

A BELIEF-BASED MODEL FOR GENERAL,
BREAST, CERVICAL, AND COLORECTAL
CANCER SCREENING ADHERENCE INTENTIONS
AMONG LOW-INCOME URBAN WOMEN

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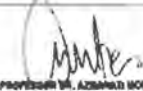
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ADHERENCE INTENTIONS AMONG LOW-INCOME URBAN WOMEN

GHANESHINEE A/P SATHIYASEELAN

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SARINGAN KANSER UMUM, PAYUDARA, SERVIKS, DAN KOLORECTAL
DALAM KALANGAN WANITA BANDAR BERPENDAPATAN RENDAH**

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I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged.

19 September 2026

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ABSTRAK

Kanser merupakan punca utama morbiditi dan mortaliti dalam kalangan wanita di seluruh dunia, khususnya kanser payudara, serviks, dan kolorektal. Walaupun perkhidmatan saringan tersedia di Malaysia, tahap kepatuhan dalam kalangan wanita miskin bandar masih suboptimum. Kajian ini bertujuan menilai niat kepatuhan saringan kanser (NKSK) serta memodelkan pengaruh struktur dan relatif faktor kepercayaan terhadap saringan umum dan spesifik kanser dalam kalangan wanita miskin bandar. Kajian keratan rentas telah dijalankan di komuniti Program Perumahan Rakyat di Kuala Lumpur. Fasa I melibatkan adaptasi dan pengesahan instrumen sedia ada serta pembangunan item baharu. Instrumen menunjukkan kesahan yang tinggi (0.95–1.00) dan kebolehpercayaan yang baik (0.77–0.97). Analisis faktor penerokaan dan model pengukuran menunjukkan ciri psikometrik yang memuaskan. Dalam Fasa II, Pemodelan Persamaan Berstruktur menunjukkan skor min NKSK yang tinggi merentasi jenis kanser (7.21–7.44). Fatalisme kanser memberi kesan negatif terhadap NKSK umum ($\beta = -0.110$), payudara ($\beta = -0.118$) dan serviks ($\beta = -0.131$). Konstruk kepercayaan kesihatan menunjukkan kesan negatif yang lebih kuat terhadap NKSK umum ($\beta = -0.411$), serviks ($\beta = -0.391$) dan kolorektal ($\beta = -0.365$). Kebimbangan dan ketakutan terhadap kanser tidak signifikan secara langsung, namun kebimbangan kanser menunjukkan kesan tidak langsung yang konsisten melalui kepercayaan kesihatan ($\beta = 0.097$ – 0.119). Pengambilan saringan terdahulu memoderasi secara signifikan hubungan antara kepercayaan kesihatan dan NKSK dalam model umum ($\beta = 0.227$) dan serviks ($\beta = 0.233$), namun kesan moderasi dimediasi tidak signifikan. Analisis Peta Kepentingan–Prestasi (IPMA) mengenal pasti kebimbangan kanser sebagai keutamaan utama intervensi (prestasi rendah ≈ 27.9), manakala fatalisme kanser menunjukkan prestasi yang lebih tinggi (≈ 53.0) tetapi kepentingan yang rendah. Analisis respons terbuka menunjukkan faktor intrapersonal memberikan pengaruh terbesar, diikuti faktor interpersonal, organisasi dan sistem kesihatan, manakala faktor komuniti memberikan pengaruh yang minimum. Kesimpulannya, NKSK didapati mempunyai hubungan dengan faktor kepercayaan individu dalam konteks pelbagai peringkat yang lebih luas. Oleh itu, program saringan kanser bagi wanita miskin bandar perlu menangani faktor kepercayaan yang boleh diubah suai, khususnya kebimbangan terhadap kanser dan kepercayaan kesihatan, di samping mengintegrasikan sokongan keluarga dan sosial serta memperkukuh sokongan sistem penjagaan kesihatan bagi meningkatkan niat kepatuhan terhadap saringan kanser.

ABSTRACT

Cancer is a leading cause of morbidity and mortality among women globally, particularly breast, cervical, and colorectal cancers. Despite available screening services in Malaysia, adherence among low-income urban women remains suboptimal. This study aimed to assess cancer screening adherence intention (CSAI) and to model the structural and relative influence of belief factors on general and site-specific screening adherence intention among low-income urban women. A cross-sectional study was conducted in *Program Perumahan Rakyat* communities in Kuala Lumpur. Phase I involved the adaptation and validation of existing instruments alongside the development of new items. The instruments demonstrated strong validity (0.95–1.00) and reliability (0.77–0.97). The exploratory factor analysis and the measurement model exhibited satisfactory psychometric properties. In Phase II, Structural Equation Modelling revealed high CSAI mean scores across cancer types (7.21–7.44). Cancer fatalism negatively influenced general ($\beta = -0.110$), breast ($\beta = -0.118$), and cervical ($\beta = -0.131$) CSAI. Health belief constructs demonstrated stronger negative effects on general ($\beta = -0.411$), cervical ($\beta = -0.391$), and colorectal ($\beta = -0.365$) CSAI. Cancer worry and fear were not directly significant; however, cancer worry showed consistent indirect effects via health belief ($\beta = 0.097$ – 0.119). Previous screening uptake significantly moderated the relationship between health belief and CSAI in general ($\beta = 0.227$) and cervical ($\beta = 0.233$) models, although moderated mediation effects were not significant. Importance–Performance Map Analysis (IPMA) identified cancer worry as the highest priority for intervention (low performance ≈ 27.9), whereas cancer fatalism showed relatively high performance (≈ 53.0) but low importance. Open-ended responses showed that intrapersonal factors had the greatest influence, followed by interpersonal, organisational, and healthcare system factors, while community-level factors had minimal influence. In conclusion, CSAI was associated with individual belief factors within a broader multilevel context. Cancer screening programmes for low-income urban women should therefore address modifiable beliefs, particularly cancer worry and health beliefs, while incorporating family and social support and strengthening healthcare-system support to promote screening adherence intention.

