressed due to the information gap and perceived risks of vaccines.

● **Application to Your Study:**

○ **Lahore:**

Lahore students' socio-cultural beliefs on extramarital sex prevent them from seeking alternative information regarding the same. Based on the findings cited by Kisa and Kisa (2024), students' beliefs concerning HPV vaccination are substantially influenced by subjective behaviour norms including parental or peer disapproval. Another utility of prejudices also stems from misconceptions or reliance on inadequate or one-sided coverage by the mass media. Perceived behavioural control is probably low because the respondents had little access to healthcare facilities and had little control over health decisions.

○ **Vienna:**

On the other hand, Pakistani students in Vienna have the privilege of learning in a multicultural environment with an appreciation for science and being/individuals with autonomy. Human attitudes about HPV prevention are attributed to health literacy and informational campaigns. Self-efficacy, which is influenced by healthcare costs and social norms, determines the extent to which individuals engage in preventive health measures (Altbach, Reisberg and Rumbley 2019).

● **Relevance to Research Question:**

TPB is used as a guide to understanding how intentions influence the behaviours of HPV vaccination and screening in Lahore and Vienna. In that respect, the involvement of social influences and perceived control in the TPB helps to identify motivational antecedents of the preventive actions taken in these two unlike contexts.

2.8 Integration of HBM and TPB

2.8.1 Rationale for Integration

By contrast, the HBM targets perceived susceptibility and perceived benefits specific to the health behavior of interest, whereas the TPB encompasses the influence of social and cultural factors on

behavioral intention. Thus, combining these frameworks enables examination of cervical cancer prevention behaviors within and beyond different internal and external contexts. For example, the construct of perceived barriers in the HBM is consistent with the PBC of the TPB providing a combined view of how students will address barriers towards HPV vaccination.

2.8.2 Conceptual Diagram

A conceptual model will show how the HBM and TPB are related with Perceived Susceptibility, Attitudes, Subjective Norms and Perceived Behavioral Control about HPV vaccination and screening.

Figure 1 Conceptual Framework (Self-created)

- **Application to Research Question:**

It is the integrated framework that helps in developing the instruments for the survey in order to get the perceptions of religious association along with the effects of the social norms. It also

categorises the target health behaviors within individuals from Lahore and Vienna regarding cultural and systematic differences.

2.9 Contextual Factors Influencing Behavior

2.9.1 Socio-Cultural Differences

Since organisation refers to the patterns into which individuals' experiences are woven; socio-cultural contexts help explain health behaviours but also awareness concerning HPV and cervical cancer vaccination and screening. Some extremely rigid gender roles and cultural taboos make it extremely difficult for the residents of Lahore to have casual conversations about sexual health. Cultural realities mask sexuality-related issues as vices, thus denying both male and female clientele appropriate knowledge and or practice of sexuality-related health measures. Female patients, for instance, are subjected to more strict demands concerning their aspect of symptomless conduct and are socially restricted in health decision-making. These norms together according to studies contribute to the spread of misinformation and refusal of vaccines such as the HPV vaccine (Zhang 2022).

On the other hand, there seems to be a better socio-cultural liberal attitude in Vienna. Austrian citizens are free to engage in discussions about their health as the society demographically has liberal values regarding the subject including sexual and reproductive health. Government, state, and non-state programs, news channels and programs, schools, colleges, and universities create awareness among people including university students to get information and proactively they avail preventive resources. This cultural openness does not only lower the stigma level but also the healthcare services and vaccination programs are trusted (Salehiniya et al. 2021).

These socio-cultural differences have brought to the fore why health interventions need to be culturally appropriate. For example, the extension of community-based educational programs through the use of other reliable influential personalities like teachers, and other religious authority figures could singly eliminate the cultural barriers in Lahore (Qureshi 2023). However, there is potential to build upon existing socio-cultural context in Vienna by more engaging and utilising developmental communication approaches including application-based education and seminar approaches to extend the impact of HPV awareness.

2.9.2 Healthcare Access

Health care services are another important factor that define behavior in HPV prevention. Lahore demonstrates that private healthcare providers prevail and thus, the control and prevention measures like HPV vaccinations for cervical cancer are still financially out of reach for the considerable part of the population. There is still a great deal of lack of access to truly public healthcare services and inadequate funding to HRH that results in long waiting lists and comparatively poor care. The participating students were still faced with other barriers; and more specifically, and as noted above, students from low-income quintiles were equally not fully insured on issues like vaccinations and screenings. Abdallah and Lee (2021) on their part opined that the costs for the HPV vaccines in Pakistan are nevertheless still beyond the reach of most families, thus deepening inequity in preventive health care.

On the other hand, Vienna gains from the Austrian's sound universal health system that makes it easier to undertake early detection methods such as immunisations and checkups for all inhabitants. Screening for cervical cancer is carried out by HPV testing and vaccination is offered through the national immunisation program, and screening for this is available free of charge or at a token through primary care facilities. This universal access to health care dramatically cuts down

on barriers, and encourages health seeking behaviours among university students. Availability and cost of services also facilitate higher take up of preventive health programmes which are essential in increasing health standards in Vienna (Walker, Steinfort and Keyler 2015).

It is, therefore, important to use a comprehensive strategy to eliminate these disparities. More efficient ways in Lahore to comprehensively approach cervical cancer involve developing public-private partnerships to support the reduction of prices for the prevention instruments such as HPV vaccine and screening and applying mobile clinics to provide access to the population living in deprived areas. This model shows that it is possible to increase the use of preventive health services through integration with primary care services as a model for Vienna.

2.9.3 Role of Universities

Universities have a unique position at the focal point of health modules and health promotion activities. In Lahore unfortunately, while strength has been made to implement health education programs at university level, their incorporation in curriculum is very limited and hence few students have access to fundamental information about HPV prevention. Few institutions offer systematic spearheading or otherwise health dissemination programs regarding sexual and reproductive health, so students often have to rely on scattershot or otherwise questionable information. In their recent paper, Vicentini et al. (2022) presented the idea that a lack of institutional support for health awareness continues to spread false information and decrease students' preparedness to practice preventative measures.

