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Cervical Cancer Prevention Challenges and Barriers to Cervical Cancer Screening and HPV Vaccinations in Ukraine and Eastern Europe

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Abstract

Objectives: To identify the obstacles and issues that hinder effective cancer prevention efforts in Ukraine. The study aims to provide a comprehensive assessment of the barriers to cancer prevention, including both infrastructure and behavioral factors, and identify potential solutions to address these challenges. **Study Design:** Comprehensive literature review. **Methods:** The following databases were searched: National Center for Biotechnology Information (NCBI) and PubMed (U.S. National Library of Medicine at the National Institutes of Health). The keywords used in the search included "Cervical Cancer", "Human Papillomavirus Vaccination (HPV)", "Ukraine", "Eastern Europe", "Healthcare Infrastructure in Disasters", "Cervical Cancer Prevention", "Pap Smear", and "HPV Testing". **Results:** A total of 3500 articles were screened. A total of 65 articles met the inclusion criteria. Limited public awareness and limited access to vaccination and screening, combined with inadequate treatment facilities lead to higher rates of cervical cancer. The COVID pandemic, war with Russia, and the Chernobyl disaster are significant factors for the low level of vaccination in Ukraine. **Conclusion:** The prevention and treatment of cervical cancer in Ukraine face significant challenges due to the inadequate HPV vaccination rates and screening by cytology. Efforts to improve funding and increase education of both the population and health care providers are necessary to increase interventions such as HPV vaccination, cervical cytology, and HPV testing to reduce cervical cancer rates in Ukraine.

Keywords

Cervical Cancer, Human Papillomavirus Vaccination, Ukraine, Eastern

Europe, Healthcare Infrastructure in Disasters, Cervical Cancer Prevention, Pap Smear, HPV Testing

1. Introduction

While preventable through Human Papillomavirus (HPV) vaccinations [1] and a robust and effective screening program using cervical cytology and HPV testing [2], cervical cancer remains a leading cause of cancer death among women worldwide [3]. Globally in 2020, cervical cancer (6.5% of all new cancers) was the fourth most common cancer in women after breast cancer (24.5%), colon (9.4%), and lung (8.4%) with a reported 604,127 new cases of cervical cancer, with over 88% occurring in the Global South, and 341,831 cervical cancer deaths [4]. Data of age-standardized incidence and mortality per 100,000 shows a significant difference between Eastern Europe (14.5 incidences and 6.1 mortality respectively) compared to Western Europe (7.0 and 2.0 respectively) [3]. Cancer prevention and cancer care are derailed by disasters and conflicts [5]. The result is cancer treatments are interrupted, new cancers develop, and the well-known tools for screening and diagnosis of preinvasive disease are destroyed.

Ukraine located in Eastern Europe is the second largest country in Europe. The current population estimate is 43,306,477 (2023 est.) and prior to the current and ongoing Russian war with Ukraine, 7.6% of the gross domestic product went to healthcare (2020) [6]. The current sex ratio of the Ukraine population is 852 males per 1000 females (0.852), lower than the global sex ratio [7]. The incidence of cervical cancer, according to the Ukraine National Registry, was 21.4 and 20.0 per 100,000 population in 2015 and 2016 respectively [8] [9]. This review examines the challenges and barriers to cervical cancer prevention in Ukraine and strives to understand the impact of several national crises ranging from the 1986 Chernobyl nuclear plant disaster to the current war with Russia on the healthcare infrastructure necessary for the prevention of cervical cancer.

2. Methods

A comprehensive literature search was conducted to find relevant publications on cervical cancer and cervical cancer prevention in Eastern Europe and Ukraine. The search was conducted on the National Center for Biotechnology Information (NCBI) and PubMed (U.S. National Library of Medicine at the National Institutes of Health). The keywords used in the search included "Cervical Cancer", "Human Papillomavirus Vaccination", "Ukraine", "Eastern Europe", "Healthcare Infrastructure in Disasters", "Cervical Cancer Prevention", "Pap Smear", and "HPV Testing".

Inclusion and exclusion criteria were applied to the abstracts of the resulting publications. Selected literature was then reviewed in its entirety for suitability. The inclusion criteria were as follows: studies of case series and population data

on the incidence of cervical cancer in Eastern Europe and Ukraine; reports about medical infrastructure in this region; studies on the impact of nuclear plant disasters, the COVID pandemic, war on healthcare infrastructure; HPV vaccination policy in Eastern Europe. No time-period limit was applied. Studies were excluded if they did not include information about cervical neoplasia, or were limited to case reports. Figure 1 summarizes the Prisma diagram for this review.