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LIST OF ABBREVIATIONS

ASR	Age-Standardised Rate
AVE	Average Variance Extracted
BC	Breast Cancer
CARS	Concerns About Recurrence Scale
CBCFS	Champion Breast Cancer Fear Scale
CC	Cervical Cancer
CFI	Comparative Fit Index
CI	Confidence Interval
CPG	Clinical Practice Guideline
CR	Composite Reliability
CRC	Colorectal Cancer
CSAI	Cancer Screening Adherence Intention
CVI	Content Validation Index
CWS	Cancer Worry Scale
DBKL	<i>Dewan Bandaraya Kuala Lumpur</i>
EFA	Exploratory Factor Analysis
EPPM	Extended Parallel Process Model
FCR	Fear of Cancer Recurrence
FCRI	Fear of Cancer Recurrence Inventory
FIT	Faecal Immunochemical Test
FOBT	Faecal Occult Blood Test
FOCS	Fear of Cancer Scale
FoP-Q-SF	Fear of Progression Questionnaire
FVI	Face Validation Index
HBM	Health Belief Model
HIC	High Income Country
HOC	Higher-Order Construct

HPV	Human Papillomavirus
HTMT	Heterotrait-Monotrait
IARC	International Agency for Research on Cancer
IPMA	Importance–Performance Map Analysis
iFOBT	Immunochemical Faecal Occult Blood Test
KAC	Knowledge and Awareness about Cancer Screening
KMO	Kaiser–Meyer–Olkin Measure
KPKT	<i>Kementerian Perumahan dan Kerajaan Tempatan</i>
LL	Lower Limit
LIC	Lower Income Country
LMIC	Lower Middle-Income Country
LOC	Lower-Order Construct
LV	Latent Variable
MIC	Middle-Income Country
MOH	Ministry of Health
N/A	Not Available
NHMS	National Health and Morbidity Survey
NKSK	<i>Niat Kepatuhan Saringan Kanser</i>
NMRR	National Medical Research Register
NSPCCP	National Strategic Plan for Cancer Control Program
OBF	Other Belief Factors
OR	Odds Ratio
PFI	Powe Fatalism Inventory
PLS-SEM	Partial Least Squares Structural Equation Modelling
PSWQ	Penn State Worry Questionnaire
PUC	Previous Uptake of Cancer Screening
RM	Ringgit Malaysia
RMSEA	Root Mean Square Error of Approximation
SD	Standard Deviation

SDG	Sustainable Development Goals
SEM	Structural Equation Modelling
SM	Socioecological Model
TESL	Teaching English as a Second Language
TPB	Theory of Planned Behaviour
UKM	Universiti Kebangsaan Malaysia
UKMMC	Universiti Kebangsaan Malaysia Medical Centre
UL	Upper Limit
UMIC	Upper Middle-Income Country
VIF	Variance Inflation Factor
WHO	World Health Organisation



CHAPTER I

INTRODUCTION

1.1 INTRODUCTION

This chapter lays the foundation for the study by presenting the research background, problem statement, justification, research questions, objectives, and hypotheses. It summarises the issue within both global and national contexts to highlight its public health significance and identifies existing gaps in the literature. By outlining the conceptual and theoretical basis of the study, this chapter establishes the research direction and lays the groundwork for the dissertation's subsequent chapters.

1.2 RESEARCH BACKGROUND

Cancer remains one of the leading causes of morbidity and mortality among women worldwide (Amicizia et al. 2025). According to GLOBOCAN 2022, more than 9 million new cancer cases and over 4 million deaths occurred among women globally, with breast, colorectal, and cervical cancers being the most prevalent (IARC 2023; Sung et al. 2021). These three cancers collectively account for a substantial proportion of preventable cancer-related mortality (Langselius et al. 2026). Evidence consistently demonstrates that early detection through screening significantly improves five-year survival rates, often exceeding 90% when screening is performed early (WHO 2023).

Consequently, the World Health Organization (WHO 2022) recommends population-based screening for breast, cervical, and colorectal cancers due to their proven effectiveness and cost-efficiency. Although breast, cervical, and colorectal cancers differ in their disease characteristics and screening approaches, they represent major screen-detectable cancers relevant to women. Their screening behaviours may

also differ because each involves distinct screening methods, recommended intervals, and levels of procedural complexity (MOH 2017, 2019, 2019). Examining these cancers together while retaining cancer-specific outcomes therefore allows both common and cancer-specific patterns of screening intention to be identified. Women represent an important population for cancer screening because breast and cervical cancers are female-specific screening priorities, while colorectal cancer is also among the most prevalent cancers affecting women (IARC 2023; Sung et al. 2021). Focusing on women therefore allows the study to examine adherence intention across three major screen-detectable cancers relevant to women within a single population.

Despite established screening protocols, participation rates remain suboptimal globally, particularly in low- and middle-income countries (WHO 2023). Malaysia operates primarily under an opportunistic screening model, where participation depends on individual initiative or physician recommendation rather than systematic population-based invitations (Htay, Donnelly, et al. 2021). Hence, national data reports persistently low screening among Malaysian women for breast, colorectal, and cervical cancers (Chan et al. 2023; MOH 2021, 2025; Tan et al. 2023). In opportunistic screening systems, the success of cancer prevention strategies relies heavily on individuals' willingness to undergo and adhere to periodic screening, making behavioural intention a pivotal precursor to screening adherence (Faries 2016). Although intentions do not always translate into behaviour, behavioural intention remains the strongest proximal predictor of future screening participation (Lee et al. 2021). In this context, screening intention refers to an individual's willingness to undergo a future screening episode, while screening uptake reflects actual participation in screening. Screening adherence extends beyond initial uptake and refers to repeated participation according to recommended screening intervals.