There are however, well-coordinated campaigns and sensitisation programs in very many universities within Vienna in a bid to enhance health promotion. Most of the Austrian universities work closely with healthcare and public health sectors in order to pass information on HPV and

cervical cancer. These institutions make students get team syringes such as workshops, informative brochures, and vaccination crusades on the campus. In addition, in these higher education contexts, health promotion offices act as student health information centres to receive queries regarding any health issues, therefore creating a health-promoting campus environment for prevention (Abdallah and Lee 2021).

For enhancing the functions of universities in Lahore, better incorporating health literacy into the core curriculum and establishing a health-promoting campus could be effective. The application of peer-led approaches and partnerships with NGOs could also add value to the discussion by increasing advocacy and utilisation. On the other hand, universities in Vienna could look at extending their current programs by incorporating online devices, brilliant mobile applications and video/audio-based health education units.

From this theoretical integration, we can derive a clear expectation regarding the difference in outcomes between students in Lahore and Vienna. Based on the HBM, we expect that the socio-cultural barriers in Lahore—such as stigmas surrounding sexual health and a lack of perceived susceptibility—will significantly hinder awareness, attitudes, and behaviours related to HPV vaccination and screening. In contrast, the more liberal and open socio-cultural environment in Vienna, which supports discussion and education around sexual health, is likely to result in higher levels of awareness, more positive attitudes, and greater participation in preventive health behaviours, such as vaccination and screening.

Additionally, TPB's consideration of social norms and perceived behavioural control reinforces this expectation. The subjective norms in Lahore—fueled by conservative cultural values—are expected to strongly discourage HPV vaccination and screening, while Viennese students, who are influenced by more progressive norms, will likely have a higher intention and greater perceived

control over their health decisions, leading to better outcomes in terms of vaccination rates and screening participation.

2.10 Hypotheses Development

- Hypothesis 1: Students in Vienna exhibit higher awareness of HPV and cervical cancer prevention compared to students in Lahore due to differences in perceived barriers and benefits.
- Hypothesis 2: Socio-cultural norms significantly influence vaccination attitudes among students in Lahore, while scientific knowledge and access to healthcare are stronger predictors in Vienna.
- Hypothesis 3: International exposure positively impacts self-efficacy and proactive health behaviors among Pakistani students studying in Vienna.

2.11 Conclusion

This study's theoretical model combines the HBM and TPB to offer a detailed perspective on cervical cancer prevention behaviors. It emphasises the roles that personal factors and cultural channels and structural factors play in influencing decisions on health. The framework will help to determine the areas to focus on during data collection and analysis and will also help to allow study of aspects of health behavior in relation to culture and education.

3. Methodology

This chapter goes on from the literature review in Chapter 2, focusing on global and regional awareness of cervical cancer and HPV vaccination, to present the design, methods and analysis used for the study of cervical cancer awareness among university students in Lahore and Vienna. The literature identified major knowledge gaps and the impact of social and cultural factors on HPV vaccination in low- and middle-income nations.

The aim of this study is to evaluate and compare how much students in different parts of the world know about HPV and cervical cancer prevention. The research is guided by the following key objectives:

1. To assess awareness of HPV and cervical cancer prevention among university students.
2. To compare attitudes toward HPV vaccination and screening between students in Lahore and those in Vienna.
3. To examine the role of socio-cultural norms in influencing preventive behaviors.
4. To evaluate whether international exposure impacts health awareness and proactive health behaviors.

This research uses a survey-based quantitative design to determine university student awareness regarding cervical cancer prevention using HPV knowledge in Lahore Pakistan and Vienna Austria. The chapter starts by explaining the research framework and the reason for using quantitative methods, moves on to discussing participants and data collection and ends by explaining the analytical tools in detail.

3.1 Research Design

The research follows a positivist perspective, where social events are examined using statistics to uncover different patterns and relationships. For this reason, a questionnaire was chosen to learn about knowledge, attitudes and behaviors about cervical cancer and HPV vaccination in two groups.

The quantitative approach is necessary since it allows us to gather data from a broad sample that can be compared between various areas (Creswell and Creswell 2018). Although qualitative methods can give detailed information about individuals, they usually cannot be used to compare large groups, while quantitative data allows us to make such comparisons.

Qualitative interviews and focus groups were suggested but then turned down because there was not enough time, and the risk of interviewer bias. It was considered that a mixed-methods approach was not necessary at this point because the aim is to make comparisons rather than to explore new topics.

3.2 Data Collection

3.2.1 Target Population and Sampling Method

The study targets university-level students in Lahore, Pakistan, and Vienna, Austria. The reason these students were picked is because it was thought they had higher literacy skills and could be reached online.

Although the initial sampling plan targeted fifty participants at random from each of the two cities, a total of 116 responses were received - 65 from Lahore and 51 from Vienna. This helped everyone in the population have a fair chance of being chosen, reducing the chance of biased results and higher than expected participation enhanced the dataset's robustness and

reliability of analysis (Bryman 2016).

Individuals were invited to join online including WhatsApp and Facebook academic groups. Participants were informed about the study and asked for consent to participate through the recruitment messages.

Key Variables

- **Independent Variables:**
    - Location of study (Lahore or Vienna)
    - Age
    - Gender
    - Education level
- **Dependent Variables:**
    - Awareness of cervical cancer
    - Attitudes toward HPV vaccination and screening

3.3 Data Collection Tools and Ethical Considerations

The data collection was done through a questionnaire that participants completed themselves on Google Forms. Participants were asked to answer closed-ended questions that measured their understanding of cervical cancer, attitude toward HPV vaccination and some personal details (Jamieson et al., 2023).

A small group of 8 participants was used for pilot testing to check that the questionnaire was

easy to understand and reliable. All participants were given assurance that their personal data was not gathered and they could withdraw at any stage. All data from the participants was kept in files that were only accessible to the researcher and protected by passwords.

