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A Cross Sectional Study among Housewives on the Knowledge and Practice of Household Mosquito Control Measures

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A study conducted at Arpookara Grama Panchayath, Kottayam District, Kerala State.

Abstract
BACK GROUND : World Health Day theme of 2014 was "Small Bite – Big Threat" to sensitise the world on the seriousness of vector borne diseases, especially mosquito borne diseases. The study was an attempt to assess the knowledge and practice of house wives in mosquito control measures followed in rural communities.
MATERIALS AND METHODS : A structured interview schedule was used to assess the knowledge and practice of 390 house wives of Arpookara grama panchayath of Kottayam district in Kerala, India during the first half of June 2021. Modified (2020) Kuppuswamy scale was followed in incorporating socio demographic details in the interview schedule. The data obtained was entered in Microsoft Excel and analysed using SPSS ver. 2016.
RESULTS :
Knowledge regarding mosquito borne diseases are fairly good (76.4%) among the study population. Knowledge on various mosquito control measures was poor that the role of protective clothing was known only to 8.2% respondents. Disposal of waste water from kitchen was observed and 60% are practicing improper methods. Health education by the public health care personnels (JHI/Jr.PHN/ASHA) was source of information only to a meager 9.2% of housewives. Mass media - TV and newspaper – are the main source of information. Though any statistical significance could be derived between age and knowledge level, contrary to the expectation, those below the age of 40 had no better level of knowledge. No statistical significance was observed between level of knowledge and socio-economic status, negating the popular belief that those having high socio-economic status have higher level of knowledge. It is seen that the practice levels are improving though marginally, as the level of socio-economic status improves.
The study shows that practice improves with the increase in educational qualification. It was also found that the low level of practice of mosquito control measures is invariably due to low level of knowledge though, the association between knowledge level and practice level was not found statistically significant.
Keywords: Vector bionomics, health education, women empowerment

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I. INTRODUCTION

"*SMALL BITE – BIG THREAT"* was the World Health Day theme [1] of 2014 and it was intended to remind the world about the magnitude of mortality and morbidity caused by vector borne diseases especially, mosquito borne. In the recent past there were sporadic incidents of spread of Mosquito borne diseases in all parts of the world and the third world region being hit in a large way.

The epidemiology of this vector borne diseases show that the frequency of human and vector contact determines the rate of disease transmission. The vector bionomics – the biting habits, the flying range, breeding places etc are also important in disease transmission and vector control. It was noticed that housewives who spent most of their time in household premises contract the disease more than their male partners who spent majority of their time out their household premises. This fact led us to study on the knowledge and practices of mosquito control practices adopted by housewives at domestic level.

The National Vector Borne Disease Control Programme (NVBDCP)[2] aims to achieve effective vector control by the appropriate biological, chemical and environmental interventions of proven efficiency appropriate to the area through the optimal use of resources and control Malaria, Filaria, Japanese Encephalitis, Dengue, Chicken Guinea, and Kala Azar. Community participation is key to the success of this program. Vector-borne diseases account for more than 17% of all infectious diseases, causing more than 700 000 deaths annually. They can be caused by either parasites, bacteria or viruses.[3]

The role of home maker in following hygienic practices in the family is unquestionable. This study aims to find out the reach of media campaign activities for vector control and the gaps if any in knowledge and practices and to find out whether they are actually aware of the ***big threats*** hidden in the ***small bites*** of the mosquitoes.

