The role of social marketing theory in assessing insecticide-treated net usage intentions among pregnant women in Ghana

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Abstract

Purpose – Despite the efforts to improve the usage of insecticide-treated nets (ITNs) among pregnant women in endemic malaria countries like Ghana, its usage still remains low. Therefore, this study aims to assess the intention to use ITNs and actual usage behaviour among pregnant women in Ghana using the integrated model of behaviour prediction (IMBP) and explore factors preventing its usage.

Design/methodology/approach – A structured questionnaire was administered to 310 respondents using a convenience sampling technique, and the data were analysed using multiple regression. Exploratory data collected through an interview guide was analysed using Kvale and Brinkman's (2015) five-step approach.

Findings – The findings indicate a significantly positive association between intention to use ITN and actual usage of ITN among pregnant women in Ghana. Attitude and normative beliefs were the most significant predictors of intention to use ITNs among pregnant women. The result further shows that despite the generally positive perception of the effectiveness of the ITN in malaria prevention and positive intention to use it, its actual usage remains low because of discomfort (primarily associated with heat, irritation, heat rashes, suffocation and vomiting, size and design, reactions to ITN's chemicals and misconceptions about ITNs causing cancer. In this study, the implications are discussed.

Originality/value – This study applied the IMBP to ITNs usage intention among pregnant women in a developing market context and found the model to predict ITN usage intention effectively.

Keywords Social marketing, Malaria, Insecticide-treated net, Pregnant women, Integrated model of behaviour prediction (IMBP), Ghana

Paper type Research paper

1. Background of the study

Malaria remains one of the most devastating global health crises, despite considerable improvements in malaria prevention initiatives in many endemic countries globally (WHO, 2020).

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In 2019, for instance, approximately half of the world's population was at risk of malaria, with an estimated 229 million cases and 409,000 people dying because of the disease. The African sub-region bears a disproportionately large share of the global malaria burden. In 2019, for example, 94% of all malaria cases and deaths globally occurred in the region (WHO, 2020). Pregnant women and children under age five are the most susceptible groups affected by malaria in 2019, as two-thirds of all malaria cases and deaths globally occurred within this group. Specifically, 11.6 million cases were reported among pregnant women across 33 countries within the African sub-region (WHO, 2020). Malaria infection remains a significant risk factor to pregnant women and children in Africa because of the lowered immunity of this group of people. Most of the morbidity and mortality cases occurred among this group. For instance, Dun-Dery *et al.*'s (2020) work show that malaria in pregnant women accounts for 17.6% of all malaria cases in Ghana. According to UNICEF (2020), though these deaths are preventable and treatable, a child under five dies of malaria every two minutes in Africa.

Ghana's malaria status is similar to that of the rest of Sub-Saharan Africa. Annually, over 3.2 million malaria cases are documented, with about 38,000 of these instances resulting in death, making malaria the country's leading cause of illness and death (GHS, 2020). Economic wise, malaria is responsible for a 1.3% annual decline in Africa's economic growth. The cost of malaria-related absenteeism and productivity losses, for example, is estimated to be US$6.6mn per year in Ghana.

Urgent action is thus required to halt the spread of this disease and get back on track towards achieving the global malaria goal of a 90% reduction in cases and deaths by 2030. One of the WHO-recommended strategies to deal with the spread of the disease is the use of insecticide-treated nets (ITNs) as the best approach for families to protect themselves from malaria because this has been shown to reduce the risk of infection by up to 85% and the risk of mortality by 30% (WHO, 2020).

In an attempt to curb the morbidity and mortality rates caused by malaria among pregnant women and children, the Government of Ghana, through the ministry of health has adopted the use of ITNs and invested heavily (e.g. US$58mn in 2018) in the free distribution ITNs nationwide along with other evidence-based interventions for malaria control (GHS, 2020). Despite this significant investment and engagement, studies have shown a gap between ownership and use of the ITNs for malaria prevention amongst nursing mothers and expectant mothers (Afoakwah *et al.*, 2018; Manu *et al.*, 2017; Dun-Dery *et al.*, 2020). The work of Manu *et al.* (2017) shows that though there is a 98% ownership of ITN among pregnant women in the Northern part of Ghana, only 45.6% report actual usage. The study conducted by Afoakwah *et al.* (2018) also found that though most pregnant women and lactating mothers are aware of the benefits of using the ITN, only a few actually use it because of the excessive heat it generates. A survey by the Ghana Health Service (GHS, 2020), for instance, shows that only 23% of pregnant women who were given ITN actually use them to prevent malaria. These studies have shown that malaria prevention efforts in Ghana have mainly focused on awareness creation and free distribution of ITNs, with little attention given to influencing usage behaviour among the target audience. The insufficient attention to interventions to improve usage could be attributed to the low utilisation of ITNs among the target audience.

The low utilisation of the ITNs and the increasing number of malaria cases in pregnant women in Ghana suggests that the current widespread distribution of ITNs in maternity clinics and communities may not necessarily result in their use unless it is supported by behaviour modification initiatives that address beliefs and misconceptions regarding the ITN. However, previous studies on malaria prevention have focused on the burden of malaria, drug efficacy and effectiveness, education and communication, neglecting behavioural change as a critical strategy to malaria prevention (Ahorlu *et al.*,

2005; Tweneboah-Koduah *et al.*, 2012; Adjah and Panayiotou, 2014). Therefore, the current study uses the integrative model of behavioural prediction (IMBP) to predict ITN usage intention among pregnant women in Ghana. The study further seeks to have an in-depth understanding of competing factors or barriers preventing pregnant women from using the ITNs and provide social marketing solutions that could improve the use of the ITN among the target audience. As demonstrated by past scholars (Vinothkumar and Subramanian, 2016), we know that intentions can influence behaviour; we, therefore, want to have an in-depth knowledge of what influences intentions to use ITN what holds this ITN program back.