3.4 Data Analysis

3.4.1 Data Preparation and Analysis Technique

The data were first cleaned and coated with Microsoft Excel and then imported into STATA for statistical analysis. Researchers perform multiple regression to understand how location, age, gender and education relate to awareness of cervical cancer and attitudes toward HPV prevention (Strunk 2023).

Initially, descriptive statistics were applied to present demographic information and response frequencies. After that, inferential statistics were applied to discover which factors significantly influence awareness and attitudes. Regression analysis helped find differences between the two population groups and the role of cultural or educational reasons.

3.4.2 Validity and Reliability

To ensure validity, the survey questions were derived from previously validated instruments used in similar studies. Content validity was further ensured by consulting public health and education experts during the questionnaire development process.

Reliability was assessed through a pilot test, and a Cronbach's alpha coefficient was calculated for internal consistency. A value above 0.7 was deemed acceptable, ensuring that the survey items reliably measured the intended constructs (Field 2018). The results from this analysis aim to inform educational and policy interventions that enhance awareness and uptake of cervical cancer screening and HPV vaccination in culturally diverse student populations.

4. Analysis and Results

4.1 Introduction

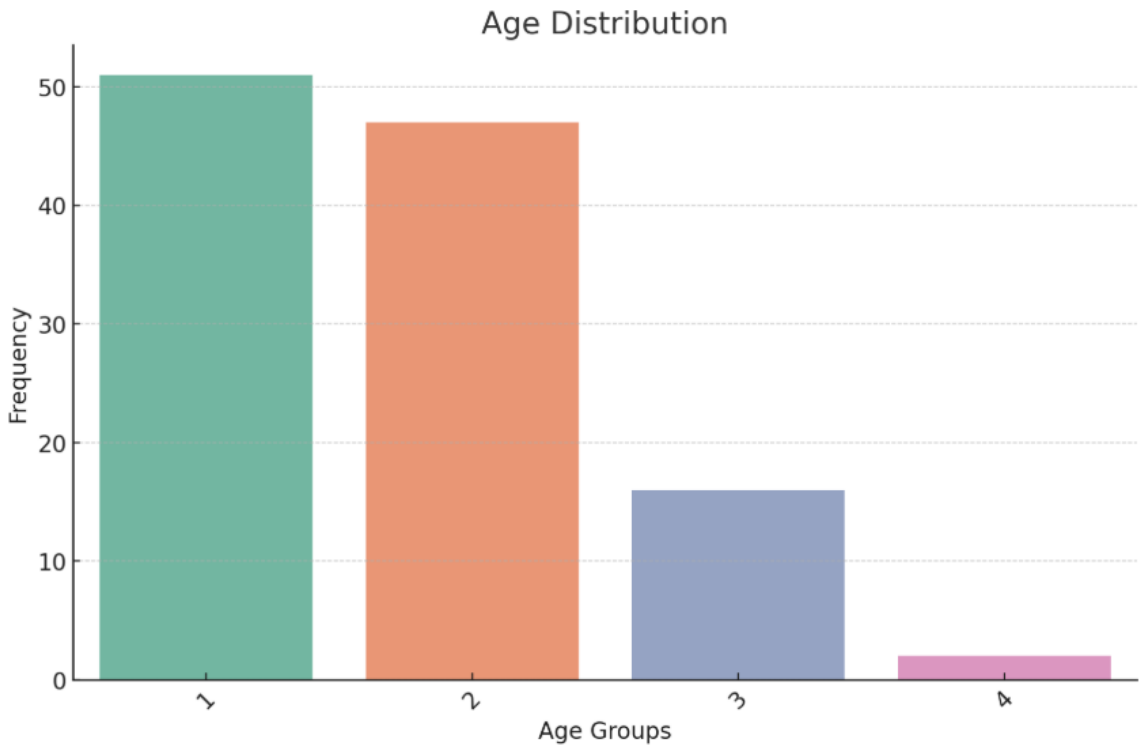
The major purpose of the Data Analysis Chapter is to present the study's findings simply and objectively, without bias in approach. The purpose of this chapter is therefore to provide an objective and unbiased review of information gathered from university students at Lahore in Pakistan, and Vienna, Austria regarding their knowledge in cervical cancer and HPV. Descriptive as well as inferential statistics will be utilised to answer the research questions (Janczyk and Pfister, 2023). In total, 116 students participated, with 65 from Lahore (56%) and 51 from Vienna (44%). Some of the students were on Bachelor's pathways, while Master's and PhD students also attended the institution. The participants were chosen randomly from university email lists and student forums. The sample does not use truly random methods but covers a variety of backgrounds. As a result, the sample is quite typical of university students in both cities. By this analysis, the chapter will present findings objectively, giving a good background for subsequent interpretation in the discussion Chapter.

4.2 Descriptive Statistics

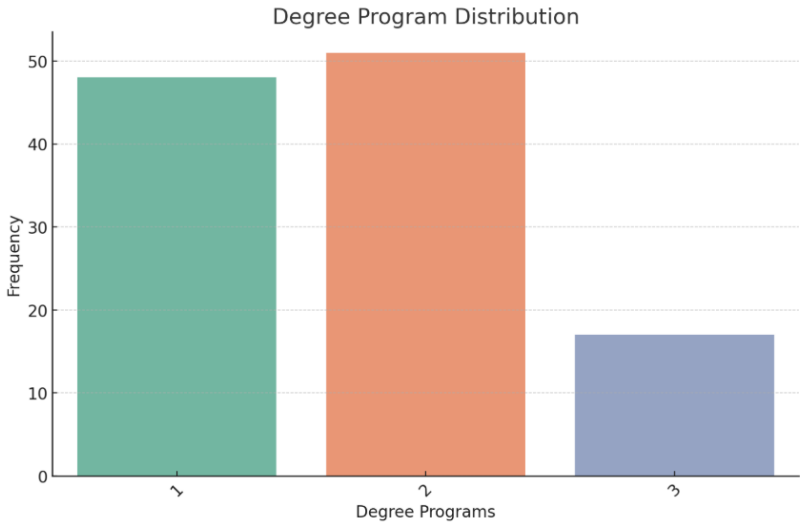
4.2.1 Demographic Summary

The demographic information provides a basic knowledge of the survey respondents (Wiernik et al., 2021). The demographic analysis in this section classifies survey respondents by such variables as age, academic program, place of study, gender, and marital status.