Vector Bionomics – Mosquito

- *Feeding Habits*:- The males never bite, instead feed on plant juices. The females on the contrary require a blood meal every 2-3 days for the development of its eggs. Some species prefer human blood while some on animals, while some feed on both human and animal blood.
- *Biting time*:- Generally, mosquitoes bite during evening and early night hours. But some like *Ades*, the vector of Dengue fever bites in the day timings.
- *Resting Habits*:- Mosquitoes prefer dark places to rest during day times. In indoor, they prefer dark corners, upper parts of walls, underneath of furniture, behind picture and other such objects. The outdoor resting places are shrubs, vegetation, tree holes, wells, cattle shed etc.
- *Breeding Habits*:- Culicines prefer dirty and polluted water, while Anophilines breed in lean water, while Ades prefer artificial collections. Mansonides breeds in ponds and lakes containing aquatic plants like Pistia and Water Hyacinth.
- *Hibernation* :- Adult Mosquitoes hibernate when the environmental conditions are un favourable usually to tide over severe winters.
- *Dispersal* :- The flight range varies from species to species. It may range from 200 meeters to 11 kilometers. Further, it is possible to disperse from country to country through aircrafts and ships.
- *Life span* :- The normal life span of mosquitoes varies from 8 to 34 days. Both high and low temperatures are fatal and humidity also affects.

Density of Vectors and its indices

There a number of ways to assess the density of a vector in and around households namely, Household index, Container index, Pupal index and Breteau index, based on presence of adult and larvae in containers.

Mosquito control measures

The World Health Organisation defines Integrated Vector Management (IVM)[4] as a rational decision-making process for the optimal use of resources for vector control.

Mosquito control measures are done at three stages namely, Anti Larval, Anti Adult and Personal Protective measure

The Anti larval measures are Environmental management, Chemical Control and Biological Control

The Anti adult measures are Indoor Residual Spraying (IRS), Indoor Space Spray (ISS), Thermal Fogging and Genetic Control

The Personal Protection measures are proper Clothing and use of Repellents

The vector management measures can be taken up at community level and at household level. At household level, the focus is always on reduction of breeding sources and personal protection measures. Hence this task usually lands on the shoulders of the homemaker.

OBJECTIVES

The objectives set for this study were:

a) To assess the knowledge and practice level of housewives on mosquito control
b) To find out the association between various socio-demographic variables and the level of knowledge on mosquito control by the study subjects
c) To assess the reach of health education activities conducted by the local health care functionaries.

II. METHODS AND MATERIALS

The study design is cross sectional and the study period is the first half of June 2021. The Study setting is Arpookara Grama Panchayath and the subject of study being Housewives. Those Housewives who were working and not available at home and those unwilling were excluded. A sample size of 390 was fixed by considering the reported prevalence in a previous study. The sampling method used was convenient sampling as we could not expect a study subject in every household, but data was collected from a well-defined area namely ward 9 of Arpookara Grama Panchayath. A specifically designed interview schedule was the study tool. The study was done with the permission of The Secretary, Grama Panchayath, Arpookara, Kottayam District, Kerala by using the interview schedule. The socio demographic details confirming to modified Kuppuswamy scale 2020[5] was incorporated in the interview schedule prepared in Malayalam which had a check list to cross check the answers related to practice.

DATA ENTRY AND ANALYSIS

The data was entered in Microsoft Excel and analysis was done using statistical package SPSS Version 16. Summary statistics like percentages are calculated. To check the association between categorical variables, chi-Square test was used with p vale less than 0.05.

III. RESULTS AND DISCUSSIONS

The data was collected from 390 families, housewives being the respondents. The age distribution shows that 24.8% are from the age group 41 – 50 and 6.7% are above 70 years of age.

TABLE No. **1**
AGE DISTRIBUTION OF STUDY SUBJECTS

AGE GROUPS	FREQUENCY	PERCENTAGE
< 30	33	8.5
31 - 40	81	20.8
41 - 50	97	24.8
51 - 60	85	21.8
61 - 70	68	17.4
71 +	26	6.7
TOTAL	390	100

TABLE No.**2**
EDUCATIONAL STATUS OF STUDY SUBJECTS

EDUCATION	FREQUENCY	PERCENTAGE
ILLITERATE	5	1.3
UPPER PRIMARY SCHOOL	56	14.4
HIGH SCHOOL	153	39.2
+2 / DIPLOMA	88	22.5
GRADUATE/ PG	81	20.8
PROFESSIONAL	7	1.8
TOTAL	390	100

The level of education show that nearly 40% are educated upto high school.

