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Journal of Women Health Care and Issues
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Research Article

Literacy, Health Insurance Cover and Procurement of Mosquito Bed Net for Sleeping in Ghana

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Received date: February 03, 2025; **Accepted date:** February 10, 2025; **Published date:** February 17, 2025

Citation: Anthony E. Boakye, Rita Tekpertey, (2025), Literacy, Health Insurance Cover and Procurement of Mosquito Bed Net for Sleeping in Ghana, J. *Women Health Care and Issues*, *8*(2); **DOI:10.31579/2642-9756/240**

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Abstract

Background: In Ghana, most households who own bed nets, do not sleep under them. This is evident that, 61% of households in 2022 had access to an insecticide-treated net, and only 40% slept under them the night prior to the GDHS survey.

Objective: Based on this, the study set out to investigate if literacy and health insurance cover of women inspire procurement of a mosquito bed net for sleeping in Ghana. Data were extracted from the 2022 GDHS. Frequency distribution was used to summarise respondents' responses into proportions. The Pearson's chi-squared test of independence was used to test association between the explanatory variables and the outcome variable. The binary logistic regression was used to assess the influence of literacy and health insurance cover of women on procurement of a mosquito bed net for sleeping.

Results: The study found listening to radio less than once a week as statistically significant at p=0.023, (OR=1.125, 95%CI ([1.017-1.244]). Using the internet for the last 12 months at p<0.001, (OR=0.538, 95%CI [0.495-0.584]). Women that have their health insurance being provided by employer at p=0.003, (OR=0.525, 95%CI [0.344-0.802]). Women covered by national/district health insurance at p=0.018, (OR=1.163, 95%CI [1.026-1.319]).

Conclusion: The study recommends that health care providers should endeavour to continue to reinforce education on ownership and usage of a mosquito bed net for sleeping since its usage consistently has financial benefits of prevention over treatment and can contribute to a good night's sleep, free of nuisance biting from mosquitoes and other insects.

Key words: health; inspire; literacy; mosquito bed net; procurement; sleeping

Introduction

In this 21st century, knowledge societies are confronted with a health decision-making paradox [1, 2]. People are increasingly challenged to make healthy lifestyle choices and manage their personal and family journeys through complex environments and health care systems but are not being prepared or supported well in addressing these tasks [3-5]. Modern societies actively market unhealthy lifestyles, health care systems are increasingly difficult to navigate (even for the best educated people), and education systems too often fail to provide people with adequate skills to access, understand, assess and use information to improve their health [6, 7]. Literacy, beyond its conventional concept is regarded as a set of reading, writing and counting skills, it is understood as a means of identification, understanding, interpretation, creation, and communication in an increasingly digital, text-mediated, information-rich and fast-changing world [8, 9]. Literacy in women empowers and liberates them [10]. It is an important factor in ensuring significant health outcomes among them [11]. Literacy in women provides the foundation on which they are enabled to play an active role in improving their own health, engage successfully with community action for health, and push governments to meet their responsibilities in addressing health and health equity [12-14]. However, women without literacy, are negatively affected in terms of knowledge, preventive behaviour, ability to navigate the health care system, and ability to care for their children while women with literacy are more likely to adopt healthier behaviours and be able to receive and act on health information and services [6, 15, 16].

In this regard, it is noted that literacy enables women to protect themselves, their family and their community from various shocks (e.g., poor health) which increases the risk of impoverishment due to, for example, inability to maintain working or caring roles, and/or catastrophic out-of-pocket health expenditures [12, 17-19]. It enables women to have access to information, communications technology (including mobile technologies) and the internet [20]. Access to these help women to advance literacy [20]. Hence, the internet provides women with an access to near infinite information, and unlike a pro-health advertisement, also allows them to actively seek information [20]. Literacy is a stronger predictor of a woman's health status

than income, employment status, education level and racial or ethnic group [6, 21-24]. Weak literacy competencies have been shown to result in less healthy choices, riskier behaviour, poorer health, less self-management and more hospitalization [6, 25, 26].