3. Results

A total of sixty-five articles were retrieved that examined various factors relevant to Ukraine on topics of health infrastructure, challenges of healthcare delivery in disasters, COVID-19, armed conflict with Russia, cervical cancer, and cancer prevention.

4. Literature Review

4.1. General Statistics

Cervical cancer incidence rates are significantly higher in Central and Eastern Europe compared to Western Europe, with at least one in fifty women developing cervical cancer before the age of 75 years [10]. The high burden of cervical cancer is attributed to a lack of screening, increasing rates of cervical cancer, and

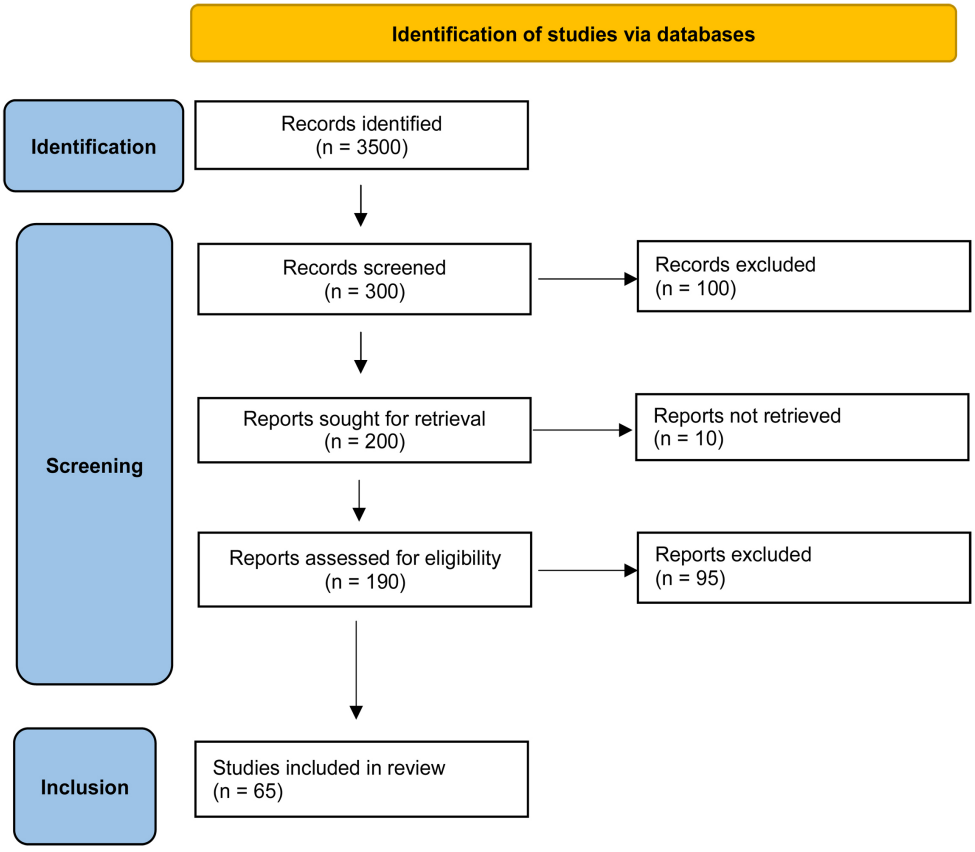

Figure 1. Prisma diagram for comprehensive literature search on cervical cancer prevention in Ukraine and Eastern Europe.

the increased risk of dying from this disease among young women. In Ukraine, cervical cancer ranks as the second most common cancer with presentation at stages III - IV in 17.4% of women. Forty percent of women diagnosed with cervical cancer die within the first year of diagnosis [11]. Cervical cancer mortality in Ukraine is 8.8 per 100,000 women, which is significantly higher than other parts of Eastern Europe (6.1 per 100,000) [3] [12]. The mortality incidence ratio in 2017 was 39.1% [13]. There has also been a trend towards a mild increase in cervical cancer rates in Ukraine [14]. Based on data from national statistics on mortality (State Statistics Service of Ukraine), data of the National Cancer Registry of Ukraine, and the European Health Information Gateway in the position "Neoplasms" ICD-10 codes: C00-D48, the mortality rate of Ukrainian women under 65 years from cervical cancer increased and was greater than four times the rates in other part of the European Union [15]. One consequence of the ongoing Russian war is a huge influx of Ukrainian immigrants into other European countries. A prewar analysis of cervical cancer rates showed increased incidence of cervical cancer rates among immigrants [16] and the incidence of cervical cancer disease is predicted to increase further with new refugees from Ukraine.

