Drivers of Enrolment Intention towards Social Health Insurance among Informal Sector Workers in Tanzania: Moderating Role of Health Literacy

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Abstract
The focus of the study is to examine the moderating role of health literacy on the determinants of enrolment intention towards social health insurance among informal sector workers in Tanzania. The study employed a positivist research philosophy, a deductive approach, and an explanatory research design. Using stratified and systematic random sampling techniques, a sample of 350 vendors from local markets across Dar es Salaam, Tanzania, was selected. Data were collected through a structured questionnaire and analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM). The findings reveal that attitude, subjective norms, and perceived behavioural control significantly, and positively affect enrolment intention in social health insurance. Nonetheless, health literacy significantly moderates only the relationship between perceived behavioural control and enrolment intention. This study contributes to the literature by integrating the Theory of Planned Behaviour (TPB) with health literacy to assess enrolment intention in the context of social health insurance among informal sector workers in Tanzania. It is among the first studies in the region to explore the moderating role of health literacy in the effects of attitude, subjective norms, and perceived behavioural control on enrolment intention. The findings offer theoretical insights and practical implications for designing health insurance policies and literacy interventions targeted at underserved populations.

Keywords: *Health literacy, social health insurance, Informal sector workers, Enrolment intention.*

INTRODUCTION

Enrolment in social health insurance schemes is a key factor in ensuring equitable access to healthcare services worldwide (Achmadi *et al.,* 2024).

Globally, social health insurance systems have been established to provide financial protection against high medical costs, especially for vulnerable populations (Tam *et al.,* 2021). These systems are widely used in both developed and developing countries. For example, countries like Germany, Japan, and South Korea are achieving near-universal health coverage through compulsory social health insurance (Ranabhat *et al.,* 2023). However, the success of such systems depends on widespread enrolment, as higher participation rates enable better risk pooling and more efficient healthcare delivery (Azizam *et al.,* 2020).

In developing countries, including many African countries, the effectiveness of social health insurance schemes has been hindered by low enrolment rates, particularly among informal sector workers who constitute a large portion of the workforce (Kazaure, 2019). While countries such as Rwanda and Ghana have made strides in expanding social health insurance coverage, Tanzania continues to face significant challenges in this regard (Malik and Alemu, 2024). The informal sector, which comprises over 75% of the Tanzanian workforce, faces unique challenges in accessing health insurance due to irregular income, lack of formal employment, and limited knowledge (Nzowa *et al.,* 2023). These challenges hinder the effectiveness of social health insurance schemes in achieving universal healthcare coverage (Mwinuka *et al.,* 2024).

There are numerous efforts to expand health insurance coverage in Tanzania. Yet, the enrolment rate in social health insurance schemes, particularly among informal sector workers, remains low (Kitole *et al.,* 2023; Afriyie *et al.,* 2024). The persistent low enrolment rates among informal sector workers raise concerns about achieving universal health insurance targets in the country (Mwinuka *et al.,* 2024).

Previous studies have identified several factors influencing intentions to enrol in health insurance, such as attitudes toward health insurance (Sun *et al.,* 2024), subjective norms (Nie *et al.,* 2023), and perceived behavioural control (Maurya and Yasmeen, 2023), primarily through the Theory of Planned Behaviour (TPB). A favourable attitude toward health insurance is associated with a higher intention to enrol, as individuals who perceive it as beneficial for managing healthcare costs are more likely to proactively decide to join (Sun *et al.,* 2024).

On the other hand, subjective norms contribute to increasing enrolment intention as suggested by TPB (Mamun *et al.,* 2021). This is because

individuals are more likely to enrol in health insurance when they perceive social pressure or approval from important people in their lives, such as family, friends, or community leaders (Nie *et al.,* 2023). Moreover, perceived behavioural control influences health insurance enrolment by increasing confidence in overcoming barriers like affordability and the complexities of insurance schemes, leading to a higher likelihood of enrolling if individuals feel in control of the process (Raza *et al.,* 2020). However, these studies have primarily focused on different health insurance, such as commercial, private, or Islamic health insurance in countries like China, Australia, and Vietnam (Nie *et al.,* 2023; Tam *et al.,* 2021; Mai and Mai, 2023). Consequently, there is a notable lack of studies focusing on social health insurance enrolment in developing countries like Tanzania, where informal sector workers face distinct challenges (Afriyie *et al.,* 2024).

Moreover, empirical evidence on the effects of attitude, subjective norms, and perceived behavioural control on health insurance enrolment shows mixed results, with some studies indicating positive and significant relationships (Sun *et al.,* 2024; Maurya and Yasmeen, 2023) and others finding negative and insignificant effects (Do and Mai, 2023; Achmadi *et al.,* 2024). This inconsistency suggests a lack of theoretical foundation to explain health insurance enrolment.

Furthermore, limited attention has been given to the role of health literacy as a moderating variable, which could enhance the predictive power of the TPB (Mai and Mai, 2023). Drawing from Self-Determination Theory (SDT), health literacy was introduced as a moderator to explain how individuals' knowledge and understanding of health insurance influence the effect of attitude, subjective norms, perceived and behavioural control on enrolment intention (Zheng *et al.,* 2020; Caso *et al.,* 2024). By integrating TPB and SDT, this study provides a stronger theoretical foundation for explaining heterogeneous enrolment behaviours and enhances the explanatory power of TPB in the context of social health insurance.

The current study aimed to examine the moderating role of health literacy on the determinants of enrolment intention towards social health insurance among informal sector workers in Tanzania, with a specific focus on Dar es Salaam. The study focused with Dar es Salaam because it has the largest concentration of informal sector workers in Tanzania,

where the problem of low enrolment in social health insurance is most prevalent (NBS, 2019).

This study contributes to theoretical and practical knowledge, as well as to policy. Theoretically, the study extends TPB by using health literacy as a moderator variable on the effects of TPB factors on enrolment intention in social health insurance. This increases the predictive power of TPB in explaining enrolment intention in the context of social health insurance. Practically, the findings offer valuable insights into the management of social health insurance schemes. It also offers strategies to develop more effective outreach and education initiatives that address the role of health literacy in fostering health insurance enrolment among informal sector workers. From a policy perspective, the study provides valuable recommendations to improve health literacy among informal sector workers. Consequently, the study supports the Tanzanian Government's goal of achieving universal health insurance coverage.