Accordingly, cancer screening adherence intention (CSAI) refers to an individual's prospective willingness and commitment to participate in screening according to recommended screening intervals, rather than intention towards a single screening episode. CSAI therefore represents an intention construct and should be distinguished from actual screening adherence, which requires repeated screening behaviour to be observed over time. Therefore, understanding the determinants of CSAI

is critical in opportunistic screening systems where participation relies largely on voluntary engagement. Although cancer screening intention has been examined in previous studies, most research has focused on intention towards an upcoming or one-time screening episode, while fewer studies have examined intention in relation to continued or repeated screening according to recommended intervals (Abamecha et al. 2019; Ketema et al. 2024; Wollancho et al. 2020).

Among women, screening behaviour is shaped not only by knowledge and access, but also by belief systems such as sociocultural beliefs and health beliefs (Gapstur et al. 2018). Sociocultural beliefs refer to perceptions and interpretations that are shaped and reinforced through an individual's social and cultural environment, including family, community, shared norms, values, and experiences with healthcare. Although these beliefs are expressed at the individual level, their meaning and expression may be socially and culturally influenced (Sathiyaseelan et al. 2025). Sociocultural belief constructs, including cancer fear, cancer fatalism, cancer worry, spirituality, and medical mistrust, have been shown to significantly influence preventive health decision-making intention (Adegboyega et al. 2022; Lemmo et al. 2023; Moey 2022). In addition, the HBM suggests that cognitive health beliefs, including perceived susceptibility, severity, benefits, barriers, and cues to action, shape behavioural intention and ultimately influence adherence to recommended screening practices (Cui et al. 2022; Lee et al. 2021).

Such belief-related barriers are particularly pronounced among poor women, who frequently face socioeconomic disadvantages, limited health literacy, competing caregiving responsibilities, and misconceptions regarding cancer and screening (Abd Wahab et al. 2022; Haeger et al. 2023). Furthermore, despite residing in urban areas where healthcare services are generally more accessible, health disparities continue to persist, making low-income urban women a particularly vulnerable subgroup (Abdul Jalal et al. 2025). However, limited studies have simultaneously examined sociocultural beliefs and health belief constructs within an integrated framework to explain both general and cancer-specific CSAI among low-income urban women in Malaysia (Sathiyaseelan et al. 2025). Consequently, the collective influence of these belief systems on screening intention remains insufficiently understood.

To address this gap and provide a more comprehensive explanation of CSAI, an integrated theoretical framework is required. Although the HBM remains one of the most widely applied frameworks in cancer screening research (Cui et al. 2022), it primarily focuses on individual-level determinants of beliefs and does not explicitly account for broader belief contexts. Integrating the Socioecological Model (SM), which recognises the influence of interpersonal, community, organisational, and cultural environments on individual behaviour (Mittal et al. 2023), enables a more comprehensive examination of how upstream sociocultural beliefs shape health belief constructs, which subsequently influence CSAI (Taplin 2019). Accordingly, this study integrates the SM and HBM to examine how sociocultural beliefs and health belief constructs influence CSAI. In addition, exploring other belief-related factors beyond predefined constructs may provide further insight into contextual influences on screening intention. This approach facilitates the development of more targeted and strategically informed educational interventions. Ultimately, such evidence may contribute to achieving the objectives outlined in the National Strategic Plan for Cancer Control Program (NSPCCP 2021–2025) through educational strategies that address misconceptions and belief-related barriers among low-income urban women in Malaysia (MOH 2021).

1.3 PROBLEM STATEMENT

1.3.1 Screening Availability Does Not Guarantee Adherence

In Malaysia, national policies and clinical guidelines support breast, cervical, and colorectal cancer screening through public-sector healthcare services (IPH 2023, 2023; MOH 2021). Despite this structural provision, screening participation remains low and inconsistent among eligible populations (Htay, Donnelly, et al. 2021; IPH 2023, 2023; Tan et al. 2023). National surveillance data further demonstrate the extent of underutilisation, with only 12.8% of eligible women reporting a mammogram within the past three years, 34.9% reporting a Pap smear within the past three years, and 6.8% reporting having undergone an annual faecal occult blood test (IPH 2023). Correspondingly, adherence indicators remain poor, with 65% of women aged ≥ 20 years not having undergone a Pap smear within the past three years, 71% of women

aged ≥ 40 years never having had a mammogram, and 88% of adults aged ≥ 50 years never having undergone a stool blood test annually (IPH 2023).

One of the main contributing factors is that Malaysia primarily operates under an opportunistic screening model, whereby individuals are required to voluntarily initiate screening rather than being systematically invited and recalled (Arunah et al. 2020; Htay, Donnelly, et al. 2021). Consequently, screening participation depends largely on individuals' motivation and willingness to initiate screening. The Ministry of Health (MOH) has acknowledged that screening uptake remains challenging and varies across populations due to limited awareness (MOH 2021) and multiple barriers to participation (Sathiyaseelan et al. 2025). As a result, late-stage cancer diagnosis continues to persist in Malaysia (MOH 2025). Collectively, these findings suggest that the availability of screening services alone is insufficient to ensure population-level adherence. Hence, in an opportunistic screening context, behavioural intention becomes a critical determinant of screening participation and adherence (Xin et al. 2023). Although previous studies have examined cancer screening intention, much of this evidence has focused on short-term intention towards initial or one-time screening uptake. Comparatively fewer studies have examined intention towards continued or repeated participation according to recommended screening intervals. Thus, the research gap is not the absence of studies on cancer screening intention, but the limited investigation of adherence-oriented intention as a precursor to sustained screening behaviour. This issue is particularly important among low-income urban women, who often face multiple socioeconomic and behavioural barriers to screening participation (Zhang M 2021).