With literacy, women are empowered to understand the need for health insurance [27-30]. For they are enabled to know how health insurance coverage significantly influences health decision-making [27-30]. Potentially, when women have access to health insurance, they are authorised to seek necessary care for improved healthcare outcomes, particularly for maternal health. Hence, health insurance coverage is an important factor in making health care affordable and accessible to women [31- 35]. Women with health insurance coverage are more likely to obtain the needed preventive, primary, and specialty care services, and have better access to new advances in health [36, 37].

Though, both women's literacy and health insurance cover are allegedly noted to enable them make informed health choices about having a mosquito bed net for sleeping [38-41]. Hence, a mosquito bed net forms a protective barrier around people that sleep under them [42-43]. A mosquito net draped over a bed or a sleeping area offer the sleeper a protection against bites and stings from mosquitos, flies, and other pest insects and thus protect against the diseases they may carry. Examples of such preventable insect-borne diseases include malaria, dengue fever, yellow fever, zika virus, Chagas disease, and various forms of encephalitis, including the West Nile virus [44, 45]. However, in practice, sleeping under a mosquito net is a choice like any other and many middle-class Ghanaians do not prefer to use them. Hence, they consider them inconvenient, uncomfortable and unattractive. Even though, they vary in size, shape, color, material, insecticide treatment status, and number and type of active insecticide ingredients within the nets [38, 39, 46].

Surprisingly, in Ghana, most households who own bed nets, do not sleep under them [47]. This is evident that, 61% of households in 2022 had access to an insecticide-treated net (ITN), and only 40% slept under them the night prior to the GDHS study [48]. Even though notable studies have explored protective factors and barriers related to insecticide-treated mosquito bed nets ownership and usage in Ghana [38, 49, 50]. Yet, one cannot conclude that literacy and health insurance cover of women inspire procurement of a mosquito bed net for sleeping in Ghana. Hence, the study. Specifically, the study seeks to: (a) ascertain if literacy of women inspires procurement of a mosquito bed net for sleeping in Ghana; and (b) analyse whether health insurance cover of women inspires procurement of a mosquito bed net for sleeping in Ghana. The study further hypothesised that there is no statistically significant relationship between literacy, health insurance cover of women and procurement of a mosquito bed net for sleeping in Ghana.

Methods

Variable Constructs and Data Extraction

Literacy and health insurance cover were the explanatory variables while having a mosquito bed net for sleeping was the outcome variable. We explored the 2022 GDHS data and found (literacy, frequency of reading newspaper or magazine, frequency of listening to radio, frequency of watching television, owns a mobile telephone, use of internet, and frequency of using internet last month) as indicators for literacy and health insurance cover has the following (covered by health insurance, health insurance type: mutual/community organization, health insurance type: provided by employer, health insurance type: private/commercially purchased, health insurance type: national/district health insurance, and health insurance type: other) indicators while having a mosquito net for sleeping has this (have mosquito bed net for sleeping) as an indicator. Therefore, data were extracted on these indicators for analysis.

Sampling Procedure

The 2022 Ghana Demographic and Health Survey (GDHS) employed a stratified two-stage cluster sampling design which helped the achievement of nationally level, urban and rural areas representative results at the end of the survey for each of the 16 regions, for most DHS indicators. Stage one, was where 618 target clusters were selected from a sampling frame using probability proportional to size (PPS) for urban and rural areas in each region. After that, a targeted number of clusters were chosen with equal probability and systematic random sampling of the clusters chosen in the first phase, for the urban and rural areas in each region. Stage two, after the clusters had been selected, a household listing and map updating operation was done in all the selected clusters, to develop a list of all the households in the cluster. This list served as a sampling frame for selection of the household sample.