TABLE No. **3**
TYPE OF FAMILY

TYPE OF FAMILY	FREQUENCY	PERCENTAGE
JOINT	154	39.5
NUCLEAR	236	60.5
TOTAL	390	100

The family composition shows that more than 60% are nuclear families.
The religious composition of the respondents shows that Muslims were a minority with only 4.4% while Hindus form the formidable chunk with 56.9%.

TABLE No.**4**
OCCUPATIONAL STATUS

OCCUPATION	FREQUENCY	PERCENTAGE
UNEMPLOYED	320	82.2
UNSKILLED	5	1.3
SEMISKILLED/ SKILLED	21	5.3
CLERK/SALES/FARMING	13	3.3
SEMI PROFESSIONAL	29	7.4
PROFESSIONAL	2	0.5
TOTAL	390	100.0

Occupational details of the respondents show that 82% of the respondents are unemployed.

TABLE No.**5**
SOCIO ECONOMIC STATUS OF THE STUDY POPULATION

SOCIO ECONOMIC STATUS	FREQUENCY	PERCENTAGE
LOWER	2	0.5
UPPER LOWER	118	30.3
LOWER MIDDLE	169	43.3
UPPER MIDDLE	82	21
UPPER	19	4.9
TOTAL	390	100

The socio economics status was tabulated by modified Kuppuswamy scale. The table shows that lower middle class is the prominent group with 43.3 % and the upper group is just near 5%.

TABLE No.**6**
CATTLE REARING

CATTLE	FREQUENCY	PERCENTAGE
ABSENT	362	92.8
PRESENT	28	7.2
TOTAL	390	100

Cattle rearing is a domestic vocation for some. They rear one or two milch animals in the household. In the study population, only a small proportion say around 7% rear cattle.

TABLE No.**7**
PROXIMITY OF CATTLE SHED TO DWELLING HOUSE

CATTLE	FREQUENCY	PERCENTAGE
FAR	14	50
NEAR	14	50
TOTAL	28	100

Far : More than 10 mtrs. Near: < 10 mtrs.

Since rearing of milch animals is a household activity, they keep its shed near to the dwelling house. Here only 50 % keep the cattle shed near to the house, probably due to the small size of the property, which was noticed during data collection.

TABLE No. **8**
PRESENCE OF CATTLE DUNG PIT

DUNG PIT	FREQUENCY	PERCENTAGE
ABSENT	18	64.3
PRESENT	10	35.7
TOTAL	28	100

Presence of cattle in the household was found out in little over 7% and the cattle shed was found to be near to the house in fifty percent of these households. Cow dung was kept in dung pit in one third of the households that rear cattle.

TABLE No. **9**
KNOWLEDGE ABOUT TRANSMISSION OF DENGUE FEVER

TRANSMITOR	FREQUENCY	PERCENTAGE
MOSQUITO	344	88.2
OTHER	46	11.8
TOTAL	390	100

The level of knowledge of the respondents about mosquito born diseases and its mode of transmission, vector bionomics and protective measures were assessed and shows that more than half of the respondents (57.9%) had medium level of knowledge.

TABLE No.**10**
KNOWLEDGE REGARDING VARIOUS MOSQUITO BORNE DISEASES

MOSQUITO BORNE DISEASES	FREQUENCY	PERCENTAGE
KNOW	298	76.4
DON'T KNOW	92	23.6
TOTAL	390	100

Knowledge regarding mosquito borne diseases are fairly good (76.4%) among the study population.

