

Is Takaful Literacy a Pathway between Micro Takaful and Poverty Reduction in Sudan?

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To Link this Article: <http://dx.doi.org/10.6007/IJARBS/v15-i1/24536> DOI:10.6007/IJARBS/v15-i1/24536

Published Date: 13 January 2025

Abstract

Purpose: This study investigated the mediating roles of takaful awareness and takaful product choices in the relationship between micro takaful participation and poverty reduction in Sudan, employing Sen's (1999) capability approach as a theoretical lens. **Methodology:** A quantitative research design using PLS-SEM was employed. Data were collected from a sample of 96 Sudanese micro takaful participants and analysed using SmartPLS 3.5. Predictive validity was assessed using $PLS_{predict}$, and an importance-performance map analysis (IPMA) was conducted to identify key drivers of poverty reduction. **Findings:** Results revealed significant positive direct effects of micro takaful on both poverty reduction and takaful product choices. A direct positive effect of takaful product choices on poverty reduction was also observed. However, the hypothesised mediating roles of takaful awareness and product choices were not statistically confirmed, although the indirect effect through product choices was marginal. $PLS_{predict}$ analysis demonstrated robust predictive validity, especially for poverty reduction and takaful product choices. The IPMA highlighted micro takaful and, to a lesser extent, takaful product choices as key contributors to poverty reduction, while takaful awareness showed limited influence within the model. **Implications:** The findings highlight the need for interventions beyond simply promoting micro takaful access. Developing targeted strategies to enhance financial literacy, particularly regarding the effective utilisation of diverse takaful product offerings, may be crucial for maximising poverty reduction outcomes. **Originality:** This study contributes to the limited research on the relationship between micro takaful, takaful literacy, and poverty reduction within a specific cultural and economic context. It provides empirical evidence to inform policy and practice in promoting financial inclusion and poverty alleviation through Islamic microfinance.

Keywords: Micro Takaful, Poverty Reduction, Takaful Literacy, Islamic Microfinance, Sudan.

Introduction

Poverty remains a persistent challenge in Sudan, driven by economic instability, conflict, and limited access to financial services, which collectively undermine the socio-economic well-being of vulnerable populations (World Bank, 2022). Microinsurance,

particularly Islamic microinsurance (micro takaful), has gained recognition as a promising tool for poverty reduction in developing countries. Micro takaful provides financial protection against unforeseen risks such as illness, death, or asset loss, thereby helping in safeguarding low-income populations from falling deeper into poverty (Akotey & Adjasi, 2018). However, the efficacy of micro takaful in achieving sustainable poverty reduction depends on multiple factors, including accessibility (Bakhtiari, 2013), affordability (Hasim, 2014), and critically, the level of takaful literacy—an individual's ability to understand and utilise takaful products effectively (Abdullah *et al.*, 2022).

Despite evidence of micro takaful's potential to mitigate financial shocks and foster economic resilience (Abdullah *et al.*, 2022; Nafti, 2022), research has predominantly focused on its outcomes rather than the pathways that enable these outcomes, such as takaful literacy (Alhammedi, 2023). Takaful literacy, encompassing awareness and informed product choices, is a crucial mediating factor that influences the adoption and utilisation of micro takaful products (Malik & Sulaiman, 2024). The relationship between takaful literacy and poverty reduction remains underexplored, particularly within the Sudanese context. This gap in understanding is particularly significant in Sudan, where low financial literacy, cultural misconceptions, and limited awareness of takaful offerings hinder the effectiveness of micro takaful schemes (Nafti, 2022). Also, institutional and operational barriers, such as inadequate regulatory frameworks and the absence of tailored micro takaful models, further exacerbate these challenges (Alhammedi, 2023).

Could enhancing takaful literacy through targeted educational initiatives bridge the gap between micro takaful offerings and their adoption by vulnerable communities? In other words, could such efforts improve financial inclusion and amplify the poverty-reducing impact of micro takaful schemes? Against this backdrop, this study investigates whether takaful literacy serves as a pathway between micro takaful participation and poverty reduction in Sudan. Through this lens, the study seeks to contribute to the broader discourse on financial inclusion and Islamic finance while offering actionable insights for policymakers and takaful operators aiming to enhance the inclusivity and impact of micro takaful initiatives.

Theoretical Framework

The capability approach, developed by Sen (1999) and further refined by Nussbaum (2000), offers a valuable lens for examining the potential relationship between micro takaful, takaful literacy (takaful awareness and takaful product choices), and poverty reduction in Sudan. This approach reconceptualises poverty as a deprivation of capabilities—essential freedoms and opportunities necessary to lead a life one values. Within this framework, micro takaful can be seen as a financial mechanism with the potential to enhance individuals' economic resilience and risk management capabilities. Takaful literacy, in this context, may play a facilitating role by enabling individuals to better understand and utilise micro takaful products. The capability approach provides a theoretical lens for systematically exploring whether takaful literacy functions as an intermediary that links micro takaful initiatives to improved socio-economic outcomes, rather than presuming such a relationship exists (Robeyns, 2005).

The capability approach provides a structured means of interrogating how takaful literacy might contribute to individuals' financial empowerment and decision-making. While

previous studies suggest a connection between financial literacy and improved economic outcomes, the extent to which this applies to takaful literacy in Sudan warrants empirical investigation (Lusardi & Mitchell, 2014). The Sudanese context presents unique challenges, including low levels of financial literacy and cultural misconceptions about takaful, which may hinder the effectiveness of micro takaful interventions (Ahmed, 2016; Haroun & Yusoff, 2024). The capability approach encourages researchers to explore whether and how takaful literacy could address these barriers, thus potentially transforming micro takaful from a theoretical tool for financial inclusion into a mechanism for meaningful poverty alleviation.

