

Determinants of Maternal Cervical Cancer Preventive Practices for Adolescent Daughters in Ibadan, Nigeria: The Influence of Risk Perception, Awareness, and Knowledge

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Abstract

Introduction:

Cervical cancer remains a major cause of cancer-related mortality among women in Nigeria despite the availability of effective preventive interventions, including HPV vaccination and health education. Mothers and female guardians play a key role in health decisions for adolescent girls, yet the relative contribution of risk perception, awareness, and knowledge in shaping preventive practices remains unclear. This study assessed whether cervical cancer preventive practices among mothers of adolescent girls are primarily driven by risk perception or by knowledge and awareness in Ibadan, Nigeria.

Methods

A community-based cross-sectional study was conducted among 440 mothers selected through multistage sampling across urban and rural communities in Ibadan. Data were collected using an interviewer-administered questionnaire adapted from the constructs of the Health Belief Model. Data were analysed using descriptive statistics, binary logistic regression, and multinomial logistic regression to identify determinants of preventive practice utilisation.

Results

The mean age of respondents was 42.27 ± 10.89 years. Only 32.7% had heard of cervical cancer, and 88.4% demonstrated poor knowledge. Although 87.3% perceived cervical cancer as a serious disease, only 41.8% perceived their daughters to be at risk. Overall, 60.7% had not adopted any preventive practice. Among those who did, 9.8% reported HPV vaccination and 37.7% provided sex education. In adjusted models, awareness of cervical cancer increased the likelihood of HPV vaccination (AOR = 5.97; 95% CI: 2.06–17.31), while poor knowledge reduced uptake (AOR = 0.27; 95% CI: 0.10–0.69). Similar patterns were observed for sex education (AOR = 4.64; 95% CI: 2.72–7.93; and AOR = 0.31; 95% CI: 0.13–0.73, respectively). Risk perception was not independently associated with either preventive practice after adjustment.

Conclusion

Cervical cancer preventive practices among mothers of adolescent girls in Ibadan are primarily driven by awareness and knowledge rather than risk perception. The findings suggest that cognitive access to cervical cancer information may play a more decisive role in preventive decision-making than perceived susceptibility or severity in this setting. Strengthening maternal health literacy may therefore be more effective than risk-focused messaging in improving uptake of HPV vaccination and related preventive practices.

BACKGROUND

Cervical cancer remains a major global public health challenge, ranking as the fourth most common cancer among women worldwide. In 2022, approximately 660,000 new cases and 350,000 deaths were recorded globally, with nearly 90% of cervical cancer–related deaths occurring in low- and middle-income countries (LMICs). Sub-Saharan Africa bears a disproportionate share of this burden, accounting for about 85% of new cases and 87% of deaths, largely due to limited access to preventive services [1, 2]. Nigeria contributes significantly to the regional burden, with an estimated incidence rate of 18.4 per 100,000 women and over 12,000 new cases diagnosed annually [3]. Persistent infection with high-risk HPV strains accounts for approximately 99.7% of cervical cancer cases, with HPV types 16 and 18 responsible for about 70% of invasive cancers [4, 5]. Evidence-based interventions, including HPV vaccination, routine screening, and early treatment of precancerous lesions, are cost-effective strategies for cervical cancer prevention across the care continuum [6]. Despite cervical cancer being largely preventable, mortality remains high, due to late presentation and poor utilization of preventive measures such as screening and human papillomavirus (HPV) vaccination.

HPV vaccination is most effective when administered prior to the onset of sexual activity, making early uptake among adolescents a critical public health priority [7]. In Nigeria, the human papillomavirus vaccine was introduced into routine immunization on October 24, 2023, with the aim of improving coverage among eligible populations [8, 9]. Although early reports suggest improvements in awareness and uptake among school-aged populations, overall coverage of HPV vaccination and related cervical cancer preventive services remains low [9–11]. Mothers play a central role in health decision-making for their adolescent daughters, and their perceptions and knowledge significantly influence preventive behaviours such as HPV vaccination [12, 13]. Hence, understanding maternal cognitive and perceptual factors is essential for guiding effective, locally-specific interventions in line with the WHO Global Strategy for the Elimination of Cervical Cancer.