1.3.2 Vulnerability of Low-income Urban Women in an Urbanised Health Landscape

National poverty surveillance data indicate that urban deprivation remains a significant public health concern, with an absolute poverty incidence of 5.1% in 2024, including 3.7% urban poverty (DOSM 2024). Although urban populations generally appear to have better access to healthcare services due to their proximity to hospitals and clinics, this advantage does not necessarily translate into regular utilisation of preventive healthcare services, especially among low-income urban communities. This creates a

structural-behavioural paradox, whereby healthcare facilities may be geographically accessible, yet utilisation of preventive health services such as cancer screening remains suboptimal (Hiscock et al. 2008). Low-income urban women are particularly vulnerable within this urbanised health landscape. Many experience financial hardship, unstable employment, low health prioritisation, and competing family and survival responsibilities, which may reduce their ability to adhere to routine cancer screening practices (Li et al. 2023). This socioeconomic vulnerability is particularly relevant among lower-income urban households, where limited financial resources may interact with competing work, caregiving, and household priorities to reduce preventive healthcare engagement. Therefore, focusing on women from low-income urban communities enables the study to examine screening intention within a population that may experience both socioeconomic disadvantage and gender-related responsibilities despite living in close proximity to healthcare services. Evidence from Malaysian urban-poor communities living in Public Housing Project (*Projek Perumahan Rakyat* (PPR)) areas in Kuala Lumpur further supports this concern (Abd Wahab et al. 2022; Abdul Jalal et al. 2025).

Studies reported that financial difficulties, transportation challenges, and systemic barriers continued to limit access to public healthcare services despite the physical availability of clinics and hospitals nearby (Abd Wahab et al. 2022). The impact of these barriers can also be observed in cancer screening follow-up behaviour. For example, an urban-poor colorectal cancer screening initiative conducted in Cheras, Kuala Lumpur, reported that only 28.8% of participants with positive immunochemical faecal occult blood test (iFOBT) results proceeded for diagnostic colonoscopy (Abdul Jalal et al. 2025). This substantial drop-out between initial screening and follow-up care reflects poor real-world adherence to cancer screening recommendations. Similar barriers have also been highlighted in the National Colorectal Cancer Screening Strategic Plan, which identified fear, absence of symptoms, time constraints, and competing responsibilities as key factors limiting screening uptake and adherence (MOH 2021). Collectively, these findings suggest that living in an urban area does not necessarily guarantee effective utilisation of or sustained adherence to cancer screening services among low-income urban women. Consequently, this vulnerable subgroup may remain hidden within urban populations, where healthcare access is often

presumed to be adequate. Furthermore, these findings suggest that determinants beyond structural and socioeconomic constraints may influence screening participation, particularly belief-related factors that shape health appraisal and behavioural intention. Therefore, understanding the role of health and sociocultural beliefs is essential for explaining CSAI among low-income urban women (Sathiyaseelan et al. 2025).

1.3.3 Underexplored Influence of Belief Factors on Cancer Screening Adherence Intention

National and empirical evidence consistently demonstrate that cancer screening decisions are influenced not only by access to healthcare services but also by deeply rooted health and sociocultural beliefs that shape health appraisal and behavioural intention (Keller et al. 2021; Lemmo et al. 2023; Moey 2022; Moreno et al. 2019; Murphy et al. 2018; Sathiyaseelan et al. 2025; Tan et al. 2023; Yunus et al. 2018). Belief factors have been shown to influence screening participation across different populations (Sathiyaseelan et al. 2025). However, the extent to which these belief factors influence CSAI remains insufficiently understood, particularly among low-income urban women. A nationwide study reported that seven out of ten women believed breast cancer screening was only necessary when symptoms were present, reflecting a symptom-based belief that contradicts the preventive purpose of routine screening and weakens long-term adherence (Tan et al. 2023). This concern is further supported by findings from the National Health and Morbidity Survey (NHMS) 2023, which identified “feeling healthy” (90%), “having no symptoms” (84%), and “being too busy” (39%) as the most common reasons for not attending cancer screening (IPH 2023). These findings suggest that screening decisions are strongly influenced by symptom-based beliefs and competing life priorities rather than by healthcare availability alone (Yunus et al. 2018).

While health beliefs may influence how women perceive cancer risk and the necessity of screening, broader sociocultural belief factors may also shape screening intention and behaviour. Qualitative studies among women aged 50 to 65 years in Kuala Lumpur revealed that fatalistic beliefs, misconceptions about cancer, embarrassment, fear, competing responsibilities, and previous negative healthcare experiences contributed to Pap smear non-adherence (Anthony et al. 2025). In this study, cancer

fear, cancer worry, and cancer fatalism are conceptualised as socioculturally influenced belief factors because, although experienced at the individual level, their development and expression may be shaped by shared cultural understandings of cancer, family and community narratives, social experiences, and prevailing beliefs regarding cancer outcomes. Thus, their classification as sociocultural belief factors does not imply that they are exclusively cultural but rather recognises the broader social and cultural context within which these individual responses are formed and reinforced.

These findings suggest that emotional and sociocultural beliefs may discourage participation in routine screening despite service availability. The importance of these belief-related influences is not limited to the Malaysian context, and similar patterns have been reported internationally. A recent systematic review synthesising 53 studies concluded that belief-related factors such as fear, worry, fatalism, spirituality, and mistrust significantly influence women's adherence to breast, cervical, and colorectal cancer screening (Sathiyaseelan et al. 2025). The review further highlighted that screening behaviour is shaped by broader multilevel belief structures extending beyond individual cognitive health beliefs.

Despite growing evidence on the importance of health and sociocultural belief factors, important research gaps remain. Most existing studies focus primarily on retrospective screening participation or one-time screening behaviour rather than examining CSAI prospectively. In addition, existing studies often examine individual belief factors in isolation, limiting understanding of how multiple beliefs simultaneously shape sustained screening intention and behavioural readiness (Sathiyaseelan et al. 2025). This limitation restricts understanding of the underlying behavioural mechanisms that influence sustained screening intention, particularly within Malaysia's opportunistic screening context. In addition, previous screening experience and knowledge may influence women's interpretation of screening recommendations and should therefore be considered when examining belief-related determinants of CSAI (Ampofo et al. 2020; Chan et al. 2021; Noman et al. 2024). Therefore, further investigation is needed to understand how health and sociocultural belief factors collectively influence CSAI among low-income urban women. In

addition, a robust theoretical framework is required to explain the complex behavioural mechanisms linking these belief factors to screening intention.