Sample

The 2022 GDHS adopted a national stratified representative sample of 18,450 households selected from 618 clusters, which resulted in 15,014 interviewed women age 15–49. The sampling frame used for the 2022 GDHS is the updated frame prepared by Ghana Statistical Service (GSS) based on the 2021 Population and Housing Census. To achieve the objectives of the 2022 GDHS.

Data Collection Procedure

Data collection commenced on October 17, 2022 and ended on January 14, 2023. In all, three months were used to collect the data from the field. The main fieldwork for the 2022 GDHS was launched on 17 October 2022. There were 37 teams, each team included a supervisor, 2 female interviewers, 1 male interviewer, and 2 biomarker technicians. The GSS coordinators created a WhatsApp group for all fieldworkers to post questions and issues encountered during data collection. In the field, fieldworkers were assisted with tablet computers to collect the data. The tablet computers were equipped with Bluetooth technology which enables remote electronic transfer of files, such as assignments from the team supervisor to the interviewers, individual questionnaires to survey team members, and completed questionnaires from interviewers to team supervisors.

Data Processing and Analysis

Data were analysed with frequency distribution, Pearson's chi-squared test of independence and binary logistic regression. The frequency distribution was used to summarise respondents' responses into proportions. The Pearson's chi-squared test of independence was used to test the hypotheses postulated in the study to either accept or refute the null hypotheses. However, the binary logistic regression was used to make predictions.

Ethical Consideration

The GSS carried out the DHS after Ghana Health Service Ethical Review Committee (ERC) and ICF Institutional Review Board (IRB) had approved of the survey protocol to assure that the survey procedures were in accordance with Ghana's and ICF's ethical research standards.

Results

Table 1 presents women having a mosquito bed net for sleeping in Ghana. Whereas 76.1% of women in Ghana have a mosquito bed net for sleeping 23.9% do not have mosquito bed net for sleeping.

Variable	Frequency	Percentage
Have mosquito bed net for sleeping		
No	3586	23.9
Yes	11428	76.1
Total	**15014**	**100.0**

Table 1: Women having a Mosquito Bed Net for Sleeping in Ghana

Source: GDHS (2022).

To find answers to satisfy our curiosity on women's literacy, we extracted data on the following variables (literacy, frequency of reading newspaper or magazine, frequency of listening to radio, frequency of watching television, owns a mobile telephone, use of internet and frequency of using internet last month) from the GDHS data. We therefore employed frequency distribution to analyse the data since we were interested in the proportions. The results are presented in Table 2.

Variable	Frequency	Percentage
Literacy		
Cannot read at all	6836	45.5
Able to read only parts of sentence	1818	12.1
Able to read whole sentence	6301	42.0
No card with required language	48	0.3
Blind/visually impaired	11	0.1
Frequency of reading newspaper or magazine		
Not at all	13603	90.6
Less than once a week	971	6.5
At least once a week	440	2.9
Frequency of listening to radio		
Not at all	5716	38.1
Less than once a week	3563	23.7
At least once a week	5735	38.2
Frequency of watching television		
Not at all	4454	29.7
Less than once a week	2379	15.8
At least once a week	8181	54.5
Owns a mobile telephone		
No	3682	24.5
Yes	11332	75.5
Use of internet		
Never	9325	62.1
Yes, last 12 months	5250	35.0
Yes, before last 12 months	439	2.9
Frequency of using internet last month		
Not at all	9953	66.3
Less than once a week	506	3.4
At least once a week	1341	8.9
Almost every day	3214	21.4
Total	**15014**	**100.0**

Table 2: Literacy among Women in Ghana

Source: GDHS (2022).

The study assessed women's literacy and the results revealed that 45.5% cannot read at all while 0.1% are blind/visually impaired (see Table 2). Concerning frequency of reading newspaper or magazine, the results revealed that 90.6% of women reported that they do not read newspaper or magazine at all while 2.9% said they read newspaper or magazine at least once a week. Whereas 38.2% of the women reported they at least listen to radio once a week 23.7% said they listen to radio less than once a week (see Table 2). On frequency of watching television, more than half (54.5%) of the women reported they watch television at least once a week while 15.8% said less than once a week (see Table 2).