Despite the availability of effective preventive measures, uptake of HPV vaccination and other cervical cancer prevention services remains suboptimal in many low- and middle-income countries, including Nigeria. While previous studies have identified factors such as inadequate knowledge, misconceptions, and low awareness as barriers to uptake, less is known about the relative contribution of risk perception in shaping maternal preventive practices decision-making for adolescent girls [9–11]. It remains unclear whether preventive practices are primarily driven by risk perception, as suggested by traditional behavioural models, or whether knowledge and awareness exert a more direct influence on behaviour in this context. Understanding this relationship is essential for designing effective interventions that move beyond risk messaging alone. This study therefore assessed cervical cancer risk perception and examined the determinants of preventive practices among mothers of adolescent girls in Ibadan, Nigeria.

METHODS

Study Design

A community-based cross-sectional study was conducted among mothers of adolescent girls in selected urban and rural communities in Ibadan, Nigeria. A quantitative approach was used to assess cervical cancer risk perception and preventive practices.

Study Area

The study was conducted in Ibadan, the capital of Oyo State in south-western Nigeria, a metropolitan city comprising 11 local government areas with a mix of urban and rural communities, well-established commercial activities, and a tiered health system, with urban sites in Ibadan North and Ibadan North-West LGAs and rural sites in Ido and Lagelu LGAs.

Study Setting and Study Population

The study was a community study and was carried out at household levels. Communities in the selected local government areas that were chosen for the study were: The study was conducted across selected urban and rural locations within Oyo State. In Ibadan North Local Government Area, the communities of Agbowo, Sango, and Yemetu were randomly selected. Similarly, in Ibadan North-West Local Government Area, Sapati, Opoo, and Oke Adu were randomly chosen. To ensure rural representation, Siba community in Ido Local Government Area, as well as Kute and Olowu communities in Lagelu Local Government Area, were included in the study.

The study population were mothers or female guardians of female children aged 8-14 years; these are school aged persons who may or may not be attending formal educational institutions in the chosen communities.

Inclusion and exclusion criteria

The inclusion criteria for this study are being a mother or female guardian of a female child aged 8 to 14 years and willingness to participate in the study. Mothers or female guardians who otherwise met the inclusion criteria were excluded if the eligible child was not residing with them in the community at the time of the study, as they were unlikely to be directly involved in the child's daily care and health-related decision-making. In addition, parents with mental illness that impaired their ability to participate meaningfully in decision-making regarding their children were excluded from the study.

Sample Size Estimation

The sample size for the study was determined using the single population proportion formula as described by Cochran (1963). At a 95% confidence level, the standard normal deviate (Z) was set at 1.96. The estimated prevalence (p) of cervical cancer preventive practice uptake was 13.5% (0.135), based on findings by [14]. Consequently, was calculated as 0.865. A margin of error (d) of 5% (0.05) was

assumed. Substituting these values into the formula yielded a minimum sample size of approximately 179.4, which was rounded up to 180 respondents. Given the use of a stratified sampling technique, a design effect (DEFF) of 2.0 was applied to account for increased variance associated with the sampling design. This adjustment resulted in an effective sample size of 360 respondents. To further accommodate an anticipated non-response rate of 15%, the sample size was adjusted upward using the formula, producing a final minimum sample size of 424 respondents. However, 440 participants were recruited to improve statistical power and account for potential data loss.

Sampling Procedure

A multistage sampling technique involving four stages was used to select participants for the study. In the first stage, Oyo south senatorial zone was selected from the three senatorial zones in Oyo State using simple random sampling. In the second stage, four local government areas (LGAs) were selected from the chosen senatorial zone. The LGAs were stratified into urban and rural categories, and two LGAs were selected from each stratum using simple random sampling, giving four LGAs which were Ibadan North, Ibadan Northwest, Ido and Lagelu. In the third stage, two communities were selected from each selected LGA using simple random sampling, resulting in a total of eight communities. In the fourth stage, households were selected within the chosen communities using systematic random sampling. Assuming a minimum of one household per house, the sampling fraction was determined by dividing the total number of houses in each community by the sample size allocated to that community. The sampling interval was then calculated, and eligible households were selected systematically based on this interval.

Data collection instruments

The data was collected using a questionnaire schedule validated by the team of the researchers. The items in the questionnaire were constructed based on the individual variables proposed in the health belief model used for determining health behavioural tendencies among individuals.

The health belief model is shown in the figure below:

Thus, the sections of the questionnaire schedule have questions on demographic characteristics, peer experiences of HPV infection and cervical cancer, perceived susceptibility, benefits and barriers, and uptake of cervical cancer preventive practices.

