A REVIEW ON THE SOCIO-DEMOGRAPHIC AND CULTURAL FACTORS ASSOCIATED WITH THE DELAYED DIAGNOSIS OF CERVICAL CANCER AND POSSIBLE INTERVENTIONS IN SCREENING ATTITUDE: FROM SOUTH ASIAN PERSPECTIVE

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A thesis submitted to the Department of Mathematics and Natural Science in partial fulfillment of the requirements for the degree, Bachelor of Science in Biotechnology

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Declaration

It is hereby declared that

1. The thesis submitted is my/our own original work while completing degree at Brac University.
2. The thesis does not contain material previously published or written by a third party, except where this is appropriately cited through full and accurate referencing.
3. The thesis does not contain material which has been accepted, or submitted, for any other degree or diploma at a university or other institution.
4. I/We have acknowledged all main sources of help.

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Abstract

Cervical cancer is the prominent reason of cancer related mortality in women in the South Asian countries. Unfortunately, due to low rate of cervical cancer screening (CCS) cervical cancer is still a significant public health problem in south Asian countries. Early diagnosis of cervical cancer can reduce the incidence and mortality rates of cervical cancer. There are lot of barriers that prevent women from up taking the CCS. But there are some facilitating factors of early diagnosis which if implemented increases the early diagnosis of cervical cancer. And here in this present review with the aim to facilitate the early diagnosis of cervical cancer we have discussed about the potential barriers to cervical cancer screening and possible interventions that targets delays and barriers to cervical cancer diagnosis.

Keyword: Cervical Cancer, barriers to delayed diagnosis, sociodemographic, cultural, interventions, South Asian Countries, LMICs

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List of Acronyms

CC	Cervical Cancer
CCS	Cervical Cancer screening
LMICs	Low- and middle-income countries
LICs	Low-income countries
HICs	High-income countries

Introduction

The leading cause of mortality globally, accounting for over 13% of all deaths, is cancer. This refers to around 10 million of deaths in the year 2020, or roughly one in every six, a figure that exceeds the combined number of TB, malaria, and HIV/AIDS. According to projections, there would be 47% more new cases in 2040, totaling over 28 million, with low- and middle-income countries (LMICs) anticipated to have the largest increases.(Sung et al., 2021). Concerns for public health especially surrounds cervical cancer, since it is the most prevalent form of cancer in 42 low-income countries (LICs).(Arbyn et al., 2020). By 2030, it is predicted that 500,000 women would decease annually from cervical cancer and 95% of these fatalities will take place in low- and middle-income countries. (McGraw & Ferrante, 2014). In order to decrease mortality and morbidity caused by cervical cancer, methods of screening (CCSs) was developed a number of years ago as a primary goal for early detection of the disease. (Karimi-Zarchi et al., 2020). If diagnosed in its precancerous state, cervical cancer may be the most treatable kind of cancer in humans. (Devi et al., 2007). Using a variety of strategies, several Asian countries have been attempting to prevent cervical cancer for some time and one such significant approach is screening, which looks for precancerous abnormalities that, if left untreated, might result in cervical cancer.(Aoki et al., 2020). Lower survival rates in cervical cancer patients have been linked to delayed diagnosis and, consequently, late stage disease presentation. (Thomson & Forman, 2009).

Delay in diagnosis of cervical cancer has been found in many studies to be heavily associated with sociodemographic and cultural barriers faced by people in adhering to the screening facilities.(Salehiniya et al., 2021). For instance, Late presentation of patients and advanced stage at diagnosis of cervical cancer were shown to be caused by inadequate understanding and awareness of cervical cancer among women. (Yu et al., 2005). One of the often cited factors for cervical cancer screening uptake is perceived psychosocial obstacles, which include personal characteristics (such as emotions, abilities, and self-evaluations) as well as environmental (such as communication with health professionals) and societal factors (e.g., perceived distance to CCS facilities).(Conner, 2009; Hall & Rossi, 2008). Any government's comprehensive cancer control policy must support early diagnosis and accessibility to cancer treatment. (Brand et al., 2019).

As a result, authorities have been working hard in recent years to broaden the scope of screening programs and each country has opted towards different approaches to execute their plans. However, several factors have been found to be directly associated with the lack of screening and hence in order to implement early diagnosis, identifying these factors and catering interventions accordingly is of high significance (Bayrami et al., 2015). Asia contributes to a sizable portion of the world's cervical cancer cases and deaths, with countries like India accounting for almost a third of the global burden (Arbyn et al., 2020) , but despite the high disease burden, there are limited numbers of studies conducted on barriers associated to late stage diagnosis and even fewer papers focusing on south Asian countries (Shrestha et al., 2018). Therefore, our review, specifically concentrated on factors associated with the delayed diagnosis of Cervical Cancer in South Asian context and explored possible interventions that are likely to positively impact screening attitude from this regional perspective.

