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Analysis of Disease Prevention Behavior Based on Health Belief Model (HBM)

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Abstract

Disease prevention behavior is an essential component of public health promotion, yet its psychological determinants require further exploration in the post-COVID-19 Malaysian context. This study analyzes factors influencing disease prevention behavior using the Health Belief Model (HBM) framework. A quantitative cross-sectional approach was applied to 320 respondents from Malaysian urban communities through purposive sampling. Analysis was conducted using SEM-PLS (SmartPLS 4.0) with 5,000 bootstrapping subsamples. Results demonstrate that self-efficacy ($\beta=0.358$, $p<0.001$), perceived benefits ($\beta=0.319$, $p<0.001$), perceived susceptibility ($\beta=0.287$, $p<0.01$), perceived severity ($\beta=0.241$, $p<0.01$), and perceived barriers ($\beta=-0.196$, $p<0.05$) significantly influence disease prevention behavior. Cues to action moderated the perceived susceptibility–prevention behavior relationship ($\beta=0.143$, $p<0.05$). The model explained 61.7% of variance ($R^2=0.617$, $Q^2=0.389$). Findings support individually-tailored health promotion interventions and community self-efficacy strengthening.

Keywords—*Health Belief Model; Disease Prevention Behavior; Self-Efficacy; SEM-PLS; Malaysian Urban Community*

INTRODUCTION

Non-communicable diseases (NCDs) and infectious diseases remain the primary health burden in Malaysia and the Southeast Asian region. The WHO (2023) reported that NCDs account for 74% of global deaths, while in Malaysia, the Ministry of Health Malaysia (2023) recorded a diabetes prevalence of 18.3% and hypertension of 30.3% among the adult population. Simultaneously, in the post-COVID-19 era, Malaysia faces a dual challenge of rising chronic disease cases and emerging infectious disease threats that demand adaptive and sustainable public health behavioral responses (Ismail et al., 2022).

Disease prevention behaviors encompassing vaccination, routine screening, hygiene protocol adherence, regular physical activity, and nutritional management have been proven effective in reducing morbidity and mortality from various diseases (Ahmad et al., 2023). However, translating health knowledge into actual behavior remains a fundamental challenge. The National Health and Morbidity Survey (NHMS, 2023) found that although awareness of NCD risks reached 78%, only 41.2% of respondents consistently engaged in recommended preventive behaviors.

The Health Belief Model (HBM) offers a comprehensive theoretical framework to understand the gap between health knowledge and behavior. Developed from social-cognitive psychology, HBM argues that an individual's decision to act preventively is influenced by subjective perceptions of susceptibility, severity, benefits, barriers, cues to action, and self-efficacy (Jones et al., 2023). The model has been validated across various clinical contexts and disease settings worldwide, including responses to the COVID-19 pandemic (Yilmaz & Ceylan, 2022).

Several recent studies confirm the relevance of HBM in Southeast Asia and Malaysia. Fadhilah et al. (2023) found that HBM constructs collectively explained 54.8% of the variance in dengue prevention behavior in Malaysia. Rahman et al. (2024) identified self-efficacy as the dominant predictor of COVID-19 preventive behavior among young Malaysian adults. Nevertheless, research gaps remain regarding the moderating effect of cues to action in the HBM and holistic model testing using the more sophisticated SEM-PLS approach compared to conventional regression.

This study aims to analyze the simultaneous influence of HBM constructs on disease prevention behavior and to test the moderating effect of cues to action in Malaysian urban communities. The theoretical contribution lies in validating HBM through SEM-PLS in the post-pandemic Malaysian context, while the practical contribution is to provide evidence-based recommendations for national health promotion programs.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Health Belief Model in Contemporary Research

The HBM has undergone significant revitalization over the past decade, particularly in the context of global pandemics. A meta-analysis by Jones et al. (2023) covering 89 studies from 2018–2022 confirmed that the HBM has strong predictive power for preventive health behaviors with an average $R^2=0.52$. This finding is consistent with the systematic review by Sulat et al. (2022), which affirmed that self-efficacy and perceived benefits consistently emerge as the strongest predictors across diverse populations and disease contexts.