High risk Human Papillomavirus (HPV-HR) infections are a necessary factor in the development of cervical cancer [17]. A study of western countries of the former Soviet Union including Ukraine showed a significant prevalence of HPV-HR with prevalence ranges up to 48.4%, 29% to 100%, and 77.2% to 100% respectively in women with normal cytology, low-grade lesions, and high-grade lesions [18]. HPV16 was the most detected HPV-HR subtype.

4.2. Healthcare Infrastructure

From 1918 until Ukraine's independence from Russia in 1991, health care in Ukraine followed the Semashko Soviet health care model [19]. The Semashko model set out the state responsibility for healthcare and universal health coverage that was under strict centralized control from Moscow. After Ukraine gained its independence, despite economic and social instability and limited financial resources, the Soviet model of universal health coverage was maintained. Over the subsequent decade, the Ukraine Ministry of Health delegated responsibility for health programs to regional and local governments. The biggest constraint to the ideal of universal health coverage has been low government healthcare expenditures which have not increased significantly as a proportion of Gross Domestic Product (GDP) since the mid-1990s [20]. Analyses of the health care system reported that in 2010 and 2012, respectively, 37.4% and 42.3% of health expenditures were out of pocket [20] [21]. Healthcare reforms beginning in 2010 focused on strengthening primary and emergency care. Conflict and political instability have been thought to be the biggest barriers to healthcare reform. In a 2017 survey of 1200 people in Ukraine, 82% felt that Ukrainian medicine did not function properly and needed to be reformed [22]. In 2018, legislative reform of the health sector focused on the creation of new mechanisms for financing health-

care [23]. A 2021 review of healthcare delivery challenges included the following: "1) inconsistency of Ukrainian legislation with the new system of administrative-territorial structure; 2) lack of clear delineation of powers, revenues and expenditures of local governments at the basic (regional), district and sub-regional levels, duplication of powers; 3) the absence of requirements to the content of regional plans for prevention and treatment of diseases that cause the greatest negative socio-demographic and economic impact" [24]. In addition, these authors describe the problems of scarcity of medical equipment, lack of staff, and problematic quality control in hospitals. Despite these problems, the Ministry of Health has been developing 23 regional public health centers that include cervical cancer screening [25]. In the context of a challenged, developing, and changing healthcare system, the assault on February 24, 2022, by Russia has further damaged the health delivery infrastructure [26].

Cervical cancer screening involves two major components: prevention through HPV vaccination and screening for preinvasive disease. Public health infrastructure is necessary to educate the public, give guidelines for vaccination to the populations and the medical profession [2]. Medical infrastructure is necessary for the delivery and administration of vaccinations either through pharmacies, clinics, doctors' offices, and/or schools. Limited availability of vaccines is a major barrier to vaccination in Ukraine. The country has been facing shortages of vaccines for many years, which has led to low vaccination rates. This issue has been particularly prominent during the COVID-19 pandemic, where the country has struggled to secure enough vaccines to meet the demand.

In 2022, after the war started, the delivery of vaccines was challenging due to several factors, including disruptions to supply chains, damage to infrastructure, and security risks for healthcare workers. In areas affected by conflict or war, it was difficult to ensure that vaccines were stored and transported at the correct temperature, which can impact their efficacy. Healthcare facilities were damaged or destroyed, making it difficult to provide vaccinations to the population. Additionally, healthcare workers were at risk of violence or abduction, making it difficult to deliver vaccines safely.

Infrastructure is necessary for cervical cancer screening. This requires training healthcare workers in performing pelvic examinations and pap smears, having suitable facilities for examination such as clinics, doctors' offices, and hospitals; and having cytologic and pathologic infrastructure (cytotechnologists, pathologists, equipment) to process and report on pap smears, HPV testing, and cervical biopsies [27]. The primary screening modality in Ukraine is cytology [28]. Screening for cervical cancer can start at age 18 years in Ukraine, however a World Bank analysis revealed screening gaps in different regions, specifically, screening captured only 47 percent of eligible women in the Lviv Region and 38 percent in the Poltava Region [29]. In a Ukrainian survey of 40 women with cervical cancer and 80 healthy controls, the authors found that age over 40 years (Odds Ratio (OR) 14), lack of physical examination in past five years (OR 5.4), and multiple

sexual partners (OR 6) were the significant risk factors for the development of cervical cancer [9].