Also, the capability approach highlights the importance of examining contextual factors that shape individuals' access to and utilisation of financial tools (Alkire, 2005). In Sudan, institutional and cultural dynamics may influence the effectiveness of micro takaful and the role of takaful literacy. The framework facilitates a critical analysis of these dynamics, guiding the researcher to assess whether takaful literacy mediates the relationship between micro takaful and poverty reduction in a meaningful way (Ahmed, 2016; Haroun & Yusoff, 2024). Interrogating takaful literacy as a potential pathway rather than a definitive one based on the postulates of the capability approach helps ground the current research in empirical evidence. This perspective not only enriches the understanding of financial inclusion efforts in Sudan but also provides insights for designing more effective poverty reduction strategies.

Conceptual Framework

Micro Takaful

Micro takaful is an Islamic microinsurance model designed to offer affordable financial protection against specific risks for low-income individuals and communities (Malik & Sulaiman, 2024). Rooted in the principles of mutual assistance (*ta'awun*) and shared responsibility, it enables participants to contribute small amounts to a common fund, which is then utilised to provide financial benefits during unforeseen events such as illness, death, or disasters (Jaenudin *et al.*, 2018). This model not only promotes financial inclusion for economically marginalised populations but also strictly adheres to Shariah principles by avoiding *riba* (interest), *gharar* (uncertainty), and investments in prohibited (*haram*) activities (Malik & Sulaiman, 2024). Furthermore, micro takaful serves as a critical tool for fostering resilience and mitigating the impact of financial shocks, particularly in disaster-prone and underserved regions, thereby contributing to broader socio-economic stability (Elsherif, 2023). Its integration within Islamic financial systems reflects a sustainable and ethical approach to addressing the vulnerabilities of low-income groups (Malik & Sulaiman, 2024).

Poverty Reduction

Poverty reduction from an Islamic perspective involves comprehensive efforts to alleviate poverty through community-driven support mechanisms rooted in the ethical and spiritual principles of Islam (Shabbir *et al.*, 2018). This approach integrates the redistribution of wealth via *zakat* (almsgiving), *sadaqah* (voluntary charity), and the sustainable utilisation of *waqf* (endowments), ensuring resources are directed towards empowering disadvantaged individuals and fostering socio-economic resilience (Khalidin *et al.*, 2024). It prioritises *halal* (permissible) investments and social finance initiatives to create lasting economic opportunities while promoting social justice, reducing inequality, and encouraging communal solidarity. Beyond addressing immediate needs, it seeks to establish systemic changes that align with Islamic values of mutual assistance, compassion, and ethical economic practices,

thereby enabling long-term socio-economic transformation (Furqon *et al.*, 2024). Micro takaful is one mechanism of Islamic finance built on the pedestal of reducing the pangs of poverty from among low-income members of the communities by shielding them from economic vulnerabilities (Malik & Sulaiman, 2024). This multidimensional approach underscores Islam's commitment to cultivating an equitable society where the well-being of all members is safeguarded.

Takaful Literacy

Takaful literacy is defined as the understanding and awareness of takaful insurance products (Minaz *et al.*, 2023), having two key dimensions: takaful awareness and takaful product choices. Takaful awareness refers to the knowledge individuals have about the principles and workings of takaful, particularly how it differs from conventional insurance, as well as understanding its religious and ethical foundations (Rizwan & Al-Malkawi, 2025). Takaful product choices pertain to consumers' ability to evaluate and select suitable takaful products based on their specific financial needs and values (Sang *et al.*, 2020). Together, these dimensions empower individuals to make informed decisions about their participation in takaful schemes, thereby promoting financial inclusion within the underprivileged community (Malik & Sulaiman, 2024).

Takaful Awareness

Takaful awareness refers to the understanding and knowledge that individuals possess regarding takaful insurance, including its principles, features, and benefits, as well as the distinctions between takaful and conventional insurance (Said *et al.*, 2024). It encompasses awareness of core takaful principles such as mutual assistance (*ta'awun*), shared responsibility, and compliance with Islamic ethical standards. Also, takaful awareness is influenced by various factors, including financial literacy, educational background, cultural beliefs, marketing efforts, and social dynamics, all of which collectively shape individuals' perceptions, trust, and attitudes towards takaful products (Ahmada & Mahadia, 2023). High levels of takaful awareness are essential for fostering informed decision-making, encouraging participation in takaful schemes, and promoting equitable financial inclusion (Ahmada & Mahadia, 2023). This awareness also plays a critical role in enabling consumers to evaluate takaful as a viable and culturally aligned alternative to conventional insurance, thus enhancing its acceptance and uptake, especially in Muslim-majority communities (AlNemer, 2015).

Takaful Product Choices

Takaful product choices refer to the decisions individuals or potential clients make when selecting takaful insurance products, influenced by a range of personal, social, and religious factors. These choices involve assessing various takaful offerings based on their adherence to Islamic principles, perceived benefits, affordability, and overall satisfaction with the available options (Ismail *et al.*, 2023). Personal values, such as religious obligations and ethical considerations, play a significant role in shaping these decisions, as takaful is perceived as a Shariah-compliant alternative to conventional insurance (Hassan & Abbas, 2020). Financial literacy and social influences, including recommendations from family and peers, further impact decision-making processes. Additionally, demographic factors such as gender differences have been shown to influence the perception and adoption of family takaful products, with religious obligations often serving as a critical motivator (Maduku & Mbeya,

2024). These combined factors ultimately determine customers' intentions to engage with takaful products, highlighting the interplay between individual beliefs and external influences.