Epidemiology

Invasive cervical cancer and cervical gland inflammation are mostly brought on by certain Human Papillomavirus (HPV) types, according to the cervical cancer etiology. In addition, several additional etiological variables, such as genetic mutation, epigenetic changes, lifestyle choices, etc., have been documented to play important roles in the development of cervical tumors (Mohanty & Ghosh, 2015; Muñoz et al., 2003). High-risk HPV infection accounts for more than 99% of precancerous lesions (cervical dysplasia) and cervical carcinomas (Walboomers et al., 1999).

The double-stranded, circular genome of HPV has nine open reading frames.(*Preinvasive Lesions of the Lower Genital Tract - Williams Gynecology, Second Edition (Schorge,Williams Gynecology), 2nd Edition*, 2012.; Southern & Herrington, 1998). The "late" (L) genes encode capsid proteins, while the "early" (E) genes regulate DNA maintenance, process of replication, and transcription. Early in an HPV infection, proteins E1 and E2 are produced at high levels, enabling viral replication in cervical cells. Low-grade cytological alterations on Papanicolaou smears or low-grade squamous intraepithelial lesions may result from this (Yim & Park, 2005). The viral oncoproteins E6 and E7 are essential for the development of cancer. When E6 proteins attach to the p53 tumor suppressor protein and E7 proteins bind to the retinoblastoma

tumor suppressor (Rb) protein, the suppressor proteins are degraded, which promotes the growth of tumor cells. (*HPV - Vaccine Preventable Diseases Surveillance Manual | CDC*, 2022).