Both COVID-19 and the Russian war have had a disruption on cytology services. In a retrospective assessment of laboratory testing before and after the Russian assault, there was a significant decline in both Pap smear collection and non-gynecologic pathology. At the same time, there was an increase rate of abnormal test results [30]. Despite this disruption, pap smear testing has been maintained during the war.

Another problem was the need for people to leave their homes and move to different regions or countries due to the war. Migration can pose several challenges for vaccination efforts, including the following issues. Access to healthcare may be inadequate. Migrants may face barriers to accessing healthcare services, including vaccinations, due to factors such as language barriers, lack of documentation, and fear of deportation [31]. This can result in lower vaccination rates among migrant populations [32]. Vaccination schedules requiring a two-dose program is challenging for a displaced population [33]. Migrants may have missed doses of vaccines in their home countries or may not have received the same vaccines as the host country. This can lead to incomplete vaccination schedules and increase the risk of vaccine-preventable diseases. Vaccine hesitancy can be a major barrier to receiving vaccines. Migrants may be hesitant to receive vaccines due to cultural or religious beliefs, mistrust of healthcare systems, or misinformation. This can further reduce vaccination rates and increase the risk of disease outbreaks.

4.3. Economic Barriers

A multi-country analysis of cost-effectiveness ratios looking at Quality-Adjusted Life Years (QALYs), a measure of disease burden, showed that HPV vaccination would be a cost-effective intervention and would reduce HPV-related disease incidence [34]. In Ukraine, HPV vaccination is not included in the national immunization program, but it is recommended for girls aged 9 - 14 years old. The decision whether to do it or not relies on individuals. The cost of vaccines can be a barrier to vaccination as people have to pay out of pocket for HPV vaccination [35]. Due to the high price and the desire to vaccinate large populations, vaccination was gradually introduced everywhere in the world. However, by the beginning of 2009, many countries, including Australia, France, and the USA, reimbursed it in full [36]. At the same time, in poorer countries, such as Romania or Bulgaria, partial financing was in force. Gardasil 9 vaccine costs 268.02 USD [37]. A study of pharmacists' perceptions of barriers to HPV vaccination included cost of the vaccine, insurance coverage and reimbursement, parental concerns, beliefs, and inadequate knowledge about the HPV vaccine [38].

4.4. Population Health Literacy

While HPV vaccination is available in Ukraine, there is no national HPV vaccination program, many people are not aware of the importance of vaccination,

and there is a lack of education on the topic, particularly prevalent in rural areas, where people may not have access to reliable information on vaccines [39]. HPV vaccination programs focus on vaccinating girls and boys between the ages of 9 years and 29 years with at least two vaccine doses [40]. Several factors contribute to low level of vaccination rates, including limited access to information about the vaccine and concerns about vaccine safety. Vaccine hesitancy is a growing problem in Ukraine, particularly among certain segments of the population, such as the elderly and those with lower levels of education [41]. This hesitancy is often fueled by misinformation and mistrust of government and healthcare providers [42]. Historically low vaccination rates for many childhood illnesses led to significant vaccine-preventable outbreaks in Ukraine. Prior to the Russian invasion, the largest epidemic of measles in over a decade occurred in Ukraine in 2017-2020, with over 115,000 measles cases and 40 measles-related deaths [43]. In a study of 79 Ukrainian refugees, the majority refused vaccinations for HPV, MMR (measles, mumps, rubella) and meningococcus C [44]. Other factors that influence low vaccinations rates among refugees were language barriers and inconvenience with accessing to healthcare system [32]. Another barrier to vaccinating displaced people is their constant movement and hesitancy registering with local governments for fear of deportation [45].

In a survey of Ukrainian medical and non-medical students, medical students had a greater knowledge of the vaccine and its benefits but only 6.5% of female medical students had been vaccinated [46]. In a previous study, while 81.1% of medical student were aware that HPV was the causative factor for cervical cancer, only 57.3% were aware of HPV vaccination programs [47]. A survey in Ukraine comparing HPV vaccination knowledge, risk factors and a history of HPV-related conditions in 524 men and women between 18 - 45 years reported that better knowledge of HPV vaccination did not lead to higher vaccination rates. Women had better knowledge than men and all women bought the vaccine with personal funds [48].