Regarding whether women own a mobile telephone or not, the results revealed that more than seventy per cent (75.5%) answered in affirmative (see Table 2). On use of internet, respondents were asked to indicate if they had ever used the internet and the results revealed that more than sixty per cent (62.1%) reported they had never used the internet while 2.9% said they had used the internet before last 12 months (see Table 2). When asked about the frequency of using internet in the last 12 months, the results revealed that more than sixty per cent (66.3%) of the women had not used internet at all while 3.4% indicated less than once a week (see Table 2).

Table 3 has chi-squared test of independence results on literacy of women and procurement of a mosquito bed net for sleeping in Ghana. This analysis was conducted to test the hypothesis there is no statistically significant relationship between literacy of women and procurement of a mosquito bed net for sleeping in Ghana. Statistically significant relationships were found between all the variables. Namely: literacy [p<0.001], frequency of reading newspaper or magazine [p=0.005], frequency of listening to radio [p<0.001], frequency of watching television [p<0.001], owns a mobile telephone [p<0.001], use of internet [p<0.001] as well as frequency of using internet last month [p<0.001] and procurement of a mosquito bed net for sleeping in Ghana.

Variable	No (%)	Yes (%)	Total n (%)	χ^2	P-value
Literacy				35.609	<.001
Cannot read at all	21.8%	78.2%	6836(100.0%)		

Able to read only parts of sentence	24.0%	76.0%	1818 (100.0%)		
Able to read whole sentence	26.1%	73.9%	6301(100.0%)		
No card with required language	27.1%	72.9%	48(100.0%)		
Blind/visually impaired	9.1%	90.9%	11(100.0%)		
Frequency of reading newspaper or magazine				10.533	0.005
Not at all	23.5%	76.5%	13603(100.0%)		
Less than once a week	27.7%	72.3%	971(100.0%)		
At least once a week	26.6%	73.4%	440(100.0%)		
Frequency of listening to radio				20.491	<.001
Not at all	25.3%	74.7%	5716(100.0%)		
Less than once a week	24.8%	75.2%	3563(100.0%)		
At least once a week	21.9%	78.1%	5735(100.0%)		
Frequency of watching television				54.483	<.001
Not at all	21.0%	79.0%	4454(100.0%)		
Less than once a week	21.1%	78.9%	2379(100.0%)		
At least once a week	26.2%	73.8%	8181(100.0%)		
Owns a mobile telephone				19.174	<.001
No	21.2%	78.8%	3682(100.0%)		
Yes	24.8%	75.2%	11332(100.0%)		
Use of internet				255.726	<.001
Never	19.6%	80.4%	9325(100.0%)		
Yes, last 12 months	31.3%	68.7%	5250(100.0%)		
Yes, before last 12 months	27.1%	72.9%	439(100.0%)		
Frequency of using internet last month				254.753	<.001
Not at all	20.1%	79.9%	9953(100.0%)		
Less than once a week	29.1%	70.9%	506(100.0%)		
At least once a week	27.7%	72.3%	1341(100.0%)		
Almost every day	33.3%	66.7%	3214(100.0%)		

Table 3: Relationship between Literacy of Women and Procurement of a Mosquito Bed Net for Sleeping in Ghana

Note: Row percentages in parenthesis, Chi-square significant at (0.001), (0.05), (0.10)

No: have no mosquito bed net for sleeping; Yes: have a mosquito bed net for sleeping.

Source: GDHS (2022).

Further analysis was conducted with a binary logistic regression on seven (7) items studied under literacy of women which included (literacy, frequency of reading newspaper or magazine, frequency of listening to radio, frequency of watching television, owns a mobile telephone, use of internet, and frequency of using internet last month). This analysis was done on these factors to ascertain those that influence procurement of a mosquito bed net for sleeping in Ghana. The results are shown in Table 4.

