

Examining the interplay between HPV knowledge and participants' propensity for vaccination

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Abstract

This is a national, qualitative and quantitative investigation involving 600 participants which employed interviews and standardized self-administered questionnaires to assess participants' HPV vaccine knowledge and their inclination to vaccinate. The results of the study underscore the pivotal influence of informed awareness campaigns in shaping vaccination behaviours and stress the imperative of tailored educational strategies to augment vaccine uptake. All respondents shared as a main concern insufficient information about the vaccine and low degree of familiarity. An inquiry into the correlation between having children and HPV vaccine knowledge revealed that individuals with children under 16 years old manifested heightened levels of HPV vaccine knowledge. The outcomes suggest that individuals with young children are more inclined to harbour comprehensive HPV vaccine knowledge.

Keywords

cervical cancer, human papillomavirus, awareness, vaccine prevention

Introduction

Despite vaccine prevention, cervical cancer still remains a major health issue worldwide, being the fourth most frequent cancer among women (WHO 2020). In Bulgaria, over a thousand women are diagnosed with cervical cancer and more than half of them die annually (Bruni et al. 2021). The five years' net survival from cervical cancer in Bulgaria is below the average for the EU and there is a tendency for increasing prevalence of the disease (Lebanova et al. 2023). Infection with human papilloma virus (HPV) is known to be main reason for development of cervical cancer. There are high-risk and low-risk types of HPV but types 16 and

18 are oncogenic and considered to be responsible for the majority of all cases in Europe (Burd 2003; Faridi et al. 2011). Primary vaccination prevention is available and three prophylactic HPV vaccines are authorized for use in Europe: Cervarix (2vHPV), Gardasil (4vHPV) Gardasil 9 (9vHPV). Depending on the HPV types antigens they contain there is a bivalent, a quadrivalent and a nine-valent vaccine respectively. In Bulgaria Gardasil 9 is available in community pharmacies. All of the licensed vaccines provide reliable protection against conditions caused by HPV types 16 and 18 and are shown to prevent more than 90% of precancerous lesions associated with these types of viruses. However, the level of vaccination coverage varies greatly

between regions and is still considered unsatisfactory in some European countries, including Bulgaria (Arbyn and Xu 2018; Pinto et al. 2018; Cheng et al. 2020).

The European Parliamentary Forum for Sexual & Reproductive Rights has launched The Cervical Cancer Prevention Atlas Policy. The Atlas focuses on HPV cervical prevention policies which combine vaccination recommendation, screening programmes, and access to online information. According to the data presented in the Atlas there are significant differences in the completeness of cervical cancer prevention policies and their implementation between Western and Eastern Europe (EPF 2023). HPV vaccines are generally included in routine vaccination programs in developed countries but other means of prevention are rather vague. Moreover, in many countries the vaccines are not offered to boys (Colzani et al. 2021). In Bulgaria, the HPV vaccine is recommended and fully funded by the Government for girls 10–13 years of age. However, the pre-set vaccination coverage rate of 75% has not yet been achieved. The national HPV prevention strategy foresees expansion of new initiatives aiming at increasing societal awareness on the consequences of HPV related conditions and efficacy and safety of available vaccines (Lebanova et al. 2023; Ministry of Health 2024). One of the reasons behind poor vaccination coverage and low interest in vaccination administration is also related to a stigma of HPV infection being a sexually transmitted disease. It is of greatest importance for parents and young adults to understand the mechanism of HPV transmission and the lack of long-term immunity after infection. HPV related diseases and cervical cancer also pose significant economic burden for healthcare systems as well as loss of workforce and risks of fertility complications (Bonanni et al. 2015; Lebanova et al. 2023). In order to obtain full benefit of prevention measures and reduce the number of life lost due to HPV-related cancer, policymakers must face the challenges by developing a complete strategy of initiatives and actions towards increasing overall awareness on the topic with the involvement of key stakeholders and target population groups.

