Practice and Perception Analysis of Mosquito Coil Usages in Bangladesh

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Abstract

Among many mosquito control approaches, the use of mosquito coil is popular because of its cost effectiveness and ease of use. But along with repelling mosquitoes, the burning of mosquito coils can cause severe health hazard. In mosquito coils, pyrethrin, allethrin, d-allethrin etc. are typically used as active ingredients. In this study, it was found that mosquito coil is used mostly (51%) in rural area and most of the rural people (64.7%) believed it to be beneficial as mosquito repellent as well as they are not so aware of the harmful effects of the mosquito coil (25%). Due to mosquito coil burning, the participants feel many such complications like suffocation (32.3%), eye irritation (29.2%), sneezing (13.1%) but they do not take any special measure or treatment to protect them. Rather, they mostly place the coil away from them (50%) to protect themselves after being exposed to those complications. These findings have raised a question, ─ which one is more harmful: Mosquito or mosquito coil? Besides, most of the people even don't know about the dangerous effects of mosquito coils. Although mosquito net is the most effective way to repel mosquito, 69% people do not use mosquito net due to laziness. Extensive research regarding alternative mosquito repelling strategy and safe use of mosquito coil is urgently needed in the context of countries like Bangladesh.

Key words: Health hazards, mosquito, mosquito coil, mosquito borne diseases.

Introduction

Mosquito-borne diseases are a serious public health concern in Bangladesh. Because of high rate of hospital admission and mortality, mosquito born diseases are creating huge load of medical expenditure. The increase in dengue fever along with the outbreak of chikungunya bring in major threats to public health (Mutsuddy *et al.*, 2019). The dengue outbreak of 2023 in Bangladesh is the most devastating one in terms of number of confirmed case, hospitalization, mortality, country wide spreading and time span of prevalence (Haider *et al.*, 2023). A situation report published by WHO on 9th October 2023 reported a total 223 564 confirmed cases of dengue including 1 086 deaths since January 2023. This is the highest ever reported single year dengue related casualties in Bangladesh and it is noteworthy that the number is still increasing (WHO Dengue situation report #7, 2023). Again during the outbreak of Chikungunya in 2017, more than 13,176 cases were confirmed clinically in 17 districts including Dhaka city (Mahmud *et al.*, 2021). Reports indicate that Japanese encephalitis (reported once in 1977), West Nile (reported first time in 2019), Zika viral fever (reported once in 2015) have also entered into Bangladesh like other southeast Asian countries (Islam *et al.*, 2022). This increasing growth rate of mosquitoes is the consequence of continuous climate

change and environmental degradation, leading to the formation of mosquito breeding grounds. The control approaches of mosquito-borne diseases are merely centred in treating the diseases and preventing the spread of the diseases. To inhibit the spreading of the diseases, vector control is indispensable. A large number of vector control strategies are available worldwide. Mosquito net, Insecticide treated net (ITN), mosquito coil, repellent vaporiser, indoor residual spray (IRS) etc are some commonly used strategies. Among these different strategies mosquito coil is the most popular mosquito control strategy in the low and middle income countries. World Health Organization estimated global annual consumption of mosquito coils to be nearly twenty-nine billion pieces in 1996 (Chen *et al.*, 2008) and surly the number has increased many fold now at 2023. Despite having potential adverse health effects, mosquito coil is widely used as a control method in Bangladesh. Although there has been detailed technical specifications for mosquito coils, bioefficacy is the main focus rather than toxicity testing (Pauluhn and Mohr, 2006). Increase in the prevalence of asthma, cough and persistent wheeze in children due to long-term mosquito coil smoke exposure has been shown in epidemiological findings. Moreover, this practice is a significant risk factor to adenocarcinoma and epidermoid carcinoma in lung (Chen *et al.*, 2008).

The market of mosquito repellent strategies is increasing as cases of mosquito-borne diseases are always in an increasing trend. A newspaper report accounted about 54.76 billion BDT annual expenditure of Bangladesh for combating mosquito. In this big market, mosquito coil captured the lion share with a volume of 14.80 billion, mosquito net accounts for 8 billion, aerosol 2 billion, mosquito bat 0.5 billion and electric vaporiser 0.14 billion (Mithu, 2020).