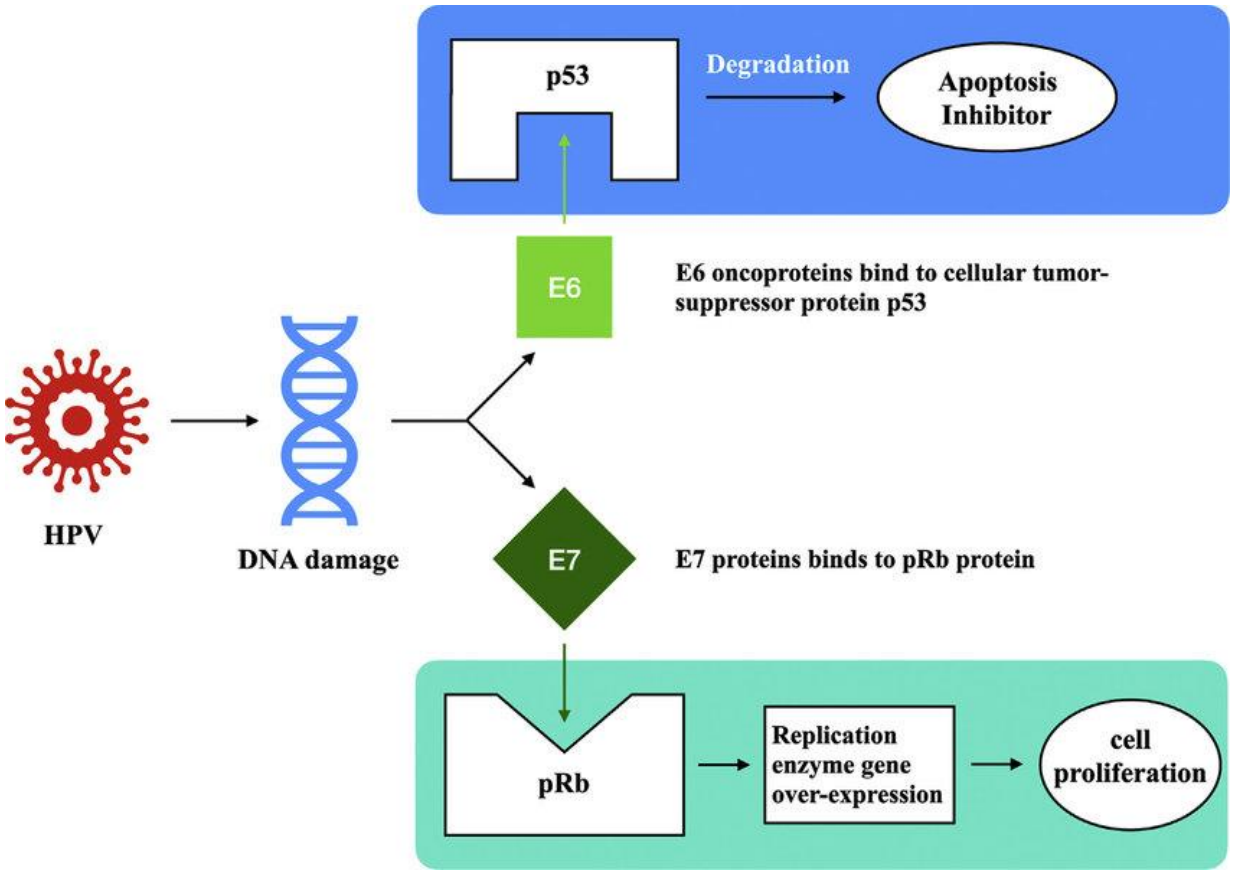

Fig 1: The function of human HPV genes E6 and E7 in the development of cervical cancer (Bedell et al., 2019)

Different regions of the world have different rates of cervical cancer, which is the second most prevalent kind of cancer among women in South East Asia and a leading cause of cancer mortality in low-and middle-income countries' women (Shrestha et al., 2018). In 2020, cervical cancer resulted in the deaths of 341,831 people worldwide with 604,127 new cases (Sung et al., 2021). Cervical cancer is still the main reason why women die from cancer in LMICs. Among Asian women it is the 3rd most prevalent kind of cancer. (Aoki et al., 2020). The incidence and mortality of cervical cancer in Southeast Asia were found to be (total new cases: 190,874 cases, new death cases: 116015, according to WHO South-East Asia (SEARO) Source: Globocan 2020) (*995-Who-South-East-Asia-Searo-Fact-Sheets.Pdf*, n.d.)

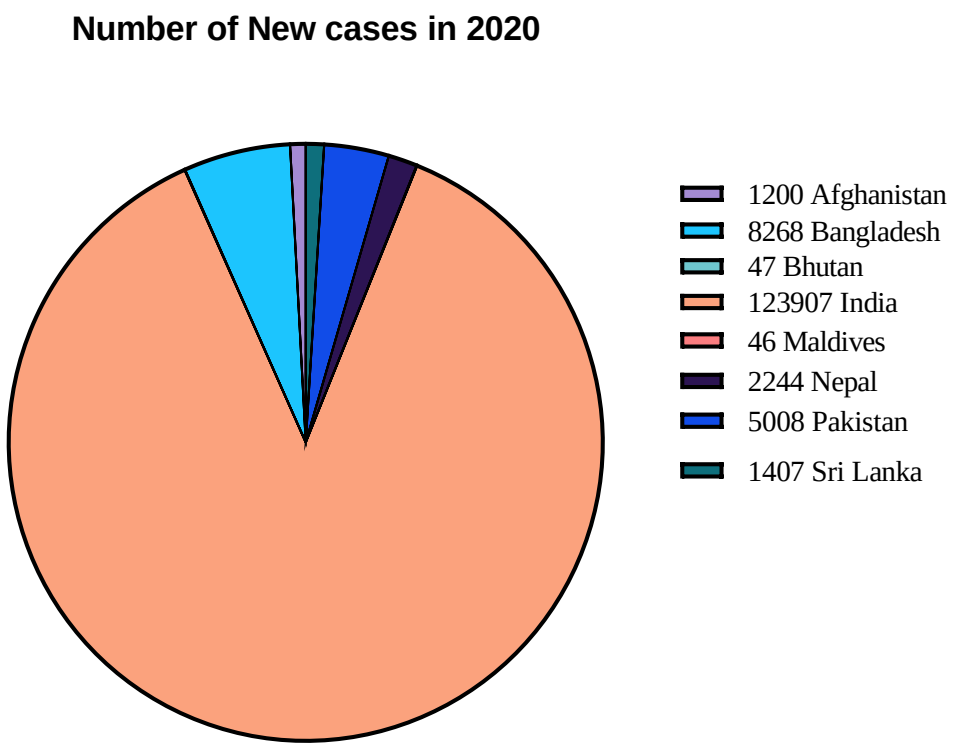

Fig 2: According to Globocan 2020, the number of new cases of cervical cancer in South Asian countries. (The International Agency for Research on Cancer (IARC), 2020)

Country	New cases	Deaths	5-year prevalence (all ages)	Source
Afghanistan	1200	823	2089	(*Afghanistan Source: Globocan*, 2020)
Bangladesh	8268	4971	18132	(*Bangladesh Source: Globocan*, 2020)
Bhutan	47	27	103	(*Bhutan Source: Globocan*, 2020)
India	123907	77348	283842	(*India Source: Globocan*, 2020)
Maldives	46	24	118	(*Maldives Source: Globocan*, 2020)
Nepal	2244	1493	4552	(*Nepal Source: Globocan*, 2020)
Pakistan	5008	3197	10070	(*Pakistan Source: Globocan*, 2020)
Sri Lanka	1407	780	3910	(*Sri Lanka Source: Globocan*, 2020)

Table 1: According to Globocan 2020, the prevalence, fatality, and frequency of cervical cancer in South Asian countries.(The International Agency for Research on Cancer (IARC), 2020)

Is delayed diagnosis the root cause of high grade cervical cancer in South Asia?