Recruitment and Training Data Collectors.

Traditional birth attendants from the selected local government areas were recruited as community mobilisers for the study. They assisted in identifying mothers of adolescent girls in each of the selected communities and in preparing for community entry. The training of the data collectors was done alongside of the research associates who did the interviews of the mothers. Five research associates who are students on master's level degree training (MPH/MSc) were recruited and trained with 24

community mobilisers in sessions over a period of two days. They were trained on the content and method of administration of the questionnaires and maintenance of ethical standards. A role play session took place on the second day of training to ensure mastery of the questions. The training was intended to reduce inter observer variation with data collection. The research associates will be supervised regularly on the field to ensure quality data collection.

Pretest of Instrument and Training of Research Assistants

Questionnaire for data collection was developed for this study (attached as a supplementary file). Data was collected using an interviewer-administered semi-structured questionnaire adapted from the Strategic Advisory Group of Experts (SAGE) vaccine hesitancy framework and tailored to HPV vaccination, incorporating the 3C model of confidence, complacency (concern), and cost. The questionnaire comprised multiple sections assessing respondents' socio-demographic characteristics, knowledge of HPV and cervical cancer, perceived risk to adolescent daughters, vaccine literacy, preventive practices, and factors influencing HPV vaccine acceptance; however, for the purpose of this study, analyses were limited to items assessing maternal knowledge of cervical cancer, risk perception, and cervical cancer preventive practices.

The study instruments were pretested in Barika, Ibadan North LGA in Oyo State; which is different from the where the study will be conducted. The questionnaires will be translated to Yoruba and back translated to English to ensure that original meanings are maintained. The data collection instrument was tested for reliability using Cronbach's alpha, and a score of 0.80 which is greater than the required 0.70 was obtained before the questionnaire was deployed in the field.

Study Variables

The dependent (outcome) variable

The primary outcome variable was the utilization of cervical cancer preventive practices (HPV vaccination and sex education). Secondary outcomes included maternal knowledge and risk perception.

Independent Variables

The independent variables include socio-demographic data including age, marital status, religion, occupation, level of educational attainment; beliefs about cervical cancer.

Data Analysis

Data were entered, cleaned, and validated daily, and subsequently analyzed using IBM SPSS version 27 and STATA version 17. Composite scores were generated for knowledge, risk perception, using equally weighted items, with correct or affirmative responses scored as one and incorrect or negative responses

scored as zero; negatively worded items were reverse-coded as appropriate. Mean scores ($\pm$ standard deviation) were computed, and respondents were categorized into low or high levels of each construct based on the median cut-off, as applicable. Descriptive statistics were presented using frequencies, percentages, means ($\pm$ SD), and 95% confidence intervals. Associations between categorical variables were assessed using chi-square or Fisher's exact tests, while multivariable logistic regression was performed to identify predictors of cervical cancer preventive practices (HPV vaccination and sex education), controlling for potential confounders and assessing multicollinearity using variance inflation factors (VIF <5).

Ethical Clearance and Informed Consent

Ethical approval for the study was obtained from the Oyo State Ministry of Health Ethical Review Committee and was registered under the number NHREC/OYOSHRIEC/10/11/22. Written informed consent was obtained from all participants prior to data collection. Confidentiality was ensured through the use of anonymous questionnaires, unique identification codes, and secure data storage accessible only to the research team. The study protocol and consent information were explained in English and, where necessary, translated into Yoruba to ensure participant comprehension. Participation was entirely voluntary, with respondents informed of their right to decline or withdraw at any stage without penalty. The study posed minimal risk to participants and was non-invasive, while potential benefits included increased awareness of HPV vaccination and cervical cancer prevention.

RESULTS

The socio-demographic characteristics of respondents are presented in Table 1. A total of 440 mothers participated in the study. More than half resided in rural areas (51.6%), while the remainder were from urban communities. The mean age was 42.27 ± 10.89 years, with the highest proportion aged 30–39 years (37.0%). Most respondents were married (91.1%) and Christians (58.4%). Trading (60.5%) and entrepreneurship (27.7%) were the most common occupations. The majority had secondary education (66.1%), and most were biological mothers of the adolescent girls (85.0%).