Social marketing is a strategy of using marketing principles and techniques to create health, environmental and social change interventions to persuade target audiences to embrace, decline, alter or quit a behaviour for the betterment of individuals, communities, or society (Andreasen, 2002; Rundle-thiele *et al.*, 2017). Thus, if public organisations tasked with the responsibility to promote the usage of ITN will address the issue from a marketing perspective, they are more likely to achieve success in terms of actual usage (Coffie and Hinson, 2022). The social marketing strategy also depends on the proper use of behavioural theory to create frameworks for designing initiatives by identifying the factors influencing health behaviour. Effective interventions could be designed to influence behaviour if these factors are understood and theories play a significant role in this regard (Luca and Suggs, 2013; Tweneboah-Koduah, 2014).

2. Literature review

The systematic application of marketing concepts and techniques to voluntarily achieve specific socially desirable behavioural goals, which will benefit both the individual and society, is known as social marketing (Kotler *et al.*, 2002; Andreasen, 2002). In other words, the key objective of social marketing is to change people's behaviour by making desirable behaviour attractive through the application of marketing techniques and concepts. However, understanding why people behave the way they do and understanding when and under what conditions they are prepared to change is critical to achieving this objective (Luca and Suggs, 2013; Tweneboah-Koduah, 2014). This is because behaviour change entails understanding people and their motives and formulating strategies that will result in a meaningful change (Tweneboah-Koduah *et al.*, 2012). Behaviour change theories play an essential role in this regard (Luca and Suggs, 2013).

The current study first uses the IMBP to predict ITN usage intention among pregnant women in Ghana. The IMBP is a combination and extension of the theory of reason action and theory of planned behaviour as a solution to the criticism of these theories (Fishbein and Yzer, 2003). The primary criticism of these theories has been the focus on one dimension of human decision-making with little attention to factors that prevent or encourage the actual performance of behaviour (Robbins and Niederdeppe, 2015; Fishbein and Yzer, 2003). The IMBP thus introduced skills and environmental factors as moderating variables that could explain the relationship between intention and actual performance of the behaviour, thereby closing the intention-behaviour gap (Fishbein and Yzer, 2003). Thus, though people may form a solid intention to perform a given behaviour, there is no guarantee that action will be taken. Two additional factors are required: the necessary skills (e.g. knowledge) about appropriate behaviour and the absence of environmental constraints (such as stigma). However, scholars (Robbins and Niederdeppe, 2015) argued that these moderating variables relating to skill and environmental constraints should be identified through exploratory means because of contextual differences and issue-specificity. As a result, an exploratory

study was conducted to understand factors that may prevent the target audience from not using the ITNs and factors that will encourage them to use the ITNs.

The IMBP framework holds that a person's (expectant mothers) willingness to perform a given behaviour (sleep in ITN) predominantly depends on the intensity of pregnant women's intention to perform the behaviour (Fishbein, 2009). Thus, behavioural intentions are the most critical factors in influencing behaviour and the stronger the intention, the more likely the behaviour will be accomplished (Ajzen, 1985). It is, therefore, hypothesised that;

H1. There will be a significant, positive relationship between intention to use ITN and the usage behaviour of ITNs.

According to the IMBP framework, behavioural beliefs relating to attitude, subjective norms and perceived behavioural control will significantly influence intention to perform or not to perform a given behaviour (sleep in ITNs) (Fishbein, 2009; Fishbein and Yzer, 2003). For instance, beliefs about the outcomes of sleeping in ITN and the evaluation of these outcomes would positively or negatively influence an individual's attitude to sleep in an ITN. In other words, if a person believes that sleeping in ITN would have a positive outcome on her health, her attitude towards sleeping in ITN will be positive and the intention of sleeping in it will be enforced. Based on this idea, it is hypothesised as follows (see Figure 1):

H2. The relationship between attitude and intention to use ITN will be positive and significant.

Normative beliefs or subjective norms, which are perceptions, thoughts and beliefs an individual hold about the expectations of his or her immediate environment and the willingness to comply with these expectations, also have a significant influence on intention to perform a behaviour (Diteweg *et al.*, 2013; Robbins and Niederdeppe, 2015).

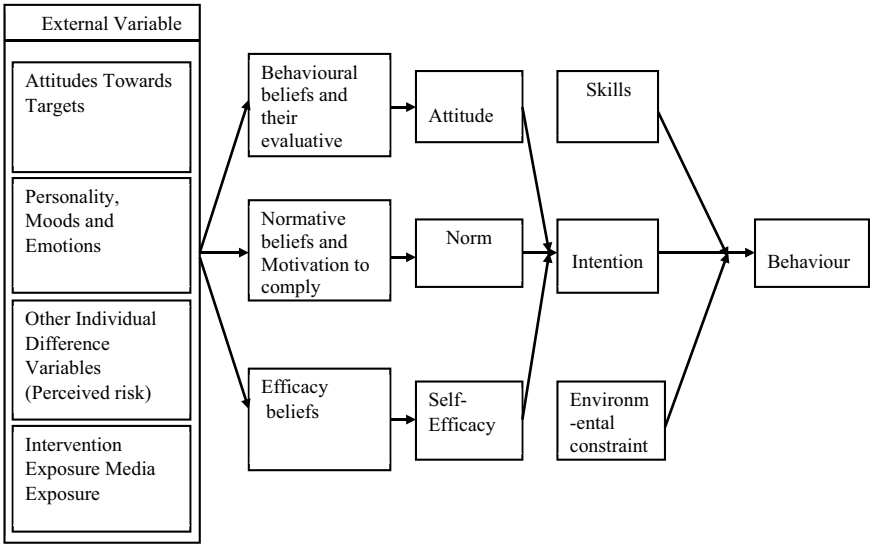

Figure 1.
Conceptual framework (Fishbein, 2009)

