Determination of noise level in domestic kitchen chimney in urban areas of Jorhat city

ABSTRACT

Environmental parameter mainly noise has a profound effect on human performance, efficiency and efficacy. Noise is an invisible indoor environmental factor that affects the quality of life and productivity of the workers in cooking activity. The present study on assessment of noise level in domestic kitchen of Jorhat city was proposed to measures noise level in the kitchen during cooking and to study the relationship between dependent and independent variables. A purposive cum random sampling method was adopted for the study. From Jorhat city 56 numbers of household were selected randomly and women who involved in cooking activity were the sample for the purpose of the study. Both interview and observation method was used for collection of data which was done through a questionnaire and observation for measurement of noise level. Noise level-meter is an instrument used for measurement of noise level. Chi square test was done to identify the relationship between variables. The findings showed that the average noise level was found to be 64.70 dB which is more than the permissible or acceptable level of noise (55 dB). The study revealed that there is a significant relationship between noise with brand name of the kitchen chimney (‘p’=0.041*). Majority of the respondents in the study area were not aware of noise pollution and kitchen environment is not for a conducive in terms of noise to improve their performance and reduction of health hazards.

Key words: Noise level, decibel (dB), noise level meter, conducive

Introduction

Noise is defined as unwanted sound which can pollute the indoor space and stresses people’s well being. A kitchen, the symbol of culture of the family is the centre and the heart of the house. Kitchen is the noisiest room in the house due to the use of different equipments such as chimney and the noise level of appliances range from 40 to 90 dB (Jackson *et al.* 1975). Generally peoples are not aware of invisible impacts and associated health problems of noise pollution and ignore the condition. High exposure to noise level can causes feeling of annoyance and irritation, damage to auditory mechanisms, number of health related effects like physiological disorders, psychological disorders, disturbances of daily activities and

performances, hypertensions and heart diseases (Goines *et al*., 2007). The most serious health hazards associated with high level of noise exposure is deafness which initially causes temporary hearing problem or deafness while prolonged exposure to high noise level causes permanent hearing damage. Different health problem produces due to numerous effects and interferes people's well being such as concentration, sleep, communication etc. (Goines *et al.,* 2007). Loud noises can seriously affect people's work performances and directly affect to the health and productivity and give negative impression (Leather *et al.* 2003). Although cooking, the primary activity at kitchen is not always considered with due weightage as a physically demanding task, it has substantial physical, emotional and cognitive demands on humans (Banerjee. *et al*., 2018). For comfort, increasing productivity and efficiency of the women in cooking activity, kitchen should be well ventilated and noise free while working inside the kitchen. The indoor environmental quality has a serious influence on the quality of life (Arif. *et al.,* 2016). Kitchen environment is highly conducive to anyone in performing daily activities especially who involved in the preparation activities. There are major various physiological and psychological risk factors which are associated with adverse environmental condition and becomes responsible for deteriorating the worker's working capacity (Khare, 2016). The environmental parameter mainly noise is the most affecting parameters (Shobha *et al.,* 2012). The human body and equipments are effective if the environment in congenial to the workers. The environment is conducive for the women if noise level 80 dB (Skyes 1988). Loud noises can seriously affect people's work performances and directly affect to the health and productivity and give negative impression (Leather *et al.* 2003). High level of noise can cause hearing impairment and increase in high blood pressure which affects heart disease Buskh *et al*. (2018). Keeping this in mind the assessment of noise level in domestic kitchen of Jorhat city was proposed to measures noise level in the kitchen during cooking and to study the relationship between dependent and independent variables.

Methodology:

A multistage purposive cum random sampling method was adopted for the study. From Jorhat municipality area 56 numbers of household were selected from 3 wards by applying Probability Proportional to Size (PPS) method. People who constructed their own home were the respondents' households for the present research study. For the present study, both interview and observation method was adopted for the data collection. Data were collected personally by the researcher. Noise level meter was used to record the data on noise level during the cooking period in the kitchen. To determine the clarity and reliability of the

instrument or the interview schedule, pretesting was done. Self- prepared questionnaire was used to obtain housing attributes of the respondents. Noise level was measured in sample households. Three readings were taken at a 15 minutes interval compared to find out the relation between dependent and independent variables.

Table 1. Dependent and Independent Variables

Variables	
Dependent variables	**Independent Variables**
1. Noise	a) Total area of the kitchen
	b) Brand Name of the Kitchen chimney

Plate 1: Noise Level-Meter

Table 2. Acceptable Limit for Noise level

Area	**Category of Area/Zone**	**Limits in dB**	
		Day Time	Night Time
(A)	Industrial Area	75	70
(B)	Commercial	65	55
(C)	Residential	55	45
(D)	Silence Zone	50	40

(Source: standards prescribed by CPCB and BIS, the Noise Pollution (Regulation and Control) Rules, 2000, APCB, 2007)

Analysis is the critical examination of assembled and grouped data, for studying the characteristics of the object under study and determining the patterns of relationship among variables related to it.