Methodology

Study protocol: With a target to find out the scenario of mosquito coil usage pattern and perception of mass people of Bangladesh, a survey was conducted among the resident of rural and urban area of Bangladesh.

Study design: It was a cross sectional study conducted in different locations of Bangladesh during August and September 2022. Primary data was collected from the survey conducted among 130 participants (50 from rural area and 80 from urban area). The survey questionnaire contained twenty eight different questions divided in three parts such as demographic information, multiple choice questions and opinion section.

Stakeholder selection: Stake holders for this study were selected keeping that goal in mind. So, the total study population from two different societal settings (rural and urban) have been selected for this research. We have selected Polashpara and Khamarpirgacha villages from Gaibandha sadar thana as representative of rural locality and Mirpur, Agargaon and Dhaka University area as representative of urban area of Bangladesh.

Data collection: Since it was post-period of Covid 19 pandemic, an offline survey was conducted via direct communication and data was collected from common people both rural and urban area. Their feedback was obtained by meeting them face-to-face and asking them what they thought about the questions. No changes were made after all responses were received and analyzed in detail.

Statistical analysis of data: Simple frequency table and summary statistics like mean and standard deviation are used to summarize categorical and quantitative variables. Distribution of categorical variables is visualized using pie chart and bar chart. To compare mean of a quantitative variables for different level of a categorical variable; two sample t-test is used. To assess the association between two categorical variables; Chi-square test of association (for large cell size i.e. when number of observation per cell is 5 or above) or Fisher's exact test (for small cell size) is applied. All analysis is carried out using MS Excel and R (version 4.2.0).

Results

The study was conducted to explore the mass people perceptions regarding the awareness of harmful effects of mosquito coil on human health.

Total 130 respondents were requested to answer some questions on various aspects regarding usage pattern of mosquito coil, health awareness, complications they had faced, perception about usefulness of mosquito repellent and their advantages and disadvantages etc.

Demographic features of the respondents: The respondents were mainly from rural (38%) and urban area (62%). The respondents were from both gender-male were 48% and 52% were female. Most of the respondents' age ranges from 15 to 30 years (63%), 32% were from age category 31 to 50 years and only 5% were above 50 years. Respondents from various family sizes were surveyed. Among 130 respondents, 70% reported that their total family member was 4 to 7; while 22% reported 1 to 3 members. Only 8% respondents found whose family members were 8 or above. Surveyed respondents were from different education level-50% were undergraduate students, 23% postgraduate students, 12% were H.S.C passed. Ten percent respondents found under S.S.C. Rest 6% were S.S.C passed and illiterate. The respondents were from different occupations. Of them, 45% were students, 36% were service holder, 15% were from other occupation (not specified) and 5% were from agriculture. The sampled respondents were from distinguished income level. Majority (35%) respondents mentioned their monthly income level as BDT 20 thousand to BDT 30 thousand; while 33% mentioned BDT 10 thousand to BDT 20 thousand BDT, 18% were from BDT 30 thousand to BDT 45 thousand income class and 14% were from income class of above BDT 45 thousand. Forty one percent respondents said that they had no children. Percentages of family with 1, 2 and 3 children were 20%, 25% and 15% respectively (Table 1). So, respondents from all sort of demographic status are included in this study.

Mosquito coil usage pattern: Respondents were asked whether they used any mosquito repellent and 68% said that they used (Table 2). Though, 32% said that they currently do not use any mosquito repellent; but all of them somehow use

Table 1. Demographic features of the respondents (N=130).

Features		N	Percent
Area	Rural	50	38%
	Urban	80	62%
Gender	Male	63	48%
	Female	67	52%
Age (in year)	15-30	82	63%
	31-50	42	32%
	51-70	6	5%
Family size	1-3	28	22%
	4-7	91	70%
	8-11	7	5%
	11+	4	3%
Education level	Illiterate	5	4%
	Under S.S.C	13	10%
	S.S.C	2	2%
	H.S.C	15	12%
	Undergraduate	65	50%
	Postgraduate	30	23%
Occupation	Agriculture	6	5%
	Service holder	47	36%
	Student	58	45%
	Other	19	15%
Monthly family income (BDT)	10-20k	43	33%
	20-30k	46	35%
	30-45k	23	18%
	45k+	18	14%
No. of children	0	53	41%
	1	26	20%
	2	32	25%
	3	19	15%
	Total	130	100%

any of the types of mosquito repellent- aerosol (16%), coil (75%) and cream (8%). 52% percent respondents reported that they use coil 5 to 9 times a week; while 44% use coil 0 to 4 times a week and only 5% use coil 10 times or above in every week. Besides, the number of coils used per day is 1 reported by 65% respondents and 2 by 15% respondents. Only 7% reported that they do not use any coil (Table 2).