Individuals may feel social pressure to conform to these expectations because of their normative beliefs. For instance, if an individual is enthusiastic about sleeping in ITN and believes that others are not against it, she will likely experience less negative social pressure. The intention to sleep in ITN is thus strengthened. It, therefore, hypothesised as follows (see Figure 1):

H3. The relationship between subjective norms and intention to use ITN will be positive and significant.

Perceived behavioural control or efficacy beliefs are perceptions or beliefs in one's ability to perform the behaviour in question under challenging circumstances (Diteweg *et al.*, 2013; Fishbein, 2009). Thus, if a person feels that it is not difficult to sleep in ITN and that she can sleep in ITN no matter the condition, intention to use it is enhanced. We, therefore, hypothesised that:

H4. The relationship between self-efficacy and intention to use ITN will be positive and significant.

According to the IMBP framework as shown in Figure 1, skills and contextual restrictions determine the intensity of the link between intentions and behaviour (Previte *et al.*, 2015). According to the model, if an individual has a strong intention to perform a given behaviour and have the necessary skills to perform the behaviour with no environmental constraints preventing the performance of the behaviour, there is a high probability that the behaviour will be performed (Diteweg *et al.*, 2013; Previte *et al.*, 2015; Fishbein, 2009). Based on this discussion, we formulate *H5* and *H6* as follows:

H5. The link between intention to use ITN and actual will be moderated by Skill (ability).

H6. The relationship between intention to use ITN will be moderated by environmental factors.

3. Research design and methodology

This study uses quantitative and qualitative research methods to determine inferences about the population's characteristics, attitudes or behaviour and explore barriers and competing factors that inhibit the usage of ITN (Creswell, 2013). This paper applied an IMBP proposed by Fishbein and Yzer (2003) to evaluate the ITN usage behaviour of pregnant women in Ghana.

This study was conducted in nine antenatal hospitals/clinics in Greater Accra, the largest administrative region of Ghana, with a population of 5.2 million people (GSS, 2020). These areas include Nima, Ashaiman, Tema Community 1, Chorkor, Madina, Mamobi, Old Fadama, James Town and Teshie Nungua. These areas were purposively selected because, according to the Ghana Health Service (GHS, 2020), 50.3% of malaria cases among pregnant women in Ghana occur in these areas. However, a convenience-based nonprobability sampling method was used in selecting the respondents because of a lack of sampling frame for pregnant women based on patient confidentiality. Thus, the pregnant women were selected based on their availability and willingness to participate in the survey.

For the quantitative data, a structured questionnaire based on a five-point Likert scale was used to measure the degree of agreement or disagreement with the statements

provided (1 = strongly disagree to 5 = strongly agree). The questionnaire was in two sections. Section 1 covered the respondents' socio-demographic profile such as age, marital status, educational level, possession and usage of ITN. Section 2 measured constructs based on the IMBP: intention, attitude, perceived norms, self-efficacy, environmental constraints and skills. All the measurement items were adapted from prior literature and modified to suit the current context. The purpose of this study was explained to the respondents. They were also guaranteed that their identity and confidentiality would be protected.

Based on the recommendations of scholars (Eng, 2003; Hsieh *et al.*, 1998; Wolf *et al.*, 2013), a sample size above 250 was deemed appropriate for this study. For instance, Hsieh *et al.* (1998) asserted that a sample size above 250 is appropriate for statistical analysis. A total of 400 people were contacted. However, only 310 responded, representing a 77.5% response rate. Out of this number, 51 were from Ashaiman, 30 from Tema Community 1, 40 from Chorkor, 59 from Nima, 22 from Old Fadama, 36 from Teshie Nungua, 27 from Madina, 34 from James Town and 11 from Mamobi Polyclinic. The administration of the questionnaire was done on a face-to-face basis.

Additionally, qualitative data was also collected through interviews to explore barriers and competing factors preventing or discouraging pregnant women from using the ITN as a malaria preventive mechanism. Conducting an exploratory study to identify factors stopping people from using the ITN became necessary as the analysis of the quantitative data shows a low usage of the ITNs by the respondents despite having a positive perception about its effectiveness. Though the qualitative data was also collected in the same health facilities where the quantitative data were collected, the respondents were different as the exploratory study was conducted after analysing the quantitative data. A total of 31 pregnant women were conveniently selected and interviewed based on their willingness to participate in the survey. The respondents were asked questions regarding the cause of malaria and how to prevent it, the efficacy and benefits of the ITN in preventing malaria, the challenges associated with using the ITN and the factors preventing usage of the ITNs. The data was transcribed using Amberscript. However, the data was analysed following the five-step approach by Kvale and Brinkman (2009): transcribing and reading data, labelling/coding, deciding important codes, labelling categories and writing and describing results.