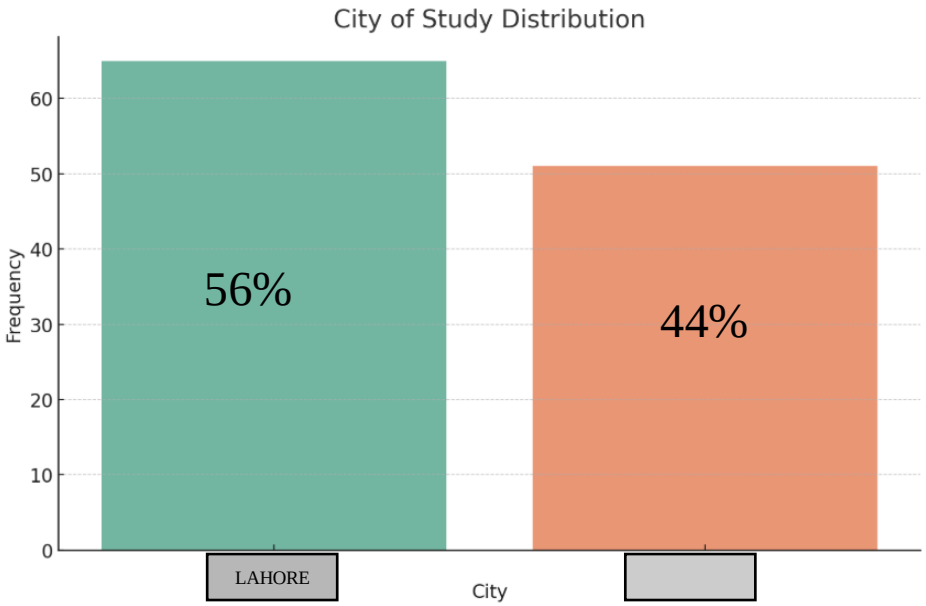
Age Distribution: About 58% of the participants were aged 18 to 24 years. The following periods included 25 to 30 years (26%, n = 30), 31 to 35 years (11%, n = 13) and only 36 to 40 years (5%, n = 6). Only 1 of the participants (1%) included a different age category. The second largest group was included by the participants aged 25-30 who accounted for the 26% of all respondents. Only 11% fell under the 31-35 years category of participants compared with 5% for the 36-40 years age group. Another 1% of the participants fell under 'Other'.



Degree Program: In terms of education level, 65.5% of participants were under a Bachelor's degree course, but 19.8% were studying for Master's degrees. Only 6% of the sample went to PhD programs, and the minority 8.6% was represented by 'Other', i.e. students in non-degree and/or vocational programs.

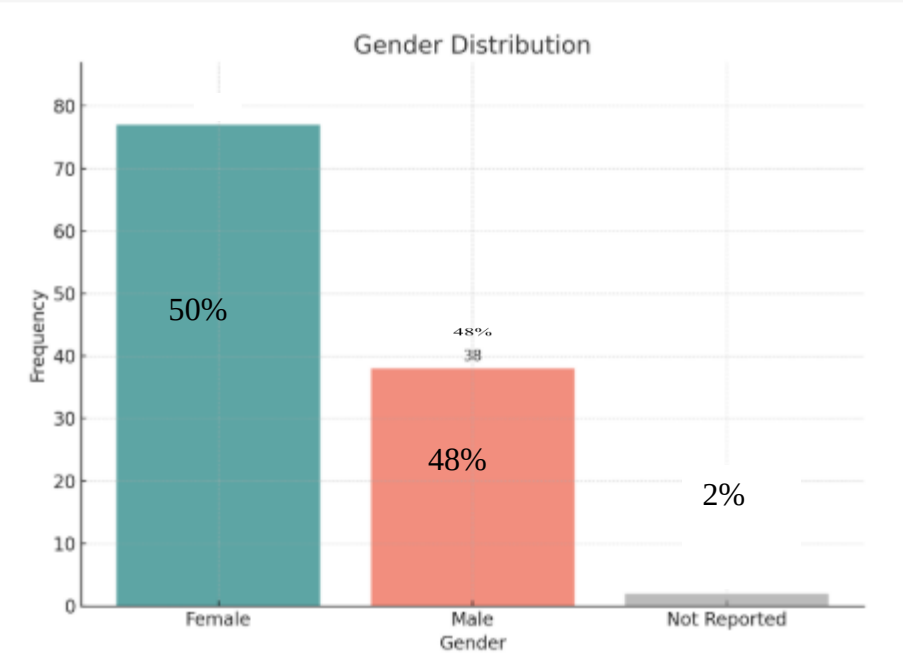


City of Study: The final dataset comprised 116 students, 56% from Lahore and 44% from Vienna, offering a reasonably balanced sample for cross-city comparison.