Table 2. Perception of participants about mosquito coil usage pattern.

Items		N	Percent
Currently use any mosquito repellent	Yes	89	68%
	No	41	32%
Types of mosquito repellent	Aerosol	21	16%
	Coil	98	75%
	Cream	11	8%
How many times use coil every week	0 to 4	57	44%
	5 to 9	67	52%
	10 and above	6	5%
Number of coils used per day	0	9	7%
	1	85	65%
	2	19	15%
	3	9	7%
	4	8	6%

Health awareness perception: About 44% respondents said that mosquito repellent coil is harmful to health. In contrary 43% said that coil repels mosquito and only 13% said coil is beneficial somehow. Almost everyone (98%) was agreed that coil has harmful effects on human health. However, among them 38% respondents moderately agreed that coil is harmful as smoking; while 32% agreed highly and 25% agreed to some extent in this issue; contrary only 5% said that coil is not harmful as smoking (Figure 1).
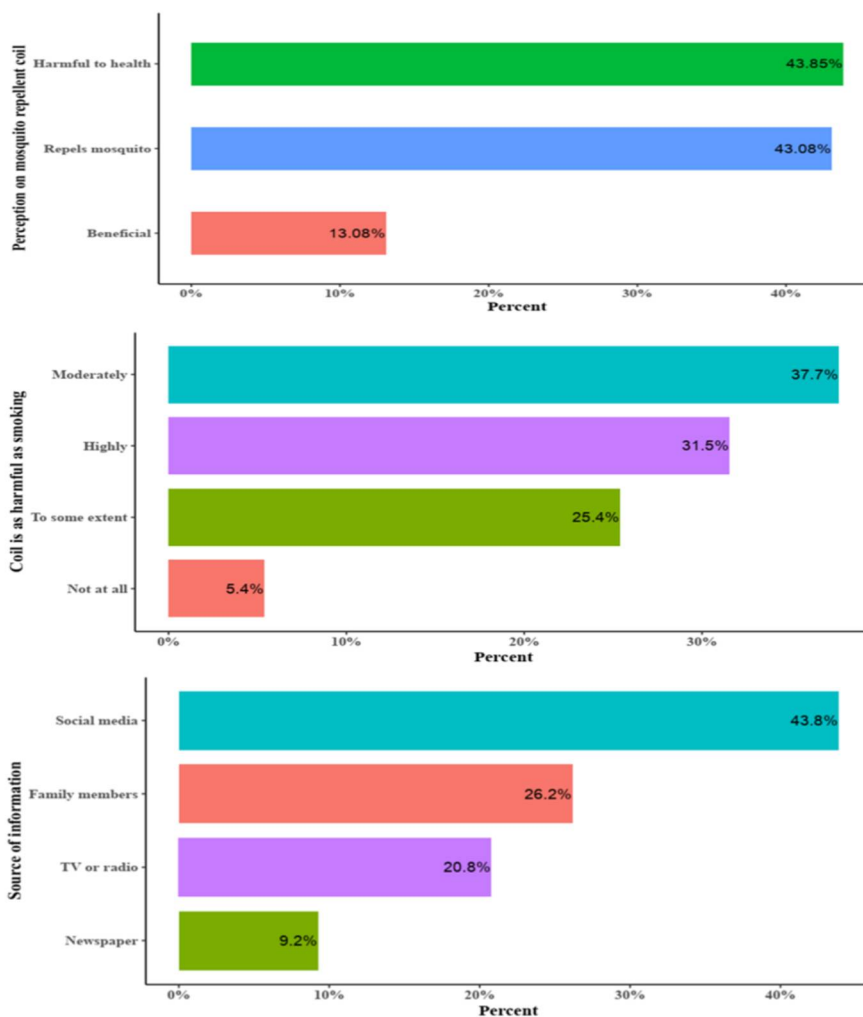

Figure 1. Illustration representing perception of participants about health awareness.