4.5. Impact of Disasters

Disasters range from natural disasters caused by extreme weather to catastrophic industrial accidents, to population violence due to internal conflicts or war. Armed conflict causes damage to civilian infrastructure, destruction of the environment and displacement of large groups of people. Armed conflicts have devastating consequences to healthcare infrastructure [49]. Emergencies include a range of circumstances ranging from acute situations following a disaster (e.g. a tsunami) to protracted and chronic conditions (such as those following armed conflict, ongoing famines, and floods). The characteristics of morbidity can vary considerably from one emergency to another. Sudden Onset Disasters (SODs) often entail large numbers of victims, surgical demand increases and may exceed local capacity, causing local health systems to collapse.

Complex Humanitarian Emergencies (CEs) occur when there has been a sig-

nificant displacement of a population due to human rights violations, civil unrest, and armed conflict. In this setting, large populations of refugees and/or Internally Displaced Persons (IDPs) are sheltered in camps, temporary shelters, homeless, or in other insecure and resource strained locations. CEs are exacerbated by the political instability of the region, weak governance, and violence from non-state actors such as drug cartels or rebel paramilitary groups. High morbidity or mortality rates occur within the context of CEs due to food and water insecurity, infectious disease outbreaks, poor sanitation, and exacerbation of pre-existing medical conditions. These displaced populations are also at increased risk for injury, trauma, and death from physical and sexual violence. The prevalence of sexual violence among female refugees in complex humanitarian emergencies is estimated at 21% [50].

Preserving existing medical infrastructure and rebuilding what is lost during and after a large disaster are challenging. These large populations are at increased risk for disproportionate loss of life and suffering [51]. Casualties are compounded when there is an armed conflict occurring during a natural disaster or pandemic where health care resources are already strained and reduced [52].

4.5.1. Chernobyl

On April 26, 1986, the worst industrial nuclear disaster worldwide occurred at the Chernobyl nuclear power station [53]. There were three major groups exposed to radiation fallout: the workers at the nuclear plant, those individuals who lived in the vicinity of the plant who were evacuated, and those individuals who did not leave the area. Thyroid cancers were significantly increased among exposed individuals. A local cancer registry was established in 1987 and documented cancer incidence amongst the 150,000 population in the most radio-contaminated areas near Chernobyl [54]. There was a significant risk of thyroid cancer especially in children. Breast cancer incidence rate increased significantly among residents in contaminated areas and among emergency responders [55] [56]. The influence of the Chernobyl disaster of 1986 on cervical cancer rates is not clear. While radiation exposure can weaken the immune system and make individuals more susceptible to HPV infection, it is not clear if this has resulted in higher rates of cervical cancer in the areas affected by the Chernobyl disaster. Onestudy in 2006 found no significant increase in the incidence of HPV-related cancers, including cervical, anal, and oropharyngeal cancers, among individuals exposed to radiation from the disaster [57]. Some authors have found slightly higher rates of breast and cervical cancer in certain areas [58]. Preinvasive disease incidences (Cervical Intraepithelial Neoplasia, CIN) were analyzed from a regional Czech hospital from 1985 through 1991 [59]. There was an increase in CIN in all age groups but most significantly in younger women two years after the Chernobyl disaster. An assessment of the population of the Bryansk region, 50 kilometers from Chernobyl, found that the incidence of cervical cancer and endometrial cancer was significantly increased three and a half decades after the accident regardless of the environmental conditions of the population's residence

[60]. However, there was a relative risk of endometrial cancer RR 1.17 for women living in contaminated regions versus safe regions and this pattern was not found for cervical cancer. This suggests that the increased rates of cervical cancer were more likely due to failures of screening than the environmental conditions. Interestingly, there were no increased rates of ovarian cancer in the contaminated regions [61].

While the incidence of HPV-related cancers did not appear to increase following the Chernobyl disaster, it is important to note that the disaster had significant and long-lasting effects on public health in the affected regions. The disaster resulted in acute radiation sickness, increased incidence of certain types of cancer, and other health effects among workers and residents in the area. The health care system relied on foreign donations to help rebuild care facilities in the area [62].