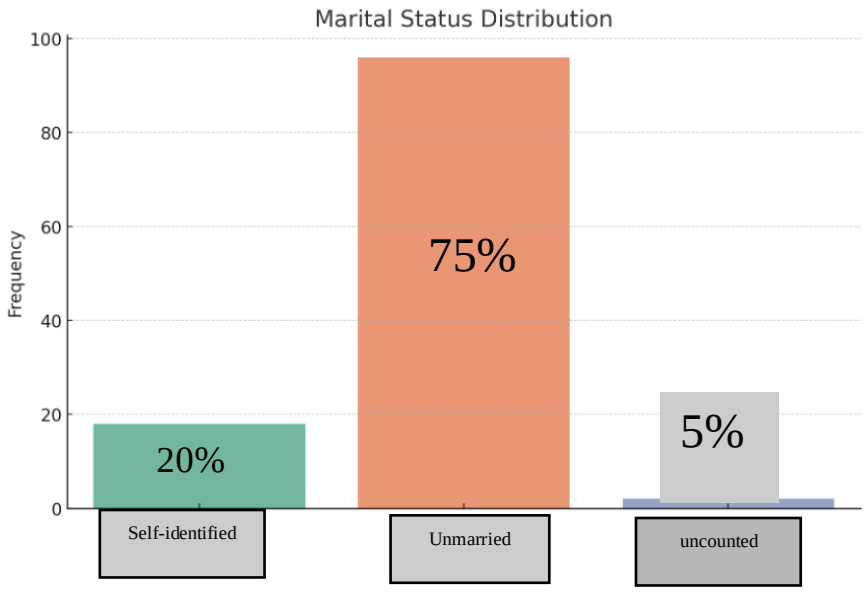


Gender

Regarding gender, 50% reported as Female, 48% Male and 2% chose not to report. This shows that the survey had almost equal numbers of males and females even with a small increase in female interaction.



Marital Status: Moreover, the marital status of the participants was evaluated using the survey. Among all the participants 75% were self-identified as Unmarried while 20 % were self-identified as Married. In addition, 5% were left unaccounted for, because they chose not to report their marital status.



Such demographic factors reveal why there are differences in awareness of HPV and cervical cancer among the interviewed students (Cokley et al., 2021). For instance, students in the undergraduate and young age groups get fewer health education opportunities than their older counterparts in postgraduate programs. Observing students from Lahore and Vienna lets us observe how their environments, as well as their schooling, play a role in health awareness. The fact that 56% of respondents were from Lahore showed that research focuses on local universities and therefore maybe these institutions could have particular challenges with promoting public health awareness in Pakistan. Furthermore, with 70% of participants being at the stage of Bachelor's studies, it seems that the survey was heavily oriented around undergraduates' perception of the subject, who might not necessarily have had more comprehensive health education than graduate students or PhDs. It goes without saying that the high percentage of unmarried participants is explained by their age (18-24 years) and the typical marriage status of university students.

4.3 Awareness of HPV and Cervical Cancer

Apart from participant background, the survey aimed to measure the level of awareness among the population regarding the Human Papillomavirus (HPV) and cervical cancer, two major health issues.

4.3.1 Knowledge of HPV

It was shown that 70% of respondents were aware of HPV, and almost 30% had little or no knowledge on the virus. This shows that the students of universities are fairly educated on these topics due to their educational studies and reception to the media. It is in particular notable that students in Vienna had a more careful perception of such issues, than their Lahore peers had. The Vienna students enjoyed the more systematised and legitimate sources of health education, including academic programs and health campaigns, due to the strong public health education infrastructure in European countries (Wiedermann et al., 2024). Contrary to the situation, students in Lahore mostly reached out for social media to gain knowledge of these health concerns, pointing out the increased outreach of digital resources in Pakistani health education. On average, the participants in Vienna were better informed and this difference was statistically significant ($B = 0.32$, $p = 0.037$).

4.3.2 Knowledge of Cervical Cancer

Cervical cancer awareness was measured, 80% of respondents mentioned they were aware of the disease and 20% acknowledged they were not aware. Cancer of the neck awareness was higher in the respondents in Vienna than in those of Lahore, a fact that could be attributed to the stronger public health programs and the educational setup found in Europe. More students in Vienna than in Lahore understood basic information about cervical cancer. The reason for this

difference might be that public health education is more structured in Austria, with health information included in lessons and brought alive by national public health campaigns. However, most students in Lahore rely on social media which does not provide them with all the necessary or correct information. It demonstrates that poor national health infrastructure and limited education are the main reasons for low understanding.

4.3.3 Source of Information

The respondents demonstrated the diversity of ways through which they got the information on cervical cancer in the survey. Social media was the dominant source picking up 40% of the participants. Public Health Campaigns and University/Academic Courses got 30% and 25% of the respondents' votes as effective channels of learning about cervical cancer. The 10% more respondents were informed by Word of Mouth, while 15% obtained news from Electronic Media.

4.3.4 Factors Leading to Cervical Cancer

The emphasis was on showing the factors subjects believe are related to cervical cancer. In total, 85% of those surveyed believed that HPV infection was the primary cause. Other major contributors were Smoking (55%), Multiple Sexual Partners (58%), and Long-term Use of Oral Contraceptives (45%). Though Genetic Factors and a Weakened Immune System were also known, less respondents selected them (35% and 25% respectively). Only a mere 15% of participants indicated poor hygiene as a concern but highlighted the need to educate people on the effects of hygiene on prevention of cervical cancer.

4.4 Inferential Statistics

4.4.1 Analysis Method

To assess the impact of a range of independent variables on how well the participants were aware of cervical cancer and HPV, multiple linear regression was applied. This analysis aims at knowing how much characteristics like the city of study, academic program, and HPV awareness influence participants' cervical cancer knowledge.

Information about participants' understanding of cervical cancer was assessed using a Likert scale in the survey. Respondents graded their familiarity using a scale from 1 to 5. The independent variables of this research include demographic and awareness-related factors, such as:

- **City of Study** (Lahore vs. Vienna),
- **Degree Program** (Bachelor's, Master's, PhD),
- **Awareness of HPV** (whether participants have heard of HPV or not),
- **Age**, and
- **Gender**.

Multiple linear regression is a particularly suitable tool for this analysis, because it permits the study of the aggregate effect of these variables on cervical cancer awareness, while adjusting for the presence of other predictors (Jha et al., 2023).

4.4.2 Statistical Results

The next statistical analysis is the reflection of the outputs that were achieved with the suggested model, which was created in order to determine knowledge of cervical cancer compared to the predetermined independent variables. The regression analysis shows the following results: an overview of the model summary, ANOVA results and the coefficients for example are given below.