Findings on awareness and knowledge are presented in Tables 2a–2c. Only 32.7% of respondents had heard of cervical cancer, while 88.4% demonstrated poor overall knowledge. Awareness of preventive methods was limited (19.3%), with low awareness of HPV vaccination (15.0%) and other screening methods.

Risk perception findings are presented in Tables 3a and 3b. Although most respondents (87.3%) recognized cervical cancer as a serious disease, only 41.8% perceived their daughters to be at risk. Overall, 48.6% were classified as having high risk perception.

The distribution of cervical cancer preventive practices is shown in Table 2b. Only 9.8% reported HPV vaccination for their daughters, while 37.7% provided sex education. Overall, 60.7% had not adopted any

preventive practice.

Associations between study variables and HPV vaccination and sex education are presented in Tables 4a, 4b, 5a, and 5b. HPV vaccination was significantly associated with LGA, marital status, education, and religion ($p < 0.05$). Awareness and knowledge were strongly associated with both preventive practices ($p < 0.001$). Risk perception was not significantly associated with HPV vaccination or sex education ($p > 0.05$).

Multivariable logistic regression results are presented in Tables 6a, 6b, and 7. Awareness of cervical cancer remained a strong predictor of HPV vaccination (AOR = 5.97; 95% CI: 2.06–17.31), while poor knowledge significantly reduced the likelihood of vaccination (AOR = 0.27; 95% CI: 0.10–0.69).

For sex education practices, awareness of cervical cancer was a significant predictor (AOR = 4.64; 95% CI: 2.72–7.93), while poor knowledge was associated with reduced likelihood of providing sex education (AOR = 0.31; 95% CI: 0.13–0.73).

In the multinomial logistic regression (Table 7), risk perception did not independently predict preventive practice utilization. Compared with respondents who did not adopt any preventive practice, being single was associated with higher odds of adopting one preventive practice (AOR = 4.57; 95% CI: 1.30–16.07) and both preventive practices (AOR = 19.23; 95% CI: 2.26–163.92). Lack of awareness of cervical cancer prevention was associated with lower odds of adopting one practice (AOR = 0.26; 95% CI: 0.15–0.45) and both practices (AOR = 0.08; 95% CI: 0.02–0.24). Good knowledge of cervical cancer increased the likelihood of adopting one preventive practice (AOR = 3.19; 95% CI: 1.22–8.31) and both preventive practices (AOR = 6.88; 95% CI: 2.19–21.62). Muslim respondents were less likely than Christians to adopt both preventive practices (AOR = 0.26; 95% CI: 0.09–0.74).

DISCUSSION

This study found low awareness and poor knowledge of cervical cancer and its prevention among mothers of adolescent girls in Ibadan. Only about one-third had heard of cervical cancer, and most respondents were unable to correctly identify its causes or preventive measures. This aligns with previous studies in southwestern Nigeria reporting similarly low awareness levels among women [16–18]. In contrast, higher knowledge observed among medical and health-related populations highlights the role of targeted exposure to health information [19].

Awareness of preventive measures was also limited, with fewer than one-fifth of respondents aware of any cervical cancer prevention method. This supports earlier evidence that low screening and HPV vaccination uptake in Nigeria is strongly driven by limited awareness of available preventive services [20, 21]. Overall, these findings reinforce the persistence of knowledge deficits as a major barrier to cervical cancer prevention in this setting.

Although most respondents recognized cervical cancer as a serious condition, fewer than half perceived their daughters to be at risk. This disconnect between perceived severity and perceived susceptibility has been widely reported in similar settings [22, 23]. Many mothers appeared to view cervical cancer as a distant or community-level problem rather than a personal or household risk, which may reduce motivation for preventive action.

Low perceived susceptibility may be influenced by misconceptions that cervical cancer affects only women with specific sexual behaviours, as well as cultural discomfort around discussing sexual and reproductive health [24]. In addition, health messaging in many settings emphasizes disease severity without adequately reinforcing universal susceptibility and the importance of early prevention. The absence of known cervical cancer cases within families or social networks may further reduce perceived vulnerability, a pattern similarly reported in other African studies [25, 26].

Despite high awareness of disease severity, utilization of cervical cancer preventive practices remained low. HPV vaccination uptake was particularly poor, while sex education was more commonly practiced but still suboptimal. These findings are consistent with evidence from other low- and middle-income countries showing persistently low coverage of cervical cancer preventive services despite increasing global attention [27, 28].