1.3.4 Fragmented Theoretical Application in Existing Cancer Screening Studies

Despite growing recognition of the importance of belief factors, a recent systematic review synthesising global evidence on women's adherence to colorectal, breast, and cervical cancer screening reported that existing studies continue to utilise diverse theoretical approaches, with these determinants rarely integrated within a single comprehensive framework (Sathiyaseelan et al. 2025). The review further revealed a predominant reliance on individual-focused theories, with limited adoption of multilevel approaches capable of explaining the complexity of cancer screening behaviour. Among individual theories, the HBM has been the most widely applied framework in predicting cancer screening behaviour (Cui et al. 2022; Lee et al. 2021). However, the model primarily focuses on individual-level beliefs and may not fully account for broader sociocultural and contextual influences shaping screening behaviour. The same systematic review identified recurrent sociocultural themes, including fear, worry, spirituality, medical mistrust, and fatalism that operate across SM levels (Sathiyaseelan et al. 2025). These findings further suggest that cancer screening behaviour is shaped by multilevel influences extending beyond individual-level beliefs.

Taplin (2019) similarly emphasised that reliance solely on individual-level constructs may provide an incomplete explanation of screening behaviour. Although existing theories provide valuable insights into specific aspects of screening behaviour, many studies continue to adopt single-theory approaches that fail to integrate broader contextual influences with individual cognitive appraisals within a unified explanatory framework (Carpenter 2010; Isonne et al. 2025; Salman et al. 2025; Sedani et al. 2025). While such approaches may offer focused understanding of behavioural domains, they may not adequately explain how sociocultural beliefs and cognitive health beliefs interact to influence CSAI. This limitation is particularly important within Malaysia's opportunistic screening context, where participation depends largely on voluntary engagement. Therefore, an integrated theoretical framework is needed to provide a more comprehensive explanation of the multilevel behavioural mechanisms influencing

CSAI among low-income urban women. However, a robust theoretical framework alone is insufficient if the analytical methods employed are unable to adequately examine the complex relationships proposed by the framework.

1.3.5 Lack of Comprehensive Analysis in Existing Studies

Methodologically, most existing studies examining cancer screening behaviour continue to rely predominantly on cross-sectional regression-based analyses that primarily assess direct relationships between predictors and behavioural outcomes (Adegboyega et al. 2022; Cui et al. 2022; Fenech et al. 2026; Lee et al. 2021; Sedani et al. 2025). Although these approaches are useful for identifying significant predictors, they are limited in their ability to explain the complex interrelationships and underlying behavioural mechanisms linking sociocultural beliefs, cognitive health beliefs, and CSAI (Hair et al. 2018). For example, a study conducted among urban poor residents in PPR communities in Kuala Lumpur examined barriers to accessing public clinics using multiple linear regression analysis (Abd Wahab et al. 2022). The study included several personal and perception-related factors, such as fear of diagnosis, shame, fatalistic views, symptom-based reasoning, concerns about community perception, and preference for alternative medicine. However, these variables were analysed as independent checklist barriers rather than as theoretically grounded latent sociocultural constructs operating within an integrated behavioural framework. In the regression model, structural and financial barriers emerged as statistically significant predictors of clinic access, whereas personal barrier variables were not significant. While these findings provide important information regarding healthcare access barriers, the study did not assess CSAI nor examine the potential indirect or conditional pathways through which sociocultural beliefs may influence behavioural outcomes.

Such limitations highlight the need for analytical methods capable of examining the multidimensional nature of cancer screening behaviour. Therefore, Structural Equation Modelling (SEM) provides a suitable analytical approach for examining the complex interrelationships among sociocultural beliefs, health beliefs, and CSAI (Tarka 2018). In addition, many existing studies focus primarily on identifying statistically significant relationships without determining which determinants should be prioritised

for intervention (Adegboyega et al. 2022; Bujang et al. 2021; Ketema et al. 2024; Yunus et al. 2018). As a result, there remains limited evidence regarding the relative importance and performance of belief-related factors influencing CSAI. Understanding which factors exert the greatest influence while demonstrating lower performance is important for guiding targeted intervention and resource prioritisation strategies. Therefore, comprehensive structural and prioritisation analyses are needed to identify not only the significant determinants, but also the most important intervention targets influencing CSAI among low-income urban women.

1.4 RESEARCH JUSTIFICATION

1.4.1 Examining Cancer Screening Adherence Intention

Internationally, although behavioural intention has been extensively theorised as the most proximal predictor of health behaviour (Plank et al. 2022), empirical research on cancer screening has tended to prioritise actual uptake, attendance rates, or compliance with one-time screening episodes over sustained adherence intention as a distinct construct (Alsalmi & Othman 2022; Dsouza & Broucke 2025; Fenech et al. 2026; Liao et al. 2025; Salman et al. 2025; Sedani et al. 2025). This is reflected in the most recent systematic review of cancer-related behaviours and literacy, which identified only six observational studies internationally up to October 2024, and found that only one explicitly focused on screening intention, while the majority assessed uptake or participation across multiple cancer types (breast, cervical, colorectal, prostate, skin) in diverse settings (Isonne et al. 2025).

