Cancer Screening Programs in Low- and Middle-Income Countries: Strategies for Success

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Cancer is a leading global health problem and, as of 2020, accounts for 10 million deaths per year.¹ The World Health Organization (WHO) estimates that between 30 and 50% of cancer deaths can be prevented by avoiding risk factors, early detection via screening, and proper treatment. The majority of cases occur in low- and middle-income countries (LMIC).² Despite awareness of the magnitude of this problem by the global health community and the large-scale efforts to implement screening programs, very few programs are successful and, more importantly, sustainable. Although there are several barriers to implementation of a cancer screening program, the critical barriers are lack of awareness and acceptance of the screening programs by the people residing in the specific geographic regions. In the article by Pak et al. entitled *Cancer Awareness and Stigma in Rural Assam India: Baseline Survey of the Detect Early and Save Her/Him (DESH) Program*, the authors highlight the cultural and psychosocial barriers to cancer screening.³

The DESH program is a well-organized screening program with multiple components that consists of an initial baseline survey followed by implementation of mobile cancer screening and subsequent follow-up of patients regarding final diagnosis and treatment. The DESH program in Assam, India, focuses on breast, oral, and cervical cancers due to the high incidence of these cancers in this

region and the availability of validated screening tests. The baseline survey was validated in a smaller cohort ($n = 20$) of local participants before widespread implementation to nearly 1000 participants. The survey consisted of multiple sections that focused on areas such as awareness of the carcinogenic effects of certain lifestyle choices, i.e., consumption of betel nuts and smoking, spiritual/religious beliefs, stigma around cancer diagnoses, and knowledge about screening programs and local health care facilities. Through this approach, they found that the majority (92.9%) of participants were not aware of cancer screening availability and had never undergone prior screening. Additionally, over 90% of the survey participants reported consumption of betel nuts, but less than half (46.9%) were aware of the carcinogenic effects of betel nuts. Finally, 42–57% of participants reported negative stigma towards cancer diagnosis. Specifically, more than 30% of participants believed that either cancer is a punishment from God or is caused by bad karma and evil spirits. Furthermore, 20% of participants described fear of cancer screening. These results highlight the complex interplay between knowledge gaps, misconceptions, and cancer stigma that could affect the acceptance, and thereby the success, of a screening program.

Taneja et al. identified similar sociocultural barriers regarding cervical cancer screening in India. Specifically, barriers identified included lack of awareness about screening, poor knowledge about initial symptoms, social stigma, cost, and familial obligations. Hence, it is not surprising that only 5% of eligible women have undergone screening for cervical cancer in India, compared with up to 84% in developed countries.⁴ This is disconcerting since cervical cancer has the potential for prevention and/or cure due to the length of the premalignant and preinvasive

period, emphasizing the importance of a population-based screening program. The benefits of an effective screening program for this disease were demonstrated by Sankaranarayanan et al. in a study of over 130,000 healthy women, in which participants were randomly assigned to undergo cervical cancer screening with either human papillomavirus (HPV) testing, cytologic testing, or visual inspection with acetic acid (VIA). Single-round HPV testing was associated with a significantly reduced number of advanced cases [hazard ratio (HR) 0.47, 95% confidence interval (CI) 0.32–0.69] and mortality⁵ (HR 0.53, 95% CI 0.33–0.83) compared with the control group. The results of this study highlight that implementation of a successful screening program with the right screening test is associated with decreased mortality, even in low-resource settings. However, the main challenge is to screen enough people for the screening program to be effective. The National Cancer Prevention and Control Program launched in 2010 in Morocco, with augmented and expanded infrastructure and considered an exemplar for screening programs in LMIC, had major challenges with uptake of screening and poor participation in early identification of precancerous lesions.⁶

It is evident that successful implementation of cancer screening programs is inextricably related to the recognition of barriers to screening and development of appropriate solutions to overcome the obstacles. The DESH program implemented a Social and Behavioral Change Communication (SBCCO) strategy in response to their survey results. This strategy addressed the misconceptions surrounding cancer screening via educational sessions, posters, and pamphlets. Analysis of breast cancer screening programs in LMICs identified that engaging community health workers to provide education, perform screening, and assist with navigation increased the rate of screening.⁷ These findings are timely as the WHO is leading the global call to eliminate cervical cancer as a health problem by 2030.^{8,9} Considering that 80% of the cervical cancer disease burden is in low-income countries,¹⁰ successful implementation of screening and vaccination programs will require understanding of the psychosocial and cultural barriers beyond the usual economic and logistic barriers entrenched in these regions.

In summary, population-based screening programs are imperative to combat the high incidence and mortality of preventable and treatable cancers in LMICs. However, the success of these programs will rely largely on a deep understanding of the psychosocial, cultural, economic, and

religious barriers, misconceptions, and stigma around cancer diagnoses. Some of these barriers will be ubiquitous to all countries, however there will also be unique obstacles specific to a region, such as lack of awareness of carcinogenic effects of betel nut consumption in Assam, India. Successful strategies used in rural India and other LMICs to overcome barriers to screening could be applied to similar initiatives across the globe. Targeted educational campaigns to bridge the specific knowledge gaps, address misconceptions and myths, and raise awareness of available screening programs are crucial to successful and sustainable screening programs.

DISCLOSURES Brittany G. Sullivan, Alliya Qazi, and Maheswari Senthil declare no conflicts of interest.

REFERENCES

1. World Health Organization. Cancer. 2021. <https://www.who.int/news-room/fact-sheets/detail/cancer>. Accessed 3 March 2021.
2. Knaul FM, Arreola-Ornelas H, Rodriguez NM, et al. Avoidable mortality: the core of the global cancer divide. *J Glob Oncol*. 2018;4:1–12.
3. Pak LM, Purad CC, Nadipally S, Rao MP, Mukherjee S, Hegde SKB, et al. Cancer awareness and stigma in rural Assam India: baseline survey of the detect early and save her/him (DESH) program. *Ann Surg Oncol*. 2021. <https://doi.org/10.1245/s10434-021-10366-7>.
4. Taneja N, Chawla B, Awasthi AA, Shrivastav KD, Jaggi VK, Janardhanan R. Knowledge, attitude, and practice on cervical cancer and screening among women in India: a review. *Cancer Control*. 2021;28:10732748211010800.
5. Sankaranarayanan R, Nene BM, Shastri SS, et al. HPV screening for cervical cancer in rural India. *N Engl J Med*. 2009;360(14):1385–94.
6. Selmouni F, Zidouh A, Belakhel L, et al. Tackling cancer burden in low-income and middle-income countries: Morocco as an exemplar. *Lancet Oncol*. 2018;19(2):e93–101.
7. Hand T, Rosseau NA, Stiles CE, et al. The global role, impact, and limitations of Community Health Workers (CHWs) in breast cancer screening: a scoping review and recommendations to promote health equity for all. *Glob Health Action*. 2021;14(1):1883336.
8. Ghebreyesus DTA. Cervical Cancer: An NCD We Can Overcome. 2018. <https://www.who.int/reproductivehealth/call-to-action-elimination-cervical-cancer/en/>. Accessed 5 Jan 2020.
9. World Health Organization. Global strategy to accelerate the elimination of cervical cancer as a public health problem. 2020. <https://www.who.int/publications/i/item/9789240014107>. Accessed 5 Jan 2020.
10. Beddoe AM. Elimination of cervical cancer: challenges for developing countries. *Ecancermedicalscience*. 2019;13:975.

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