Experience of complications and action taken while using coil: The most common early complication experienced by the respondents is suffocation (32.3%) followed by eye irritation (29.2%), sneezing (13.1%), headache (12.3%), allergic reaction (7.7%) and asthma (5.4%). The respondents were asked how many times they were exposed to the above problems. 62% replied sometimes, 36% replied every time they were exposed to these problems. After being exposed by those complications, 50% respondents said that they place the coil away; while 30% stop burning, 6.9% use alternatives and few (2.3%) use face mask. Some (10.8%) did not response to the exposure of complications (Table 3).

Table 3. Perception of participants about complications and action taken while using coil.

Experience of complications		N	Percent
Early complications experienced	Allergic reaction	10	7.7%
	Asthma	7	5.4%
	Eye irritation	38	29.2%
	Headache	16	12.3%
	Sneezing	17	13.1%
	Suffocation	42	32.3%
Frequency of exposed to the complications	Never	2	2%
	Sometimes	81	62%
	Every time	47	36%
Instant responses	No response	14	10.8%
	Place it away	65	50.0%
	Stop coil burning	39	30.0%
	Use alternatives	9	6.9%
	Use face mask	3	2.3%

Out of 130 respondents, 40% answered that they burn coil for 1 hour; while 25% respondents burn coil for 2 hours and 32% respondents burn coil for 3 hours. Very few respondents (3%) reported that they burn coil for 4 hours or 7 hours. The respondents were asked where they use to keep coil while burning. 38% used to keep coil near to the reading table followed by near to bed (35%), near to bed (18%) and outside the room (9%). About 42% respondents said that they throw coil ash into dustbin; 36.2% throw it outside home and 22.3% keep it into a small container (Table 4).

Perception towards advantage and disadvantages of using mosquito coil: People were asked in what extent they agree that quitting using coil is healthy. 43% moderately agreed with this statement, 32% agreed highly and 25% did not agree to a great extent with this claim. Besides, 41% respondents were moderately satisfied from mosquito coil burning, while 33% were satisfied to some extent. The percentage of highly satisfied respondents is 26%. Laziness is found to be the most influential factor for not using mosquito net (reported by 53.1% respondents). Then, difficulty in maintenance the net, limited space coverage and time consuming are reported as influential factors for not using mosquito net by 20%, 15% and 12% respondents, respectively. Almost 44% respondents said that mosquito coil is popular because it is easy to use and 40.8% said it is cheap. The rest 15.4% think that the mosquito repellent is the most effective among all (Table 5).

Usage, association between location, perception towards mosquito coil (Table 6): The types of mosquito repellent used vary between rural and urban

areas. All participants who use aerosol and cream are from urban area; while out of 98 coil users, 51% are from rural area and 49% from urban area. So, types of mosquito repellent usage vary significantly between rural and urban area (p<0.01, Fisher's Exact). Rural people use coil every week 6.74 times on average with a standard deviation of 2.75; which is higher than that of urban people (M=4.11, SD=2.04). T-test confirms that, average number of coil usage per week by rural people is significantly higher than urban people, t-stat=5.82, p<0.01. Urban people use more coils on average per day (M=1.5, SD=10.9) than rural people (M=1.24, SD=0.62); but the difference between average number of coils is not significant, t-value=-1.73, p=0.087>0.05.

Table 4. Response pattern of coil usage time and trashing procedure.

Coil usage time and trashing procedure		N	Percent
When do you usually use coil?	At any time	7	5.4%
	At night	115	88.5%
	In the morning	8	6.2%
Duration of burning coil (in hour)	1	52	40%
	2	33	25%
	3	41	32%
	4	3	2%
	7	1	1%
Location of burning coil	Near to bed	45	35%
	Near to my bed	24	18%
	Near to reading table	49	38%
	Outside my room	12	9%
Location of throwing coil ash	Into dustbin	54	41.5%
	Keeps it into a small container	29	22.3%
	Outside home	47	36.2%

Table 5. Participants' perception towards advantage and disadvantage of using coil (n=130).