A similar pattern is evident at the national level. Although cancer screening behaviour has been widely studied at the policy level, Malaysia's NSPCCP 2021–2025 (MOH 2021) emphasise early detection and improved screening coverage as core strategies for reducing premature mortality from cancer. Unfortunately, most Malaysian research still focuses on screening uptake or general barriers rather than examining adherence intention as a dependent variable (Abdul Jalal et al. 2025; Chan et al. 2023; Yunus et al. 2018). In opportunistic screening systems such as Malaysia's, behavioural intention is a crucial determinant of participation because screening depends largely on voluntary action (Htay, Donnelly, et al. 2021). Actual screening uptake represents

whether an individual has participated in screening, whereas screening adherence requires repeated participation over time according to recommended intervals. Measuring actual adherence therefore requires longitudinal observation across the relevant screening intervals. Given the cross-sectional design of the present study, actual future adherence could not be established within a single assessment. CSAI was therefore selected as the outcome to capture women's current willingness, readiness, and commitment to adhere to recommended future screening, while recognising that intention does not necessarily translate into subsequent behaviour. This represents a conceptual gap in understanding why screening participation remains suboptimal despite service availability.

Consequently, although cancer screening intention has been investigated previously, studies explicitly conceptualising sustained adherence intention as the primary outcome remain limited both locally and internationally. Hence, this study directly addresses this gap by treating CSAI as the primary outcome and by strengthening the understanding of the determinants of periodic adherence to screening recommendations. These priorities are further aligned with Sustainable Development Goal (SDG 2015), which aims to reduce premature mortality from non-communicable diseases through prevention and treatment by 2030. Achieving these national and global targets requires not only service availability but also sustained behavioural adherence among at-risk and vulnerable populations. Therefore, while previous studies have established the relevance of cancer screening intention, the specific evidence on adherence-oriented intention remains comparatively limited. The present study addresses this gap by examining CSAI as willingness, readiness, and commitment towards screening in accordance with recommended screening practices and intervals, rather than intention towards a single screening episode.

1.4.2 Focusing on Low-income Urban Women and Cancer-Specific Intention

Although urban residence is commonly associated with better access to healthcare services, socioeconomic inequalities within urban environments continue to create disparities in preventive health behaviours. Lower educational attainment, limited health literacy, and financial instability have been consistently associated with reduced

participation in cancer screening (Ferreira et al. 2021; Haeger et al. 2023). Consequently, low-income urban women may experience geographical proximity to healthcare facilities without corresponding engagement in preventive screening behaviours. The focus on women is further justified by the relevance of breast and cervical screening to women, together with colorectal screening as an important preventive priority among women. Within this population, focusing specifically on socioeconomically disadvantaged urban women enables the study to address an important disparity: physical availability of healthcare services may coexist with financial, social, and behavioural constraints that limit preventive screening engagement. Despite this vulnerability, Malaysian evidence specifically examining CSAI among low-income urban women remains limited, and this population has rarely been investigated as a distinct high-risk subgroup (Abd Wahab et al. 2022; Abdul Jalal et al. 2025).

Furthermore, previous studies have predominantly focused on single cancer types and seldom differentiated between general and cancer-specific CSAI, despite evidence suggesting that intentions may vary across breast, cervical, and colorectal cancer screenings (Chan et al. 2023; Tan et al. 2023). The inclusion of breast, cervical, and colorectal cancers was therefore intentional rather than an assumption that screening behaviours are equivalent across cancer types. These cancers involve different screening methods, recommended intervals, and levels of invasiveness and may therefore generate different perceptions, barriers, and behavioural intentions. Examining the three cancers within the same population enables both shared and cancer-specific patterns of screening intention to be identified, which would not be possible by focusing on a single cancer alone.

Accordingly, although the recommended screening eligibility ages differ across breast, cervical, and colorectal cancers under Malaysian guidelines, a common age threshold of ≥ 40 years was applied to establish a comparable population for examining cancer-specific CSAI across the three screening contexts (MOH 2017, 2019, 2019). In opportunistic screening contexts, women may face competing demands across different screening recommendations, resulting in variations in adherence intention across cancer types. Existing studies have also primarily examined disease-specific determinants

without considering shared or overlapping factors that may simultaneously influence adherence to multiple cancer screenings (Chan et al. 2023; Tan et al. 2023). Consequently, the lack of population- and cancer-specific analyses restricts a comprehensive understanding of adherence intention patterns and limits the development of targeted yet integrated intervention strategies. Therefore, examining both general and cancer-specific CSAI among low-income urban women is essential for generating a more comprehensive and realistic understanding of cancer screening adherence and for informing interventions that address the unique challenges faced by this vulnerable population.

1.4.3 Integrated Belief-Based Model and Instrumentation

In Malaysia's multi-ethnic setting, cultural norms, religious values, and family expectations may influence women's perceptions of susceptibility, stigma, and preventive health behaviour (Ong et al. 2020). Preventive health behaviours are not determined solely by access or awareness, but are also influenced by sociocultural belief systems, including cancer fear (Feng et al. 2022), fatalistic attitudes (Keller et al. 2021), and cancer worry (Murphy et al. 2018), which have been shown to influence health decision-making. At the same time, the health belief factors explain how individual perceptions of susceptibility, severity, benefits, and barriers influence behavioural intention (Cui et al. 2022; Lee et al. 2021). Sociocultural beliefs are culturally embedded, emotionally driven, and shaped by collective norms (Lemmo et al. 2023), whereas health belief constructs represent individual-level cognitive evaluations of susceptibility, severity, benefits, and barriers (Carpenter 2010).

Accordingly, cancer fear, cancer worry, and cancer fatalism were positioned as socioculturally influenced belief factors in the present study because, although experienced by individuals, they may reflect culturally and socially shaped meanings attributed to cancer, including perceptions of threat, anticipated consequences, uncertainty, and perceived inevitability of the disease. In contrast, HBM constructs represent the more proximal cognitive appraisal of whether an individual perceives herself as susceptible, considers cancer severe, recognises screening benefits, and perceives barriers to screening. Sociocultural beliefs may operate as upstream

emotional and normative influences, whereas health belief constructs function as proximal cognitive appraisals directly influencing behavioural intention. Hence, CSAI is shaped by interconnected belief systems rather than isolated factors (Abed et al. 2025; Dsouza & Broucke 2025; Fenech et al. 2026; Liao et al. 2025).