4. Data analysis and results

4.1 Quantitative data analysis

The quantitative data were analysed using the SPSS software package. To analyse the data, we used both descriptive and inferential statistical tools. Multiple regression analyses were used to assess the links hypothesised in the study. The data's reliability and internal consistency were assessed using Cronbach's alpha, Kaiser–Meyer–Olkin (KMO) sampling adequacy and Bartlett's sphericity test. The correlations between the items were sufficiently strong for factor analysis (principal component analysis [PCA]) based on the KMO values for the individual items and Bartlett's test (Hsieh *et al.*, 1998). As a result, principal component analysis was used to simplify the data by eliminating any redundancy among the variables and determining a factor loading for each item in the associated factors. Items with factor loadings of less than 0.6 were removed (Hsieh *et al.*, 1998; Wolf *et al.*, 2013); see Table 1 below. A total of six (6) items were deleted (INTENT2, INTENT4, ATT2, NORM3, NORM6 and EFF4).

Construct	Code	Factor loadings	Variance explained	Cronbach's alpha
Intention	INT1	0.71	66.23	0.75
	INT3	0.79		
Attitude	ATTI1	0.72	55.88	0.80
	ATTI3	0.62		
	ATTI4	0.59		
	ATTI5	0.62		
	ATTI6	0.69		
Normative beliefs	NOR1	0.72	60.88	0.78
	NOR2	0.80		
	NOR4	0.730		
	NOR5	0.650		
Self-efficacy	EFF11	0.671	54.48	0.71
	EFF12	0.618		
	EFF13	0.740		
Environmental constraints	ENVC1	0.767	51.78	0.72
	ENVC2	0.51		
Skills	SKIL1	0.67	78.73	0.77
	SKIL2	0.66		
	SKIL3	0.69		

Table 1.
Rotated component matrix and internal consistencies

4.2 Profile of respondents

The demographic data of the sampled respondents reveals that 95% of them are under the age of 40 (see Table 2). This is because, above age 40, most women stop reproducing. In terms of educational qualifications, 36% of the sampled respondents had no formal education, whereas 46% had completed SHS or A level schooling. The majority of those polled (37.4%) were unemployed. The table also shows that 95.2% of the respondents have received an ITN from their respective health facilities. The result further shows that though the majority (82.6%) of the respondents believe that the ITN is an effective means of reducing malaria infection, 22% of them have never used it, 37% sometimes use it with only 41% of the respondents reported to always sleeping in the ITN.

5. Multiple regression analysis

Multiple regression analyses were carried out to evaluate the claims presented earlier in this research (see Table 3). These tests and validations were carried out to test and validate the study's hypotheses. Multiple regression results were used to investigate the relationship between the variables in the behaviour prediction model. This was done to determine which independent variables best explained the dependent variables. In the first regression, the variable of the IBPM framework were the independent variables, with intention as the dependent variable. However, actual usage of ITN was the dependent variable in the second regression and intention was the independent variable. Table 4 shows the graphical representations of the regression analysis.

The regression results show a significant and robust association between the construct variables and ITN usage intention. The first model had (F = 24.180, Prob. F-stats = 0.05), whereas the second model had (F = 187.579, Prob. F-stats 0.05), all indicating significance of the construct's reliabilities (Rundle-thiele *et al.*, 2017). In the model summary, the R-square value shows how much variance in the dependent variable was explained by the independent variables. The R-squared of 0.476 in the first regression model indicates that

Profile	Measurements	Frequency	(%)
Age of respondents	18–24	86	27.7
	25–30	110	35.5
	31–40	111	35.8
	Above 40	3	1.0
	Total	310	100.0
Educational Qualification	No formal education	111	35.8
	JHS	34	11.0
	SHS/A Level	142	45.8
	Tertiary	23	7.4
	Total	310	100.0
Marital Status	Married	191	61.6
	Single	54	17.4
	Divorced	3	1.0
	Cohabitation	62	20.0
	Total	310	100.0
Employment Status	Employed	34	11.0
	Self-employed	96	31.0
	Student	59	19.0
	Unemployed	116	37.4
	Retired	5	1.6
	Total	310	100.0
Possession of ITN	No ITN	15	4.8
	Planning to have	–	–
	Have ITN	295	95.2
	Total	310	100
Source of ITN	Received as gift	5	1.6
	Received ITN from clinic/health facility	295	95.2
	Bought the ITN myself	10	3.2
	Total	310	100
Effectiveness of the ITN	Very effective	5	1.6
	Effective	256	82.6
	Not effective	49	15.8
	Total	310	100
ITN usage	Always sleep in ITN	127	41
	Sometimes sleeps in ITN	115	37
	Never slept in ITN	68	22
	Total	310	100

Table 2.
Profile of respondents

the independent variables (attitudes, norms and efficacy) explained 47.6% of the variance in intention. Intention explained 37.9% of the variance in behaviour in the second regression model.