Hypotheses

Micro Takaful and Poverty Reduction

Micro takaful is increasingly recognised as a powerful instrument for poverty reduction, offering financial protection to vulnerable populations by mitigating risks and enhancing economic resilience (Malik & Sulaiman, 2024; Phan *et al.*, 2023). Unlike conventional insurance, micro takaful adheres to Islamic principles, making it more culturally acceptable in Muslim-majority countries such as Sudan. Functioning as a social safety net (Akotey & Adjasi, 2018), micro takaful enables low-income households to cope with financial shocks, avoid the liquidation of assets, and maintain stable consumption levels during crises (Maduku & Mbeya, 2024). Micro takaful contributes to the broader goals of economic empowerment and social justice through solving the foregoing vulnerabilities in line with Islamic ethical standards that prioritise community welfare and equity.

Empirical evidence from diverse contexts underscores the significant role micro takaful plays in poverty reduction. For instance, Maduku and Mbeya (2024) demonstrated in South Africa that micro takaful helps households manage risks related to health, agriculture, and natural disasters, enhancing their economic resilience (Chantararat *et al.*, 2013). Similarly, Ahmada and Mahadia (2023) highlighted its effectiveness in Afghanistan, where it extends insurance access to impoverished communities, bolstering their financial security. In Malaysia, Rapi *et al.* (2022) found that micro takaful fosters financial inclusion, allowing low-income households to participate in economic activities and improve their livelihoods. Haroun and bin Yusoff (2019) further noted that its sustainable approach addresses financial exclusion, a significant barrier to economic mobility in developing countries. In Bangladesh, Banihani (2012) confirmed that micro takaful protects rural households from income disruptions caused by health emergencies or crop failures, preventing deeper poverty. Given Sudan's pressing poverty challenges, micro takaful emerges as a viable solution for reducing vulnerability and promoting economic empowerment. This study builds on these insights and hypothesises as follows:

H₁: That micro takaful significantly impacts poverty reduction in Sudan.

Micro Takaful and Takaful Awareness

Micro takaful has become a critical financial tool for economically vulnerable populations, offering risk protection and fostering financial inclusion (Malik & Sulaiman, 2024; Rapi *et al.*, 2022). Its success, however, hinges on the level of awareness among potential beneficiaries, as awareness directly influences adoption and understanding of takaful products (Ahmada & Mahadia, 2023; Said *et al.*, 2024). Studies indicate that targeted educational initiatives and community engagement efforts are effective in enhancing awareness. For instance, in Sri Lanka, Minaz *et al.* (2023) awareness about the differences in Islamic and conventional microinsurance is critical to their adoption rates. Similarly, Lusardi and Mitchell (2014) revealed that financial literacy plays a pivotal role, enabling underserved populations to better understand takaful principles and benefits, thereby fostering greater acceptance.

These findings highlight the potential of micro takaful to bridge the awareness gap, especially in countries like Sudan, where takaful systems remain underutilised despite their

alignment with cultural and religious values. In Malaysia, Jahya *et al.* (2023) found that income level, knowledge, and loss exposures boosted awareness, indicating the importance of context-specific approaches. Ismail *et al.* (2013) further demonstrated that micro takaful can act as an entry point, not only increasing product adoption but also enhancing trust in the broader takaful system. Building on these insights from other countries, this study hypothesizes as follows:

H₂: That micro takaful significantly impacts takaful awareness in Sudan.

Takaful Awareness and Poverty Reduction

Takaful, rooted in Sharia-compliant risk-sharing principles, resonates with Sudan's predominantly Muslim population, enhancing its potential for widespread acceptance (Haroun & Yusoff, 2024). Increased awareness of takaful can address existing gaps in financial literacy and inclusion by equipping individuals with knowledge about risk mitigation tools that align with their cultural and religious values. This is particularly pertinent in Sudan, where frequent economic shocks and environmental vulnerabilities exacerbate poverty levels (Siddig *et al.*, 2023). Studies indicate that microinsurance mechanisms like takaful can help mitigate income shocks, smooth consumption, and enhance household resilience (Carter *et al.*, 2014; Chantararat *et al.*, 2013). Moreover, creating awareness about Takaful as an alternative financial safety net can encourage adoption and utilization, enabling individuals and communities to better withstand crises such as health emergencies, agricultural losses, and unemployment.

Heightened takaful awareness has the potential to stimulate the uptake of insurance products, thereby contributing to financial stability among low-income households. This aligns with Shinkafi *et al.*'s (2023) findings establishing a link between financial literacy campaigns and increased participation in financial products, including insurance schemes. Similar dynamics have been observed in Islamic finance contexts, where awareness initiatives significantly influence customer adoption of takaful products (Cole *et al.*, 2017). The role of takaful in fostering financial resilience is particularly relevant in Sudan, where limited access to formal financial services leaves many vulnerable to poverty traps (Haroun & Yusoff, 2024). Thus, increasing awareness, stakeholders can potentially unlock the latent benefits of takaful, providing a culturally sensitive and effective pathway to poverty reduction. Nonetheless, rigorous empirical studies are necessary to validate these claims and quantify the impact of takaful awareness on poverty alleviation within Sudan's specific socio-economic and cultural framework. Accordingly, this study hypothesises as follows:

H₃: That takaful awareness significantly impacts poverty reduction in Sudan.