Most of the countries in South Asia are developing countries where there is a huge scarcity of health resources. And when developed countries are compared with developing counties, stark differences in cancer mortality and incidence can be observed (Sharma et al., 2011). In developed countries, the age-standardized incidence rate (ASIR) for cervical cancer is lesser than in developing countries, where it is much higher at 8.0 per 100,000 (Global Burden of Disease Cancer Collaboration, 2015). Corresponding to this, developed countries have a lower age-standardized death rate (ASDR) for cervical cancer (2.2 per 100,000) than developing countries (4.3 per 100,000) ("Control of Cancer of the Cervix Uteri," 1986). While having only limited resources, developing countries still must cope with a wide range of health issues. This essentially means that majority of individuals living under such conditions lack access to basic health facilities for cancer screening that could lead to early detection (Boyle et al., 2008). Sub-Saharan Africa could be an example were there are only limited cancer services available (Preker et al., 2006). In the early stages of cervical cancer, there are mild but significant symptoms, however women frequently misread these signs or delay till the condition worsens before they avail any healthcare. According to research, very few people are aware of the symptoms associated, and raising awareness through interventions lead to better results (Robb et al., 2009). A Malaysian study showed how training programs for staffs and public cancer awareness campaign together managed to cut down the amount of late-stage breast and cervical cancer presentations by half during a 4-year period. Due to lack of early diagnosis, Palliative care is frequently the sole choice left by the time the majority of patients seek treatment (Amuyunzu-Nyamongo, 2010).

One of the main causes of the significantly higher prevalence of cervical cancer in developing countries is the absence of efficient screening programs intended to find and treat precancerous symptoms. Compared to 40 to 50 percent of women in developed countries, just approximately 5 percent of women in developing countries have reportedly undergone a cervical dysplasia screening in the last five years ("Control of Cancer of the Cervix Uteri," 1986). Papanicolaou (Pap) smear screening for women at risk for the condition and treating precancerous lesions have been the main focuses of cervical cancer preventive initiatives globally. These initiatives have significantly decreased the incidence of invasive cervical cancer by up to as 90% in areas

with good screening quality and coverage (Campos et al., 2017). However, the majority of developing counties have been unable to put in place extensive Pap smear screening-based programs. In regions where Pap smear screening service is available, it is mostly only available to a small percentage of women via private health care providers or the service is primarily given to young women through family planning or maternal health clinics where the population being screened is typically not at high risk (Robles et al., 1996). These methods haven't had much of an impact on morbidity and mortality, and they're often more expensive than public sector screening programs that are centrally controlled (Fahs et al., 1996). Most patients have advanced, incurable illness when they first arrive. The lack of knowledge of the cancer's signs and symptoms, the cost of traveling to a hospital, and the expense of diagnosis and treatment are some of the typical reasons for a delay in presentation, which prompts many people to seek out conventional treatments (Beaglehole & Yach, 2003; Gustafsson et al., 1997).

Sociodemographic factors associated with delayed diagnosis of cervical cancer

One of the most significant determinants regarding the delayed diagnosis of cervical cancer screening (CCS) is sociodemographic factors. While some variables deal with individual knowledge and understanding about cervical cancer and methods for preventing it, others have an influence on individual's willingness to be screened (Salehiniya et al., 2021).

- **Cost and affordability**

  - Due to the startling gap in incidence and mortality between low and middle-income countries (LMIC) and the contrary high-income countries (HIC), cervical cancer is sometimes referred as a "disease of disparity" (Vu et al., 2018). The absence of health insurance and inability to pay for imaging or possible treatments were the primary financial obstacles (Brand et al., 2019). According to a survey on low-income women, 72% of participants said they consider financial constraints as limitations to screening. The most often reported expenditures were for screening appointments (71%), followed by follow-up/future treatment costs (44%), lost income from missed work (6%) and transportation costs (5%) (Biddell et al., 2021). Due to financial constraints, women put

social obligations ahead of screening. They contend that since living expenses are so high, preventative measures are not a primary concern (Akbari et al., 2010).