In Model 1, the result shows that normative beliefs (subjective norms) ($\beta = 0.17$, $t = 2.86$, $p < 0.001$) was the second biggest contributor to intention to use ITNs for malaria prevention among expectant mothers in Ghana ($\beta = 0.343$, $t = 5.941$, $p < 0.001$). Intention (desire or willingness) to employ ITNs for malaria prevention amongst expectant women in Ghana was influenced mainly by attitude ($\beta = 0.343$, $t = 5.941$, $p < 0.05$). Although there was a positive relationship between efficacy and intention to use ITN, it was statistically insignificant ($\beta = 0.023$, $t = 0.382$, $p > 0.702$). This suggests that self-efficacy is not a significant influencer of expectant mothers' decision to use ITNs. The second model analysed the relationship between intention as a predictor variable and ITN usage as a dependent variable. The statistical results demonstrated a strong positive and significant

			S. E	β	t	Sig.
Model 1	(Constant)[a]		0.364		1.623	0.001
	Attitude		0.105	0.343	5.941	0.000
	Norms		0.071	0.165	2.855	0.005
	Efficacy		0.088	0.023	0.382	0.702
	R	0.547			S.E. of estimate	0.57510
	R-square	0.476			F-statistics	24.180
	Adj. R-square	0.438			Prob. (F-stats.)	0.000
Model 2			S. E	β	t	Sig.
	(Constant)[b]		0.121		20.500	0.000
	Intention		0.032	0.615	13.696	0.000
	R	0.615			S.E of estimate	0.61713
	R-square	0.379			F-statistics	187.579
	Adj. R-Square	0.376			Prob. (F-stats.)	0.000

Notes: [a]Dependent variable: intention; [b]Dependent variable: behaviour

Table 3. Multiple regression analysis results

Model	Relationships	B	T	Sig.	R^2	Adj. R^2	F
1	Intent	0.635	14.436	0.000	0.412	0.409	107.711
	Skill_x_Intent	0.185	4.205	0.000			
2	Intent	0.595	13.086	0.000	0.390	0.386	97.963
	Env_x_Intent	0.107	2.359	0.019			

Table 4. Moderating effects of skill and environment on intention

association ($\beta = 0.615$, $t = 13.696$, $p < 0.05$) between the two parameters. Thus, there is a substantial link between the intention to use ITNs and their actual use, as seen by their positive behaviour, among the Ghanaian pregnant women sampled. Thus, when pregnant women form the intention to use ITN, it is likely to result in actual usage behaviour to protect themselves from malaria.

6. Test for moderation

According to the study's conceptual framework, there is a suggested assumption that pregnant women's skills or ability to correctly use ITN and the environment in which they find themselves will significantly influence their usage of the ITNs to prevent malaria. As a result, moderation tests were conducted in that regard (see Table 4 below). The moderating effect of skill (abilities) on the relationship between pregnant women's intention to use ITNs and their actual usage of ITNs is represented in Model 1. Model 2 represents the moderating effect of environment on the relationship between pregnant women's intention to use ITNs and their actual usage of ITNs.

Following Baron and Kenny's (1986) criteria, the beta (β) values, t-values and R^2 values revealed that both factors moderated the association between intention and behaviour. In particular, the higher R^2 values in both cases ($R^2 = 0.412$ and $R^2 = 0.390$) suggest that in Ghana, the link between expectant women's willingness to use ITNs and their actual usage habit is strongly and favourably moderated by both competence (skill in using ITN) and environment (locality or community). This also suggests that identifying the sources of

these variables (skills and environmental factors) will significantly influence the effective design and implementation of interventions to facilitate or improve actual usage of the ITN among the target audiences. An exploratory study was, therefore, conducted to identify these factors.

7. Results of the qualitative study

7.1 Knowledge of the cause of malaria and how to prevent it

The respondents are very knowledgeable about mosquito bites as the source or cause of malaria and how to avoid getting malaria. Thus, the respondents are aware that avoiding mosquito bites means preventing malaria. The respondents are also aware that the primary means of preventing malaria is to keep the environment clean to prevent mosquitoes from breeding. However, the responses from the respondents clearly show that the peculiar nature of their environment makes it almost impossible to avoid mosquitoes from breeding and that the only feasible means within their control is how to avoid the mosquitoes from biting them.

> Mosquitoes prefer dirty, bushy places with stagnant water as their breeding ground [. . .] so if we can keep our environment clean and our gutters clean and dry, we will eliminate mosquitoes and malaria without using chemicals. However, the environment where most of us find ourselves, it is practically impossible to achieve that as almost all of us connect our bathwaters directly to gutters and others also dump refuse in these gutters. Therefore, the mosquitoes are always with us in their numbers and the only way to stop them from biting you is to continue spraying, use coil or sleep in mosquito net [Respondent from James Town Health centre].

The result also shows that the use of mosquito repellants and sprays, mosquito coils, natural repellants (e.g. orange pills) and sleeping in the insecticide-treated net are the common means through which the respondents prevent mosquito bite and malaria.

> Yea, it is possible to prevent mosquitoes from biting you by sleeping in a mosquito net, using mosquito coils on daily basis or mosquito spray [Respondent from Mamobi Polyclinic].

8. Efficacy and perceived benefits of insecticide-treated nets usage

The analysis of the result shows that the respondents perceived the ITN as a very effective means of controlling or preventing malaria. The result further shows that though the respondents adjudge the ITN as an effective measure in malaria prevention, it is perceived that its usage alone might not be enough as other activities are done outside the net. Some participants explained this as a reason for the low usage of the ITNs despite the positive perception about its effectiveness, as demonstrated by the following statements. The result further shows that though the respondents are aware of the effectiveness of the ITN, using domestic insecticides to prevent mosquito bites before bedtime discourages the use of the ITNs.

> Though the treated net is very good in preventing malaria, using it alone is not enough as we have to do other things like cooking, eating, or watching television outside the net [. . .] what I mean is, we only sleep in the net, what about the time we spend at the hall watching TV, or cooking, or children doing their homework? So, though the net is very effective, it must be combined with other methods like mosquito coil or periodically spray the entire rooms in addition to sleeping in the net [Respondent from Madina Polyclinic].

> The net is very good in preventing mosquito bite and malaria but I see no reason why I have to sacrifice and sleep in a net that produce so much heat when I still have to spray my room because I spend most of my time at the kitchen and the hall cooking or watching TV[. . .] so, once I spray the room every three days, I don't sleep in the net.