LITERATURE REVIEW

Theoretical Review

This study integrates the Theory of Planned Behaviour (TPB) and Self-Determination Theory (SDT) to identify key theoretical drivers influencing enrolment intentions in social health insurance and to inform the development of the conceptual framework. The TPB, an extension of the Theory of Reasoned Action (TRA), posits that behavioural intention is influenced by attitude, subjective norms, and perceived behavioural control (Fishbein and Ajzen, 1975; Ajzen, 1985). While TRA lacked explanatory power in situations involving limited individual control, TPB addressed this by including perceived behavioural control as an additional determinant (Maurya and Yasmeen, 2023; Raza *et al.,* 2020). In the context of health insurance, TPB suggests that enrolment intention is shaped by individuals' attitudes, perceived social pressure, and their sense of control over the process (Mai and Mai, 2023; Sun *et al.,* 2024). Studies such as Brahmana *et al.,* (2018); Nie *et al.,* (2023), and Kazaure (2019) confirm the usefulness of TPB in predicting health insurance enrolment. The theory is praised for its comprehensiveness, flexibility, and predictive power (Shetu, 2024; Zareban *et al.,* 2024), but it falls short in considering demographic influences such as education or literacy (Sun *et al.,* 2024). To mitigate this gap, this study incorporates SDT to account for the role of health literacy.

SDT developed by Deci and Ryan in the 1980s, emphasises the role of internal motivation in shaping human behaviour through the fulfilment of autonomy, competence, and relatedness needs (Deci and Ryan, 1980). When individuals feel autonomous, competent, and socially connected, their motivation, well-being, and performance improve (Evans *et al.,* 2024). Applied to health insurance, SDT posits that health literacy enhances individuals' ability to make informed decisions, increases their confidence in understanding insurance products, and encourages engagement when supported by others (Caso *et al.,* 2024; Zheng *et al.,* 2020; Srikanteshwara and Ilavarasu, 2024). SDT's strength lies in its focus on intrinsic motivation and adaptability across disciplines. However, its limitation is its minimal focus on external constraints such as socioeconomic factors (Caso *et al.,* 2024). Therefore, researchers recommend combining SDT with TPB to provide a broader and more comprehensive understanding of complex decisions, such as health insurance enrolment (Srikanteshwara and Ilavarasu, 2024).

Health literacy is incorporated as a moderating variable to strengthen the explanatory power of TPB. Within TPB, the effects of attitude, subjective norms, and perceived behavioural control on intention depend on individuals' capacity to understand and evaluate health insurance information. Health literacy enhances this capacity by improving cognitive processing, informed judgment, and realistic assessment of enrolment constraints. From an SDT perspective, health literacy reinforces autonomy and perceived competence, enabling more self-determined and informed enrolment intentions (Caso *et al.,* 2024). Thus, health literacy conditions the strength of the relationships between TPB constructs and enrolment intention, offering a clearer theoretical explanation for observed variations in social health insurance participation.

Development of Research Hypotheses

Attitude

Attitude refers to an individual's positive or negative evaluation of engaging in specific behaviour (Tam *et al.,* 2021). Empirical studies on the effects of attitude on enrolment intention have shown mixed results (Tam *et al.,* 2021; Mai and Mai, 2023). However, most studies aligned with the TPB revealed that attitude and enrolment are positively and significantly related (Sun *et al.,* 2024; Mai and Mai, 2023; Kazaure, 2019). Individuals with favourable attitudes toward health insurance perceive it as beneficial in terms of financial protection and access to

medical services. This increases their willingness to enrol (Sun *et al.,* 2024). Based on most of the studies and the TPB, the following hypothesis statement was developed:

H_1: *Attitude has a positive effect on enrolment intention in social health insurance among informal sector workers.*

Subjective Norms

Subjective norms refer to the perceived social pressure to perform or not perform a behaviour (Azizam *et al.,* 2020). Previous studies have produced contradictory findings on the effect of subjective norms on enrolment intention in health insurance (Mamun *et al.,* 2021; Azizam *et al.,* 2020). However, most studies are consistent with the TPB, which have shown a positive and significant relationship between subjective norms and enrolment intention (Mamun *et al.,* 2021; Brahmana *et al.,* 2018; Nie *et al.,* 2023). Subjective norms positively influence enrolment in intention in health insurance because individuals are often influenced by the opinions and behaviours of those around them, such as family, friends, or society at large (Nie *et al.,* 2023). Drawing the insights from most of the studies and TPB, this study developed the following hypothesis statement:

H_2: *Subjective norms have a positive effect on enrolment intention in social* health *insurance among informal sector workers.*

Perceived Behavioural Control

Perceived behavioural control is defined by Raza *et al.,* (2020) as an individual belief in their ability to perform a specific behaviour, based on their perception of the ease or difficulty of doing so. Earlier studies on the effect of perceived behavioural control on enrolment intention in health insurance have shown mixed results (Maurya and Yasmeen, 2023; Achmadi *et al.,* 2024). However, most empirical studies are consistent with TPB, finding a positive and significant relationship between perceived behavioural control and enrolment intention (Maurya and Yasmeen 2023; Raza *et al.,* 2020; Nzowa *et al.,* 2023). Perceived behavioural control positively affects enrolment intention in health insurance because it reflects an individual's belief in their ability to overcome barriers and complete the enrolment process. When people feel that they have sufficient resources, opportunities, and self-efficacy to enrol in social health insurance, they are more likely to enrol in health

insurance (Raza *et al.,* 2020). Drawing on the previous studies and the TPB, this study developed the following hypothesis:

H_3: *Perceived behavioural control has a positive effect on enrolment intention in social* health *insurance among informal sector workers.*