Methods and materials

The study is a national, qualitative and quantitative investigation conducted in two modules. Module 1 employed in-person interviews and Module 2 employed standardized self-administered questionnaires to assess participants' HPV vaccine knowledge and their inclination to vaccinate. The data was collected in the period February–March 2023. The targeted population for Module 1 included the following groups of interest: Mothers of girls up to 10 years old; Mothers of girls 12–15 years old; Mothers of vaccinated girls up to 18 years of age; Mothers of boys up to 10 years old; Mothers of boys between the ages of 12–15; General practitioners; Pediatricians; Homosexuals. Module 2 included man and woman 18–65 years old. The collected data underwent thorough analysis using descriptive statistics and chi-square tests, with a significance

threshold set at $p < 0.05$. During the conduct of the interviews, the respondents who have heard of the HPV vaccine were excluded.

Results

The study sample's demographic composition reflects a balanced gender distribution, with 300 participants identifying as male and an equal number as female among the total of 600. Predominantly, individuals falling within the age bracket of 25 to 44 years constitute the largest segment, accounting for 60.4% of the sample. Approximately 70% of the participants are either married or engaged in a civil union. Notably, around 60% of the respondents have children under the age of 16 residing in their households. A notable majority holds higher education credentials (40%), followed by secondary education (30%), and individuals with lower educational backgrounds (20%). Concerning income, the predominant group earns between BGN 2,001 and BGN 3,000 (48.8%).

The nexus between individuals' propensity to receive the recommended HPV vaccine and their knowledge about the vaccine was meticulously explored. Within a cohort comprising 600 participants, a noteworthy 48% (288 individuals) displayed a proclivity toward vaccination (Fig. 1). Employing a chi-square test, our analysis unearthed a substantial and compelling statistical linkage between participants' HPV vaccine knowledge and their expressed inclination to pursue vaccination ($\chi^2 = 63.725$, $df = 3$, $p < 0.001$).

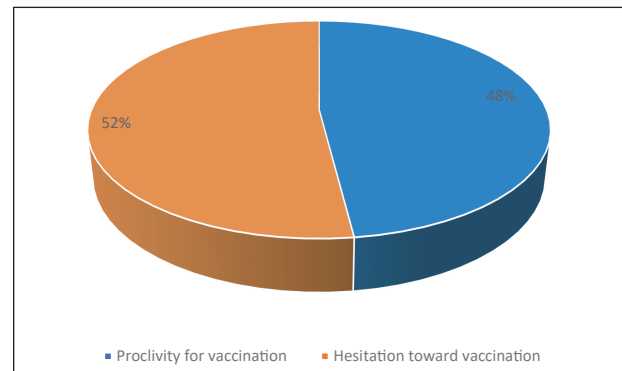


Figure 1. Results on the attitude towards HPV vaccination.

These findings underscore the pivotal influence of informed awareness campaigns in shaping vaccination behaviours and stress the imperative of tailored educational strategies to augment vaccine uptake. Moreover, an inquiry into the correlation between having children and HPV vaccine knowledge revealed that individuals with children under 16 years old manifested heightened levels of HPV vaccine knowledge. Specifically, 56.4% of this subgroup indicated “My information is mostly general,” compared to 30.7% among those without children. Similarly, 28.4% of participants with children conveyed being “Very well acquainted,” contrasting with 24.8% without children. Furthermore, the category “Heard about the virus, but information is limited”