Variable	B	Wald	P-value	Odds ratio	95CI	
Frequency of listening to radio (Not at all=1.0)						
Less than once a week	.117	.052	.023	1.125	1.017	1.244
At least once a week	.324	.046	.000	1.383	1.264	1.514
Frequency of watching television (Not at all=1.0)						
Less than once a week	.094	.065	.151	1.098	.966	1.248
At least once a week	-.150	.049	.002	.861	.783	.947
Use of internet (Never=1.0**)**						
Yes, last 12 months	-.620	.042	.000	.538	.495	.584
Yes, before last 12 months	-.425	.111	.000	.654	.526	.813
Constant	**1.333**	**.041**	**.000**	**3.791**		

Table 4: Binary Logistic Regression of Literacy of Women and Procurement of a Mosquito Bed Net for Sleeping in Ghana

Source: GDHS (2022), significant at (0.05)

After processing the data, only three (3) variables namely; frequency of listening to radio, frequency of watching television, and use of internet were significant. Those that were not significant were removed from the model (see Table 4). Overall, the logistic regression model was significant at -2LogL = 16192.746; Nagelkerke R2 of .031; $\chi 2$= 314.951; p<.001 with correct prediction rate of 76.1%. More importantly, the Model Summary which shows a Nagelkerke R2 of .031 suggests that the model explains 3.1% of variance in the likelihood of procurement of a mosquito bed net for sleeping among women in Ghana. With this percentage contribution to the entire model, the results confirmed the whole model significantly predict women's procurement of a mosquito bed net for sleeping in Ghana.

Table 4 revealed that listening to radio less than once a week was statistically significant related to procurement of a mosquito bed net for sleeping at p=0.023, (OR=1.125, 95%CI ([1.017-1.244]). This factor classifies those women to have 1.3times more likely to procure a mosquito bed net for sleeping compared with women that reported they do not listen to radio at all. Further, it was found that listening to radio at least once a week was statistically significant at P<0.001, (OR=1.383, 95%CI [1.264-1.514]). This

factor labelled those women to have 1.4times more likely to procure a mosquito bed net for sleeping compared with women that reported they do not listen to radio at all (see Table 4).

Furthermore, the study found watching television at least once a week as statistically significant to procurement of a mosquito bed net for sleeping at p=0.002, (OR=0.861, 95%CI [0.783-0.947]). This variable tag those women to have 0.9times less likely to procure a mosquito bed net for sleeping compared with women that reported they do not watch television at all (see Table 4).

Additionally, the study found using the internet for the last 12 months to be statistically significant to procurement of a mosquito bed net for sleeping at p<0.001, (OR=0.538, 95%CI [0.495-0.584]). This factor labels those women to have 0.5times less likely to procure a mosquito bed net for sleeping compared with women that reported they had never used the internet (see Table 4). Also, using the internet before the last 12 months was statistically significant to households having a mosquito bed net for sleeping at p<0.001, (OR=0.654, 95%CI [0.526-0.813]). This factor classifies those women to have 0.7times less likely to procure a mosquito bed net for sleeping compared with women that intimated they had never used the internet (see Table 4). Moreover, statistically significant relationship was not found in the remaining variable which could be as a result of chance.

To answer research objective two which is "analyse whether health insurance cover of women inspires procurement of a mosquito bed net for sleeping in Ghana" prompted us to extract data on the following variables (covered by health insurance, health insurance type: mutual/community organization, health insurance type: provided by employer, health insurance type: private/commercially purchased, health insurance type: national/district health insurance, and health insurance type: other) from 2022 GDHS data. This data was analysed with frequency distribution for we were interested in the proportions. The results are presented in Table 5.