However, both belief systems are often examined separately, limiting understanding of how broader cultural perceptions shape cognitive health evaluations and ultimately influence screening intention (Abed et al. 2025; Fenech et al. 2026; Isonne et al. 2025; Salman et al. 2025; Sathiyaseelan et al. 2025). This highlights a substantive conceptual and methodological gap in understanding how upstream beliefs shape downstream behavioural intention, particularly within the Malaysian context. Therefore, integrating sociocultural belief factors with cognitive health belief constructs enables a more comprehensive examination of the belief-related determinants of CSAI among low-income urban women. In addition to beliefs, previous screening behaviour may influence future intention. Individuals who have previously undergone screening may demonstrate stronger or more stable adherence intention (Vega Crespo et al. 2022). Furthermore, knowledge and awareness of cancer screening are recognised determinants of preventive health behaviour and must be accounted for to ensure that the observed effects of beliefs are not confounded by informational exposure (Gapstur et al. 2018; Haeger et al. 2023).

Existing validated instruments were available for measuring cancer worry, cancer fear, cancer fatalism, and health beliefs and were therefore adapted rather than newly developed. However, existing measures for knowledge and awareness, previous screening uptake, and particularly adherence intention were not sufficiently aligned with the present study population, multi-cancer context, and Malaysian screening recommendations. Therefore, study-specific KAC, PUC, and CSAI items were developed to provide contextually appropriate measures for low-income urban women while retaining established instruments for constructs where suitable measures were already available.

Although established instruments were available internationally, their linguistic and cultural applicability to low-income urban women in Malaysia required further

consideration. Validated Malay-language instruments assessing cancer fear, fatalism, and cancer worry remain limited (Yunus et al. 2018). Although these measures have been developed internationally (Feng et al. 2022; Keller et al. 2021; Murphy et al. 2018), their applicability within the Malaysian urban-poor context cannot be assumed. Therefore, cross-cultural adaptation and psychometric validation are necessary to ensure conceptual equivalence, contextual relevance, and measurement reliability of the belief-based instruments used in this study (Boateng et al. 2018).

1.4.4 Integrated HBM–Socioecological Theoretical Framework

Building on existing evidence, a multilevel theoretical integration provides greater explanatory depth in understanding CSAI (Cui et al. 2022; Lee et al. 2021; Sathiyaseelan et al. 2025; Vallone et al. 2022). Cancer screening decisions are influenced not only by individual perceptions, but also by the broader social and environmental context in which women live (Mulcahy Symmons et al. 2025). Factors operating at family, community, healthcare system, and policy levels may shape women's screening perceptions, beliefs, and behavioural intention. Other factors that may influence screening intention include sociodemographic and socioeconomic characteristics, knowledge and awareness, previous screening experience, family and social support, healthcare accessibility, and healthcare provider-related influences (Haeger et al. 2023). These factors may operate across different socioecological levels and interact with individual beliefs in shaping screening intention. Building on these theoretical considerations, this study integrates HBM with SM to provide a more comprehensive multilevel explanation of CSAI among low-income urban women (Cui et al. 2022; Lee et al. 2021).

The HBM explains how personal beliefs influence intentions to participate in cancer screening (Sathiyaseelan et al. 2025). Therefore, reliance solely on individual-level cognitive frameworks may provide an incomplete explanation of CSAI, particularly among low-income urban women who experience multiple structural and social challenges within opportunistic healthcare settings. The SM complements the HBM by recognising that health behaviour is influenced by multiple interconnected levels, including intrapersonal, interpersonal, community, organisational, and policy-

related factors. By integrating the HBM with the SM, this study provides a more comprehensive theoretical framework to explain how cognitive health beliefs interact with broader sociocultural influences in shaping CSAI among low-income urban women. This integrated approach also provides clearer insights into where interventions should be targeted, whether at the individual, interpersonal, community, or system level, to improve adherence to recommended cancer screening practices.

1.4.5 Comprehensive Structural and Prioritisation Analysis

Many studies examining CSAI rely predominantly on cross-sectional regression analyses focusing mainly on direct associations between predictors and behavioural outcomes (Cui et al. 2022; Lee et al. 2021). Although such approaches are useful for identifying significant predictors, they may not adequately capture the complex mechanisms through which sociocultural beliefs and cognitive health beliefs jointly influence behavioural intention. Cancer screening behaviour is multidimensional, involving interconnected emotional, cognitive, sociocultural, and experiential influences. Therefore, examining only direct relationships may oversimplify the behavioural mechanisms underlying CSAI. More comprehensive analytical approaches are therefore needed to evaluate the complex relationships among belief-related factors, health belief constructs, previous screening experience, and behavioural intention.

To address these limitations, this study employs SEM to simultaneously assess direct, indirect (mediation), moderation, and moderated mediation pathways among multiple constructs (Hair et al. 2022; Tarka 2018). This approach provides a more comprehensive mechanism-driven understanding of how sociocultural beliefs and cognitive health beliefs collectively influence CSAI. In addition, existing studies provide limited evidence on which belief-related determinants exert the greatest relative importance and influence CSAI. Without prioritisation analysis, intervention strategies may lack strategic focus and fail to target the most influential determinants affecting screening intention. Identifying statistically significant relationships alone does not indicate which belief factors should receive greater intervention attention. Prioritisation is therefore necessary to distinguish factors according to both their relative importance in predicting CSAI and their current performance, thereby identifying those with the

greatest potential for improvement and supporting more efficient allocation of limited public health resources. Therefore, this study further evaluates the relative importance and performance of sociocultural belief factors and health belief constructs in predicting CSAI. This prioritisation analysis provides practical guidance for developing targeted and resource-efficient interventions aimed at improving cancer screening adherence among low-income urban women.