Concerning benefits of using the ITN, protection from mosquito bites and malaria, saving money from hospital bills, staying healthy throughout pregnancy, cost-effectiveness, sound sleep, mosquitoes developing resistance to most mosquito sprays and protection from other insects were the common benefits cited for using the ITNs.

> Using the mosquito net is very, very helpful because it protects me from mosquito bites and malaria, keeps me healthy and help me from paying so much on hospital bills and help me save a lot of money from buying mosquito sprays and coils.

Confirming the findings of Kudom *et al.* (2013), the responses from the respondents have shown that malaria-causing mosquitoes continually develops resistance to domestic insecticides suggesting that the use of the ITN is safer and better approach to malaria prevention in Ghana. This is demonstrated in the statement below.

> [. . .] now plenty of the mosquito sprays and coils don't do anything to the mosquitoes again [. . .] they only make them to sleep for a while. So, it is safer to sleep in the mosquito net [. . .] it keeps you healthy from malaria and you save money from going to the hospital [Respondent from Nima Polyclinic].

Additionally, the perceived side effects of competing products (mosquito sprays and coils) such as colds and flu, headache and sore throat are some factors that motivated the usage of the ITN among some pregnant women.

> The mosquito sprays are very strong and could have negative effect on human beings. Just imagine the negative effect those chemical could have on me and baby [. . .] a chemical that I would have to leave my room for 30 minutes after spraying [. . .] just imagine the effect and bad smell that comes with it, which sometimes makes you vomit. So, for me, I prefer the net. The benefits of using the treated net far outweigh the negative [Respondent from Tema Community 1].

9. Barriers, challenges or factors preventing insecticide-treated nets usage

The respondents provided various reasons or factors influencing their non-regular or non-usage of the ITNs. These factors have been summarised under themes such as discomfort, difficulty in fixing, size and design, religious beliefs, lack of husband's interest, reactions to chemicals, misconceptions about ITNs causing cancer.

Discomfort with usage is one of the primary reasons reported by the respondents for the lack of interest in using the ITN because of intense heat entrapped by the net and difficulty in breathing under the net, as well as the unpleasant smell of the chemical that causes vomiting. Irritation and distraction during sex were also mentioned as discomfort with ITN, which prevents usage.

> I don't use it. The heat it produces is too much [. . .] you will feel as though, you are suffocating and you will be sweating like a pregnant fish [. . .] The scent is too strong and makes me vomit as if I have malaria [. . .] it's just too bad, I prefer spraying the room [Respondent from Teshie Nungua Maternity home].

The respondents also mentioned difficulty in fixing the net because of size and design as some of the critical factors preventing or discouraging the usage of the ITN. Fixing or hanging the net was perceived as cumbersome and difficult by the respondents because of the architecture of the nets requiring a rectangular frame for proper hanging. In some instances, the size of the net also poses difficulty for usage as some beds or mattresses are larger than the net provided. These sentiments are captured in the following statements.

> The truth of the matter is though I would have love to use it, the difficulty of where to tie all four ropes has discouraged me. The round type is easy to fix as you just have to hang on the ceiling. The size is too small; my mattress is bigger, so I can't use it [Respondent from Old Fadama].

Religious and spiritual beliefs were also captured as a barrier to ITN usage as some of the respondents believe that sleeping in ITN will make them give birth prematurely or give birth to non-intelligent or disabled children.

> There is a spiritual implication for sleeping in mosquito net [. . .] in the realm of the spirit, you entangled the unborn child mentally and physically when a pregnant woman sleeps in a net. Those of us who understand these things don't allow pregnant people to use mosquito net, we recommend other methods to prevent malaria during pregnancy [Respondent from Nima Polyclinic].

Lack of husbands' interest in sleeping in the ITN with their partners was also identified as another key barrier preventing pregnant women from using the ITNs.

> I don't sleep in the net again because my husband doesn't like it. At this state (state of pregnancy) you want to get all the love, warmth and care from your husband [. . .] his arm around you when sleeping [Respondent from Madina Polyclinic].

Another key barrier to ITN usage is the misconception that the ITN chemical causes cancer, as shown in the statement below.

> The chemical is very strong and it can cause cancer. Just imagine the side effects of sleeping under a chemical that can kill insects for more than a year [. . .] it can cause cancer [Respondent from Nima Polyclinic].

10. Discussion

The study's objective was to predict factors influencing ITN usage intention among pregnant women in Ghana and explore competing variables or barriers preventing usage behaviour among the target audiences. Understanding the characteristics or factors that determine ITN usage intention and behaviour among pregnant women is likely to influence efficient malaria prevention programs and minimize the surge in malaria cases among pregnant women. Using the IMBP, the study's findings show that the model's three primary constructs (attitude, subjective norms and self-efficacy) effectively predict ITN usage intention. This finding is in line with the findings of prior research that showed these variables as important determinants in developing successful behavioural change projects (Vinothkumar and Subramanian, 2016; Tweneboah-Koduah *et al.*, 2020).