Micro Takaful and Takaful Product Choices

Micro takaful, tailored for low-income populations, is seen as addressing the specific needs and preferences of underprivileged communities, needs that often remain unmet by conventional takaful products. This perspective resonates with the findings of Cole *et al.* (2013) on microinsurance product design and uptake, where factors like affordability, simplicity, and accessibility were crucial for adoption among vulnerable populations. Given Sudan's economic context, characterized by a large low-income population and limited access to formal financial services (World Bank, 2022), micro takaful's focus on smaller premiums, simpler contracts, and community-based distribution mechanisms could significantly influence product choices (Haroun & Yusoff, 2019). This aligns with the principles of financial

inclusion, where products tailored to the unique needs of marginalised communities facilitate greater participation in the financial system. Also, emphasis on localized risks and culturally appropriate solutions, such as livestock or agricultural insurance (Carter *et al.*, 2014), may resonate more strongly with the needs and preferences of Sudanese communities compared to conventional *takaful* offerings.

Although direct empirical evidence from Sudan is scarce, the broader literature on microinsurance and Islamic microfinance suggests that product characteristics and accessibility play a crucial role in shaping consumer choices. Obaidullah (2008) highlights the importance of product diversification within Islamic microfinance, including *takaful*, to cater to diverse needs. While this does not specifically address micro *takaful*'s impact on product choices within Sudan, it underscores the relevance of product tailoring and accessibility for broader financial inclusion. Furthermore, the cultural and religious compatibility of *takaful* within Sudan (Kasim *et al.*, 2016), coupled with the potential for micro *takaful* to address previously unmet insurance needs of the lower-income segments, suggests a strong potential for influencing product choices. However, rigorous empirical research within Sudan is crucial to validate this assumption and quantify the precise impact of micro *takaful* on *takaful* product decisions. Accordingly, this study hypothesises as follows:

H₄: That micro takaful significantly impacts takaful product choices in Sudan.

Takaful Product Choices and Poverty Reduction

The argument that *takaful* product choices may be an influential factor in poverty reduction in Sudan can be pursued based on the premise that access to and appropriate utilisation of *takaful* can enhance financial resilience among vulnerable populations (Malik & Sulaiman, 2024). Similar to the findings on microinsurance and consumption smoothing (Carter *et al.*, 2014), selecting *takaful* products aligned with specific needs, such as health, livestock, or agricultural insurance (Chantarat *et al.*, 2013), can help households mitigate financial shocks and avoid impoverishment. In Sudan, where a significant portion of the population relies on agriculture and is vulnerable to climate-related risks, choosing appropriate *takaful* products, like index-based agricultural insurance (Chantarat *et al.*, 2013), can be crucial for protecting livelihoods and preventing poverty. Also, access to *takaful* health products can mitigate the impoverishing effects of illness, mirroring the broader findings on health insurance and poverty reduction.

Given Sudan's context, characterised by both vulnerability to economic shocks and a growing *takaful* sector, the potential for *takaful* product choices to influence poverty outcomes becomes particularly relevant. While direct empirical evidence linking *takaful* product choices and poverty reduction in Sudan remains emergent, the broader literature on insurance and poverty, as well as the potential for *takaful* to address specific needs within the Sudanese context, supports the plausibility of this hypothesis. Similar to the observed link between financial literacy and informed insurance decisions (Hastings & Tejeda-Ashton, 2008), informed *takaful* product choices can contribute to improved financial well-being and potentially reduce poverty. Therefore, this study advances the following hypothesis:

H₅: That takaful product choices significantly impacts poverty reduction in Sudan.

Micro Takaful, Takaful Awareness, and Poverty Reduction

Increased access to micro takaful, designed specifically for low-income populations, can serve as a catalyst for enhancing takaful awareness through well-structured educational programmes and community-focused engagement initiatives (Ahmada & Mahadia, 2023; Said *et al.*, 2024). Such awareness equips individuals with the knowledge to make informed financial decisions, enabling them to leverage takaful products effectively for mitigating risks associated with health crises, unemployment, or natural disasters (Carter *et al.*, 2014; Chantarat *et al.*, 2013). Furthermore, the mediating role of financial awareness in translating access to financial products into tangible poverty-reduction outcomes has been extensively documented, with Lusardi and Mitchell (2014) underscoring that financial literacy significantly enhances the capacity to utilize financial tools for economic resilience. This framework highlights that while micro takaful provides the foundational access to risk-sharing mechanisms, the awareness it fosters is pivotal for its effective deployment in poverty alleviation strategies. Accordingly, the current study hypothesizes as follows:

H₆: Takaful awareness mediates the relationship between micro takaful and poverty reduction in Sudan.

Micro Takaful, Takaful Product Choices, and Poverty Reduction

Micro takaful, with its emphasis on affordability and inclusivity (Cole *et al.*, 2013), has the potential to enable low-income populations to access a variety of takaful products tailored to their specific needs. These products, such as health, livestock, or agricultural takaful, address key vulnerabilities that perpetuate poverty cycles (Chantarat *et al.*, 2013). However, the impact of micro takaful on poverty reduction is contingent upon the ability of individuals to make informed product choices that align with their risk profiles and economic circumstances. Access alone is insufficient; the effectiveness of micro takaful lies in empowering users to select and utilize products that provide the most relevant financial protection (Bakhtiari, 2013; Hasim, 2014). These choices act as the mechanism through which the benefits of micro takaful are realized, underscoring the importance of product-specific awareness and decision-making support. Accordingly, the present study posits as follows:

H₇: Takaful product choices mediate the relationship between micro takaful and poverty reduction in Sudan.

Methodology

The study employed a survey design to collect data. Structured questionnaires were administered to a representative sample of the population of interest, gathering quantitative data on micro takaful, takaful literacy, perceptions of poverty reduction among the sampled respondents. This approach, consistent with descriptive research designs (Creswell & Creswell, 2018), allowed for the collection of self-reports across a large sample, facilitating statistical analysis to examine the relationships between the variables under investigation. Following Dillman *et al.*'s (2014) tailored suggestions, the survey instrument was carefully designed to ensure clarity, minimise respondent burden, and maximise response rates, thereby enhancing the reliability and validity of the collected data.