Items		n	Percent
Extent of agreement to quitting coil is healthy	Low	33	25%
	Moderately	56	43%
	High	41	32%
Satisfaction from mosquito coil burning	High	34	26%
	Moderate	53	41%
	To some extent	43	33%
Most influential factor	Difficulty in maintenance	26	20%
	Laziness	69	53%
	Limited space coverage	20	15%
	Time Consuming	15	12%
Reasons of popularity	Cheap	53	40.8%
	Easy to use	57	43.8%
	Most effective among all the mosquito repellent	20	15.4%

Table 6. Usage, association between location, perception towards mosquito coil (n=130).

Variable		Rural (*n=50*)	Urban (*n=80*)	χ^2/ Fisher's Exact test	*p-value*
Mosquito repellent	Aerosol	0.0% (0)	100.0% (21)		
	Coil	51.0% (50)	49.0% (48)	-	0.000[b]
	Cream	0.0% (0)	100.0% (11)		
Perception on mosquito repellent coil	Beneficial	64.7% (11)	35.3% (6)		
	Harmful to health	7.0% (4)	93.0% (53)	42.43	0.000[a]
	Repels mosquito	62.5% (35)	37.5% (21)		
Mosquito coil is as harmful as smoking	Not at all	42.9% (3)	57.1% (4)		
	To some extent	27.3% (9)	72.7% (24)	-	0.000[b]
	Moderately	57.1% (28)	42.9% (21)		
	Highly	24.4% (10)	75.6% (31)		
Time of using coil	At any time	14.3% (1)	85.7% (6)	-	0.295[b]
	At night	40.9% (47)	59.1% (68)		
	In the morning	25.0% (2)	75.0% (6)		
Place of keeping coil while burning	Near to bed	35.6% (16)	64.4% (29)		
	Near my bed	62.5% (15)	37.5% (9)	-	0.000[b]
	Near to reading table	30.6% (15)	69.4% (34)		
	Outside my room	33.3% (4)	66.7% (8)		
Place of trashing coil ash after burning	Into dustbin	33.3% (18)	66.7% (36)		
	Keeps it in a small container	51.7% (15)	48.3% (14)	-	0.181[b]
	Outside home	36.2% (17)	63.8% (30)		
Quitting using coil is healthy	Low	63.6% (21)	36.4% (12)		
	Moderately	39.3% (22)	60.7% (34)	16.78	0.000[a]
	High	17.1% (7)	82.9% (34)		
Satisfaction with service from mosquito coil burning	High	67.6% (23)	32.4% (11)		
	Moderate	34.0% (18)	66.0% (35)	18.27	0.000[a]
	To some extent	20.9% (9)	79.1% (34)		
Most influential reasons for not using a mosquito net	Difficulty in maintenance	30.8% (8)	69.2% (18)		
	Laziness	34.8% (24)	65.2% (45)	4.35	0.000[a]
	Limited space coverage	45.0% (9)	55.0% (11)		
	Time-Consuming	60.0% (9)	40.0% (6)		
Agreement about satisfaction with service from mosquito coil burning	Cheap	35.8% (19)	64.2% (34)		
	Easy to use	38.6% (22)	61.4% (35)	0.515	0.773[a]
	Most effective among all	45.0% (9)	55.0% (11)		

Out of 130 participants, 17 said that the mosquito repellent coil is beneficial, of them 64.7% were rural and 35.3% were urban. While, mosquito repellent coil is harmful to health was reported by 57 people; of them 93% were urban people. Out of 56 participants, 62.5% rural people think that coil repels mosquito.

The perceived proportion on mosquito repellent coil significantly vary between rural and urban area, as $\chi^2 = 42.43, p<0.01$. Of total 130 participants, 100% of rural people responded "Yes" toward the claim of coil having harmful effects on human health, while, 97.5% urban people said "Yes" on this issue. So, the

proportions do not vary at large and hence found insignificant (Fisher's Exact Test, p=0.523).