Variable	Frequency	Percentage
Covered by health insurance		
No	1355	9.0
Yes	13659	91.0
Health insurance type: mutual/community organization		
No	14989	99.8
Yes	25	.2
Health insurance type: provided by employer		
No	14922	99.4
Yes	92	.6
Health insurance type: private/commercially purchased		
No	14961	99.6
Yes	53	.4
Health insurance type: national/district health insurance		
No	1392	9.3
Yes	13622	90.7
Health insurance type: other		
No	15014	100.0
Total	**15014**	**100.0**

Table 5: Health Insurance Cover among women in Ghana

Source: GDHS (2022).

Women were asked to indicate whether they are covered by health insurance or not, the results revealed that overwhelming majority (91.0%) of the women are covered by health insurance (see Table 5). Concerning if women have their health insurance cover from mutual/community organization or not, the results revealed that more than ninety per cent (99.8%) of the women health insurance cover was not a mutual/community organization (see Table 5).

Regarding if women health insurance was provided by employer or not, the results revealed that a little above ninety-nine per cent (99.4%) of the households' health insurance was not provided by employer. Whereas 99.6% of the households reported that their health insurance type was not private/commercially purchased 0.4% said their health insurance type was private/commercially purchased (see Table 5).

On whether women health insurance type was national/district health insurance or not, the results revealed that more than ninety per cent (90.7%) of the women answered in affirmative. When asked whether women health insurance type was other or not, the results revealed that none of the women health insurance type was other (see Table 5).

Table 6 presents chi-squared test of independence results on health insurance cover of women and procurement of a mosquito bed net for sleeping in Ghana. This analysis was done to test the hypothesis there is no statistically significant relationship between health insurance cover of women and procurement of a mosquito bed net for sleeping in Ghana. Statistically significant relationships were found among three factors. Namely: covered by health insurance [p=0.031], health insurance type: provided by employer [p=0.001] as well as health insurance type: national/district health insurance [p=0.011] and women having mosquito bed net for sleeping in Ghana. However, statistically significant relationships were not found among health insurance type: mutual/community organization [p=0-629] as well as health insurance type: private/commercially purchased [p=0.450] and procurement of a mosquito bed net for sleeping in Ghana.

Variable	No (%)	Yes (%)	Total n (%)	χ^2	P-value
Covered by health insurance				4.675	0.031
No	26.3%	73.7%	1355(100.0%)		
Yes	23.6%	76.4%	13659(100.0%)		
Health insurance type: mutual/community organization				.233	0.629
No	23.9%	76.1%	14989(100.0%)		
Yes	28.0%	72.0%	25(100.0%)		

Health insurance type: provided by employer				10.208	0.001
No	23.8%	76.2%	14922(100.0%)		
Yes	38.0%	62.0%	92(100.0%)		
Health insurance type: private/commercially purchased				0.571	0.450
No	23.9%	76.1%	14961(100.0%)		
Yes	28.3%	71.7%	53(100.0%)		
Health insurance type: national/district health insurance				6.466	0.011
No	26.7%	73.3%	1392(100.0%)		
Yes	23.6%	76.4%	13622(100.0%)		

Table 6: Relationship between Health Insurance Cover of Women and Procurement of a Mosquito Bed Net for Sleeping in Ghana

Note: Row percentages in parenthesis, Chi-square significant at (0.001), (0.05), (0.10).

No: have no mosquito bed net for sleeping; Yes: have a mosquito bed net for sleeping.

Source: GDHS (2022).

To unearth factors that predict procurement of a mosquito bed net for sleeping among women in Ghana, we conducted a binary logistic regression analysis on the five (5) variables that were tested for a relationship under health insurance cover of women and procurement of a mosquito bed net for sleeping in Ghana. These variables included (covered by health insurance, Health insurance type: mutual/community organization, Health insurance type: provided by employer, health insurance type: private/commercially purchased, and health insurance type: national/district health insurance. The results are presented in Table 7.