Respondents

The study employed a non-probability purposive sampling technique (Memon *et al.*, 2025) to recruit a total of 96 respondents from two key sources: religious and community

leaders (RCLs) and low-income communities (LICs). A total of 32 respondents were selected from RCLs, including imams, mosque committees, and community leaders, primarily through direct engagement at mosques and community centres. These leaders were targeted due to their role in promoting takaful awareness and Islamic financial principles. The remaining 64 respondents were drawn from LICs in regions with documented high poverty rates and active micro takaful initiatives. Data collection involved door-to-door outreach and group survey sessions at community centres, facilitated by collaboration with local NGOs and community-based organisations. The structured questionnaire was administered in settings convenient for respondents, ensuring clarity and accessibility, with efforts guided by ethical principles, including informed consent and confidentiality. This approach ensured a diverse and contextually relevant sample, representative of those familiar with and directly impacted by micro takaful initiatives.

Measures

Micro takaful was measured using a 10-item Likert scale. The scale items were adapted from the work of Churchill (2006), Dror *et al.* (2006), Giesbert *et al.* (2011), Matul *et al.* (2010), and Roth *et al.* (2007). This approach ensured the measure's content validity and comparability with existing literature. Participants responded to each item on a five-point scale ranging from 1= *Strongly Disagree* to 5 = *Strongly Agree*, reflecting their level of agreement with statements related to access to, usage of, and perceived benefits of micro takaful products and services.

Poverty reduction was measured using an 9-item Likert scale, designed to capture multiple dimensions of poverty. The items were adapted from Alkire & Santos (2010), Banerjee *et al.* (2015), Khandker (2005), Karlan & Zinman (2010), and Morduch (1999). Participants responded to each item on a five-point scale from 1= *Strongly Disagree* to 5 = *Strongly Agree*. The items addressed various aspects of poverty, including income, access to basic necessities, asset ownership, and economic opportunity.

The takaful literacy variable was defined as two constructs: takaful awareness and takaful product choices. Both takaful awareness and takaful product choices were assessed using a 7-item Likert scales, each. The items for both scales were adapted from existing financial literacy and insurance literacy measures, drawing specifically from Atkinson & Messy (2012), Huston (2010), Lusardi & Mitchell (2014), OECD/INFE (2011), and Worthington (2006). Participants responded to each item on a five-point scale 1= *Strongly Disagree* to 5 = *Strongly Agree*, reflecting their level of agreement or frequency of engagement with the described behaviours. The takaful awareness scale assessed participants' knowledge and understanding of takaful principles, products, and services. The takaful product choices scale measured participants' ability to evaluate, compare, and select takaful products appropriate for their needs and risk profiles.

The reliability of the constructs was assessed using Cronbach's alpha. The 10-item micro takaful scale demonstrated high reliability ($\alpha = 0.85$). The 8-item poverty reduction scale also exhibited strong internal consistency ($\alpha = 0.78$). The two constructs of the takaful literacy variable showed acceptable reliability: the 6-item takaful awareness scale ($\alpha = 0.72$) and the seven-item takaful product choices scale ($\alpha = 0.75$). These alpha values indicate that the scales used in this study are internally consistent and reliable measures of

their respective constructs. All alpha values exceed the generally accepted threshold of 0.70, suggesting adequate internal consistency (Nunnally & Bernstein, 1994).

Data Analysis

Descriptive statistics were computed using JASP (JASP Team, 2024), an open-source statistical software package. JASP was employed to calculate means, standard deviations, and frequencies for demographic variables and the study’s core constructs. Partial least squares structural equation modelling (PLS-SEM) was performed using SmartPLS 3.5 (Magno *et al.*, 2024) to evaluate the hypothesised relationships between micro takaful, takaful literacy, and poverty reduction. PLS-SEM, well-suited for analysing complex models with reflective constructs (Hair *et al.*, 2019), was chosen given the exploratory nature of the research and the focus on predicting poverty reduction based on the study variables.

Results

Descriptives

The study sampled 96 participants (Table 1), with an average age of 42.06 years (*SD* = 7.55). The sample was predominantly male (67%), with the remainder being female. On average, participants scored 3.16 ± 0.70 on poverty reduction, 3.14 ± 0.79 on micro takaful, 2.96 ± 0.76 on takaful product choices, and 2.27 ± 1.09 on takaful awareness. Shapiro-Wilk tests indicated that age (*W* = 0.954, *p* = 0.002), class (*W* = 0.613, *p* < 0.001), gender (*W* = 0.589, *p* < 0.001), and takaful awareness (*W* = 0.890, *p* < 0.001) were not normally distributed, whereas poverty reduction (*W* = 0.991, *p* = 0.771), micro takaful (*W* = 0.982, *p* = 0.196), and takaful product choices (*W* = 0.975, *p* = 0.063) demonstrated approximate normality. The relatively low mean score for takaful awareness (2.27) highlights a potential lack of familiarity with takaful principles among respondents. Additionally, the relatively high variability observed, particularly in takaful awareness (*SD* = 1.09), suggests diverse levels of understanding and experiences with takaful concepts within the sample. The gender imbalance within the sample also raises considerations about the generalisability of the findings, particularly to women who may have unique perspectives on microfinance and poverty reduction.