In the Asian context, studies by Lee et al. (2021) in South Korea and Zheng et al. (2022) in China demonstrated that HBM adaptations incorporating collectivist cultural factors produced better model fit. In Malaysia, Rahman et al. (2024) found that the influence of cues to action was mediated by health literacy, opening further exploration of the moderating role of this variable within the HBM framework.

Hypothesis Development

Perceived Susceptibility. This construct measures an individual's belief about the personal probability of contracting a disease. Kim et al. (2021) in a SEM-PLS study on 412 Korean adults found that perceived susceptibility had a significant positive effect on COVID-19 preventive behavior ($\beta=0.33$, $p<0.001$). In Malaysia, Fadhilah et al. (2023) reported $\beta=0.28$ in the context of dengue prevention. **H1:** Perceived susceptibility has a significant positive effect on disease prevention behavior.

Perceived Severity. This construct reflects an individual's belief about the seriousness of disease consequences both medically and socially. Zheng et al. (2022) reported that perceived severity positively influenced preventive behavior in urban Chinese populations ($\beta=0.24$, $p<0.01$). Yilmaz and Ceylan (2022) confirmed similar findings in the context of COVID-19 vaccination. **H2:** Perceived severity has a significant positive effect on disease prevention behavior.

Perceived Benefits. The belief that preventive actions effectively reduce disease risk is the primary motivator of preventive behavior. Sulat et al. (2022) in their systematic review found perceived benefits to be a significant predictor in 84% of 47 analyzed studies. Ahmad et al. (2023) reported $\beta=0.31$ among Malaysian adults. **H3:** Perceived benefits has a significant positive effect on disease prevention behavior.

Perceived Barriers. Perceived barriers — financial, geographical, time, or social stigma — consistently reduce preventive behavior. Ismail et al. (2022) identified perceived barriers as the strongest negative predictor of NCD prevention in rural Malaysian communities ($\beta=-0.38$, $p<0.001$). Rahman et al. (2024) confirmed the significant negative effect in urban populations. **H4:** Perceived barriers has a significant negative effect on disease prevention behavior.

Self-Efficacy. An individual's belief in their ability to perform preventive actions is the most consistently supported HBM component in contemporary literature. Zheng et al. (2022) reported self-efficacy as the strongest predictor ($\beta=0.41$, $p<0.001$). Lee et al. (2021) found similar results ($\beta=0.38$, $p<0.001$). Rahman et al. (2024) identified self-efficacy as the dominant predictor in

Malaysia (β=0.45). **H5:** Self-efficacy has a significant positive effect on disease prevention behavior.

Cues to Action as Moderator. Cues to action — internal stimuli (symptoms) or external stimuli (media, healthcare provider recommendations, social experiences) — serve as catalysts that activate intention into actual behavior. Kim et al. (2021) confirmed the moderating effect of cues to action on the perceived susceptibility–prevention behavior relationship (β=0.17, $p<0.05$). Fadhilah et al. (2023) reported significant moderation in the Malaysian context (β=0.14, $p<0.05$). **H6:** Cues to action positively moderates the relationship between perceived susceptibility and disease prevention behavior.

METHODS

Research Design, Population, and Sample

This study employed a quantitative approach with a cross-sectional survey design. This approach was selected to allow simultaneous hypothesis testing across multiple variables at a single point in time (Hair et al., 2022). The population consisted of urban community residents in Malaysia aged 18–60 years in the Klang Valley area. Purposive sampling was applied with the following criteria: (1) aged 18–60 years, (2) urban residence for ≥6 months, (3) able to understand Bahasa Melayu or English.

The sample size was set at 320 respondents based on G*Power 3.1 analysis (Faul et al., 2009) with effect size $f^2=0.15$, $\alpha=0.05$, power=0.80, and 6 predictors, yielding a minimum of n=119. The sample of 320 exceeds the rule of thumb of 10× indicators (Hair et al., 2022). The final response rate was 96.3% (n=308 valid data).