Selected people of this study were asked whether the mosquito coil is as harmful as smoking or not. The answer was "Not at all" by 41 people (24.4% rural, 75.6% urban), "To some extent" by 49 people (57.1% rural, 42.9% urban), "Moderately" by only 7 people (42.9% rural, 57.1% urban) and "Highly" by 33 people (27.3% rural, 72.7% urban). The proportions within each extent of agreement significantly vary between rural and urban people (Fisher's Exact Test, p<0.01). From earlier analysis it is observed that 115 out of 130 respondents said that they use coil usually at night. Among them, 59.1% were urban and 40.9% were rural people. The Fisher's Exact Test indicates that there is no association between the area of people live and their usage pattern of coil at different times in a day (p=0.295). This study indicates that rural people burn the coil more on average (M=2.36, SD=1.21) than urban people (M=1.77, SD=0.78). The difference in averages is significant, t-value=3.05, p<0.01.

Participants were asked where they used to keep coil while burning. Out of 45 people who keep the "Near to bed" while burning; 64.4% were urban and 35.6% were rural. However, 24 people responded that they keep coil "Near to bed" while burning (rural 62.5%, urban 37.5%), 49 people said "Near to reading table" (rural 30.6%, urban 69.4%) and 12 people reported "Outside my room" (rural 33.3%, urban 66.7%). The proportion pattern of rural and urban people' habit regarding where they keep the coil while burning is significantly different (Fisher's Exact, p<0.01). Out of 130 respondents, 53 said that they throw coil ash after burning "into dustbin"; 67.9% of them were urban people. Forty-seven people reported that they threw the coil ash "outside home"; of them 63.8% were urban. Another 29 people said they keep the coil ash "into a small container"; of them 51.7% were rural. The Fisher's Exact Test implies that there is no association between area and place where people keep the coil ash (p=0.181). Out of 130 respondents, 56 respondents moderately agreed that that quitting using coil is healthy; of them

60.7% were urban and 39.3% were rural. Forty-one (41) respondents highly agreed about this matter; of them 82.9% were urban and 17.1% were rural. Extent of agreement was low from 36.4% urban people and 63.6% rural people out of 33. A significant association is found between area and extent of agreement (χ^2 = 16.78, p<0.01).

The people were asked how they are satisfied with the service they get from mosquito coil burning. Out of 130 respondents, 53 said that they are moderately satisfied; of them 66% were urban and 34% were rural people. While 79.1% urban people of total 43 respondents said they are satisfied to some extent. Thirty-four people were found highly satisfied; among them 67.6% were rural. A significant association is found between extent of agreement towards satisfaction with service which you get from mosquito coil burning and area (χ^2 = 18.27, p<0.01). In earlier univariate analysis, laziness was identified as the most influential for not using mosquito net (69 respondents). Urban people are found (65.2%) twice as likely to be lazy than urban people (34.8%) regarding using mosquito net. The proportions of urban and rural people are 69.2% and 30.8% while mentioning "Difficulty in maintenance" as the influential factor. The proportions of urban and rural people while mentioning "Limited space coverage" and "Time consuming" as the influential factors are not differing at large extent. The overall distribution of proportion influential factors across rural and urban area is not significantly differ (χ^2 = 4.35, p=0.227).

Almost half of the respondents (57 respondents) said that the reason behind the popularity of mosquito coil is "Easy to use"; among them 61.4% were urban and 38.6% were rural people. On the other hand, 53 respondents pointed that coil is popular because it is cheap; of them 64.2% were urban and 35.8% were rural people. As a reason of popularity of mosquito coil, "Most effective among all the mosquito repellent" was reported by 20 respondents (urban 55.5%, rural 45.0%). There is no significant association between area and reasons reported by the respondents (χ^2 = 0.515, p=0.773).