Health Literacy

Health literacy refers to the degree to which individuals can access, comprehend, and use information to make appropriate health-related decisions (Zheng *et al.,* 2020). The role of health literacy as a moderating variable was proposed to test the effects of attitude, subjective norms, and perceived behaviour control on enrolment intention in social health insurance among informal sector workers. The objective is to increase the predictive power of the TPB in understanding enrolment decisions. Individuals with high health literacy are more informed about health insurance benefits and the enrolment process, which can affect their perception of control and decision-making processes (Caso *et al.,* 2024; Zheng *et al.,* 2020). In contrast, individuals with low health literacy may face challenges in understanding and acting upon health insurance information, potentially affecting their intentions differently (Srikanteshwara and Ilavarasu, 2024). Thus, based on the given explanation, the following hypotheses are developed:

H_{4a}: *Health literacy positively moderates the relationship between attitude and* enrolment *intention in social health insurance among informal sector workers.*

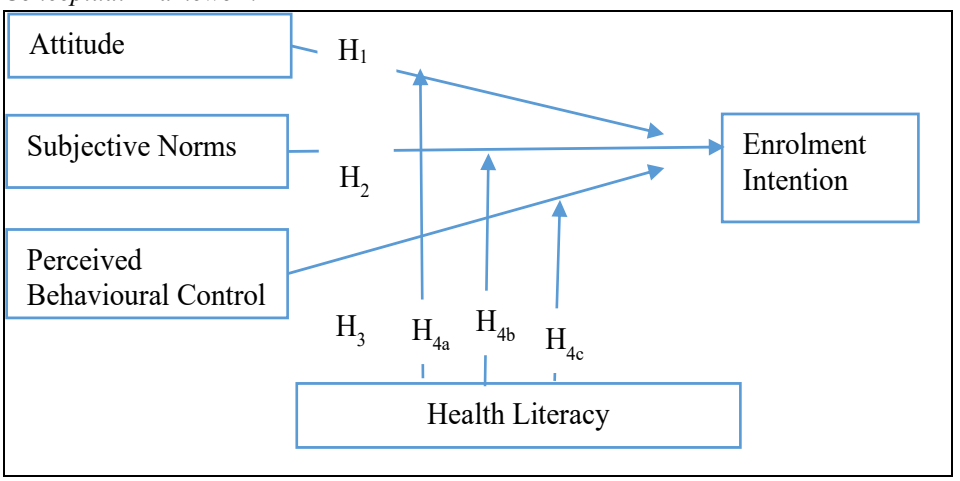
H_{4b}: *Health literacy positively moderates the relationship between* subjective *norms and enrolment intention in social health insurance among informal sector workers.*

H_{4c}: *Health literacy positively moderates the relationship between* perceived *behavioural control and enrolment intention in social health insurance among informal sector workers.*

Conceptual Framework

The conceptual framework in Figure 1 is based on the integration of the TPB and SDT to explain enrolment intention in social health insurance. The study assumes that enrolment intention in social health insurance is direct influenced by attitude, subjective norms and perceived behavioural control, these are drawn from TPB. Moreover, health literacy drawn from SDT is a moderating variable in the effects of attitude, subjective norms and perceived behavioural control on enrolment intention in social health insurance.

Figure 1
Conceptual Framework



METHODOLOGY

Research Philosophy and Approach

This study adopted a positivist research philosophy. The philosophy emphasises the existence of an objective reality and the use of scientific methods, including statistical analysis, to test hypotheses and analyse measurable data (Wati, 2024; Mazengo and Mwaifyusi, 2021). Positivism was appropriate for this study as it aimed to empirically examine the moderating role of health literacy on the relationship between attitude, subjective norms, perceived behavioural control, and enrolment intention. In line with this philosophy, the study employed a deductive research approach. The approach involves deriving hypotheses from established theories and testing them through empirical observation (Premraj, 2024; Hall *et al.,* 2023). Specifically, hypotheses were developed based on the TPB and SDT.

Research Design, Strategy, and Study Area

This study adopted an explanatory research design, which is suitable for examining causal relationships using a deductive approach (Swedberg, 2020; Mmasi and Mwaifyusi, 2021). The design was chosen to explore the causal links between attitude, subjective norms, perceived behavioural control, health literacy, and the intention to enrol in social health insurance. To operationalise this design, the study employed a survey research strategy, which aligns with the positivist and deductive paradigm (Hall *et al.,* 2023). The survey strategy was suitable for collecting quantitative data from a large sample, allowing for the statistical testing of hypotheses and generalisation of findings. It also supported the structured analysis of relationships among variables derived from theoretical frameworks (Swedberg, 2020).

With regards to study area, the study was conducted in Dar es Salaam, Tanzanian largest city, and economic hub (Kirumirah and Munishi, 2022). The city was selected due to its high concentration of informal sector workers, who contribute over 3.2% to the national GDP (NBS, 2019). The research focused on five major markets including Kariakoo, Temeke Stereo, Tegeta, Kigamboni Ferry, and Simu 2000 which represent key informal economic zones within the city.

Population, Sampling Procedures and Sample Size

This study focused on informal sector workers from five major markets, comprising a total population of 12,378 registered vendors (DCC, 2023). Due to the positivist approach adopted, probability sampling was deemed the most appropriate method. Specifically, stratified random sampling was used to categorise the markets into five strata based on worker numbers. Within each stratum, systematic random sampling was applied to ensure proportional representation and reduce selection bias, as recommended by Hair *et al.,* (2016).

Each market's proportion to the total population was calculated to allocate the sample accordingly: Kariakoo (47.6%), Temeke Stereo (20.0%), Tegeta (11.1%), Kigamboni Ferry (10.7%), and Simu 2000 (10.6%). Systematic sampling intervals were determined by dividing population size with its corresponding stratum sample size, where all strata yielded an interval of every 35th individual, ensuring consistency across the sample.