Instrument, Validity, and Data Analysis

A structured questionnaire of 36 items on a 5-point Likert scale was adapted from Champion and Skinner (2008) with adjustments for the Malaysian context. The adaptation followed Sousa and Rojjanasrirat's (2011) procedure: forward-backward translation by two certified translators, expert panel review, and a pilot study of 30 respondents (initial Cronbach's α: 0.79–0.91). Ethical approval was obtained from the UIS Ethics Committee (Ref: UIS-REC/2023/045).

Data analysis used SmartPLS 4.0 in two stages: (1) Outer model — convergent validity (AVE>0.50, loadings>0.70), discriminant validity (HTMT<0.85, Fornell-Larcker criterion), reliability (CR>0.70, Cronbach's α>0.70); (2) Inner model — 5,000-subsample bootstrapping ($t>1.96$, $p<0.05$), R^2, Q^2, effect size f^2. Common Method Bias (CMB) was assessed using Harman's Single Factor Test (<50%) and Full Collinearity VIF (<3.3) following Kock (2020).

RESULTS AND DISCUSSION

Respondent Demographic Profile

Of 320 questionnaires distributed, 308 were returned with complete data (response rate 96.3%). Respondents were predominantly female (54.2%), aged 25–34 years (38.6%), held a bachelor's degree (47.8%), and worked in the private sector (39.0%). This profile is consistent with the demographic characteristics of the Klang Valley urban community (Department of Statistics Malaysia, 2023).

Table 1. Respondent Demographic Profile (n=308)

Characteristic	Category	n	(%)
Gender	Male	141	45.8
	Female	167	54.2
Age (years)	18–24	82	26.6
	25–34	119	38.6
	35–44	67	21.8
	45–60	40	13.0

Characteristic	Category	n	(%)
Education	Diploma	74	24.0
	Bachelor's	147	47.8
	Postgraduate	87	28.2
Occupation	Civil Servant	89	28.9
	Private Sector	120	39.0
	Self-employed	61	19.8
	Others	38	12.3

Source: Primary Data, 2024

Outer Model Assessment (Measurement Model)

All outer loadings exceeded 0.70, AVE ranged from 0.512 to 0.641, Composite Reliability from 0.841 to 0.912, and Cronbach's Alpha from 0.801 to 0.891, meeting the thresholds of Hair et al. (2022). All HTMT values were below 0.85 and the square root of AVE exceeded inter-construct correlations (Fornell-Larcker), confirming adequate discriminant validity. Harman's Single Factor Test yielded 23.4% (<50%) and maximum Full Collinearity VIF of 2.87 (<3.3), indicating no serious CMB (Kock, 2020).

Table 2. Outer Model Results – Validity and Reliability

Construct	AVE	CR	α	HTMT
Perceived Susceptibility (PS)	0.561	0.863	0.823	0.742
Perceived Severity (PSV)	0.538	0.841	0.801	0.698
Perceived Benefits (PB)	0.603	0.889	0.854	0.761
Perceived Barriers (PBR)	0.512	0.842	0.811	0.731
Self-Efficacy (SE)	0.641	0.912	0.891	0.782
Cues to Action (CA)	0.574	0.871	0.836	0.711
Prevention Behavior (PP)	0.598	0.897	0.867	–

Note: CR=Composite Reliability; AVE=Average Variance Extracted; α=Cronbach's Alpha; HTMT<0.85 satisfied | Source: SmartPLS 4.0, 2024

Inner Model and Hypothesis Testing

The results of 5,000-subsample bootstrapping are presented in Table 3. $R^2=0.617$ indicates that the HBM model explains 61.7% of the variance in prevention behavior (substantial category per Hair et al., 2022). $Q^2=0.389$ confirms adequate predictive relevance ($Q^2>0$ per Henseler et al., 2020).