- **Education and illiteracy**

  -Women with some formal education had a lower incidence of cervical cancer than those without any formal education, and a strong dose-response association was seen as education level increased (Thulaseedharan et al., 2012). According to research, Nepal's high rate of female illiteracy was found to be accountable for cervical cancer's late detection (Gyenwali et al., 2013). In India too, low levels of formal education were linked to insufficient screening, according to several studies (Nene et al., 2007). Cervical Cancer mortality is relatively greater than that of cancers of other sites, according to a 2016 evaluation of the state of cancer care in Afghanistan, which even issued a warning. This is mostly because of unequal access to healthcare and a lack of knowledge about gynecological malignancies (Silbermann, 2016).

  According to a cross-sectional study conducted in Bangladesh, where the respondent educational background was mostly primary or illiterate (74%), awareness of cervical cancer was found to be connected with respondent's low levels of education (OR: 5.653, 95% CI: 0.021-0.257, p-value 0.001). The majority of women (86.4%) worked at home and only 26% of respondents had schooling above the primary level. The spouses' educational backgrounds were also found to be primarily below the elementary level (55.5%). (Shahi et al., 2021)

- **Lack of Health care referral**

  -While many women take charge of their health by scheduling screening and diagnostic exams in a timely manner, some rely on the medical professionals. Only after receiving encouragement from medical professionals do the latter group of women comply to the test (Amarin et al., 2008). Among the difficulties in many developing and underdeveloped countries, are service providers' lack of efforts in promoting screening (Refaei et al., 2017). One strategy to promote test participation is to ensure its safety. In a number of studies, concerns regarding the hospital equipment and test-giver's uncertainty, were cited as limitations (Salehiniya et al., 2021). A positive link was found between patients who get a physician referral and the cervical cancer screening uptake in a systemic review paper. According to studies shown there, a

relatively high percentage of women (86.7%) who recently saw their doctor but didn't have a Pap test stated that they didn't get a referral for screening from their doctor (Plourde et al., 2016). The evidence of correlations between the uptake of cervical cancer screening and perceived social barriers was studied, referencing to previous interactions with healthcare professionals. These interactions included previous CCS interactions perceived as a negative experience (16.3 %), CCS not advised by a family doctor (11.6 %) (Bukowska-Durawa & Luszczynska, 2014). Despite the relatively low quality of the recovered clinical data, a cross-sectional survey based in Afghanistan revealed that more than 60% of the women had to contact many doctors before receiving a diagnosis (Acuti Martellucci et al., 2021). Studies from India and Nepal, which reported diagnosis delays related to healthcare professionals in a percentage of women with Cervical cancer (CC) ranging from 20 to 84 percent, found similar results (Beaglehole & Yach, 2003; Gustafsson et al., 1997).

- **Limited access to healthcare facilities (geographical location and infrastructure)**

- Oncology treatments are often only available in city centers, despite the fact that more than 50 % of the population of less developed countries lives in rural regions. This implies that a large number of patients have to travel a long way for their treatment and deal with competing priorities between the expense of travelling and medication, as well as from household and work obligations (Wu et al., 2017). According to a survey, only few facilities at the primary and secondary levels in Bangladesh have sufficient availability and preparedness for diagnostic services, and only tertiary-level hospitals are prepared to diagnose and treat individuals with cervical cancer (Rakhshanda et al., 2021). Studies among health institutions in a particular Bangladeshi district revealed that fewer than 40% of services were available (Islam et al., 2016). Women in rural areas are far less likely to report having had cervical cancer screening (CCS) recently or ever, according to researchers who compared disparities in cervical cancer screening practices between women living in urban and rural/remote locations (Paz Soldan et al., 2008; Ranjit et al., 2016).

Cultural Challenges associated with delayed diagnosis of cervical cancer

Culture has a big impact on human behavior and choices. Hence, perceptions about health and sickness, religion and spirituality, and family dynamics may have a significant impact on a person's decision to undergo screening (Gan & Dahlui, 2013).

- **Gender dominance (Social support)**

  -Choosing family responsibilities over one's own health, such as child care and participation in domestic duties, decreases willingness to attend screening (Ansink et al., 2008). The need for a spouse's consent to undergo the test affects the success of screening programs in some Asian countries, in addition to preferences given to specific gender and the important role of the male figure in making decision for the hygiene-related behaviors (Al-Naggar et al., 2010), and the spouse's refusal to permit the investigation in some Asian countries contributed to the prevalence of higher stage cervical cancer in the region (Hassani et al., 2017). Women's propensity to not undergo screening tests is positively connected with their husbands' refusal to give them permission or to leave the house or their husband's disapproval of the testing (Ersin & Bahar, 2013). Lack of family support was linked to lack of screening, according to a population-based study conducted in India (Basu et al., 2006).