Discussion

This research focuses on comparing how various mosquito coils are used by rural and urban residents in terms of health risks. According to the findings of the research, there are a wide variety of disparities between both categories with respect to their socioeconomic attributes, the use of repellents, their experience with illnesses and their financial burden caused by each episode of sickness. The findings demonstrate that the mosquito issue is far more severe in rural areas owing to the crowded living conditions and unsanitary conditions that exist because of ineffective waste management that limits the drainage system. The usage of mosquito coils, on the other hand, varies according to the desire for the price level, and the ease of accessibility. This is because there is a bigger range in the level of education and income. It has been shown that those living in rural areas with lower incomes are more likely to use cheaper coils made by a local brand, whilst people living in urban areas are more likely to utilise a variety of insect repellents such as sprays, liquid vaporizers, and coils. On the other hand, this result is very much in line with what many researchers have reported (Moore *et al.*, 2018; Islam, *et al.*, 2022). The findings of the study suggest that the smoke produced by indoor air pollution frequently triggers various respiratory ailments. The level of severity is comparatively greater in rural regions in comparison to urban areas because a significant proportion of the rural population resides in densely populated surroundings. Individuals residing in rural regions experience a higher incidence of ocular irritation, as well as nasal and pharyngeal infections, asthma, cardiovascular disease, and respiratory allergies. To mitigate this burden, various preventative measures are implemented, including the procurement of bed nets, utilisation of herbal products and acquisition of electric rackets, all of which incur associated costs. The sum is notably substantial for individuals residing in both rural and urban areas who have a low income. It is recommended that pertinent stakeholders involved in public health initiatives disseminate information to the public regarding the adverse health implications associated with the burning of mosquito coils. Additionally, individuals should be encouraged to restrict their use of deleterious mosquito coils and instead opt for herbal alternatives, such as neem based coils. Furthermore, it is advisable to refrain from using coils within indoor living spaces and instead employ them outside of such areas while ensuring that windows are closed. Lastly, it is recommended to utilise appropriate bed nets during night-time hours. Additional investigation could be conducted through the involvement of multiple stakeholders in order to comprehend the potential health ramifications of employing mosquito coils produced within the vicinity (Islam *et al.*, 2022). Therefore, by acquiring knowledge on the various methods employed by individuals from diverse socioeconomic backgrounds to protect themselves against mosquitoes, and collating this information with other relevant data, it is possible to enhance the effectiveness of repellent use. So, this can be inferred from the study that from production to end use wherever we see, carelessness is prominent in dealing with mosquito coils due to unawareness which can be result in health hazards. There are many unbranded coils available in our market which is produced without maintaining health rules. Many mosquito coils consumed in Bangladesh are being manufactured without the compliance with standard criteria and mixing excessive poisonous ingredients. Bangladesh Standards & Testing Institution should be strict in this regard and proper quality assurance should be confirmed. Mosquito coils are kept along with the food items in the same shelves. As a result, the foods can be contaminated with the chemical ingredients of coils through permeation due to the use of low graded packaging materials for wrapping of coils. Mosquito coils should be stored in a separate shelf. People generally remove ash carelessly, so some ash can be remained in the room which may increase the risk. Ash trays with lids can be provided with the coils so that ash does not met environment. People take burning coils as the easiest solution to combat mosquitoes and don't want to use mosquito nets due to their laziness. They should be encouraged to use mosquito nets.

Conclusion

In 2000, World Health Organization ranked indoor smoke from solid fuels as one of the top ten risk factors for the burden of disease globally (Zhang and Smith, 2003). Burning of mosquito coil exposes indoor air to combustible gases containing life threatening and possibly carcinogenic compounds which is an environmental health concern. In spite of the fact that smoke emitted from mosquito coil may cause numerous potential deleterious health effects, a large number of residents from developing countries use mosquito coils in their daily life may be due to familiarity and economical mode of personal protection against mosquito bite (Liu *et al.*, 2003). It was estimated that the annual world consumption of mosquito coils was 32 billion by the year 2000. Generally, every year mosquito coils are used overnight in a bedroom for at least several months and so this long-term exposure to mosquito coil smoke may result in harmful cumulative effects which may endanger lives. Exposure could be higher in people spending long time indoors. In millions of congested slums worldwide where people live in crammed room, such kind of mosquito repellents could be a potent source of polycyclic aromatic hydrocarbons and metal contamination and cause harmful effects in human health. But these products are used in unsupervised way, so supervision in this regard is necessary and it is essential to analyse the quality of approved products and the products should have adequate data on safe use and disposal and vast analysis of the available mosquito coils of our country market should be performed, if possible safer ones should be encouraged.

Acknowledgments

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