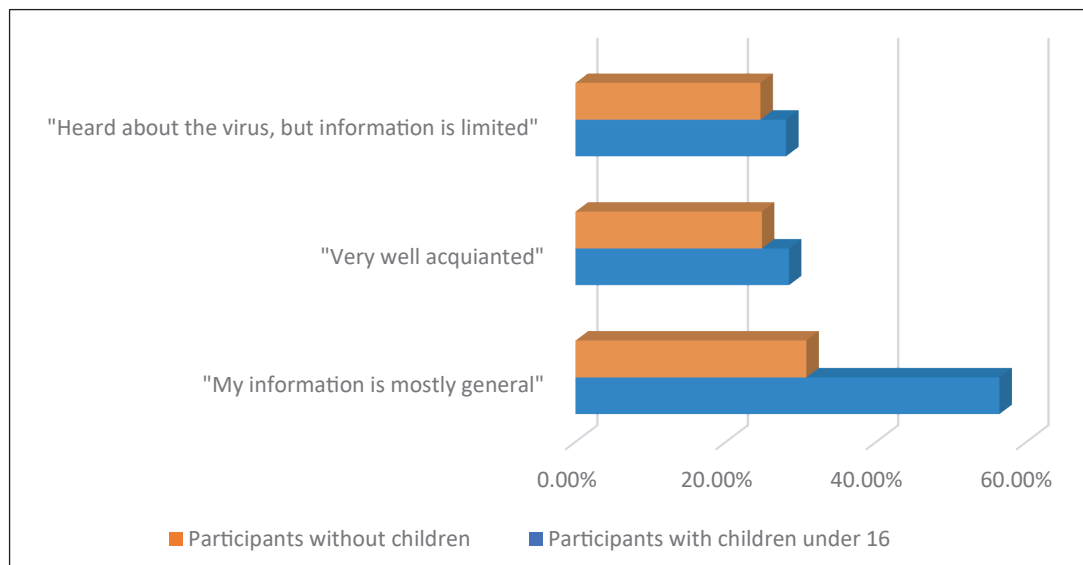


Figure 2. Results on HPV awareness and knowledge.

comprised 28% among those with children and 24.6% among those without (Fig. 2). These cumulative outcomes suggest that individuals with young children are more inclined to harbor comprehensive HPV vaccine knowledge, potentially influenced by family dynamics.

The significance of tailoring educational strategies to optimize awareness and acceptance becomes conspicuous, accommodating the inherent diversity within family contexts. The robust association between knowledge and family composition is further underscored by the highly significant chi-square analysis results ($\chi^2 = 18.937$, $df = 3$, $p < 0.001$), affirming the statistical significance of this observed relationship. Based on the conducted in-depth interviews, in general, individuals have a positive perception to vaccines. All respondents shared as a main concern insufficient information about the vaccine and low degree of familiarity.

Discussion

As the results of our study show, information plays a pivotal role in decision-making and trust in vaccine prevention (Stockwell and Fiks 2013; Kumar et al. 2016; Attwell et al. 2021; Lamb 2023). Higher education is related to better understanding of HPV and vaccine prevention. In general, awareness of HPV is considered higher than Australia and UK with data suggesting women have better understanding than man (Marlow et al. 2013). Therefore, the efforts of policymakers should be focused on building and strengthening data systems for decision making and tracking vaccination impact on one hand, and delivery infrastructure to achieve the target 90% vaccination coverage rate on the other (WHO 2020; Adult vaccine access coalition 2023). HPV data systems capture relevant information such as vaccine coverage rates, screening rates or data on cancer and other HPV-related diseases, allowing for HPV prevention strategies and outcomes to be measured and monitored over time. For example, immunization records, screening registries and

cancer registries could be linked with cancer and vaccine data systems, public and private. Investment and building sustainability of data systems will deliver real time local data of key importance for further in-depth analysis and design of prevention programs (Yusuf et al. 2002; Kolasa et al. 2006; Dillner et al. 2010; Oliveira and Niccolai 2021). Data systems which document the burden of HPV-related disease, also generate real world evidence and monitor effectiveness of vaccination programs (e.g. progress towards elimination). Nevertheless, information on HPV is often scattered across multiple systems which are not interconnected and data gaps are frequent (Murray et al. 2003; Ronveaux et al. 2005; MacNeil et al. 2014; Scobie et al. 2020). This makes improvement of knowledge on the topic harder even for medical students (Aldawood et al. 2023).

It is possible to build a sustainable HPV data system by change in legislation which may preclude data linkage. By contributing to the enhancement of data systems, a long term, sustainable impact oriented program design can be created. The prioritization of HPV vaccination will reinforce public health awareness overall (Wilkins et al. 2008; Stashko et al. 2019; Vaughan et al. 2020). Overall, high-income countries tend to prioritize prevention and gender-neutral vaccination (Colzani et al. 2021). A comprehensive approach to HPV data can expand elimination goals beyond cervical cancer only. Given low vaccination coverage rates, real-time data and integration with screening and cancer programs can bring new opportunities to optimize HPV programs and enhance vaccine resiliency (Ismail et al. 2022; eClinicalMedicine 2023; Ozawa et al. 2023). In countries and regions with robust HPV vaccination and disease surveillance systems, the ability to measure and quantify the impact of HPV vaccination on preventing infection and subsequent HPV-related morbidity and mortality has generated evidence on the real-world effectiveness of the vaccine and monitoring of immunization program progress (Arbyn et al. 2009; Nicula et al. 2009; Wang et al. 2022). Additionally, where surveillance systems have been intricately linked to

paint a holistic picture of the impact, and demonstrate a direct correlation between HPV vaccination and a quantifiable decrease in HPV-related morbidity and mortality, such evidence is helpful in facilitating decision-making on vaccine efficacy and cost-effectiveness (Kavanagh et al. 2013; Vorsters et al. 2017; Patel et al. 2018; Swift et al. 2022).