- **Psychological factor (Shame, anxiety, stress, fear, embarrassment)**

- One of the biggest barriers to screening is shame while another major psychological roadblock to screening is fear. Sources of psychological discomfort include dread of pain related to diagnosis and self-examination, fear of cancer screening and diagnostic outcomes, and also, fear of follow-up therapy (Salehiniya et al., 2021). Since many women fear and worry about getting treated for cervical cancer, many preferred to rather pass away with dignity than get the test (Gu et al., 2017). Many studies based on South Asian countries including India, Bangladesh, and Malaysia highlighted feelings of humiliation linked to gynecological examinations and fear and anxiety associated to Pap smear testing or unexpected diagnostic findings as obstacles to

screening for cervical cancer (Al-Naggar et al., 2010; Ansink et al., 2008; Basu et al., 2006; Dunn & Tan, 2010). According to a cross-sectional survey, obstacles to CCS include feeling of embarrassment (69%) or uncomfortable (59%), too time consuming (68%), clashing with family responsibilities (64%), and unpleasant procedures (45%) (Satyal, 2013). The desire to take a repeat screening test is significantly influenced by prior pleasant or unpleasant experiences (Refaei et al., 2020). These consist of test-related bad experiences in the past, suspicious tests in the past, and test-related anxiety (Refaei et al., 2017).

- **Awareness and Attitude**

- The three foundational pillars of screening tests are cancer awareness, cancer prevention, and early detection (Salehiniya et al., 2021) Only 5.2% of Pakistani women knew the Pap smear was a diagnostic test, and 70.1% of women had no idea what cervical cancer was (Khan et al., 2014). The main obstacles to screening uptake among women in their midlife in Bangladesh are a lack of knowledge about cervical cancer and a lack of comprehension of the idea of screening. Those women think that if there are no symptoms, there is no sickness, hence there is no need for treatment (Khan et al., 2014). According to an Afghan survey, patients' delays were most frequently caused by their ignorance of how serious their symptoms were (70.0%) and their reluctance to seek medical advice (30.0%) (Acuti Martellucci et al., 2021). According to studies, 31% of Nepali women and 42% of Bhutanese women too had insufficient knowledge of Cervical Cancer (Bhatta et al., 2020).

Interventions in screening attitude

The results of several literature reviews suggest that both intrinsic and extrinsic variables are likely to have an impact on women's cervical screening behaviors. Several of the external variables can't be changed like age or are challenging to do so such as the level of education. However, by addressing internal variables like the perceptions of vulnerability and attitude regarding cervical cancer, we can affect women's decision-making with the aid of certain interventions (Ackerson & Gretebeck, 2007). By influencing societal and cultural

norms and removing personal obstacles with the help of interventions that can address these internal variables, routine cervical cancer screening can be increased.

- **Cervical cancer awareness**

  -There was little knowledge that HPV vaccination for young girls (8.3%) or Pap tests (41%) can prevent cervical cancer. A greater percentage of participants (85%) felt that cervical cancer itself would be sexually transmitted, despite the fact that only around one in three (30.5%) participants had heard of the link between a sexually transmitted virus and the development of cervical cancer. Lack of understanding about cervical cancer risk factors, symptoms, and Pap screenings may impede people from taking preventative measures and seeking medical attention at an early stage (Daley et al., 2013; Pati et al., 2013). Delays in presentations may be caused by a lack of knowledge about or an inability to detect cancer signs (Wong et al., 2009). The radio emerged as the most popular source of information on cervical cancer in this survey, particularly among males and those living in cities. In this respect, radio talk shows might be used as a vehicle for health education initiatives to engage males and urban areas in encouraging cervical cancer screening uptake and early assistance seeking. Health care practitioners were the second most frequent source, especially for women (Msuya et al., 2008). All of these informational resources may be utilized to spread the word about Pap smears and HPV.

  The social cognitive framework served as the foundation for one of the successful, theory-based educational interventions in the studies we reviewed. According to this hypothesis, understanding health risks and benefits sets the stage for change, and if people are unaware of how their lifestyle choices influence their health, they are less likely to go through the trouble of quitting those unhealthy behaviors (Bandura, 1986, 2004). These theory-based educational interventions are especially relevant for underdeveloped communities with low level of literacy. These interventions improved women's awareness of cervical cancer, their understanding of the need of screening, provided barrier counseling and assistance with arranging screening appointments, and ultimately enhanced the probability that eligible women would get Pap smear testing (Hou et al., 2002; Mishra et al., 2009; Taylor et al., 2002). One of the studies in rural Kenya indicated that while giving didactic health presentations may raise women's