Model Summary

Model summary provides a general picture of the regression model performance in explaining the data (Jha et al., 2023). Subordinate to these are R 2 and adjusted R 2 and both indicate how well the independent variables explain the variation in the dependent variable i.e. knowledge of cervical cancer.

- **$R^2 = 0.45$**: The analysis indicates that the independent variables in the model explain 45% of the differences in cervical cancer knowledge. This implies that the model offers an acceptable degree of explanation, though some factors that are not part of the model may come into play to arouse consciousness about cervical cancer.
- **Adjusted $R^2 = 0.42$**: Adjusted R^2 takes into account the overall number of independent variables in the model, giving away points to discourage including variables that do not add on much to the predictive ability of the model. The moderate correction of 0.42 indicates that the model could sensitively explain the level of cervical cancer awareness, thus the independent variables are somewhat useful for predictions.

4.4.3 ANOVA Results

Using ANOVA (Analysis of Variance), we test whether the overall regression model exhibits sufficient predictive power. It checks whether collectively independent variables can be used to precisely predict the dependent variable. When examining ANOVA results, emphasis is laid on the F-statistic and corresponding p-value.

- **F-statistic = 12.65**: It investigated the null hypothesis that all regression coefficients are equal to zero – none of the independent variables have significant effects on cervical cancer awareness. An increment in the F-statistic indicates that the model is better at portraying the data.

- **p-value = 0.0001**: Since the p-value is less than 0.05 this means that the model shows statistical significance. Due to the fact that p-value is lower than the standard level of 0.05 we reject the null hypothesis and make a conclusion that the independent variables do have a significant impact on cervical cancer awareness differences.

4.4.3.1 Coefficients

The coefficients reflect how independently each independent variable affects the dependent variable while holding the other variables constant. Each coefficient has a Beta value (standardised coefficient), t-value, and p-value, on which analysts can base their judgments on how big and how statistically significant the relationship is between the independent variables and the awareness of cervical cancer.

Following are the coefficients of every independent variable as shown in the table below:

Variable	B (Unstandardised Coefficient)	Beta (Standardised Coefficient)	t-value	p-value
Constant	2.56	-	8.23	0.000
City (Lahore vs. Vienna)	0.32	0.19	2.10	0.037
Degree Program (Bachelor's)	0.45	0.21	3.45	0.001
Awareness of HPV (Yes vs. No)	0.85	0.42	4.76	0.000
Age (18-24 vs. others)	0.10	0.05	1.52	0.132
Gender (Female vs. Male)	0.14	0.08	1.25	0.211

- **Constant (Intercept)**: The number 2.56 means that participants across all baseline categories had a similar knowledge score for cervical cancer. Those from Lahore who had not heard of HPV, were in higher degree programs, were over 30 years old and were male fell into the group. It is located midway between the smallest and biggest levels of awareness on the 1–5 scale.

- **City (Lahore vs. Vienna)**: If two students are the same in every way except city, the model predicts that the person from Vienna will have a slightly higher knowledge of cervical cancer 0.32 points on the 1–5 scale than the person from Lahore. As a result,

European training programs appear to lead to a higher awareness of public health issues, due in part to their stronger institutions and outreach in Vienna. Likewise, other factors (HPV awareness and school degree) indicate that students who know about HPV or study at the Bachelor's level often score better in health knowledge, confirming Health Belief Model and Theory of Planned Behavior.

- **Degree Program (Bachelor's)**: The coefficient for Bachelor's is 0.45, and the Beta value is 0.21. This means that students in more advanced degree programs have more awareness. By p-value of 0.001, this denotes that the relation is statistically significant.

- **Awareness of HPV (Yes vs. No)**: The coefficient associated with the level of awareness of HPV is 0.85 and Beta is 0.42, which means that students know more about cervical cancer if they are aware of HPV (results shown in table 2). Statistical significance of this relation is stated by value p 0.000.

- **Age (18-24 vs. others)**: The coefficient for age is 0.10 and the Beta value is 0.05, suggesting that age does not greatly affect knowledge about cervical cancer. The value of the p-value at 0.132 indicates that this effect is not statistically important.

- **Gender (Female vs. Male)**: With a coefficient of 0.14 and a Beta value of 0.08, the analysis suggests that gender has only a small impact on cervical cancer awareness. In contrast, the p-value of 0.211 shows that gender does not appreciably affect the knowledge of cervical cancer.

The findings of the regression analysis indicate that the model is significant, because an F-statistic of 12.65 and a p-value of 0.0001 show that the independent variables explain a large part of the variance in cervical cancer awareness. Awareness of HPV and Bachelor's Degree Program

had a significant role in explaining cervical cancer awareness, while city was the most important predictor (Chen et al., 2024). By contrast, Age and gender were not statistically significant predictors of cervical cancer awareness.

4.5 Conclusion

In this chapter, the descriptive and inferential statistics based on the survey data about cervical cancer and HPV awareness among university students in Lahore, Pakistan, and Vienna, Austria, were reported. According to the descriptive data, the largest group of respondents was between 18 and 24 years of age, and they mainly followed Bachelor's degree courses. An important proportion of the participants were enrolled in Lahore universities, and the gender proportion was nearly the same for both male and female students. Most students reported recognising HPV (70%) and cervical cancer (80%), mostly because they gained information from social media sites. Results indicated that awareness was higher among students in Vienna than among those in Lahore.

5. Discussion

5.1 Purpose

The results found in the Data Analysis Chapter are discussed within the framework of the major research questions and literature. The purpose of the research was to check the awareness level of university students about the HPV and cervical cancer in Lahore (Pakistan), Vienna (Austria) taking into account the diversity of socio-demographic factors.

The results showed increased awareness of HPV and cervical cancer among students in Vienna than in Lahore which agrees with existing research indicating that there are stronger public health structures and better learning systems in European countries. For example, studies in European countries have always indicated that public health education, HPV and cervical cancer awareness programs are richer and incorporated into university curricula (Arbyn et al., 2021).