1.5 RESEARCH QUESTION

1. What are the psychometric properties of the new translated Malay version of instruments in measuring belief factors and cancer screening-related outcomes among low-income urban women?
2. What are the general and site-specific CSAI scores for colorectal, breast, and cervical cancer among low-income urban women?
3. How does the structural relationship among belief factors (cancer fear, cancer fatalism, cancer worry, and health belief) explain the variation in general and site-specific CSAI scores for colorectal, breast, and cervical cancer among low-income urban women?
4. Which belief factors exhibit the highest relative importance and performance in predicting general and site-specific CSAI scores for colorectal, breast, and cervical cancer among low-income urban women?
5. What other belief factors are most perceived by low-income urban women to influence their intention to adhere to cancer screening programs?

1.6 RESEARCH OBJECTIVE

1.6.1 General Objective

To evaluate the structural relationships and relative importance of belief factors influencing general and site-specific CSAI among low-income urban women.

1.6.2 Specific Objective

1. To develop and validate a new translated Malay version of instruments in measuring belief factors and cancer screening-related outcomes among low-income urban women.
2. To determine the general and site-specific CSAIs scores for colorectal, breast, and cervical cancer among low-income urban women.
3. To examine the mechanisms linking belief factors (cancer worry, cancer fear, cancer fatalism, and health belief) with general and site-specific CSAIs scores for colorectal, breast, and cervical cancer among low-income urban women.
4. To prioritise the relative importance and performance of belief factors in predicting general and site-specific CSAI scores for colorectal, breast, and cervical cancer among low-income urban women.
5. To describe the other belief factors most perceived by low-income urban women to influence their intention to adhere to cancer screening programs.

1.7 RESEARCH HYPOTHESIS

The hypotheses presented below were developed to fulfil Objective 3, focusing on testing the proposed structural relationships between belief factors and CSAI. These hypotheses encompass direct, mediating, moderating, and moderated-mediation effects, as specified in the integrated belief-based model and the hypothesised directions of these relationships were established based on theoretical and empirical evidence and are further explained in Section 2.5.2.

1.7.1 Direct Effects Hypotheses

1. H1: Belief factors (cancer worry, cancer fear, cancer fatalism, and health belief) are negatively associated with the general CSAI score among low-income urban women.
2. H2: Belief factors (cancer worry, cancer fear, cancer fatalism, and health belief) are negatively associated with breast CSAI score among low-income urban women.

3. H3: Belief factors (cancer worry, cancer fear, cancer fatalism, and health belief) are negatively associated with cervical CSAI score among low-income urban women.
4. H4: Belief factors (cancer worry, cancer fear, cancer fatalism, and health belief) are negatively associated with colorectal CSAI score among low-income urban women.

1.7.2 Mediation Hypotheses

1. H5: Health belief positively mediates the relationships between sociocultural belief factors (cancer fatalism, cancer worry, and cancer fear) towards the general CSAI score among low-income urban women.
2. H6: Health belief positively mediates the relationships between sociocultural belief factors (cancer fatalism, cancer worry, and cancer fear) towards breast CSAI score among low-income urban women.
3. H7: Health belief positively mediates the relationships between sociocultural belief factors (cancer fatalism, cancer worry, and cancer fear) towards cervical CSAI score among low-income urban women.
4. H8: Health belief positively mediates the relationships between sociocultural belief factors (cancer fatalism, cancer worry, and cancer fear) towards colorectal CSAI score among low-income urban women.

1.7.3 Moderation Hypotheses

1. H9: Previous uptake of cancer screening (PUC) positively moderates the relationships between health beliefs towards the general CSAI score among low-income urban women.
2. H10: PUC positively moderates the relationships between health beliefs towards breast CSAI score among low-income urban women.
3. H11: PUC positively moderates the relationships between health beliefs towards cervical CSAI score among low-income urban women.

4. H12: PUC positively moderates the relationships between health beliefs towards colorectal CSAI score among low-income urban women.

1.7.4 Moderated Mediation Hypotheses

1. H13: PUC positively moderates the indirect relationship between sociocultural belief factors (cancer fatalism, cancer worry, and cancer fear) and general CSAI score through health belief among low-income urban women.
2. H14: PUC positively moderates the indirect relationship between sociocultural belief factors (cancer fatalism, cancer worry, and cancer fear) and breast CSAI score through health beliefs among low-income urban women.
3. H15: PUC positively moderates the indirect relationship between sociocultural belief factors (cancer fatalism, cancer worry, and cancer fear) and cervical CSAI score through health beliefs among low-income urban women.
4. H16: PUC positively moderates the indirect relationship between sociocultural belief factors (cancer fatalism, cancer worry, and cancer fear) and colorectal CSAI score through health beliefs among low-income urban women.

1.8 SUMMARY

This chapter has established the foundation and justification for the study by highlighting the persistent issue of suboptimal adherence to cancer screening within Malaysia's opportunistic screening context. Although screening services are available, adherence remains low, indicating that behavioural intention is not sufficiently understood, particularly among low-income urban women who face compounded socioeconomic and access-related challenges. The chapter emphasised the importance of examining belief-related determinants, specifically how sociocultural belief factors and cognitive health belief constructs influence CSAI. It further recognised that previous screening behaviour and knowledge may shape these relationships, underscoring the need for a more comprehensive and mechanism-driven understanding of screening intention. In response, this study proposes an integrated belief-based structural model that combines sociocultural belief factors with the HBM within a broader socioecological perspective of SM. This approach moves beyond single-factor

and direct-effect analyses by incorporating mediation and moderation mechanisms to better capture the complexity of behavioural intention. Furthermore, the chapter highlighted the need for culturally appropriate and validated measurement instruments, alongside rigorous structural modelling, to ensure both contextual relevance and analytical robustness. The next chapter presents a comprehensive review of the literature on cancer screening behaviour, sociocultural belief factors, and health belief theory. It further identifies key research gaps and establishes the theoretical foundation for the proposed conceptual framework and research model.



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