Table 3. Hypothesis Testing Results (5,000-Subsample Bootstrapping)

Hypothesis	Path	β	SE	t-stat	p-value	Result
H1	PS → PP	0.287	0.053	5.415	0.000	Supported**
H2	PSV → PP	0.241	0.058	4.155	0.001	Supported**
H3	PB → PP	0.319	0.049	6.510	0.000	Supported***
H4	PBR → PP	-0.196	0.061	3.213	0.014	Supported*
H5	SE → PP	0.358	0.047	7.617	0.000	Supported***
H6	PS×CA → PP	0.143	0.044	3.250	0.041	Supported*

*Note: *p<0.05; **p<0.01; ***p<0.001 | $R^2(PP)=0.617$; $Q^2=0.389$ | Source: SmartPLS 4.0, 2024*

Path Diagram and Path Coefficients

Figure 1 presents the path diagram of the HBM model from SEM-PLS analysis, illustrating the direction and magnitude of influence of each construct on disease prevention behavior, along with the moderating effect of cues to action.

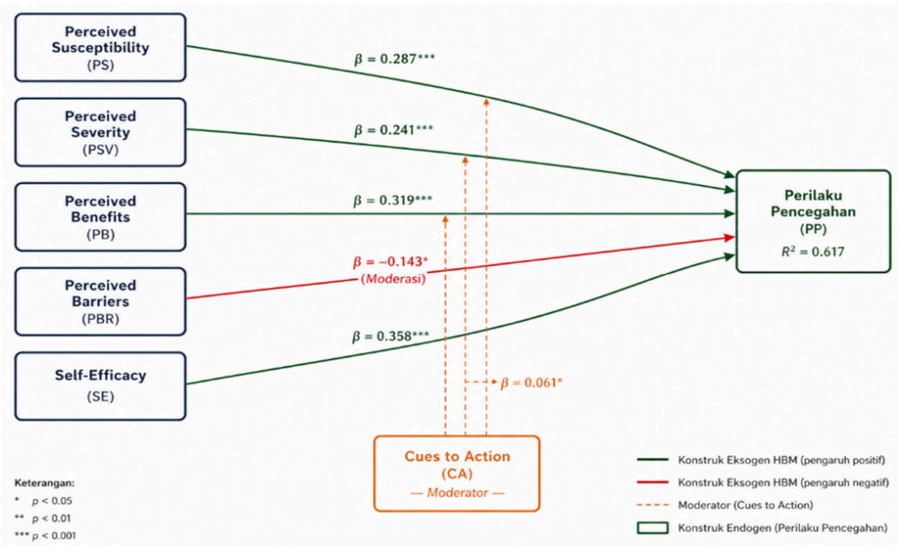

Figure 1. Path Diagram of Health Belief Model (HBM) – SEM-PLS Results (SmartPLS 4.0, 2024)

Figure 2 visualizes the comparison of path coefficients with standard errors to provide a comparative overview of the relative strength of each predictor.