Result and discussion

Demographic profile of the respondents:

The results showed that 44.6 per cent of the respondents were between the age group of 51-60 years, and 37.50 percent of the respondents were belonged to the age group of 40-50 years and the minimum number of respondents i.e. 17.9 per cent were between the age group of 61-70 years. Findings showed that the highest percentage (42.2%) were found to be graduate whereas 21.40 per cent were post graduate and (17.10%), (12.5%) were found to be higher secondary passed and HSLC passed respectively. Regarding the demographic attributes of the respondents found that majority of the respondents (78.60%) were belong to the nuclear family and the minimum number of families i.e.21.40 per cent were belong to the joint family. Majority of the respondents (78.60%) were having family members between 2-4 members in their household whereas 21.40 per cent were having 5-7 members in their household. Socio economic characteristics of the family found that the highest percentage (98.20%)were service holder and about 23.2 per cent of the head of the families were found to be business whereas 46.4 per cent of the respondents were also depended on service holder and (30.4%), (23.2 %) were found to be housewife and business. About 32.1 per cent of the families were had monthly income Rs 50,001/- to Rs 70,000/-per month whereas 26.8 per cent had income range between Rs70, 001/- to 90,000/ and more than Rs 90,000 respectively.

Housing attributes of the family

This section of the study deals with the background information of respondents in terms area of the kitchen, position of burner/stove in the kitchen and brand name of the kitchen chimney.

Size of kitchen

It is evident from the Table 3 that majority of the kitchens of the selected sample had an area less than 100 square feet (78.50%) which was followed by (21.50%) of the respondents kitchens had an area of more than 100 square feet. This may be due to the fact that time is very much scare for housewife and not able to maintain a large kitchen.

Kitchen is a place where family members are performed cooking, worship and bonding together and even socializing with friends and family. In some of families of study area the size of the kitchen was more. They used the kitchen space not only for cooking but also used for worship and as well as dinning purpose.

Table 3. Distribution of the respondents according to their housing attributes.

Sl. no	Attributes	Frequency	Percentage
A.	**Size of Kitchen**		

1	Less than 100 sq.ft	44	78.50
2	More than 100 sq.ft	12	21.5
	Total	56	100.0
B. **Brand name of the kitchen chimney used in the house**			
1	Kutchina	20	35.7
2	Faber	33	58.9
4	Apex jps	3	5.4
	Total	56	100.0
C. **Distance from floor to Chimney**			
1	Upto 5'5"	33	58.92
2	More than 5'5"	23	41.08
	Total	56	100.0

Position of burner/stove in the Kitchen

The data given in Table 3 on the information of the position of stove in the kitchen and observed that 28.60 per cent of the respondent's kitchen burner/stove was in East side, followed by 25 per cent respondents kitchen stove were in South and North side and only 21.40 per cent respondents kitchen stove was in West side of the kitchen in their house.

Brand name of the Kitchen chimney

Regarding the brand name of the kitchen chimney, it was recorded that from Table 3 and Fig 1 that most of the respondents were using brand name of Faber (58.90 %), followed by 35.70 per cent were using Kutchina chimney and only 5.40 per cent of respondents were using Apex Jps in their kitchen. Among the different brand of kitchen chimney Faber is most popular brand in the study area.

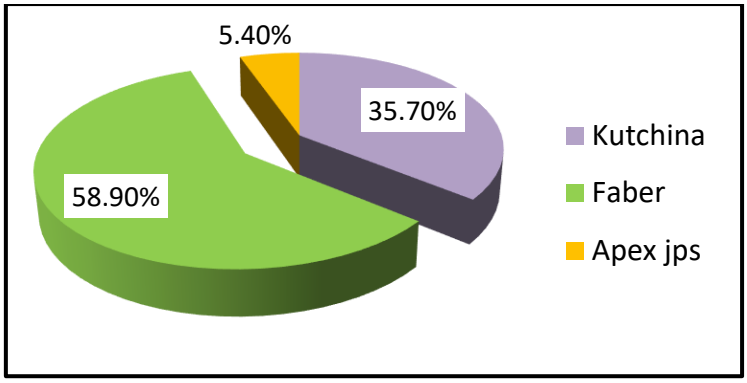

Fig: 1 Distribution of different brands of the chimney

Distance from floor to chimney

The installation of kitchen chimney was done by the Firm itself. They follow the instruction given by the firm to install the chimney in specified height. The data given in Table 3, highlighted that in the study area of the distance from chimney to floor were up to 5'5" (58.60 %), and the minimum number of kitchen chimney were installed at a height more than 5'5" (41.08 %). The distance for installing the kitchen chimney is depending on distance from the kitchen slab. The distance between chimney and kitchen slab should be 70 – 75 cm. If the height of the kitchen slab is less, than distance between floors to chimney would be less.

Measurement of noise (dB) level in the domestic kitchen

Noise is unwanted sound considered unpleasant, loud or disruptive to hearing. A sound, especially one that is loud or unpleasant or that causes disturbance. The instrument to measure sounds in the air is the sound level meter and unit of measuring is dB. Noise level was measured at the time o cooking activity in a selected area.