Variable	B	Wald	P-value	Odds ratio	95 CI	
Health insurance type: national/district health insurance (No=1.0)						
Yes	.151	5.566	0.018	1.163	1.026	1.319
Health insurance type: provided by employer (No=1.0)						
Yes	-.644	8.873	0.003	0.525	0.344	.802
Constant	**1.027**	**284.186**	**0.000**	**2.793**		

Table 7: Binary Logistic Regression Analysis of Health Insurance Cover of Women and Procurement of a Mosquito Bed Net for Sleeping in Ghana

Source: GDHS (2022), significant at (0.05).

After processing the data, only two (2) variables namely; health insurance type: national/district health insurance and health insurance type: provided by employer were significant. Those that were not significant were removed from the model (see Table 7). Overall, the logistic regression model was significant at -2LogL = 16493.053; Nagelkerke R2 of .001; χ2= 14.644; p<.001 with correct prediction rate of 76.1%. More importantly, the Model Summary which shows a Nagelkerke R2 of 0.001 suggests that the model explains 0.1% of variance in the likelihood of procurement of a mosquito bed net for sleeping among women in Ghana. With this percentage contribution to the entire model, the results confirmed the whole model significantly predict women's procurement of a mosquito bed net for sleeping in Ghana.

The study found that women covered by national/district health insurance was statistically significant related to procurement of a mosquito bed net for sleeping at p=0.018, (OR=1.163, 95%CI [1.026-1.319]). This factor categorises those women to have 1.2times more likely to procure a mosquito bed net for sleeping compared with women that reported they are not covered by national/district health insurance (see Table 7).

Further, it emerged that women that have their health insurance being provided by employer was observed as statistically significant to procurement of a mosquito bed net for sleeping at p=0.003, (OR=0.525, 95%CI [0.344-0.802]). This indicator labels those women to have 0.5times less likely to procure a mosquito bed net for sleeping compared with women that intimated their health insurance is not being provided by employer.

Discussion

The study found that only 42.0% of women were able to read whole sentence. The low literacy rate among women in Ghana has a debilitating effect on their ability to read newspaper or magazine, listen to radio, watching television, own a mobile telephone and use the internet. This suggests that achieving widespread literacy can only happen in the context of building literate societies that encourage individuals to acquire and use their literacy skills. This finding refuted previous research findings that the proportion of literate women is 37.8% in Senegal [51] and 36.2% in Ethiopia [52]. The dissimilarity in the findings could partly be due to the sample size enrolled, study context and the statistical tool applied for the analysis.

The study found a relationship between literacy of women and procurement of a mosquito bed net for sleeping in Ghana. Therefore, the null hypothesis was rejected. This finding implies that the more and more women are literate it is the more and more they procure a mosquito bed net for sleeping. The chi-squared values indicate that the literacy of women has high influence on procurement of a mosquito bed net for sleeping in Ghana. This finding corroborated with previous research findings that literacy status of mothers was significantly associated with ITN utilization in four studies [53-57].

It emerged that women listening to radio either less than once a week or once a week were revealed to have an increase odd to procure a mosquito bed net for sleeping. Listening to a radio can help influence an individual's life positively. The radio serves as a medium through which an individual can learn how healthy choices in life promotes longevity. Mostly, radio messages enlighten listeners to understand why there is a need to procure a mosquito bed nets for sleeping. Hence, it prevents mosquito bites as well as malaria. Further, the finding implies that the more and more women listen to radio it is the more they are enabled to know the benefits of procuring a mosquito bed net for sleeping. This finding has suggested that messaging around mosquito bed net use and care should be strengthened to increase use and improve the level of recall for long lasting insecticidal net care. The outcome

corroborated with previous research findings that those who listened to radio are about 1.6 times more likely to use ITN while respondents who had heard of a specific sponsored radio campaign on ITN are 1.53 times more likely to use a bed net [58, 59].