TABLE No. **11**
TABLE SHOWING LEVEL OF KNOWLEDGE OF STUDY POPULATION BASED ON REGARDING BREEDING SITES OF MOSQUITOES

BREEDING SITES	DON'T KNOW		KNOW	
	Frequency	Percentage	Frequency	Percentage
STAGNANT WATER	15	3.8	375	96.2
EMPTY CONTAINERS	256	65.8	134	34.2
WASTE WATER	199	51	191	49
VEGETATION	288	73.8	102	26.2
COCONUT SHELL	130	33.3	260	666.7
TYRE	270	69.2	120	30.8
PLASTIC WASTE	254	65.1	136	34.9
WELL	321	82.3	69	17.7
FRIDGE / A/c	302	77.4	88	22.6

Housewives knowledge about the breeding source was poor except for stagnant water (96.2%) and coconut shell (66.7%).

TABLE No. **12**
DISTRIBUTION OF STUDY POPULATION BASED ON KNOWLEDGE REGARDING VARIOUS MOSQUITO CONTROL MEASURES

MOSQUITO CONTROL MEASURES	KNOW		DON'T KNOW	
	Frequency	Percentage	Frequency	Percentage
MOSQUITO NET	249	63.8	141	36.2
SCREENING	113	29	277	71
SMOKING COIL	285	73.1	105	26.9
REPELLANT CREAM	58	14.9	332	85.1
ELECTRIC APPLIANCES	269	69	121	31
PROTECTIVE CLOTHING	32	8.2	358	91.8
TULSI	22	5.6	368	94.4
SMOKING	249	63.8	141	36.2

The distribution of respondents based on their knowledge on various mosquito control measures was also poor that the role of protective clothing was known to only 8.2%, so as the use of locally available *Thulsi* [6], an indigenous adult mosquito control measure, was not known to 94.4%. Even one third of the respondents did not know use of *Mosquito Net* as a control measure.

It was found that in 82% of the households the housewives themselves cleaned the household premises and looked after the environmental hygiene in their household premises.

TABLE No: **13**
KNOWLEDGE LEVEL OF THE STUDY POPULATION ABOUT HOUSEHOLD MOSQUITO CONTROL MEASURES

KNOWLEDGE LEVEL	FREQUENCY	PERCENTAGE
LOW (< = 7)	127	32.6
MEDIUM (8 – 14)	226	57.9
HIGH (> = 15)	37	9.5
TOTAL	390	100.0

The practice of dry day in a week is crucial for control of mosquito breeding but, 76.9% of the respondents don't know about it despite large scale mass media campaign.

TABLE No.**14**
DISTRIBUTION OF STUDY POPULATION BASED ON MOSQUITO CONTROL MEASURES

MOSQUITO CONTROL MEASURES	Frequency	Percentage
MOSQUITO NET	62	15.9
SCREENING	50	12.8
SMOKING COIL	21	5.3
REPELLANT CREAM	93	23.8
ELECTRIC APPLIANCES	7	1.7
PROTECTIVE CLOTHING	186	47.6
NONE	1	0.2
SMOKING LEUCAS (തുമ്പ)	146	37.4

It was noticed that 15.9 % of housewives are not at all taking any mosquito control measure. Similarly, 48.4% are not using any larvicidal methods. Disposal of waste water from kitchen was observed and 60% are practicing improper methods, including no method. Similarly, solid household waste disposal was proper in 91% during summer and during rainy season it dropped to 55.9%.

TABLE No. **15**
MOSQUITO CONTROL ACTIVITIES DONE BY FIELD HEALTH STAFF AS REPORTED BY RESPONDENTS

CONTROL MEASURES	FREQUENCY	PERCENTAGE
FOGGING	122	28.7
CHRORINATION	43	11.0
BOTH	35	9.0
DONE NOTHING	200	51.3
TOTAL	390	100.0

The mosquito control activities done by the Health Services Department through grama panchayath is not appreciated by 51.3%.