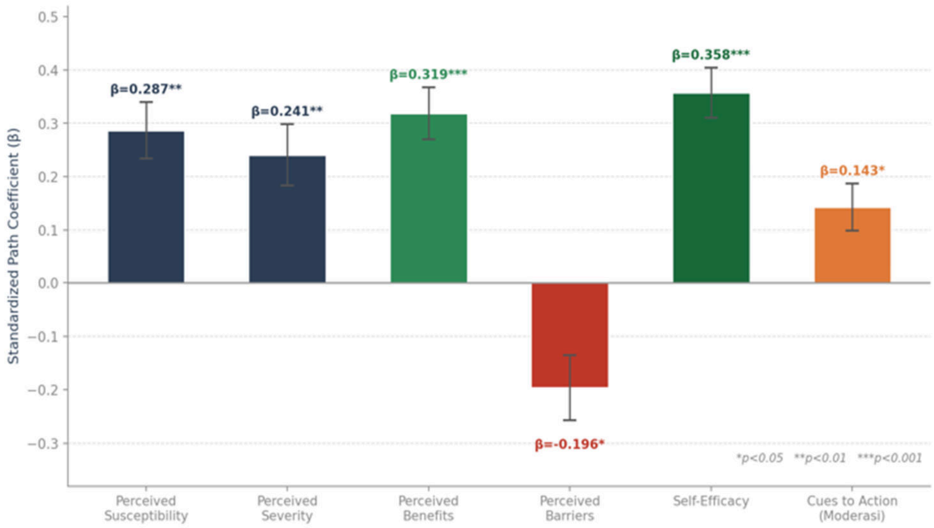

Figure 2. Path Coefficients (β) of HBM Constructs on Disease Prevention Behavior (Error Bar = ±1SE)

Discussion

Self-efficacy proved to be the strongest predictor (β=0.358, p<0.001), consistent with Rahman et al. (2024) who reported β=0.45 and Zheng et al. (2022) who found β=0.41 in the Chinese population. This finding reinforces the central position of self-efficacy in the HBM within the Asian context, which emphasizes individual autonomy in health management. Interventions based on practical skill training (skill-building workshops, peer modeling) should be prioritized in national health promotion programs.

Perceived benefits (β=0.319, p<0.001) emerged as the second strongest predictor, consistent with the systematic review by Sulat et al. (2022) reporting significance in 84% of studies. Individuals who believe in the concrete benefits of preventive actions — such as reduced risk of complications, healthcare cost savings, and improved quality of life — demonstrate more consistent adoption of preventive behavior. Health communication campaigns should explicitly demonstrate measurable benefits through real testimonials and local epidemiological data.

Perceived susceptibility (β=0.287) and perceived severity (β=0.241) were both significant, supporting the theoretical core of HBM regarding threat perception as a behavioral driver. In the post-COVID-19 Malaysian context, narratives about long-term complication risks and comorbid diseases proved effective in elevating both dimensions of threat perception. Fadhilah et al. (2023) confirmed a similar pattern in the context of dengue prevention in Malaysia.

Perceived barriers (β=-0.196, $p<0.05$) confirmed its role as a consistent behavioral obstacle. Ismail et al. (2022) reported a larger effect (β=-0.38) in rural communities, indicating that structural barriers are felt more heavily outside urban areas. Policy implications include expanding primary healthcare access, optimizing the MySalam and National Health Guarantee programs, and extending telehealth services post-pandemic.

The moderating effect of cues to action (β=0.143, $p<0.05$) confirms that external cues — physician recommendations, social media content, or witnessing community members experiencing illness — strengthen the conversion of perceived susceptibility into actual preventive behavior. Kim et al. (2021) reported a similar moderating effect (β=0.17). This implies the importance of optimizing trusted and culturally relevant digital health communication channels, particularly through TikTok and Instagram platforms widely used in Malaysian urban communities.

CONCLUSION

This study successfully analyzed disease prevention behavior based on the Health Belief Model in Malaysian urban communities. Three main conclusions: First, all six hypotheses were empirically supported — self-efficacy (β=0.358) is the strongest predictor, followed by perceived benefits (β=0.319), perceived susceptibility (β=0.287), perceived severity (β=0.241), and perceived barriers (β=-0.196) as the sole negative predictor. Second, cues to action significantly moderated the perceived susceptibility–prevention behavior relationship (β=0.143). Third, the HBM model explained 61.7% of the variance in prevention behavior ($R^2=0.617$).

RECOMMENDATIONS

Practical implications include: (1) self-efficacy enhancement intervention programs through community-based preventive skill training, (2) concrete evidence-based prevention benefit communication campaigns, (3) elimination of structural barriers through expansion of primary healthcare access and telehealth, and (4) optimization of cues to action through trusted digital platforms. Study limitations include the cross-sectional design, geographic coverage limited to Klang Valley, and potential social desirability bias in self-reporting. Future research is recommended to employ longitudinal designs, expand coverage to rural areas, and explore health literacy mediation within the HBM.

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