Although concerns about vaccine side effects and access barriers such as distance to vaccination centres were frequently reported, these structural constraints alone do not fully explain the observed behavioural patterns. Within broader vaccine uptake frameworks such as the SAGE model, these factors interact with cognitive determinants such as knowledge and awareness.

A key finding of this study is that knowledge and awareness were the strongest and most consistent predictors of both HPV vaccination and sex education utilization. Mothers who had heard of cervical cancer and those with higher knowledge levels were significantly more likely to engage in preventive behaviours. This highlights health literacy as a central driver of preventive decision-making and is consistent with studies showing that informed mothers are more likely to accept HPV vaccination and engage in preventive discussions [29, 30].

Although socio-demographic factors such as education, religion, and place of residence were significant at the bivariate level, most were no longer significant after adjustment. This suggests that their effects are likely mediated through knowledge and awareness rather than exerting independent influence on behaviour, supporting findings from similar behavioural studies in Nigeria and other LMIC settings.

Marital status remained an independent predictor in adjusted models, with single mothers less likely to adopt preventive practices. This may reflect reduced social support, financial constraints, or competing caregiving responsibilities, and is consistent with evidence highlighting structural vulnerabilities in single-parent households [31–33].

Importantly, risk perception and trust in the health system were not significant predictors of preventive practices in adjusted models. This challenges traditional behavioural assumptions that perceived susceptibility and severity are primary drivers of preventive health behaviour, as suggested in models such as the Health Belief Model. Instead, the findings indicate that in this context, preventive behaviour is more directly influenced by knowledge and awareness than by risk perception constructs. These findings however, suggest that cervical cancer preventive behaviours among mothers in Ibadan are driven more by health literacy than by perceived risk, supporting a shift from risk-focused messaging toward structured, community-based educational interventions that strengthen knowledge and actionable understanding of prevention.

CONCLUSION

This study assessed whether cervical cancer preventive practices among mothers of adolescent girls in Ibadan are driven more by risk perception or by knowledge and awareness. Although most respondents recognized cervical cancer as a serious condition, perceived susceptibility was lower and did not translate into preventive action. Instead, maternal awareness and knowledge consistently emerged as the strongest predictors of both HPV vaccination and provision of sex education. In contrast, risk perception did not independently predict preventive behaviours after adjustment for socio-demographic factors and knowledge.

Overall, the findings indicate that preventive decision-making in this population is shaped more by health literacy than by perceived risk. This suggests that traditional behaviour change approaches that rely mainly on increasing perceived susceptibility or severity may be insufficient in this context.

RECOMMENDATIONS

Interventions aimed at improving cervical cancer prevention among mothers of adolescent girls in Ibadan should prioritise strengthening health literacy. Community-based education programmes should focus on clear, practical information about cervical cancer, HPV infection, and the benefits and timing of HPV vaccination, rather than relying mainly on fear-based or risk-focused messaging.

Health communication strategies should be integrated into primary healthcare services, schools, and community outreach platforms to improve sustained exposure to accurate information. Given the strong influence of awareness in this study, structured and repeated educational engagement is likely to be more effective than one-off campaigns.

Policy efforts should also support routine inclusion of cervical cancer education within maternal and child health services, especially during immunisation visits and antenatal/postnatal care. In addition, targeted outreach to women with lower educational attainment may help reduce persistent knowledge gaps and improve equitable uptake of preventive practices.

Declarations

Consent for publication

Not Applicable

Availability of Data and Materials

Data from this study has not been made publicly available yet due to confidentiality of research participants, however it would be made available upon reasonable request. Requests on the data should be sent to the corresponding authors.

Competing Interests

The authors declare no competing interests during the process and reporting of this study

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Authors' contributions

MDD conceived and designed the study. MDD, AMA, contributed to the development and adaptation of the study instrument. AMA coordinated field data collection and supervised research assistants. SOA, FMA, STO, and OAO supported community entry, data collection, and quality assurance. AMA performed data cleaning and statistical analysis. MDD and AMA interpreted the results and drafted the initial manuscript. All authors contributed to critical revision of the manuscript for important intellectual content, read and approved the final version, and agreed to be accountable for all aspects of the work.

Ethics Approval

This study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the University of Ibadan Institutional Review Board (UI/UCH Ethics Committee) prior to the commencement of the study (Approval No.: NHREC/OYOSHRIEC/10/11/22).