4.5.2. COVID-19

Pandemics are well known to lead to social conflicts, scapegoating, and misinformation [63]. With the development of vaccines to COVID-19, the worldwide strategy has been to institute widespread COVID-19 vaccination [64]. There is a long history of vaccine hesitancy in Ukraine and a survey in 2019 showed only 29% of the population thought any vaccine was safe [65]. A retrospective evaluation of excess mortality in Ukraine identified three "waves" of excess all-cause mortality in Ukraine in December 2020, April 2021, and November 2021 with excess of 32%, 43% and 83% above the expected mortality [66]. The additional challenge with COVID-19 in Ukraine was the attack by Russia during the Omicron surge in 2022 when it was estimated by the National Research Foundation of Ukraine that there were 30,000 new COVID-19 cases daily [67]. Only approximately 39% of adults had been vaccinated and the program to vaccinate children aged 12 years and up had just started in January 2022, so the vaccination rates of children was extremely low. Additionally, the pandemic had devastated Ukraine's health system with loss of life among healthcare workers [68]. Evacuation of civilians during the Russian assault led to increased risk of transmission of COVID-19 due to crowding during transportation and in temporary shelters [69].

The COVID-19 pandemic has affected many aspects of healthcare worldwide, including vaccination programs for diseases such as Human Papillomavirus (HPV) [70]. The pandemic reduced the capacity to screen and evaluate women for cervical cancer in Ukraine. There was a decrease in the detection rate of new cancer cases due to this lack of screening and an increase in advanced stages of cervical cancer [15]. Ukrainianpublic health leaders are predicting an increase in mortality rates from cervical cancer in the coming years [15]. Using National Cancer Registry of Ukraine data and cancer incidence rates from 2003-2012 to estimate age-standardized rates, an overall increase of 18% in the number of cancer cases is predicted [13].

In Ukraine, the government implemented measures to continue HPV vacci-

nation despite the challenges posed by the pandemic. According to the Ministry of Health of Ukraine, the HPV vaccination program is considered an essential service and is therefore continuing to be provided during the pandemic. The government has instructed healthcare facilities to ensure that preventive vaccinations, including HPV, are carried out in compliance with COVID-19 prevention measures such as wearing masks, maintaining social distancing, and ensuring proper hygiene. Furthermore, the government has made efforts to increase awareness among the public about the importance of HPV vaccination, especially during the pandemic. The Ministry of Health has emphasized that the vaccine is safe and effective and that it can help prevent cervical cancer. Despite these efforts, there have been some challenges in the delivery of the HPV vaccine in Ukraine during the pandemic. For example, some healthcare facilities have reported shortages of vaccines and difficulties in maintaining the cold chain for storage and transport. Additionally, there have been reports of decreased demand for the vaccine due to concerns about the safety and efficacy of vaccines in general. Vaccine shortages in general and with COVID-19 have led to increased illness from vaccine preventable infectious diseases [71]. According to *Our World in Data* estimates only 36.08% of Ukraine's population was vaccinated against COVID-19 due to shortages and vaccine hesitancy. However, the last recorded data on COVID-19 stopped on February 27, 2022, and there is no accurate statistics over the past year [72].

4.5.3. Impact of War

Armed conflict with Russia has destroyed healthcare infrastructure by both physically destroying hospitals and clinics, displacing health care workers, and by diverting money from healthcare to defense [71]. Life-saving supplies such as oxygen rapidly were depleted [73]. Nevertheless, Ukraine Ministry of Health issued 29 orders during the first month of the war to regulate issues of medical care, drug, delivery, blood transfusions, and medical records for both the civilian and military population [74]. External resources from the World Health Organization have supported and continue to support healthcare in Ukraine [75] [76]. An estimated 8.2 million people have left Ukraine of which a significant proportion is over age 60 [77]. The disease burden of older refugees is estimated at a mean of 2.5 illnesses including cardiovascular, respiratory, and cancer [78].

There is limited information available on HPV vaccination rates specifically during war 2023. However, it is well-documented that conflict and instability can have a significant impact on healthcare systems and the delivery of healthcare services, including vaccination programs. In war-torn regions, healthcare facilities may be destroyed or unavailable, making it difficult for people to access vaccines. Vaccine hesitancy has also been reported to increase in conflict zones [79]. Additionally, conflict can cause displacement, making it challenging for individuals to maintain vaccination schedules or access healthcare services in general. In some cases, vaccines may not be a priority for individuals or governments amidst the immediate concerns of war, which can lead to lower vaccination rates.