Table 1
Descriptives of Key Study Variables

Variable	Mean				Skewness		Kurtosis		Shapiro-Wilk	
	Value	SE	SD	Var.	Value	SE	Value	SE	Value	p-Value
Gender	1.323	0.048	0.470	0.221	0.770	0.246	-	0.488	0.589	< .001
Age	42.063	0.770	7.546	56.943	-	0.246	-	0.488	0.954	0.002
Class	1.625	0.050	0.487	0.237	-	0.246	-	0.488	0.613	< .001
Poverty Reduction	3.163	0.071	0.695	0.483	0.092	0.246	-	0.488	0.991	0.771
Micro Takaful	3.138	0.080	0.787	0.620	0.218	0.246	-	0.488	0.982	0.196
Takaful Product Choices	2.963	0.077	0.756	0.571	0.222	0.246	-	0.488	0.975	0.063
Takaful Awareness	2.266	0.111	1.087	1.182	1.002	0.246	0.243	0.488	0.890	< .001

Measurement Model

The measurement model for this study demonstrated strong psychometric properties. As displayed in Table 2 (and illustrated in Appendix A), all standardised item loadings on all respective constructs were above the recommended threshold of .50, ranging from .51 to .89, indicating that the items contributed meaningfully to their respective constructs. Also, internal consistency reliability was supported, with Cronbach's alpha (α) values ranging from .83 to .89, rho_A values between .75 and .90, and composite reliability (CR) values from .88 to .91. These results reflect robust reliability across the constructs of micro takaful, poverty reduction, takaful awareness, and takaful product choices. The strong psychometric performance of the measurement model underscores its validity and reliability, providing a sound basis for examining the hypothesized relationships in the study.

Table 2

Reliability Indices

Constructs	Items	Loadings	CA	rho_A	CR
Micro Takaful	MITAK1	0.860	0.891	0.904	0.911
	MITAK10	0.614			
	MITAK2	0.808			
	MITAK3	0.723			
	MITAK4	0.829			
	MITAK5	0.714			
	MITAK6	0.682			
	MITAK7	0.505			
	MITAK8	0.661			
Poverty Reduction	MITAK9	0.680	0.846	0.855	0.883
	POVRE1	0.698			
	POVRE3	0.727			
	POVRE4	0.784			
	POVRE5	0.760			
	POVRE6	0.737			
	POVRE7	0.754			
	POVRE8	0.572			
Takaful Awareness	TAKAW1	0.861	0.894	0.748	0.890
	TAKAW2	0.769			
	TAKAW4	0.697			
	TAKAW5	0.845			
	TAKAW6	0.755			
	TAKAW3	0.513			
Takaful Product Choices	TAKPC1	0.836	0.833	0.846	0.877
	TAKPC2	0.874			
	TAKPC3	0.513			
	TAKPC4	0.748			
	TAKPC5	0.708			
	TAKPC6	0.691			
	TAKPC7	0.566			

This study further demonstrates adequate to good convergent and discriminant validity for its constructs (Table 3). Convergent validity, assessed via Average Variance Extracted (AVE), was acceptable for Micro Takaful (AVE = 0.511), Poverty Reduction (AVE = 0.521), and Takaful Product Choices (AVE = 0.512), slightly exceeding the 0.50 threshold (Fornell & Larcker, 1981), while Takaful Awareness showed stronger convergent validity (AVE = 0.621). Discriminant validity, assessed using both the Fornell-Larcker criterion and Heterotrait-Monotrait Ratio of Correlations (HTMT), was also supported. The Fornell-Larcker criterion was met as all inter-construct correlations were lower than the square roots of the respective AVEs (approximately 0.715 to 0.785). Furthermore, all reported HTMT values were well below the 0.85 threshold (ranging from 0.126 to 0.543), providing robust support for discriminant validity (Henseler *et al.*, 2015).

Table 3
Validity Indices

Constructs	AVE	Fornell-Larcker Criterion				HTMT Ratio of Correlations			
		MITAK	POVRE	TAKAW	TAKPC	MITAK	POVRE	TAKAW	TAKPC
MITAK	0.511	0.715				—			
POVRE	0.521	0.500	0.722			0.528	—		
TAKAW	0.621	0.138	0.160	0.788		0.126	0.155	—	
TAKPC	0.512	0.359	0.405	0.194	0.715	0.408	0.453	0.201	—

Overall, the model explained a moderate portion ($R^2 = 0.312$, adjusted $R^2 = 0.289$, medium to large effect; Cohen, 1988) of the variance in poverty reduction, but substantially less variance in takaful awareness ($R^2 = 0.019$, adjusted $R^2 = 0.008$, small effect) and takaful product choices ($R^2 = 0.129$, adjusted $R^2 = 0.120$, small to medium effect). Model fit indices presented a mixed picture: while the SRMR (0.093) suggested a less than ideal fit (Hu & Bentler, 1999), exceeding the recommended 0.08 threshold, and the NFI (0.618) indicated a poor fit, falling below the 0.90 threshold (Bentler & Bonett, 1980), the close correspondence between saturated and estimated values for SRMR (0.093, 0.093), d_{ULS} (3.732, 3.728), d_G (1.586, 1.591), χ^2 (694.659, 696.134), and NFI (0.618, 0.618) suggests the model's complexity is appropriate.

Structural Model

As a prerequisite to structural model analysis, a multicollinearity test was conducted using variance inflation factor (VIF). VIF values > 3 typically indicate problematic multicollinearity (Hair *et al.*, 2010). In this study, with poverty reduction as the dependent variable, the VIFs for the independent variables were all below the problematic threshold: micro takaful (VIF = 1.154), takaful awareness (VIF = 1.045), and takaful product choices (VIF = 1.177). These low VIF values suggest that multicollinearity is not a significant concern and is unlikely to adversely affect the hypothesis test results.