Given that Structural Equation Modelling (SEM) requires large samples, and considering the 21 questionnaire items, a minimum of 315 participants was estimated based on the rule of 15 participants per item (Field, 2009). Kass and Tinsley (1979) also support a sample size of 300 for SEM. Nonetheless, based on previous studies in social health insurance that employed surveys, the average response rate was 85.6%, implying 14.4% non-response rate (Afriyie *et al.,* 2024; Azizam *et al.,* 2020). To accommodate this expected non-response rate, the final sample was adjusted by dividing 300 by 0.856, yielding a sample of 350. Hence, the study used a final sample size of 350 vendors from the informal sector. The distribution of the sample across the five local markets is outlined in Table 1.

Table 1
Sample Distribution by Stratum and Systematic Sampling Interval

Stratum	Ratio	Sample Size (350 × Ratio)	Sampling Interval (K/n)
Kariakoo	0.476	167	5,891/167 = 35th
Temeke Stereo	0.200	70	2,478/70 = 35th
Tegeta	0.111	39	1,370/39 = 35th
Kigamboni Ferry	0.107	37	1,322/37 = 35th
Simu 2000	0.106	37	1,317/37 = 35th
Total	1	350	

Selected vendors were approached in person at their market stalls during normal business hours by trained research assistants, who explained the purpose of the study and invited voluntary participation. In cases where a selected vendor declined or was unavailable, the next vendor in the sampling sequence within the same stratum was approached as a replacement, ensuring that proportional representation across markets was maintained while minimising potential self-selection bias.

Research Instruments and Measurement

The study employed a structured, self-administered questionnaire using the drop-and-collect method to enhance response rates and data reliability (Hair *et al.,* 2016; Hall *et al.,* 2023; Mwaifyusi and Dau, 2022). The questionnaire consisted of sections on demographic characteristics and constructs related to the study variables: attitude, subjective norms, perceived behavioural control, health literacy, and enrolment intention in social health insurance. All variables were measured using previously validated items and assessed on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), as supported in prior studies

(Sun *et al.,* 2024; Do & Mai, 2023; Achmadi *et al.,* 2024). Table 2 presents the summary of variables, constructs, measurement scales, and sources.

Table 1
Measurement

Variables	Constructs	Measurement	Sources
Attitude	– Perceived benefits (ATT1) – Perceived drawbacks (ATT2) – Perceived necessity (ATT3) – Past service satisfaction (ATT4) – Trust in the system (ATT5)	5-point Likert scale	Sun *et al.,* (2024); Do and Mai (2023); Mai and Mai (2023)
Subjective norms	– Family influence (SN1) – Media influence (SN2) – Community expectation (SN3) – Cultural belief (SN4)	5-point Likert scale	Brahmana *et al.,* (2018); Mamun *et al.,* (2021); Nie *et al.,* (2023)
Perceived behavioural control	– Financial capacity (PBC1) – Past experiences (PBC2) – Access to information (PBC3) – Enrolment accessibility (PBC4)	5-point Likert scale	Maurya and Yasmeen (2023); Raza *et al.,* (2020); Achmadi *et al.,* (2024)
Health literacy	– Autonomy (HL1) – Competence (HL2) – Relatedness (HL3)	5-point Likert scale	Zheng *et al.,* (2020); Caso *et al.,* (2024)
Enrolment intention	– Intend to enrol (EI1) – Recommendation (EI2) – Plan to enrol (EI3) – Consideration (EI4) – Willingness to pay (EI5)	5-point Likert scale	Mamun *et al.,* (2021); Tam *et al.,* (2021); Nie *et al.,* (2023)

Data Analysis Techniques

Data analysis in this study began with editing and coding to ensure consistency and accuracy of the responses. Descriptive statistics were then performed using SPSS Version 26 to summarise demographic characteristics of the respondents, including age, gender, and education level. This preliminary analysis helped demonstrate the representativeness of the sample and supported the validity of subsequent findings.

Thereafter, inferential analysis was conducted using Partial Least Squares Structural Equation Modelling (PLS-SEM) through SmartPLS software (Version 4.1.1.2). This method was selected due to its strength in handling complex models, its flexibility with small to medium sample sizes, and its robustness in cases where data may deviate from multivariate normality (Hair *et al.,* 2016). The inferential process was carried out in two main stages. The first stage involved assessing the measurement model to ensure the reliability and validity of the constructs.

Reliability was tested using outer loadings, Cronbach's Alpha, and composite reliability (rho_a and rho_c). At the same time, convergent and discriminant validity were evaluated using the Average Variance Extracted (AVE), the Fornell-Larcker criterion, and the Heterotrait-Monotrait (HTMT) ratio, as suggested by Hair *et al.,* (2019).

In the second stage, the structural model was analysed to test the direct effects of attitude, subjective norms, and perceived behavioural control on enrolment, and the moderating role of health literacy on these relationships. The metrics used in this stage included path coefficients, t-values, and p-values obtained through a bootstrapping procedure with 5,000 subsamples. Moreover, R^2 values were used to measure the variance explained by the model, while f^2 and Q^2 statistics were used to assess effect size and predictive relevance.

RESULTS

Response Rate

A total of 350 questionnaires were distributed to informal sector workers across five major markets in Dar es Salaam. Out of these, 342 were returned, resulting in a high return rate of 97.7%. However, after data screening, 7 questionnaires were excluded due to incompleteness or invalid responses, leaving 335 valid and usable questionnaires for analysis. This yielded an effective response rate of 95.7%, as shown in Table 3. According to Evans *et al.,* (2024), a response rate above 70% is considered very good in survey research. Mamun *et al.,* (2021) also emphasises that high response rates reduce the risk of nonresponse bias and enhance the representativeness of the data.

Table 3
Survey Response Rate

Response Category	Frequency	Percent (%)
Questionnaires distributed	350	100.0
Questionnaires returned	342	97.7
Incomplete/Invalid questionnaires	7	2.0
Valid questionnaires for analysis	335	95.7
Total response rate		95.7

Demographic Profile of the Respondents

The findings in Table 4 present the demographic characteristics of the 335 informal venders who participated in the study. Most respondents (34.3%) were aged between 26 and 35 years, followed by 20.6% aged 36 to 45 years, and 20.3% aged 18 to 25 years. A smaller proportion fell within the age brackets of 46 to 55 years (13.7%) and 56 years and above (11.0%).