awareness and understanding of cervical cancer, it does not always result in higher cervical screening rates (Rosser et al., 2015). Reduced time to diagnosis, fewer referrals, and lower disease stage at diagnosis were all assessed in three general population studies (Leander et al., 2007). In order to reduce disease staging and increase referral rates, a comprehensive intervention program in South Africa evaluated the efficacy of educational presentations and a widespread media campaign that targeted newspapers and national radio broadcasts (Nuño et al., 2011). The effectiveness of health promotion initiatives using flyers and posters targeted at the general public in lowering disease stage was observed to vary (Leander et al., 2007). The participants' knowledge of cervical cancer (causes, importance of screening, how screening is done and where to have screening done, as well as interpretation and treatment of abnormal screening test) can be increased through educational interventions that are mediated by videos, the use of culturally responsive educational materials, letters with statistics on cervical cancer and screening, cervical cancer screening leaflets, and call or text-message influenced education (Buehler & Parsons, 1997; Decker et al., 2013; Fujiwara et al., 2015; Nuño et al., 2011). In order to enhance the involvement of women in cervical screening programs, we advise the adoption of educational interventions that are based on culturally appropriate language suited for particular populations.

- **Provider recommendation and reminder**

  - These interventions contain invitation letters from a health facility/screening program to eligible women with no previous screening or who are due for screening, as well as provider-initiated screening during opportunistic contacts with eligible women in a health facility environment. Additionally, we included interventions including text messages, phone calls, direct mailings of personalized letters, and reminder letters for eligible women whose screenings were past due.

  Regardless of the practitioner's area of specialty, health care professionals can affect the incidence and mortality of cervical cancer by talking to their patients about their views on Pap smear testing and their perceptions of their susceptibility to the disease. Then, by dialogue with patients and other healthcare professionals during a doctor's visit as well as through educational materials that are culturally and linguistically relevant, health care practitioners may address these ideas and impressions that may be incorrect (Ackerson & Gretebeck, 2007). Doctors, nurses, midwives, dental

professionals, and medical students were among the healthcare workers. Medical professionals should increase awareness and understanding via the production and supply of linguistically and culturally relevant information, according to the USDHHS (*Excess Cervical Cancer Mortality: A Marker for Low Access to Health Care in Poor Communities*, 2005). Nurse Practitioners [NP] have a special opportunity to support women's health screening practices since it has been discovered that having a regular source of care improves cervical cancer screening. NPs might take part in community health fairs by offering educational materials, advice, and gift cards for cervical cancer screening, as one illustration. Nurse practitioners can also send postcards to women to remind them to make an appointment for their yearly Pap smear screening (Hiatt et al., 2001; Otero-Sabogal et al., 2003; Sambamoorthi & McAlpine, 2003). According to our review, methods that included invitation letters, a brochure on cervical cancer and the Pap test, extra telephone reminders, and a brief explanation of the significance of the Pap smear test had a good impact on cervical screening rates (Abdullah & Su, 2013; Eaker et al., 2004). One experiment that discovered a substantial impact on screening rates in women scheduled for a follow-up Pap smear showed the crucial importance of a reminder phone call compared to an invitation letter alone (Abdullah & Su, 2013). The use of a telephone technique may be more practical than a written invitation letter for screening programs that target difficult-to-reach women in rural regions with disorganized postal systems. The direct connection that a phone call allows for with the participants may serve to inspire and motivate them to do well on the screening exam. Women who have not yet replied to a screening invitation letter may get a phone call as a reminder (Heranney et al., 2011). Calling someone directly might be beneficial, especially for women who are worried about getting their Pap smears or getting an exam. Additionally, the option of having the Pap smear done by the individual with whom the women spoke may serve to further motivate screening (Eaker et al., 2004). We also recommend additional research to examine how social media platforms like Twitter and Facebook may enhance the dissemination of educational messages and women's engagement in cervical cancer screening.

- **Capacity building and strengthening workforce**

  - By 2025, there will be 12 500 oncologists practicing in the United States, one oncologist serving for every 100 patients, according to study conducted in 2008 under the direction of the American Society of Clinical Oncology. While India, which is next door, has a ratio of 1 every 1600 patients, Bangladesh has a ratio of 1 per 10,000 patients(Atun et al., 2015). There is a severe shortage of trained oncologists and physicists in Bangladesh, which the World Health Organization has identified as one of the 58 crisis nations suffering from a human resources for health crisis. Oncopathology and cytopathology capabilities must advance for better cancer treatment (Datta et al., 2014). Increased health care worker ability and education were linked to significantly improved full remission survival rates ($p = 0.005$) and decreased treatment abandonment rates (p 0.001), according to a multifaceted intervention research carried out in Colombia. Clinical skill training programs for healthcare workers have been demonstrated to speed up diagnosis, expand access to treatments, raise detection rates, and increase patient survival rates. It has been demonstrated in several studies that adopting staff training and public awareness campaigns significantly reduced cervical cancer stage (Qu et al., 2020; Suarez et al., 2015).