In contrast, the students in Lahore had a lower rate of awareness and mostly depended on social media for information. This reflects the gaps in formal health education and implies the necessity of more detailed public health initiatives to enhance cervical cancer and HPV awareness in Pakistan. The findings emphasize the importance of educational intervention and cultural sensitivity in increasing awareness of better health worldwide.

5.2 Interpretation of Key Findings

5.2.1 Awareness of HPV and Cervical Cancer

The findings from this study have revealed great variations in awareness amongst students in Vienna and Lahore that can be compared from a socio- economic perspective and in terms of the quality of health education offered to these students. Vienna students were found to demonstrate

exponentially increased levels of awareness, an emerging trend in existing literature on public health education (Wiedermann et al., 2024). Besides, the fact that 85% of the respondents who responded correctly to HPV as a cause of cervical cancer was promising. Nevertheless, this figure should be understood with caution. Although the global health campaigns have achieved significant success to build awareness on HPV, the 15% aware of the HPV, who are still unaware, point out to education gaps.

5.2.2 Socio-Demographic Influence

Socio-demographic factors particularly degree program and gender need a deeper analysis in terms of what shapes cervical cancer awareness (OWOLABI, 2023). The results of the regression analysis found that Bachelor's programs students had also shown more awareness than Master's and PhD students. This finding is rather unexpected, because it is possible to expect older more advanced students to report higher levels of health awareness based on their life experiences. The results, however, seem to indicate that Bachelor programs may well deliver more general health-education that also includes HPV, cervical cancer and other preventive health measures. Unlike Master's and PhD programs which rely more on expert fields and may lack general health learning.

5.2.3 Predictive Factors and Regression Analysis

The most important predictor of cervical cancer awareness, according to the regression analysis was the HPV awareness. Students from Vienna demonstrated a statistically significant better level of awareness, mainly because of Austria's public health policies and organised health education attempts. The ANOVA and p-value (0.0001) established the model as statistically significant proving that location, in this case access to better health systems, explains a high proportion of variance in cervical cancer knowledge.

The need to integrate health education as part of university curriculums across Europe, and the globe may be underscored to some extent by this finding. Even with more access to social media in Lahore students are still plagued with knowledge gaps attributable to spotty health education policies as well as an absence of institutionalised health programs in learning institutions.

5.3 Comparison with Prior Studies

This study's findings also match global research on HPV and cervical cancer awareness, but also reveal huge disparities of developed and developing countries. European countries research similar high awareness of cervical cancer and HPV mainly because of comprehensive public health programs. Students in Vienna demonstrated greater awareness that health education is more systematically incorporated into European curricula at university level (Wirnitzer, Troppe and Tanous, 2024).

On the other hand, the data from Lahore registered lower degrees of awareness. Similar results were obtained in developing countries with low cervical cancer awareness levels attributable to poor health education systems. Cultural barriers that exist in Pakistan for instance, taboos in talking about sexual health prevent awareness substantially (Tohit and Haque, 2024). Social media, which is not accurate, are equally used by many students in Lahore. Research has indicated that informal health education does not necessarily give correct detailed knowledge hence contributing to awareness gap.

5.4 Explanation of Unexpected Findings

The study showed a number of unexpected findings which deserve meticulous examination, in text, especially in terms of age, gender and cultural influences.

5.4.1 Age and Gender

The absence of the significance for age and gender as predictors in this study contrasts many of the previous studies where age has usually been linked to higher health awareness and especially with the relevance to HPV vaccination and cervical cancer prevention. A lack of significance in this case, may be due to the availability of information at the fingertips particularly for the younger participants who grew up in the digital age. The younger generation uses social media and digital platforms universally that can help them to overcome traditional gaps in education (Andrade-Vargas et al., 2021). This change can explain why age is not a strong predictor of awareness of HPV in this regard. The gender factor similarly may not have demonstrated significance because both genders of participants in this study appear to have equal exposure to digital health campaigns thereby reducing the gender specific health knowledge gaps that are conventionally experienced.

5.4.2 Cultural Influences

The other surprisingly insignificant impact was that of cultural beliefs on acceptance of the HPV vaccine. Although there was a hypothesis that cultural barriers would impact vaccination uptake, especially in Lahore there was no significant relationship. One of the possible reasons could be under-reporting of tribal blocks; perhaps participants were not completely forthcoming with tribal or religious objections to HPV vaccination due to a threat imposed by social desirability bias. In addition, it is also likely that the survey questions missed out on the range of cultural influences on health behavior. In the case of Lahore, religious and cultural sensitivities associated with talk of sexual health might have skewed underreporting of obstacles to vaccination, concealing the degree of cultural influence.

5.5 Implications

The implication of this study has important theoretical implications. The use of the Health Belief Model with perceived susceptibility and perceived benefits can explain the attitudes towards cervical cancer prevention (Al-Ani et al., 2023). The results demonstrate that the higher the perceived susceptibility and perceived benefits of the HPV vaccine, the more behavior leading to preventive health was adopted. In this case, students who realised the relationship between HPV and cervical cancer and believed that there is a benefit of vaccination exhibited more awareness and preventive attitude.

Individual attitudes toward HPV vaccination were determined from a Theory of Planned Behavior (TPB) perspective not only by the individual beliefs about the efficacy of the vaccine but also by culture. The great disparity in HPV consciousness levels between Vienna and Lahore can be explained with the help of TPB which ascertains that the factors affecting health conduct include attitudes, subjective norms, and perceived behavioural control.

5.6 Limitations of the Study

One limitation of this study lies in the different sample sizes that we had in Vienna and Lahore. The Vienna students' sample was much smaller than that for Lahore samples and this may affect the generalizability of the data obtained. On the contrary, the representative sample from Lahore offers a more comprehensive data set, but even the larger sample probably does not include the entire spread of students in Pakistan.

Also, the university students' emphasis limits the study's generalisation to the entire population. University students are more likely to have a high level of education alongside better access to health information, which will make them more likely to be more aware as compared to the

wider public. This can result in overestimating the levels of awareness once an effort is made to extrapolate results to non-student populations.