This age distribution suggests that a significant portion of the respondents are in their economically active years, which is relevant to the study since individuals in this age range are more likely to consider enrolling in social health insurance for both current and future healthcare needs. Moreover, the study found that male constituted the majority of respondents (61.2%), while females accounted for 38.8%. This gender imbalance may reflect the gender composition of the informal market in Dar es Salaam, where male dominance in certain occupations is more pronounced. Regarding education levels, 39.7% of the respondents had completed primary school, 36.1% had secondary or high school education, and the remaining 24.2% possessed post-secondary qualifications (certificate/ diploma or bachelor's degree). These findings suggest that a large portion of informal sector workers have limited formal education, which may influence their health literacy and understanding of health insurance schemes.

Table 4
Respondents' Profile

Demographic Variables	Response	Frequency	Percent
Age	18-25 years	68	20.3
	26-35 years	115	34.3
	36-45 years	69	20.6
	46-55 years	46	13.7
	56 +	37	11.0
	Total	335	100.0
Gender	Male	205	61.2
	Female	130	38.8
	Total	335	100.0
Level of Education	Primary School	133	39.7
	Secondary/High School	121	36.1
	Certificate/Diploma	42	12.5
	Bachelor	39	11.6
	Total	335	100.0

Descriptive Statistics

The results in Table 5 presents descriptive statistics for key constructs in the study, including attitude (ATT), subjective norms (SN), perceived behavioural control (PBC), health literacy (HL), and enrolment intention (EI) toward social health insurance among informal sector workers. Attitude items (ATT1 to ATT5) recorded means between 3.14 and 3.37, with standard deviations ranging from 1.027 to 1.169, indicating moderate agreement and a positive perception. Subjective norms (SN1 to SN4) showed means ranging from 3.14 to 3.29 and standard deviations from 1.118 to 1.187, indicating a moderate perceived social influence.

Perceived behavioural control (PBC1 to PBC4) had mean scores between 3.06 and 3.21, with lower standard deviations (0.940 to 1.061), reflecting consistent responses and moderate perceived control over enrolment decisions. Health literacy (HL1 to HL3) demonstrated lower means ranging from 2.81 to 3.13 and higher variability, with standard deviation (1.147 to 1.265), indicating modest levels of understanding health-related information. Enrolment intention (EI1 to EI5) displayed means between 3.05 and 3.25, with high standard deviations (1.205 to 1.366), implying a moderate yet varied willingness to enrol. All items ranged from a minimum of 1 to a maximum of 5, suggesting the full Likert scale was utilised across responses.

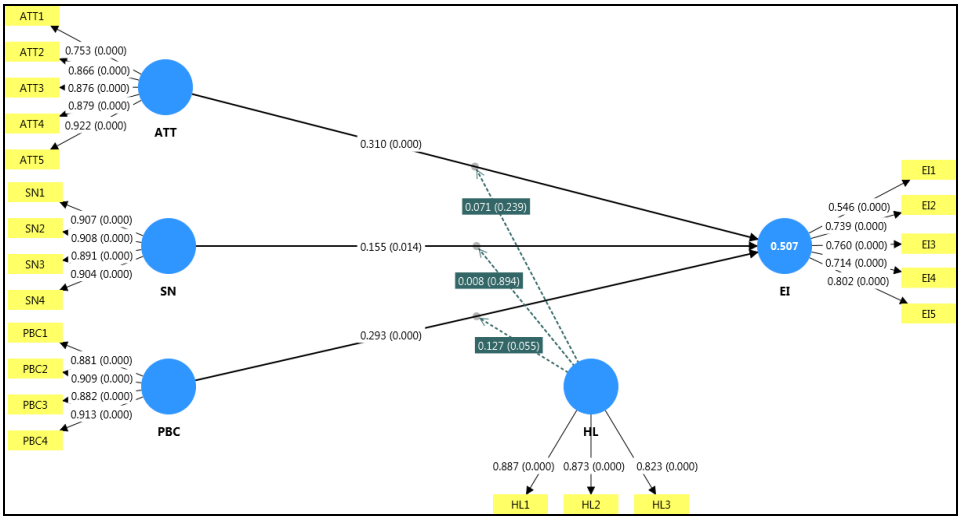
Table 5
Descriptive Statistics

Items	N	Min	Max	Mean	Std. Dev
ATT1	335	1	5	3.29	1.169
ATT2	335	1	5	3.29	1.029
ATT3	335	1	5	3.14	1.048
ATT4	335	1	5	3.37	1.072
ATT5	335	1	5	3.23	1.027
SN1	335	1	5	3.14	1.187
SN2	335	1	5	3.25	1.139
SN3	335	1	5	3.15	1.118
SN4	335	1	5	3.29	1.133
PBC1	335	1	5	3.06	.950
PBC2	335	1	5	3.12	.940
PBC3	335	1	5	3.21	1.061
PBC4	335	1	5	3.17	1.026
HL1	335	1	5	3.03	1.147
HL2	235	1	5	3.13	1.265
HL3	335	1	5	2.81	1.162
EI1	335	1	5	3.25	1.205
EI2	335	1	5	3.14	1.259
EI3	335	1	5	3.05	1.366
EI4	335	1	5	3.20	1.269
EI5	335	1	5	3.23	1.232

Measurement Model Evaluation

The reflective measurement model was assessed, following the guidelines by Hair *et al.,* (2019). Indicator reliability was evaluated through outer loadings, with all items exceeding the 0.60 threshold, except EI1 (loading = 0.546), which was removed due to insufficient reliability. This ensured that only reliable indicators were retained for subsequent structural model evaluation.

Figure 2
Smart PLS-SEM Measurement Model



The reflective measurement model in Figure 2 was further evaluated based on criteria established by Hair *et al.,* (2019), including indicator reliability, internal consistency reliability, convergent validity, and discriminant validity.

The indicator reliability assessment in Table 6 revealed that all reflective measurement items demonstrated strong outer loadings above the recommended threshold of 0.70 (Hair *et al.,* 2019), confirming adequate reliability across constructs. After the removal of one weak item (EI1), the remaining indicators for attitude, subjective norms, perceived behavioural control, health literacy, and enrolment intention consistently showed satisfactory loadings.