Hypotheses were tested using bootstrapped confidence intervals and p-values. Results, presented in Table 4, indicated significant positive direct effects of micro takaful on both poverty reduction ($\beta = 0.407$, $p < .001$) and takaful product choices ($\beta = 0.359$, $p < .001$), as well as a direct effect of takaful product choices on poverty reduction ($\beta = 0.243$, $p = .024$). However, the hypothesized indirect effects, suggesting mediating roles of takaful awareness

($\beta = 0.008$, $p = .719$) and takaful product choices ($\beta = 0.087$, $p = .074$) between micro takaful and poverty reduction, were not statistically significant at $\alpha = .05$, though the indirect effect through product choices was marginal.

Table 4
Path Coefficients

Paths	β	SD	t-Stat	CIBC			p-Values
				Bias	2.50%	97.50%	
MITAK → POVRE	0.407	0.112	3.640	0.015	0.157	0.585	0.000
MITAK → TAKAW	0.139	0.182	0.760	-0.026	-0.339	0.318	0.447
MITAK → TAKPC	0.359	0.080	4.501	0.031	0.097	0.480	0.000
TAKAW → POVRE	0.055	0.125	0.445	-0.034	-0.217	0.250	0.656
TAKPC → POVRE	0.243	0.108	2.256	-0.001	0.021	0.437	0.024
MITAK → TAKAW → POVRE	0.008	0.021	0.360	0.007	-0.059	0.033	0.719
MITAK → TAKPC → POVRE	0.087	0.049	1.790	0.007	-0.004	0.187	0.074

Predictive Power and Relevance

PLS_{predict} analysis (Table 5), using Mean Absolute Error (MAE) due to asymmetric prediction errors (Appendix B), revealed generally strong predictive validity for the PLS-SEM model. For poverty reduction and takaful product choices, all items exhibited positive $Q^2_{predict}$ values and lower MAEs compared to the linear model (LM) benchmark, supporting the PLS-SEM model's superior predictive performance. However, takaful awareness presented mixed results; despite lower MAEs for most items at an item level, three items (TAKAW4, TAKAW2, and TAKAW6) showed negative $Q^2_{predict}$ values, indicating poorer predictive performance than the LM for these specific items. This finding for takaful awareness warrants further investigation. Overall, the PLS-SEM model demonstrated robust predictive validity, especially for poverty reduction and takaful product choices, confirming its ability to generalize beyond the sample data.

Table 5

PLS_{predict} Analysis

Constructs	Items	PLS-SEM		LM	
		MAE	Q ² _{predict}	MAE	Q ² _{predict}
Poverty Reduction	POVRE3	0.720	0.040	0.772	-0.070
	POVRE1	0.834	0.082	0.906	-0.104
	POVRE4	0.784	0.105	0.793	0.008
	POVRE8	0.749	0.010	0.792	-0.110
	POVRE5	0.658	0.133	0.654	0.126
	POVRE7	0.874	0.134	0.898	0.040
	POVRE6	0.728	0.208	0.775	0.105
Takaful Awareness	TAKAW4	1.155	-0.023	1.225	-0.257
	TAKAW1	1.245	0.006	1.302	-0.178
	TAKAW2	1.003	-0.012	1.085	-0.156
	TAKAW5	1.091	0.004	1.195	-0.199
	TAKAW6	1.078	-0.024	1.173	-0.267
Takaful Product Choices	TAKPC3	0.866	0.028	0.948	-0.166
	TAKPC4	1.010	0.056	1.048	-0.043
	TAKPC6	0.590	0.045	0.617	-0.020
	TAKPC2	1.018	0.047	1.112	-0.102
	TAKPC1	1.067	0.044	1.163	-0.141
	TAKPC5	0.873	0.065	0.929	-0.070
	TAKPC7	0.633	0.062	0.615	0.117

Importance–Performance Map Analysis (IPMA)

The IPMA (Figure 1) visually represents the total effects (importance) and performance scores of micro takaful, takaful awareness, and takaful product choices on poverty reduction, thereby highlighting key areas for improvement in using micro takaful for poverty alleviation in Sudan. The IPMA reveals that micro takaful has the highest total effect (0.469) and performance score (52.619), placing it in the upper right quadrant. This signifies its strong importance and high performance in influencing poverty reduction. Takaful product choices exhibits a moderate total effect (0.250) and a relatively high-performance score (49.697), positioning it in the right-centre area, reflecting notable importance and performance. Conversely, takaful awareness has a low total effect (0.035) and the lowest performance score (33.963), situating it in the lower left quadrant. This indicates its comparatively minor role in predicting poverty reduction within the model. These results suggest focusing efforts on micro takaful and, to a lesser extent, takaful product choices to effectively address poverty reduction, while the impact of takaful awareness appears less substantial within this specific model.

