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# Survey on determinants of intention to reduce nasopharyngeal cancer risk: an application of the theory of planned behavior

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## Abstract

**Background:** To have better prognostic outcomes and minimize deaths due to nasopharyngeal cancer, it is vital to understand factors that motivate the public to undertake cancer preventive measures. The study investigated determinants of intention to adopt measures to reduce nasopharyngeal cancer risk using the Theory of Planned Behavior.

**Method:** A cross-sectional survey was conducted on Malaysians ( $n = 515$ ) using a questionnaire on attitudes, subjective norm, perceived behavioral control, knowledge of nasopharyngeal cancer, past nasopharyngeal cancer preventive behavior, and intention to adopt preventive measures. The attitudes construct encompassed perceptions of susceptibility, severity, benefits and barriers. Hierarchical regression of mediation effect under structural equation model approach was used to test the theory. The model was re-estimated using the two-stage least square approach by instrumental approach. Next the Maximum Likelihood Estimation-Structural Equation Modeling was conducted to gauge the instrumentation and check the robustness of the model's simultaneity.

**Results:** The respondents had moderate knowledge of nasopharyngeal cancer, and reported high levels of perceived risk, perceived severity and perceived behavioral control. The respondents were under little social pressure (subjective norm) to perform nasopharyngeal cancer preventive actions, marginally believed in the benefits of medical tests and reported few barriers. The Partial Least Squares-Structural Equation Modeling results show that the relationship between intention and four independent variables were significant (perceived behavioral control, perceived risk, perceived severity, marital status) at  $p < .05$ . Tests of Two-stage Least Square Approach and Maximum Likelihood Estimation-Structural Equation Modeling confirm the four key factors in determining the intention to reduce nasopharyngeal cancer risk. The variance explained by these factors is 33.01 and 32.73% using Two-stage Least Square Approach and Maximum Likelihood Estimation-Structural Equation Modeling respectively. Intention to undertake nasopharyngeal cancer risk-reducing behavior has no significant relationship with subjective norm, attitudes (perceived benefits and barriers to screening), knowledge of nasopharyngeal cancer and past behavior in enacting nasopharyngeal cancer preventive measures. The only demographic variable that affects intention is marital status. Gender, age, race, religion, education level, and income are not significantly associated with intention.

For brevity reason, the cross-loading table is available upon request.

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**Conclusions:** In contexts where knowledge of nasopharyngeal cancer is moderate, the factors associated with the intention to reduce risk are perceived risk and severity, perceived behavioral control, and marital status.

**Keywords:** Nasopharyngeal cancer, cancer prevention, Theory of planned behavior, Attitudes, Subjective norm, Perceived behavioral control, Intention

## Background

Nasopharyngeal cancer (NPC) is an important public health issue, which is particularly serious for Asian people. NPC is a cancer that develops in the head and neck region. Deaths due to NPC in East and Southeast Asia are particularly high, accounting for 71% of world statistics on NPC mortality. In Malaysia, NPC is now the fourth most common cancer, after breast, colorectal and lung cancers based on The Global Cancer Observatory [1]. Many of the deaths can be avoided if NPC is detected earlier. In Malaysia, patients are usually diagnosed with NPC at stage III or IV (27 and 47%, respectively) [2], leading to poor prognostic outcomes. This is because in the early stages, NPC presents with non-specific symptoms similar to common cold [3]. The early signs are similar to common cold, which is why they are often ignored. NPC may present with nosebleed (which may flow into the throat, causing blood-tinged phlegm), pain or blockage in the ear, loss of hearing, headache, double vision, facial pain, numbness, and a lump in the neck. Balanchandran et al. found that even primary care doctors may not be familiar with uncommon presentations of NPC, causing delayed diagnosis of NPC [2]. In Malaysia, the endeavor to create awareness of NPC currently relies on pamphlets but the public education is not driven by findings on factors that motivate screening uptake to reduce NPC risk.

Little is known about factors that determine motivation to enact NPC preventive measures. Factors determining intention to reduce risk of some cancers have been well studied, particularly cervical cancer [4–11], colorectal cancer [12, 13], and breast cancer [14–16]. Using the Theory of Planned Behavior [17], studies have found that attitude, subjective norm and perceived behavioral control determine intention to undertake cervical cancer screening [4, 6, 11]. Attitude measures an individual's evaluation or appraisal of the behavior whereas subjective norm measures the effect of perceived social pressure to perform the behavior and perceived behavioral control measures the perceived ease of performing the behavior. The additional determinants of cervical cancer screening intention are the objective promotion factor on advantages and disadvantages of the screening [11], husband's support behavior [5], knowledge [9], education level [7, 11], and age and childbearing condition [11]. As for colorectal cancer, all three TPB factors predict screening intention [15] but an additional factor is heightened

perceived susceptibility in Nigeria [12]. Breast cancer is no different in that all the three TPB factors are predictive of preventive measures like screening [12] and vaccination [18] but the additional factor is perceived susceptibility and benefit [18]. Studies using interviews uncovered other factors affecting breast cancer screening intentions such as language skills and knowledge about breast cancer and screening [14] and communication of genetic risk of breast cancer in the family [16]. The intention to be screened significantly predicted actual cervical cancer screening [8] and Pap smear test [9].

Other findings suggest that certain TPB factors have greater predictive power for certain types of cancer and populations. For oral cancer screening, subjective norm and perceived behavioral control are predictive [19] but for skin cancer, attitude is the main predictor of intention to wear hats, shirt and sunscreen [20]. Attitude and perceived behavioral control predict intention to undertake colorectal cancer screening intention in Hong Kong [13] and HPV screening intention in Canada [7]. As for cervical cancer, increased vaccine intentions are associated with attitude and subjective norm in the United States [21], and with subjective norm and self-efficacy (perceived behavioral control) in Seoul, Korea [22]. Roncancio et al. found that perceived behavioral control is the strongest predictor of Latina's intention to get a Pap smear test, followed by subjective norm [8]. Thus far, studies using TPB show that attitude is an important determinant of intention to undertake cancer preventive measures, with the exception of some studies [19, 22]. The additional determinants are knowledge (which is associated with education level), perceived susceptibility (which includes family history) and perceived benefits of undertaking the cancer preventive measure. Identification of determinant factors is important in order to target these in public education. Thus far, to our knowledge, studies on determinants of intention to undertake NPC preventive measures have not been conducted.

The study investigated determinants of intention to undertake NPC preventive measures in Malaysia. The preventive measures examined were screening and environmental risk factors which are within the volitional control of individuals, that is, reducing consumption of certain preserved food [23], and exposure to environmental pollutants [24, 25]. Figure 1 shows our proposed model for the hypothesis testing.