Table 6
Outer Loadings Matrix

	ATT	SN	PBC	HL	EI
ATT1	0.753				
ATT2	0.866				
ATT3	0.877				
ATT4	0.879				
ATT5	0.922				
SN1		0.907			
SN2		0.908			
SN3		0.891			
SN4		0.904			
PBC1			0.881		
PBC2			0.909		
PBC3			0.880		
PBC4			0.913		
HL1				0.880	
HL2				0.872	
HL3				0.832	
EI2					0.756
EI3					0.771
EI4					0.745
EI5					0.817

After establishing indicator reliability, internal consistency reliability was assessed using Cronbach's Alpha, Dijkstra–Henseler's rho_A, and composite reliability(rho_C). As recommended by Henseler *et al.,* (2015), all constructs exhibited reliability values exceeding the threshold of 0.70. Both rho_A, and rho_C values ranged from 0.778 to 0.946, indicating high internal consistency among the items of each construct. Cronbach's Alpha values also confirmed the internal reliability of the constructs, with the lowest being 0.775 for enrolment intention and the highest being 0.924 for subjective norms. These reliability statistics are summarised in Table 7.

Table 7
Internal Consistency Reliability

Variables	Cronbach Alpha	Composite reliability(rho_a)	Composite reliability(rho_c)
ATT	0.912	0.920	0.935
SN	0.924	0.925	0.946
PBC	0.918	0.921	0.942
HL	0.827	0.829	0.896
EI	0.775	0.778	0.855

Moreover, convergent validity was confirmed through Average Variance Extracted (AVE), with all constructs exceeding the recommended threshold of 0.50 (Fornell & Larcker, 1981). The results in Table 8 show that all AVE values ranged from 0.597 to 0.815, indicating that each construct adequately explained the variance of its indicators.

Table 8
Construct Validity

Variables	Average Variance Extracted (AVE)
ATT	0.742
SN	0.815
PBC	0.803
HL	0.743
EI	0.597

Discriminant validity was assessed using the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio, following Hair *et al.,* (2021). The Fornell-Larcker results in Table 9 show that the square root of each construct's AVE exceeded its correlations with other constructs, confirming discriminant validity. Moreover, all HTMT values were below the conservative threshold of 0.85, with the highest value being 0.690 between PBC and SN. These findings collectively confirm that discriminant validity was satisfactorily established for all constructs.

Table 9
Discriminant Validity – Fornell-Larcker Criterion and HTMT Ratio

Constructs	ATT (AVE)	EI (AVE)	HL (AVE)	PBC (AVE)	SN (AVE)	HTMT-ATT	HTMT-EI	HTMT-HL	HTMT-PBC	HTMT-SN
ATT	**0.861**	0.534	-0.299	0.452	0.452	–	0.631	0.345	0.495	0.497
EI	0.534	**0.773**	-0.392	0.563	0.531	0.631	–	0.488	0.666	0.628
HL	-0.299	-0.392	**0.862**	-0.430	-0.418	0.345	0.488	–	0.491	0.477
PBC	0.452	0.563	-0.430	**0.896**	0.637	0.495	0.666	0.491	–	0.690
SN	0.452	0.531	-0.418	0.637	**0.903**	0.497	0.628	0.477	0.690	–

Common Method Bias (CMB) Assessment

The study assessed common method bias (CMB) using inner model VIF values, as recommended by Hair et al. (2019). The results in Table 10 show that all VIF values ranged from 1.311 to 1.895, well below the threshold of 3.3, indicating no multicollinearity issues and confirming that CMB is not a concern. These results affirm the robustness and reliability of the structural model.

Table 10
Inner Model for Collinearity Statistics

Path	VIF
ATT -> EI	1.370
SN -> EI	1.895
HL x ATT -> EI	1.324
HL x PBC -> EI	1.794
HL x SN -> EI	1.840

Structural Model Results

The model was assessed based on multicollinearity, coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2), in line with the guidelines provided by Hair *et al.,* (2019). Multicollinearity was assessed using VIF values. According to Kass and Tinsley (1979), VIF values below 3.3 suggest no serious multicollinearity issues. As presented in Table 11, all VIF values ranged from 1.231 to 2.927, confirming that multicollinearity does not pose a threat to the model's validity and ensuring the reliability of the coefficients.

Table 11
VIF Values

Items	VIF
ATT1	1.775
ATT2	2.737
ATT3	2.860
ATT4	2.854
ATT5	2.114
SN1	1.289
SN2	1.322
SN3	1.231
SN4	2.927
PBC1	2.717
PBC2	2.181
PBC3	2.715
PBC4	2.346
HL1	2.017
HL2	2.021
HL3	1.699
EI2	1.503
EI3	1.496
EI4	1.430
EI5	1.665

The explanatory and predictive power of the structural model was assessed using R^2 and Q^2 statistics as presented in Table 12. The R^2 value for enrolment intention was found to be 0.471, indicating that 47.1% of the variance in the dependent variable is explained by attitude, subjective

norms, perceived behavioural control, health literacy, and their interactions. According to Hair *et al.,* (2016), this R^2 value represents a moderate level of explanatory power, further supported by a significant t-statistic ($t = 9.493$, $p < 0.001$). In terms of predictive relevance, the Q^2 value of 0.427, derived through the blindfolding procedure, confirms that the model has strong predictive relevance for enrolment intention. This is reinforced by acceptable levels of RMSE (0.762) and MAE (0.608), as recommended by Hair *et al.,* (2019), which demonstrate robust out-of-sample predictive capability.

Table 12
Coefficient of Determination (R^2)

Variable	R^2	t statistic	P values	Q^2	RMSE	MAE
EI	0.471	9.493	0.000	0.427	0.762	0.608

Moreover, effect size (f^2) was used to determine the individual contribution of each exogenous variable. According to Hall *et al.,* (2023), f^2 values of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively. The results in Table 13 indicate that ATT ($f^2 = 0.113$) and PBC ($f^2 = 0.081$) had small-to-moderate effects on EI, while SN ($f^2 = 0.025$) had a small effect. Interaction terms including HL × ATT (0.012), HL × SN (0.015), and HL × PBC (0.017) showed only marginal moderating effects, indicating that HL contributes limited additional variance when interacting with other predictors.