  The shortage of qualified healthcare personnel is a significant barrier to providing proper cancer care. Support for the inclusion of specialist training on cancer into the curriculum and syllabi of medical schools is crucial in order to prepare the future generation of health professionals, in addition to offering on-the-job training programs for trained physicians and nurses (Sharma et al., 2011). One example of how international cooperation can help to support the development of sustainable in-country oncology training and education is twinning partnerships between institutions from developed and developing countries, with the caveat that such projects are locally led by local country experts. Institutional twinning partnerships have the ability to broaden the scope of cancer education initiatives. adopting a low-cost, sustainable strategy for continued help in poor nations. Twinning relationships can be established to: Share educational and training materials; Offer training programs for physicians, nurses, and/or other healthcare professionals; helping to establish better patient resources and awareness-raising campaigns through community outreach activities (Oncology, 2011).

A Vision of the Future

The Addressing the Need for Advanced HPV Diagnostics trial, a significant HPV primary screening study conducted in the United States, found that the HPV test was as effective as or more effective than cytology alone for primary cervical cancer screening (T. C. Wright et al., 2015). The potential for easier collection is a big benefit of employing HPV testing for primary screening. HPV testing can be carried out by the patient themselves by self-swabbing, as opposed to requiring a pelvic examination by a qualified healthcare professional. This might be especially helpful in areas with limited resources, like South Asia (J. Wright Thomas C. et al., 2000). The sensitivities and specificities of patient self-sampling compared to those obtained by doctors for identifying HPV were comparable (74% and 88% vs. 81% and 90%, respectively) in a meta-analysis carried out by Ogilvie et al. (Ogilvie et al., 2005). The majority of the women who were screened in several additional research conducted in numerous foreign places have further discovered that they are willing to use the self-swab procedure (Parkin et al., 2010; Smith et al., 2001). Cost, the requirement for laboratory processing, and the length of time to get findings are the biggest problems with HPV testing. In low-resource settings, a new version of the Hybrid Capture II HPV DNA test has been developed (Jeronimo et al., 2014; Sauvaget et al., 2011); the care HPV testing system (QIA- GEN, Germantown, MD, USA) provides a quick, easy, affordable, and reliable way to test for HPV. Additionally, semiportable, each care HPV system can process 90 specimens for $4–$6 each in around three hours. With this rather quick HPV testing, patients can wait for the results and have a digital colposcopy (DC) or acetic acid visualization of the cervix performed the same day. Polymerase chain reaction-based HPV testing devices are currently approved in China and Europe and are awaiting FDA approval. They are quicker, more accurate, and less expensive. It is not difficult to picture a day in the future when screening programs use self-swab HPV testing on thousands of women every day that is quick, affordable, high volume, and accurate (*Introducing AmpFire HPV Testing in Cervical Precancer Screening Activities: Experience from Battor, Ghana*, 2022.)

Conclusion

In order to prevent another disastrous pandemic like the HIV/AIDS, poorer nations must now enhance their health systems to combat cancer. Even though efforts are ongoing to increase HPV vaccinations for primary prevention of cervical cancer, in low resource settings like in south Asian countries where vaccination coverage is very poor, early diagnosis still remains as a great tool in fighting cervical cancer. It is because of lack of early diagnosis that instances of cervical cancer that are quite advanced usually gets reported. Advanced diseases come with a heavy financial burden, few available treatments, stress, family losses, and a greater fatality rate. This bleak situation, which is all too common in our culture, may be avoided if we raise awareness about it and put in place effective screening programs as a public health policy.

Cultural preconceptions, myths, and stigmas around cancer are pervasive worldwide. Cultural attitudes and various sociodemographic factors have hindered health-seeking for cervical cancer and decreased the uptake of Pap smears; and to diminish or eradicate them, culture-tailored interventions needs to be implemented (Daher, 2012; Ho & Dinh, 2011; Mwaka et al., 2016; Schulmeister & Lifsey, 1999). To debunk potentially detrimental myths about cervical cancer, government program managers and organizations in LMICs need to develop and deploy culturally relevant strategies (Fang et al., 2011). To turn awareness into tangible benefits, policymakers and healthcare systems in LMICs must provide preventative measures like HPV vaccination and cervical screening as well as infrastructure for early detection and treatment of symptomatic cervical cancer (Mwaka et al., 2016). Cervical cancer prevention programs can solve the difficulties of delivering adequate screening and treatment and eventually have a lasting impact on women's health by utilizing innovative service delivery systems and well-trained, motivated staff. Further research is required in order to find other possible barriers and fully explore the barriers found in this literature review which in turn will serve as a catalyst for the formation of culturally appropriate interventions catered to the requirements of South Asian women, enhancing the early diagnosis of cervical cancer (Ackerson & Gretebeck, 2007).

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