It is known that real world evidence is critical for prevention program expansion. However, infrastructure to generate data is often lacking. A comprehensive and robust data information and management systems related to HPV vaccination uptake and disease-related surveillance is often not a priority for policymaking and resource allocation (Ebrahimi et al. 2023). Moreover, HPV vaccination delivery systems differ in countries, and key social, demographic, and political factors can preclude optimal delivery systems (Mesch and Schwirian 2015; Debus and Tosun 2021; Reza et al. 2023). Vaccine supply systems include the organizations, processes, and technologies that allow the HPV vaccine to reach patients. They are complex, variable and are not fully optimized and in order to achieve target vaccination coverage rates investments and new technologies must be set in place (Zaffran et al. 2013; Hanson et al. 2017; Hu et al. 2023). The broad range of age cohorts, outside of paediatric vaccination as well as the multiple professionals involved pose an additional challenge to finding the best design of vaccination programs. By contributing to the greater understanding of vaccination delivery systems, we can create long term, sustainable, impact-oriented recommendations towards comprehensive program design and prioritization of HPV vaccination (Akumbom et al. 2022; Escoffery et al. 2023). Expanded access through new delivery sites and expanded vaccinators along with strategic stakeholder engagement and advocacy to secure necessary investments and training are crucial for success (Kaul et al. 2019; Davies et al. 2021; Enskär et al. 2023; Shin et al. 2023).

Reaching the desirable vaccination coverage rate is a multi-layer problem which requires addressing all stakeholder groups where priorities of action are different. For the primary cohort of adolescents, it is crucial to maximize impact through best practice guidance and target high vaccination rate in established and new programs. New approaches must be found in order to integrate those who have 'missed out' in existing programs and delivery chains. In adults and parents to young children the main purpose must be to increase awareness of HPV related cancers and diseases and build infrastructure for program strength and growth throughout life (Holman et al. 2014; Mupandawana and Cross 2016; Anuforo et al. 2022; Xie et al. 2023). In clinical trials and the real-world setting, the HPV vaccine has demonstrated immunogenic effect and has shown strong direct and indirect protection against HPV infection and

HPV-related conditions, but the clinical and societal benefits towards vaccination remain a challenge (Orumaa et al. 2020). Misunderstanding of information is spread even among young specialists (Topçu et al. 2024). It is of major importance to underscore that cervical cancer is a vaccine-preventable disease and its elimination is possible only through joint efforts (Armstrong 2010; Rodrigues and Plotkin 2020; Frenkel 2021; Li et al. 2021). There are common misconceptions about HPV in various regions. They must be addressed as otherwise they can lead to unsatisfactory level of vaccination (Almehmadi et al. 2019). The longer the patients and parents continue to see low vaccination rates across the world and variability in program effectiveness within and across countries, the harder the vaccine skepticism will be to overcome. As our study shows, there is a gap to fill in terms of information sources and evidence-based data available to patients and parents (Ames et al. 2017; Avelino-Silva et al. 2023). Finding the right tools to address the public, as well as building a sustainable data infrastructure are the foundation of successful prevention of HPV-related conditions (Igoe and Giordano 1992; Geense et al. 2013; Patja et al. 2022).

Conclusions

The conducted study aimed at exploring the relationship between HPV awareness and willingness to vaccinate. Our data corresponds to previously conducted researches and reaffirms the connection between knowledge on HPV vaccines and inclination to pursue vaccination. Among the investigated cohort, our research showed that parents with young children are more willing to search for and obtain information and knowledge on HPV-related disease and primary vaccine prevention. These results underscore the need for targeted and accurate information on HPV-related diseases. The outcomes of the study show potential for development of informational and educational materials and campaigns for general population as well as specific focus groups. Ameliorating the quality of available information and adapting it to public needs is a crucial part of raising awareness on vaccine-preventable diseases. Obtaining such measures is of crucial significance to see an increase in vaccine coverage and the reduction of societal, health and economic burden of cervical cancer.

Disclosure statement

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