All procedures involving human participants were performed in accordance with the ethical standards of the institutional and/or national research committee and the declaration of Helsinki.

Human Ethics and Consent to Participate Declarations

Human Ethics and Consent to Participate declarations: applicable.

Consent to Participate

Informed consent was obtained from all individual participants included in the study. Participants were informed about the purpose of the research, the procedures involved, potential risks and benefits, and

their rights, including the right to withdraw at any time without any consequences. Written informed consent was obtained from all participants prior to their inclusion in the study.

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Tables

Tables 1 to 7 are available in the Supplementary Files section.

Figures

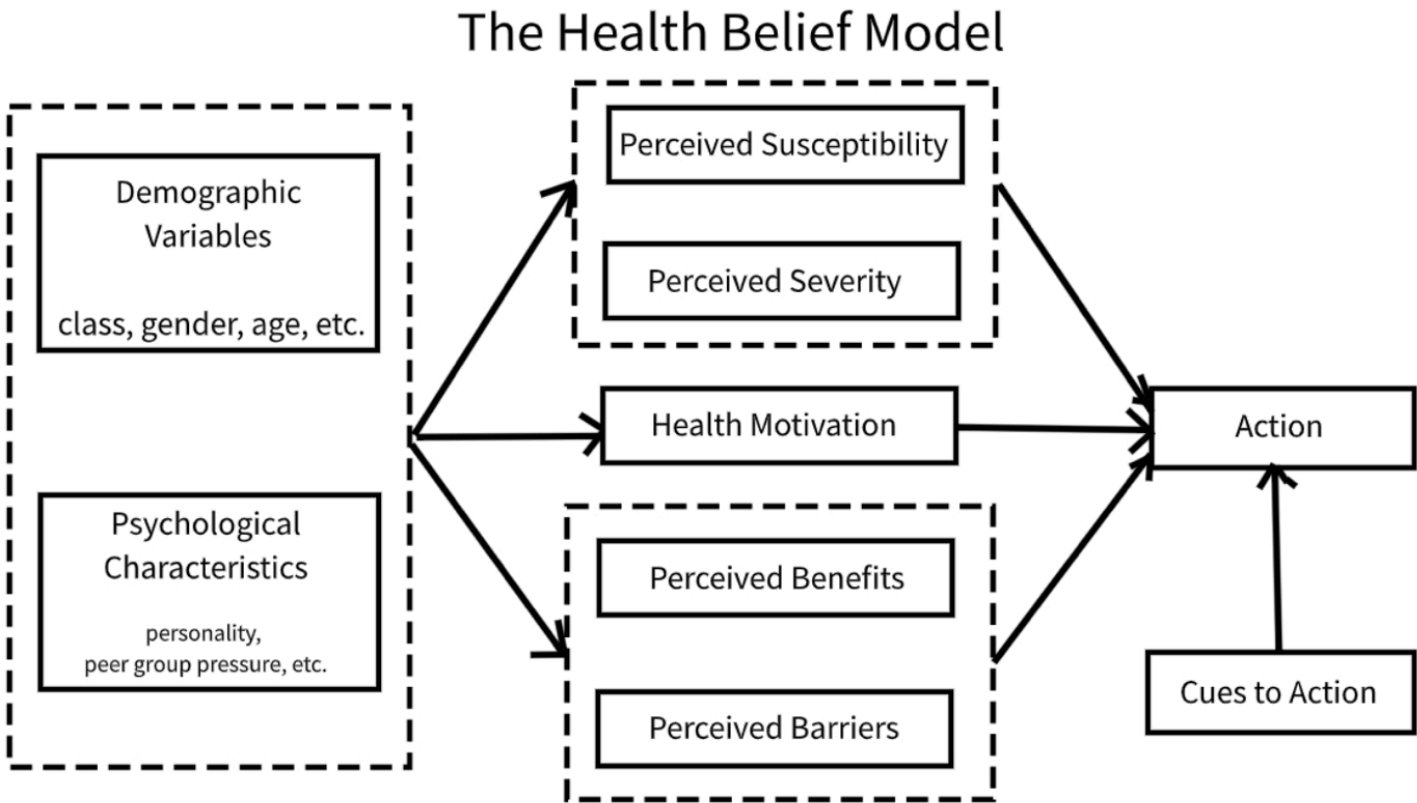


Figure 1

Framework based on the Health Belief Model originally developed by Rosenstock, 1974[15].

Supplementary Files

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