The study's fundamental hypothesis was that intention would have a positive and significant association with the actual usage behaviour of ITN among expectant mothers in Ghana (Fishbein, 2009). The statistical findings demonstrated a positively significant and robust relationship between the two parameters ($\beta = 0.615$, $t = 13.696$, $p < 0.05$), thereby supporting *H1*. Put differently, the results show a substantial positive correlation between intention to use and actual usage of the ITNS among pregnant women in Ghana. This result is consistent with past studies that found a positive and significant relationship between intention and behaviour (Ajzen, 1985; Lee *et al.*, 2016; Tweneboah-koduah, 2014). The current result suggests that the target audiences are more likely to take steps to perform the behaviour (sleep in the ITN) when they form the intention to do so. However, the profile analysis of the respondents for the quantitative study and the result of the exploratory study shows that though the respondents have positive perception and intention to use the ITNs, actual usage was low. The moderation analysis results actually show that skills and environmental factors have a positive and significant influence on the intention – ITN usage link, suggesting that these variables are critical to closing the gap between intention and usage of the ITN. In other words, for pregnant women's intention to use the ITN to be

successfully translated into actual usage, effective interventions are required to improve skill and reduce environmental constraints.

Consistent with the findings of past scholars, the exploratory result of the study shows discomfort (primarily associated with heat, irritation, heat rashes, suffocation and vomiting because of chemical smell), size and design, reactions to ITN's chemicals and misconceptions about ITNs causing cancer as major factors preventing the target audiences from using the ITNs (Ahorlu *et al.*, 2019; Chukwuocha *et al.*, 2010; Kudom *et al.*, 2013; Manu *et al.*, 2017). For instance, the findings of Ahorlu *et al.* (2019) shows heat as the most widely reported constraint prohibiting the usage of ITNs. Similarly, the findings of Chukwuocha *et al.* (2010) show reactions to the ITN chemical and misconception about the ITN as causing cancer as major factors prohibiting the usage of the ITNs among pregnant and non-pregnant women in Nigeria. The results further reveal other barriers to using the ITN as difficulty in fixing, religious beliefs, lack of husband's interest in sleeping in the net and the use of mosquito repellants. The difficulty in fixing it emanated from the design of the net, where a rectangular frame is needed for proper hanging. Modification to the product is thus needed to simplify the fixing process or, better still, distribute the ring-type which is easier to fix will help improve the usage of the ITN among the target audiences.

Additionally, as the results have shown that intention will lead to the performance of the behaviour (use the ITNs), social marketers must identify factors that will influence pregnant women's intention to use ITN. This study's findings suggest attitude and normative beliefs as critical factors influencing pregnant women's intention to use ITNs.

For instance, the second hypothesis, which stated that the relationship between attitudes and intentions to use ITN would be positive and significant, was accepted ($\beta = 0.343$, $t = 5.941$, $p < 0.05$). For the current study, attitude is conceptualised as positive or negative evaluations of the outcomes or benefits of using the ITNs. The significant relationship thus, suggests that pregnant women's assessment of the benefits of using the ITN significantly influence their desire to use it. The exploratory result, for instance, shows cost-saving, staying free from malaria during pregnancy, sound sleep and ITN as a safer and better alternative to malaria prevention because of continual resistance of mosquitoes to repellents as some benefits cited by the respondents for using ITNs. This suggests that designing interventions that highlight these benefits is most likely to increase the intention to use the ITNs. The works of the following scholars, who deemed attitude to be crucial in understanding intentions and behaviour, are consistent with this study (Robbins and Niederdeppe, 2015; Vinothkumar and Subramanian, 2016). The work of Robbins and Niederdeppe (2015), for instance, shows a positive connection between attitude and HIV testing intentions. The findings of the study, on the other hand, contradict Diteweg *et al.* (2013)'s findings, which indicated no significant association between attitude and the desire to get tested for HIV.

According to *H3*, there would be a significant and positive association between perceived norms (normative beliefs) and ITN usage intention. For this study, normative belief is conceptualised as the influence of important others (people the target audiences listen to and obey) on pregnant women's intention to use ITNs. The result shows a positive and significant relationship between normative belief (important importance others) and ITN usage intention. This suggests that pregnant women's beliefs regarding their immediate environment, such as family, friends or partner, will considerably impact their desire to use ITN as a malaria prevention mechanism. The exploratory result shows husbands and religious leaders as key "important people" who influence usage or otherwise of the ITNs. The results, for instance, shows that the lack of partners' interest in sleeping in the ITN negatively influences usage behaviour among the target audiences. The result further

shows that religious leaders also have a role to play because spiritual and religious beliefs such as giving birth to unintelligent children when pregnant women sleep in ITN were also provided as reasons for not using the ITN. Thus, appealing to pregnant women to use the ITNs through important people such as husbands and religious leaders is more likely to increase intention to use ITN and eventual usage of ITN during pregnancy. This result agrees with past studies that found a positive association between subjective norms and intention to perform a behaviour (Previte *et al.*, 2015; Giles *et al.*, 2005). For example, Giles *et al.* (2005) found that the subjective norm of parents influenced condom usage intention among young South Africans.

H4 was that self-efficacy and intention to use ITNs would have a strong positive connection. The findings did not support this hypothesis. Although there was a positive relationship between efficacy and intention to use ITN, it was statistically insignificant (β = 0.023, t = 0.382, p = 0.702 > 0.05). This indicates that self-efficacy was not a significant factor in pregnant women's decision to employ ITNs for malaria prevention in the current study. The emotions of pregnancy could explain this as pregnant women might not be willing to endure some reactions to the ITN, such as vomiting because of the scent of the chemical, suffocation as cited by the respondents in the exploratory study. This finding supports the findings of past scholars (Vinothkumar and Subramanian, 2016; Swanepoel, 2010). Swanepoel (2010), for instance, found that students at the University of Pretoria were not confident in their ability to cope with the emotional effect of a positive test result.