Table 13
Model Effect Size (f^2)

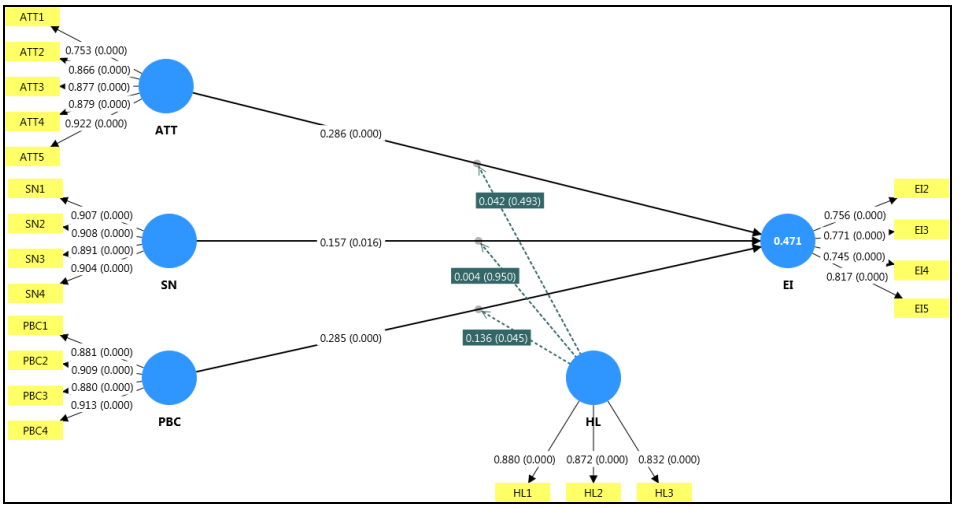
Path	f^2
ATT -> EI	0.113
SN -> EI	0.025
PBC -> EI	0.081
HL x ATT -> EI	0.012
HL x SN -> EI	0.015
HL x PBC -> EI	0.017

Hypothesis Testing

The model assessed both direct and moderating effects, specifically examining how attitude, subjective norm, and perceived behavioural control influence enrolment intention in social health insurance, and how health literacy moderates these relationships. As illustrated in Figure 4.2, the final model incorporates interaction terms and path relationships, with bootstrapping (5,000 subsamples) employed to assess the statistical

significance of path coefficients, following Hair *et al.,* (2019) to ensure theoretical and empirical rigour.

Figure 3
The Final PLS-SEM Structural Model for Hypothesis Testing



The results in Table 14 show that attitude and enrolment intention in social health insurance are positively and significant related (β = 0.286, *t* = 4.988, *p* = 0.000). These findings indicate that a positive attitude contributes to an increase in enrolment intention in social health insurance in Tanzania. Similarly, the study found a significant positive relationship between subjective norms and enrolment intention (β = 0.157, *t* = 2.412, *p* = 0.016). This implies that informal sector workers who perceive social pressure or expectations from others (such as family, friends, or community) are more likely to express an intention to enrol in social health insurance schemes. Moreover, the results indicate a positive and significant relationship between perceived behavioural control and enrolment intention in social health insurance (β = 0.285, t = 4.232, p = 0.000). This indicates that when informal sector workers believe they have the ability, resources, and opportunities to enrol, their intention to join social health insurance increases. Therefore, hypotheses H_1, H_2, and H_3 were supported.

Regarding the moderating role of health literacy, the results indicate that only the interaction between perceived behavioural control and health literacy is statistically significant (β = 0.136, *t* = 2.007, *p* = 0.045). This

suggests that health literacy strengthens the effect of perceived behavioural control on enrolment intention, implying that informal sector workers with higher health literacy are more likely to act on their confidence and ability to enrol in social health insurance schemes. In contrast, the interaction effects of health literacy with attitude (β = 0.042, *t* = 0.686, *p* = 0.493) and with subjective norms (β = 0.004, *t* = 0.063, *p* = 0.950) were not statistically significant. This suggests that health literacy does not significantly influence the effect of attitude or social pressure on enrolment intention. Therefore, Hypothesis H_{4c} was supported, while Hypotheses H_{4a} and H_{4b} were rejected.

Table 14
Path Coefficients for Attitude

Hypotheses	Path	β-values	T statistics	P-Values	Remarks
H_1	ATT -> EI	0.286	4.988	0.000	Accepted
H_2	SN -> EI	0.157	2.412	0.016	Accepted
H_3	PBC -> EI	0.285	4.232	0.000	Accepted
H_{4a}	HL x ATT ->EI	0.042	0.686	0.493	Rejected
H_{4b}	HL x SN -> EI	0.004	0.063	0.950	Rejected
H_{4c}	HL x PBC -> EI	0.136	2.007	0.045	Accepted

DISCUSSION

This study examined the drivers of enrolment intention towards social health insurance among informal sector workers in Tanzania. The direct effect results confirmed that attitude, subjective norms, and perceived behavioural control (PBC) are significant driver of enrolment intention. These findings align with the assumptions of the TPB, which posits that intention is driven by attitude, subjective norms, and one's perception of control over the behaviour (Ajzen, 1985).

Attitude was found to have a positive and statistically significant effect on enrolment intention. This finding suggests that informal sector workers who believe that social health insurance is useful, trustworthy, and worthwhile are more likely to develop the intention to enrol. This aligns with prior studies, including Sun *et al.,* (2024) in China, Mai and Mai (2023) in Vietnam, and Kazaure (2019) in Nigeria. However, this relationship may be influenced by contextual factors, as seen in Tam *et al.,* (2021) in Australia and Do and Mai (2023) in Vietnam, who found

either negative or non-significant effects, due to trust issues or dissatisfaction with the local insurance systems. In the Tanzanian context, where national health insurance reforms are ongoing, building positive perceptions remains essential to stimulate voluntary enrolment.