It was found that women watching television for at least once a week had lower odds of procuring a mosquito bed net for sleeping. The plausible explanation for this finding could be that those women who watch television cannot apply the message they receive to everyday life practises. It could also be that these women always tune the television channel to stations where they can have cinemas. Further, it could be that these women might not know that they can have improved sleep quality when slept in mosquito bed net. This outcome confirmed a study that regarding media exposure, having media exposure was associated with 1.33 times higher odds of ITN use as compared to their counterparts [60].

The study found that women using the internet for the last 12 months and before the last 12 months had a lower likelihood of procuring a mosquito bed net for sleeping. This finding has demonstrated that even though these women use the internet but are equally naïve about the benefits of procuring a mosquito bed net for sleeping. Further, it could also be that these women might have been navigating the internet for social media funny clips instead of learning to know how procurement of a mosquito bed net for sleeping is beneficial to their health. It could probably mean that they are not aware that it prevents them from mosquito bites and other insect's harassments.

Assessment of health insurance cover of women revealed that overwhelming majority of women are covered by health insurance in Ghana. It was found that more than ninety per cent of the women are covered by national/district health insurance. Being covered by health insurance is associated with an increase mosquito bed net use, hence, health insurance cover serves as an avenue which enables subscribers access healthcare resources, including insecticides treated net. Health insurance coverage covers medical expenses, allowing women to access healthcare independently without worrying about the cost and without financial worry. This finding refuted previous research conducted in Ghana which found an overall health insurance coverage of 51.9% and 66.01% respectively [61, 62]. On the contrary, the study was in line with a study conducted in Rwanda which found almost similar results that 89% of pregnant women are covered by health insurance [63]. The reason for the similarity could partly be due to participants enrolled, sample size and the ragour in the analysis.

Relationship was found between health insurance cover of women and procurement of a mosquito bed net for sleeping in Ghana. Therefore, the null hypothesis was not confirmed. This association purports that both the explanatory and the outcome variables were not independence of each other. Further, the finding has revealed that with health insurance cover it facilitates access to healthcare resources including mosquito bed net. The chi-squared values indicate a high relationship which meant that the health insurance cover of women speaks more about procurement of mosquito bed net for sleeping in Ghana.

The study found that women covered by national/district health insurance had a higher likelihood of procuring a mosquito bed net for sleeping. The plausible explanation to this finding could probably be that being covered by health insurance exposes beneficiaries to more healthcare resources since the insurance facilitates it easier for beneficiaries to ascertain that resource involving health is covered by insurance and that they endeavour to avail themselves to claim those resource including mosquito bed net whenever the need arises. It could also mean that they value their quality sleep and that do not want to be disturbed in it. So, they attempt to procure it and sleep under it to avert any threat mosquitoes' and other insects' bite could bring to them.

Further, it emerged that women that have their health insurance being provided by their employer had lower odds of procuring a mosquito bed net for sleeping in Ghana. The plausible explanation could be that their employer does not pay the premium for them which deter them from accessing anything that has to do with healthcare resources. Hence, they think they could be made to pay for the mosquito bed net if they want to access it. It could probably mean that these women do not value their quality sleep and health which is why they are not being inspired to access them.

Conclusion

The findings of the study suggest that Ghana is capable of achieving the SDG 3 which is Good Health and Well-Being. This is so because majority of women are covered by health insurance. The associations found in the hypotheses postulated in the study suggest that women literacy and their insurance cover motivate them make health decision without an eye browse. Low literacy rate found in the study affected most of the women to understand the need for mosquito bed net for sleeping. Therefore, the study recommends that health care providers should endeavour to continue to reinforce education on ownership and usage of a mosquito bed net for sleeping since its usage consistently has financial benefits of prevention over treatment and can contribute to a good night's sleep, free of nuisance biting from mosquitoes and other insects.

Declaration

Ethical Approval

We did not seek ethical approval because we used the 2022 GDHS data

Competing Interests

No conflict of interest was declared.

Funding

The study was not funded.

Availability of Data and Materials

The study made used of the 2022 DHS data. Therefore, it is publicly available online.

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DOI:10.31579/2642-9756/240

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