One example of this is the ongoing conflict in Syria, which has resulted in a significant decline in vaccination rates for preventable diseases such as polio and measles [80]. It is reasonable to assume that HPV vaccination rates would also be impacted in such contexts. Overall, while there is no specific data on HPV vaccination rates during war, conflict can have a negative impact on vaccination programs and healthcare delivery more broadly. It is crucial for governments and organizations to prioritize the provision of essential healthcare services, including vaccination programs, in conflict-affected areas to prevent the spread of preventable diseases.

5. Conclusions

Cancer prevention is significantly less expensive than cancer therapy, yet funding for it in the setting of a disaster is limited [81]. Cervical cancer is a global health crisis and a leading cause of untimely death among women [82]. The estimated new cancer patients per month in Ukraine before the conflict were 13,106 individuals and the estimated cancer case among Ukrainian refugees after the conflict is 33,121 [83]. The Russian war has led to the displacement and migration of almost 20% of the Ukrainian population [77]. Of the countries accepting refugees (Poland, Hungary, Slovakia, Romania), only Poland has the capacity to care for this influx of individuals with cancers. The United Nations Office for Disaster Risk Reduction adopted the Sendai Framework for Disaster Risk Reduction [84]. The goal is to prevent new and reduce existing disaster risks through multifactorial measures to reduce hazard exposure and strengthen resources for response and recovery. This framework can be applied to cancer care by providing access to medical information, ensuring continuity of care, identifying vulnerable patients, and including cancer care in rapid-response teams [5]. The American Cancer Society developed a guide for people with cancer during a disaster [85].

To address these challenges, vaccination programs should be designed to reach migrant populations, considering their unique needs and circumstances [86] [87]. This may involve providing culturally and linguistically appropriate information, offering vaccinations at convenient locations and times, and ensuring access to vaccination records and documentation [88]. Collaboration between health systems, governments, and community organizations is also important in addressing vaccine hesitancy and increasing vaccination rates among migrant populations. The international disaster response community can also provide support and education to reduce vaccine hesitancy. It is imperative to conduct pro-health education in primary schools. Such an educational campaign will help children to understand what HPV-related cancers are, how they can be prevented and how vaccinations work, which will allow them to make correct and informed decisions about vaccinations [89]. It is also important to emphasize the benefits of reducing the risk of sexually transmitted infections—explaining that in immunosuppressed people (e.g. HIV), HPV infections more often lead to cancer. Patients infected with HPV should be informed about the risk of infection of sexual partners, as

well as about the possibility of developing malignancy and the possible need for appropriate periodic examinations (cytology, colposcopy, anoscopy) [90].

Gynecologists, physicians of other specialties, especially dermatologists, urologists, and family physicians, should also play an important role in the implementation of vaccinations in the sexually active population. They should encourage HPV vaccination; patients and parents agree that health care providers' recommendations were among the most important factors in their decision to get vaccinated [91]. Physicians must also be willing to dispel fears and correct misconceptions of patients and their parents. By addressing behavioral and ethical concerns about vaccinating prepubertal children against sexually transmitted infections, clinicians can steer the conversation to cancer prevention while still providing complete and accurate information about the nature of HPV vaccination. Biological arguments may help to clarify the timing of vaccination. It should be stressed that vaccination in childhood may increase the immunogenicity of the vaccine [89], and that administration of the vaccine before sexual contact provides maximum protection against viral exposure. Attention to the high lifetime prevalence of HPV infection can help to better understand the actual clinical situation, reduce prejudices, and correct the erroneous perception of low risk. When it comes to vaccinating boys, there is a direct benefit due to the increasing incidence of HPV-related anal, penile, and head and neck cancers [90]. Physicians can finally increase the proportion of people who adhere to the recommended two-dose regimen vaccination, using systems to remind patients about the next doses (by phone or via e-mail or SMS) [88]. Another tool is the use of the internet with telemedicine to increase information exchange and education [92].

The Ukrainian Ministry of Health must take steps to increase awareness and uptake of HPV vaccination in Ukraine. Continued education and outreach efforts are needed to ensure that both healthcare providers and the public understand the importance of vaccination in preventing cervical cancer and other HPV-related diseases. Ukraine should invest in expanding access to cervical cancer screening and HPV vaccination programs, particularly in underserved regions. The government could also work to improve treatment facilities and healthcare infrastructure to ensure that patients receive high-quality care.

Disclosures

The authors have no disclosures.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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