11. Theoretical and practical implications of the study

11.1 Theoretical implications

The study applied the IBPM to predict the factors influencing pregnant women's intention to use ITNs from an emerging market's perspective. Though the IBPM provides significant insight into behavioural beliefs that influence intention and other factors (environmental and skills) that could positively influence the intention-behaviour gap, its usage in social marketing to predict ITN usage behaviour has received limited attention. The current study adds to the social marketing theory-building agenda by using the IBPM framework to predict ITN usage behaviour among pregnant women in an emerging market context. This study also contributes to theory building by conducting an exploratory study to identify or have an in-depth understanding of moderating factors that could help close the gap between intention and actual usage behaviour of ITNs. Using this theory in ITN usage, the result shows a positive and significant relationship between intention and actual usage behaviour of ITNs among pregnant women in Ghana.

Additionally, attitude and normative beliefs were found to be significant predictors of intention to use ITNs among pregnant women. Efficacy beliefs were, however, found not to be a significant predictor of ITN usage intention though having a positive relationship with ITN usage intention. Thus, combining the IBPM with an exploratory study, the result shows that to be able to improve the ITN usage among Ghanaian pregnant women, social marketers need to focus on attitude (benefits) normative beliefs (important others) and reduce barriers such as fixing difficulties, religious beliefs and discomfort associated with using the ITNs.

11.2 Practical implications

Based on the findings of the study, the following recommendations are provided. Social marketers and health practitioners seeking to improve ITN usage behaviour among pregnant women in Ghana should highlight the benefits of performing the behaviour and reduce barriers to performing the behaviour. The benefits include cost saving, staying free

from malaria during pregnancy, sound sleep and ITN as a safer and better alternative to malaria prevention compared to repellents, particularly as studies have shown that excessive use of mosquito repellents could be harmful to human health (Gul *et al.*, 2013). These benefits should be effectively communicated to elicit interest and a strong desire by pregnant women to use the ITNs. Additionally, sleeping in the ITN could be positioned among the target audiences as a costs saver from buying insecticides, which could also be hazardous to their health. The ITN could also be projected as a primary means to achieving malaria-free life and as an effective means of avoiding the intake of too many drugs.

Sensitization programs on the benefits of using the ITN could be held monthly at the various maternity homes, preferably on non-working days. Wives of husbands who attend these programs could be rewarded with incentives such as baby baths or given preferential treatment on their antenatal days. Campaigns targeting men or encouraging them to sacrifice a little of their comfort and sleep in the ITN with their wives will be a step in the right direction. This is because the result identifies husbands and partners of pregnant women as important influencers of the ITN usage behaviour among pregnant women. Men who sleep in the ITN with their pregnant women and encourage their pregnant women to protect themselves from malaria by sleeping in the ITNs should be projected as caring and loving husbands or partners. Revered religious leaders could also be approached and convinced to volunteer as ambassadors for ITN usage to deal with the religious and spiritual beliefs against the usage of ITNs. This is important because perceived norm or normative beliefs was found to be a significant predictor of ITN usage intention. In other words, pregnant women are more willing to comply with what their immediate society expects or think about using it. Therefore, social marketers should tailor their campaigns towards changing the beliefs and perceptions of the society relevant to pregnant women (especially their partners) towards using ITNs.

To reduce barriers or factors preventing people from performing the behaviour, modification to the product itself (ITN) is necessary. For instance, given the strong insect-killing effect of the ITN, the holes of the net should be enlarged a little to reduce concerns about heat and suffocation. The manufacturers of the ITN should also consider using non-irritant chemicals with similar strong insect-killing effects to reduce the irritation effect of the ITNS. Usage could also be improved by increasing the distribution of the ring-type, which could be hanged on the ceiling. Segmented distribution is also recommended such that people with a bigger bed or mattress are given large sizes of the ITNs. A strong health education/promotion component is essential in ITN programs, especially where the nets are introduced for the first time. This will improve usage skills such as the proper hanging of the net indoors or under a shade for 24 h to reduce chemical smell and heat. Education is also necessary to dispel misinformation about ITN causing cancer.

Another critical barrier that blocks usage and threatens the survival of the ITN program is the increasing need to use mosquito repellent to prevent mosquito bite bedtime, which is usually between 9 and 10 p.m. Thus, as most activities such as cooking and watching TV are done outside the bed net, people use these repellents to protect themselves, thereby seeing no need to sleep in the ITN. This could be addressed through educative promotions on peak biting time (11 p.m. to 4 a.m. GMT) and project or recommend minimal use of these repellents during non-peak biting times because of the harm of repellents to human health. Furthermore, the communication should highlight scientific study findings indicating mosquitos' continual resistance to repellents (Kudom *et al.*, 2013), as a result of which they only become weak for a few hours, rise and bite individuals sleeping without ITNs.

12. Limitations and direction for future research

The study uses a single behavioural change theory (IBMP) to predict the usage intention of ITNs among pregnant women in Ghana. Combining theories provides an opportunity to identify multiple constructs to design effective interventions for behaviour change. Therefore, future studies could consider integrating two or more theories to have a deeper or different perspective on factors that hinder or improve usage behaviour of ITNs as a malaria prevention mechanism among target audiences. The current study only focused on pregnant women being most vulnerable to malaria. As the malaria burden increases, extending the study to cover a larger segment of the Ghanaian population is equally important to design pragmatic solutions to reduce the malaria burden. Another limitation of the study is that the quantitative and qualitative data were collected from different respondents. Collecting both qualitative and quantitative data from the same respondents is desirable.

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