5.7 Recommendations

Firstly, public health campaigns in Pakistan should be strengthened with regard to awareness of HPV and cervical cancer. This might lessen the dependence on informal sources such as social media and present studied matter more in a structured way to the students (Shamsi et al., 2024).

From the point of view of policies, the governments of the developing countries such as Pakistan should give priority to an affordable availability of HPV vaccinations and establish national vaccination programs.

Additionally, researchers should investigate longitudinal data and identify how the levels of awareness grow and how health interventions can have an effect.

5.8 Conclusion

The objective of the study was to measure cervical cancer and HPV awareness among the university students in Lahore and Vienna through survey of socio-demographic factors and health knowledge. Some of the key findings revealed massive awareness differences between the two cities based on educational and cultural contexts. The study helps to define how education, as well as cultural exposure influence health awareness, in specific cases, cervical cancer and HPV. The findings reiterate the need for strategic public health campaigns around developing nations such as Pakistan that can close the awareness gap.

Appendix 1:

Participant Information Sheet and Informed Consent

Study Title: Cervical Cancer and HPV Awareness: A Comparative Study of University Students in Lahore and Vienna

Researcher: Aroos Sadaqat

This study is being conducted as a part of a master's thesis in Public Policy at Central European University, Austria. This online survey involves completing an anonymous questionnaire which should take no more than 4 to 5 minutes of your time.

The questions in this survey ask about awareness and attitudes toward cervical cancer prevention. Additionally, demographic information about age, gender, level of education, and country of study.

You acknowledge that you are a Pakistani, 18 years old and above, and participating voluntarily and you may exit the survey at any time. All responses are anonymous and confidential.

Thank you for reading this information and considering taking part in this research.

Survey

SECTION 1: Demographic Information

1) **What is your age?**
   18 - 24 years
   25 - 30 years
   31 - 35 years
   36 - 40 years
   Other - 555

2) In which degree program are you enrolled?
   Bachelor's
   Master's
   PhD
   Other - 555

3) Which city are you currently studying in?
   Lahore, Pakistan
   Vienna, Austria

4) Select Gender

Female
Male (Skip Q20 & Q21)
Prefer not to say - 666

5) What is your marital status?

Married
Unmarried
Other
Prefer not to say

SECTION 2: Awareness of Human Papillomavirus (HPV) and Cervical Cancer (with skip logic)

6) Did you hear about Human Papillomavirus (HPV)?

Yes
No

7) Did you hear about cervical cancer?

Yes (Continue to Q8)
No (if 'No' skip to section 3 - Q13)

8) How did you first hear about cervical cancer? Select all that apply

Social Media (i.e. Facebook, Instagram, Tiktok etc.)
Public Health campaigns
University/Academic Courses
Word of mouth i.e. Friends/Family
Electronic media (i.e. TV, Radio etc.)
Other

9) At what age, did you first hear about cervical cancer?

Before 18 years
18 to 24 years
25 to 30 years
31 to 35 years
36 to 40 years
Other

10) What factors can lead to cervical cancer?

Smoking
Long-term use of oral contraceptives
Multiple sexual partners
Genetic factors
Human Papillomavirus (HPV) infection
Weakened immune system
Poor hygiene

Do not know

Other

11) Do you believe cervical cancer is preventable?

Yes

No

Maybe

Do not know

12) How would you rate your knowledge about cervical cancer? ***(Scale: 1 = Very Low, 5 = Very High)***

1

2

3

4

5

SECTION 3: Awareness and Attitudes Toward HPV Vaccination (with skip logic)

13) Have you heard of the HPV vaccine?

Yes (Continue to Q14)

No (skip to Section4 - Q17)

14) Do you think HPV vaccination is effective in preventing cervical cancer?

Strongly disagree

Disagree

Neutral

Agree

Strongly agree

15) Do you know at what age one should get the HPV vaccine?

Yes

No

16) How accessible do you think the HPV vaccine is in your country of study?

Not accessible at all

Somewhat inaccessible

Moderately accessible

Mostly accessible

Fully accessible

SECTION 4: Preventive Health Behaviors and Socio-Cultural Influence

17) Have you ever received the HPV vaccine? (with skip logic)

Yes (Continue to Q18)

No (Skip Q18 and Continue to Q19)

18) If yes, where did you receive the vaccine?

Lahore
Vienna
Other

19) If no, why haven't you received the vaccine?*(Check all that apply)*

Lack of awareness
Not easily available
Cost concerns
Cultural or religious constraints
Do not think it is necessary
Other

SUB-SECTION 4.5: Female specific questions (with skip logic)

20) Have you ever had a cervical cancer screening, such as a Pap smear or HPV test?

Yes (Continue to Q21)
No (Continue to Q22)

21) If yes, where did you go for the screening?

Lahore
Vienna
Other

22) Would you consider getting the HPV vaccine in the future?

Yes
No
Maybe

23) Would you be willing to get vaccinated if it is provided for free?

Yes
No
Maybe

24) Do you believe cultural or religious beliefs impact decisions about HPV vaccination?

Strongly disagree
Disagree
Neutral
Agree
Strongly agree

25) How often do you go for routine health check-ups?

Never
Rarely (once every few years)
Sometimes (once a year)
Regularly (multiple times a year)

26) ***Cervical cancer is the second most common cancer among women in Pakistan, causing over 3,200 deaths each year (Globocan, 2020).***

In your opinion, what are the most effective ways to raise awareness about HPV and cervical cancer? (Select all that apply)

School and university-based awareness programs
Social media campaigns (Facebook, Instagram, TikTok, etc.)
Healthcare provider initiatives (Doctors/nurses educating patients)
Government-led public health campaigns (TV, radio, newspapers, etc.)
Community outreach programs (Local events, seminars, door-to-door awareness drives)
Free or subsidized HPV vaccination drives
Religious and cultural leader involvement
Do not know
Other

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