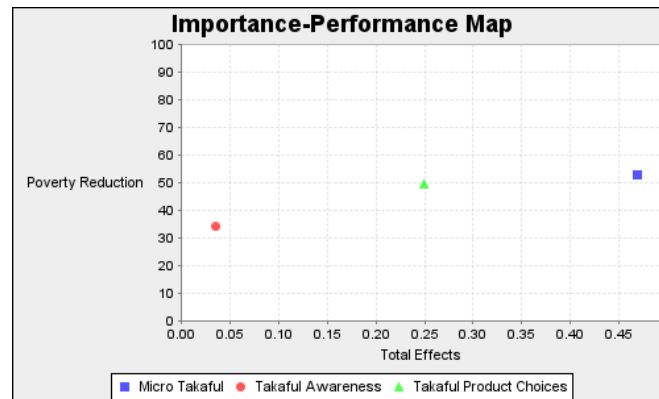


Figure 1. IPMA Plot

Discussions

This study investigated the potential mediating roles of takaful awareness and takaful product choices in the relationship between micro takaful and poverty reduction in Sudan, employing Sen's (1999) capability approach as a theoretical lens. The significant direct effects of micro takaful on poverty reduction and takaful product choices support the notion that micro takaful can serve as a key instrument in enhancing individuals' capabilities by reducing vulnerability to economic shocks and enabling access to diverse financial products. The positive direct effect of takaful product choices on poverty reduction further corroborates this, suggesting that micro takaful can create an enabling environment for individuals to make informed financial decisions that directly improve their socio-economic conditions (Abdullah *et al.*, 2022). These findings align with existing literature, which highlights the role of microinsurance in expanding economic opportunities and reducing poverty (Bakhtiari, 2013; Banihani, 2012; Elsherif, 2023).

However, the non-significant mediating roles of takaful awareness and takaful product choices indicate potential gaps in their contributions as pathways between micro takaful and poverty reduction. Although the indirect effect of takaful product choices approached significance, the limited mediation highlights the need for a stronger emphasis on financial literacy and awareness initiatives to ensure that the benefits of micro takaful are fully realised (Ahmada & Mahadia, 2023; Lusardi & Mitchell, 2014). This finding is consistent with studies emphasising that awareness and understanding of financial products are crucial for their effective utilisation in poverty alleviation strategies (Alhammedi, 2023; Ismail *et al.*, 2013; Jahya *et al.*, 2023).

The predictive validity analysis reinforces the model's robustness for poverty reduction and takaful product choices, underscoring the utility of PLS-SEM for generalising beyond the sample data. However, the mixed predictive performance for takaful awareness, particularly the negative Q^2 predict values for certain items, suggests inconsistencies that require further exploration. These results imply that while the structural model performs well overall, interventions targeting takaful awareness may benefit from tailored approaches that address the specific barriers to understanding and engagement (Alhammedi, 2023).

The IPMA analysis provides actionable insights by identifying micro takaful as the most critical driver of poverty reduction, with its high performance and importance scores highlighting its central role in this context. Takaful product choices, while moderately

impactful, also contribute meaningfully, suggesting potential for scaling up their influence through enhanced accessibility and diversity of product offerings. Conversely, the relatively low performance and importance of takaful awareness underscore its limited role in driving poverty reduction. This finding aligns with the broader observation that awareness alone may not suffice to bridge the gap between micro takaful adoption and its intended socio-economic outcomes (Minaz *et al.*, 2023).

Overall, the results suggest prioritising micro takaful initiatives and improving the breadth and depth of takaful product offerings to maximise their poverty reduction impact. Concurrently, addressing the gaps in takaful awareness requires targeted education and outreach efforts to enable broader participation and more effective utilisation of micro takaful services in Sudan.

Implications of the Study

Theoretical Implications

The findings of this study, grounded in Sen's (1999) capability approach, highlight micro takaful's significant role in poverty alleviation by directly enhancing individual capabilities. The positive direct effects of micro takaful on both poverty reduction and takaful product choices highlight its function as a financial safety net, reducing vulnerability and enabling individuals to pursue socio-economic opportunities. This aligns with theoretical perspectives that view financial protection as a means of expanding capabilities and freedoms essential for sustainable poverty alleviation (Sen, 1999; Nussbaum, 2000). Also, the direct relationship between takaful product choices and poverty reduction suggests that the availability of diverse financial instruments empowers individuals to make tailored financial decisions, promoting resilience and improved living conditions, consistent with previous findings on the role of microfinance in capability expansion (Morduch, 1999).

Conversely, the non-significant mediating role of takaful awareness challenges assumptions that awareness alone is sufficient for capability enhancement. The low importance and performance scores for takaful awareness suggest that its impact is limited without accompanying accessibility and product attractiveness (Karlan & Zinman, 2010). The marginal indirect effect of takaful product choices further indicates that micro takaful's primary contribution to poverty reduction is through direct mechanisms rather than intermediary pathways. These findings highlight the need for theoretical refinements that integrate contextual factors and access considerations into the capability framework.

Practical Implications

The results of this study also provide actionable insights for policymakers, microfinance providers, and practitioners involved in poverty alleviation initiatives in Sudan. The significant direct effects of micro takaful on both poverty reduction and takaful product choices suggest that expanding access to micro takaful products should be a priority. This aligns with practical evidence that microfinance initiatives offering accessible and tailored financial services can improve socio-economic conditions (Khalidin, 2024). Also, the direct relationship between takaful product choices and poverty reduction highlights the importance of diversifying and customising takaful products to meet the needs of impoverished populations. Strategies to increase product adoption, such as simplifying enrolment processes, ensuring affordability, and enhancing the relevance of takaful products

to local contexts, could further amplify their impact on poverty alleviation (Haroun & Yusoff, 2024).

The findings also highlight areas for improvement in raising awareness of takaful schemes. The low total effect and poor performance scores of takaful awareness suggest that current outreach and education efforts are insufficient. Practitioners should prioritise targeted campaigns to improve understanding of takaful concepts, leveraging culturally resonant messaging and trusted community channels to increase engagement (Malik & Sulaiman, 2024). However, the study also suggests that awareness alone is not enough; it must be paired with improved product accessibility and attractiveness. Again, the robust predictive validity of the model for poverty reduction and takaful product choices underscores the practical reliability of micro takaful initiatives as poverty reduction tools, reinforcing their importance in financial inclusion policies. Addressing gaps in takaful awareness and enhancing product design will further optimise the impact of micro takaful on poverty reduction in Sudan.

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