Regarding subjective norms, the results also revealed a positive and statistically significant effect on enrolment intention. This implies that social influence from close social networks such as family members, friends, and community plays a meaningful role in shaping the intention to enrol. These findings are consistent with Mamun *et al.,* (2021) in Malaysia, Brahmana *et al.,* (2018) in Indonesia, and Nie *et al.,* (2023) in China, who found that individuals are more likely to enrol when they perceive supportive social pressure. However, other studies have shown mixed results. For instance, Huhman *et al.,* (2016) in the United States reported a negative and statistically insignificant relationship, while Azizam *et al.,* (2020) found a positive but statistically insignificant effect. These inconsistencies may stem from cultural and structural differences in how much weight individuals assign to others' opinions. In the Tanzanian informal economy, where community relationships and social networks are often strong, peer and family influence can serve as a powerful driver of health-related behaviours.

Perceived behavioural control was also found to significantly influence enrolment intention. This suggests that informal workers who believed they had sufficient knowledge, access, and financial ability to join a social health insurance scheme showed stronger intentions to enrol. The results are similar to those of Maurya and Yasmeen (2023) in India, Raza *et al.,* (2020) in Pakistan, and Nzowa *et al.,* (2023) in Tanzania, who reported a significant effect of PBC on health insurance enrolment intentions. Nonetheless, some studies have diverged from this view. Adamu (2016) in Nigeria found an insignificant relationship, while Achmadi *et al.,* (2024) reported a negative effect, which may be linked to perceived complexity of the insurance system or institutional inefficiencies in delivering services. These findings emphasise the importance of simplifying enrolment procedures and increasing perceived accessibility to strengthen perceived behavioural control among informal sector workers in Tanzania.

On the other hand, the study examined the moderating role of health literacy on the relationships between the TPB constructs and enrolment intention in social health insurance. The interaction between attitude and

health literacy was found to be statistically insignificant. Similarly, the interaction between subjective norms and health literacy was also insignificant. These findings suggest that variations in health literacy levels do not meaningfully alter the influence of attitude or social norms on enrolment intention. However, a significant moderating effect was found between perceived behaviour control and health literacy. This implies that the positive effect of perceived behavioural control on enrolment intention becomes stronger among individuals with higher health literacy. The results are supported by Zheng *et al.,* (2020) and Srikanteshwara and Ilavarasu (2024), who emphasise that health-literate individuals are better able to navigate health systems and make informed decisions. Therefore, improving health literacy among informal sector workers serve as a critical factor in transforming perceived capability into actual behavioural intention to enrol.

Viewed through the integrated TPB–SDT framework, the moderating results indicate that health literacy primarily strengthens action-oriented pathways of intention formation. Consistent with TPB, higher health literacy enhances the translation of perceived behavioural control into enrolment intention by improving individuals' understanding of enrolment procedures and system requirements. From an SDT perspective, this reflects increased perceived competence and more autonomous decision-making among health-literate individuals. In contrast, attitudes and subjective norms are shaped mainly by evaluative beliefs and social influences, which appear less sensitive to differences in health literacy. Thus, the selective moderating effect underscores the complementary value of integrating TPB and SDT in explaining how cognitive capacity and motivation jointly shape health insurance enrolment intentions.

CONCLUSION AND IMPLICATIONS

Conclusion

This study concludes that attitude, subjective norms, and perceived behavioural control significantly and positively influence enrolment intention in social health insurance among informal sector workers in Tanzania. Informal workers who perceive social health insurance as beneficial, experience supportive social pressure, and feel capable of enrolling are more likely to express stronger enrolment intentions, underscoring the relevance of the TPB in Tanzanian context. These findings highlight the importance of positive perceptions, social influence, and perceived capability in shaping insurance-related decisions.

The study further concludes that health literacy plays a selective moderating role, significantly strengthening the relationship between perceived behavioural control and enrolment intention, but not moderating the effects of attitude or subjective norms. This indicates that health literacy enhances action-oriented decision-making by enabling individuals to translate perceived capability into enrolment intention, while evaluative beliefs and social influences remain relatively stable across literacy levels.

Implications of the Study

Theoretical Implications

This study empirically strengthens the TPB by confirming the significant influence of attitude, subjective norms, and perceived behavioural control on enrolment intention in social health insurance among informal sector workers in Tanzania. Notably, this study extends the TPB by incorporating health literacy from SDT as a moderating variable. The findings indicate that health literacy enhances the effect of perceived behavioural control but not that of attitude or subjective norms, thereby offering theoretical refinement to TPB.

Practical Implications

The findings of this study have several practical implications for practitioners, particularly the management of the National Health Insurance Fund (NHIF), in designing and implementing effective social health programs in Tanzania. The significant influence of attitude and perceived behavioural control on enrolment intention suggests that the management of NHIF should prioritise initiatives that build public trust in the scheme and simplify the enrolment process. Moreover, the confirmed role of subjective norms highlights the importance of social influence. Trusted individuals can foster social pressure that supports enrolment in social health insurance. Furthermore, the moderating effect of health literacy underscores the need for management of NHIF to develop targeted, culturally appropriate educational interventions that not only convey information but also empower informal sector workers to understand and evaluate the enrolment processes.

Limitations and Suggestions for Future Studies

This study acknowledges several limitations that provide direction for future research. The focus on informal sector workers within Dar es Salaam may constrain the generalizability of findings to other regions, given potential socio-economic, cultural, and contextual differences

across Tanzania. Moreover, the exclusive reliance on self-reported data introduces the risk of biases such as social desirability and recall inaccuracies. Future studies are encouraged to adopt broader geographical coverage, incorporating rural and peri-urban areas to enhance representativeness. Employing mixed-methods or longitudinal designs could improve data validity and offer deeper insights into behavioural dynamics over time. Moreover, exploring alternative moderating variables such as trust in healthcare systems, or digital literacy may provide a more comprehensive understanding of the determinants influencing enrolment in social health insurance schemes.

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