It was apparent from the Fig. 2 that minimum noise level in the selected domestic kitchen was found to be 59.93 dB and the maximum noise level were fund to be is 69.48 dB respectively. It was also revealed that the average noise level in domestic kitchen of the selected area was found to be 64.70 dB. Fig 2 indicates the maximum and minimum noise level in domestic kitchen.

As per the recommended standards prescribed by the Noise Pollution (Regulation and Control Rules, (2000) it was stated that the acceptable limit of noise level in residential kitchen is 55 dB. The average noise level in domestic kitchen of the study area was found to be 64.70 dB which is more than the permissible or acceptable level of noise (Fig-3). The

study is in conformity of the study conducted by Kaur (2016) on assessment of indoor pollution in rural and urban houses and it was observed that the average noise level in the kitchen and drawing room was found to be 53.85 dB and 55. 67 dB respectively. According to the recommendations of NBO of India (2002), it reveals that in residential area noise level should not be exceed more than 55 dB.

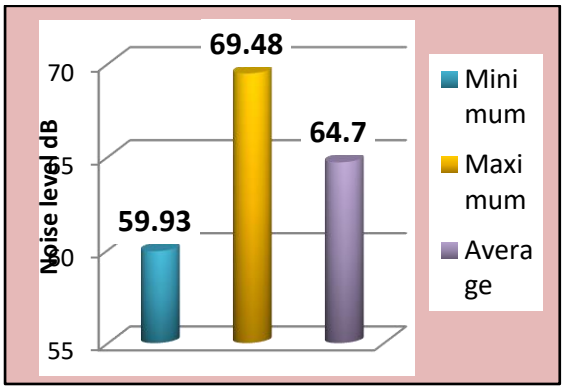

Fig: 2 Distribution of maximum and minimum value of noise in domestic kitchen

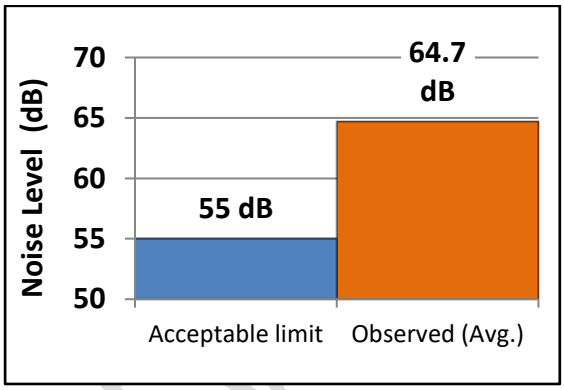

Fig: 3 Distribution of Observed (Avg.) and Acceptable Limit of Noise level

4.5.7 Distribution of respondents according to practices followed for noise control in domestic kitchen.

Based on the data analysis on practices followed by the respondents for noise control in domestic kitchen is shown in Fig 4 indicated that 3.50 per cent of the respondents were adjusting chimney knob by lowest to highest and highest to lowest and a very meagre per cent (1.70%) of the respondents ensured ducting has least number of bends from chimney to outside wall respectively. The respondents in the study area are not aware regarding noise and its impact on human health.

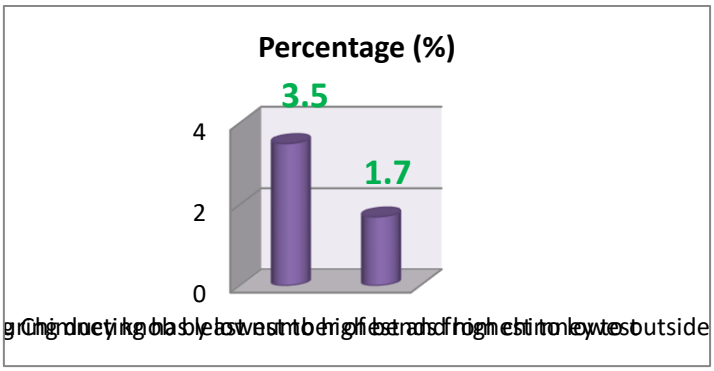

Fig: 4. Distribution of respondents according to practices followed for reduction of noise in the kitchen.

Identification of the relationship between the selected independent variables and dependent variables.

These studies of the relationship between the selected independent variables and dependent variables were computed using Chi-square test. The dependent variable was noise level whereas independent variables selected were area of the kitchen and brand name of the Kitchen chimney. From the analysis of the data it was found that, no significant association was found between noise and area of the kitchen, ('p'=0.286). Although, there lies a significant relationship between noise and brand name of the kitchen chimney (**'p'=0.041**).** This data signifies that choosing the good brand name of chimney also reduce the noise level in the kitchen. Therefore, the null hypothesis is partially accepted.

Conclusion

Noise is unwanted sound which can hinder the regular activities of the workers physically and psychologically. It was also unfolded that the average noise level in the kitchen was found to be more than the acceptable limit. The environmental parameters of the kitchens under the study area were not conducive. To make the noise level acceptable or congenial, to the user sound absorbing material could be used.

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