TABLE No. **16**
SOURCE OF INFORMATION FOR THE STUDY POPULATION ABOUT MOSQUITO CONTOL METHODS

SOURCE OF INFORMATION	FREQUENCY	PERCENTAGE
NEWSPAPER	194	49.7
TELEVISION	193	49.4
RADIO	4	1.0
HEALTH EDUCATION BY HEALTH CARE PERSONNEL	36	9.2
OTHER SOURCES	186	47.7

The source of information was also studied and found that newspaper and television played a prominent role, while health education by health care personnel was source of information to a meager 9.2% of housewives.

As said earlier, the data collection tool had a check list to note the observations about the environmental conditions and general hygiene which will be the proof their practice. Environmental sanitation, presence of shrubs and vegetation, liquid and solid waste disposal and potential mosquito breeding places were in the check list for observation.

TABLE No. **17**
OVERALL ENVIRONMENTAL SANITATION LEVEL OF THE HOUSEHOLDS STUDIED

ENVIRONMENTAL SANITATION	FREQUENCY	PERCENTAGE
POOR	39	10
SATISFACTORY	133	34.1

GOOD	193	49.5
EXCELLENT	25	6.4
TOTAL	390	100

The environmental sanitation was poor in 10% of households and it was good in 49.5% of the households. It was observed that in 75.9% of household's solid waste disposal is proper. Similarly, the liquid waste disposal was proper in 67.7% of households. Growth of shrubs and vegetation was present in one third of the households.

Based on six questions on practice of mosquito control, the practice level was grouped as poor and good. The maximum score for the six questions was 18 and a score below 6 was fixed as cut off value between poor and good.

The association between various socio demographic variables and level of knowledge was perused and are presented below.

TABLE No. **19**
ASSOCIATION BETWEEN AGE OF THE RESPONDENT AND KNOWLEDGE LEVEL

AGE GROUP	KNOWLEDGE LEVEL			
	LOW	MEDIUM	HIGH	TOTAL
< = 40	43 (37.7%)	62 (54.4%)	9 (7.9%)	114 (29.23%)
41 - 60	53 (29.1%)	110 (60.5 %)	19 (10.4%)	182 (46.67%)
>= 61	31 (33%)	54 (57.4 %)	9 (9.6%)	94 (24.10%)
	127 (100%)	226 (100%)	37 (100%)	390 (100%)

Chi square value 2.526 p value 0.64

Though any statistical significance could be derived between age and knowledge level, contrary to the expectation, those below the age of 40 had no better level of knowledge.

TABLE No. **20**
ASSOCIATION BETWEEN KNOWLEDGE LEVEL AND EDUCATIONAL LEVEL OF THE RESPONDENT

KNOWLEDGE LEVEL	EDUCATIONAL LEVEL			
	A	B	C	TOTAL
LOW	28 (45.9%)	74(30.7 %)	25 (28.4%)	127 (100 %)
MEDIUM	27 (44.3%)	147 (61.0%)	52 (59.1%)	226 (100 %)
HIGH	6 (9.8%)	20 (8.3%)	11 (12.5%)	37 (100 %)
TOTAL	61 (100 %)	241 (100 %)	88 (100 %)	390 (100 %)

Chi square value : 7.641 P value - 0.106

A - Up to UP School
B - Above UP, up to post High School(+2/ Diploma)
C – Graduate / Professional

No significant variation was observed in level of knowledge as the proportion of population with *low* level of knowledge indicates that those up to Upper Primary education and those with graduate or higher level of education had almost same level. Similarly, among those with graduate or higher education, it is seen that only 11 out of 88, that is a meager 12.5% had *high* level of knowledge.

TABLE No. **21**
ASSOCIATION BETWEEN SOCIO ECONOMIC STATUS AND KNOWLEDGE LEVEL

KNOWLEDGE LEVEL	SOCIO ECONOMIC STATUS		
	A	B	C
LOW	44 (36.7%)	44 (26%)	39 38.6%)
MEDIUM	65 (54.2%)	111 (65.7%)	50 (49.5)
HIGH	11 (9.1%)	14 (8.3%)	12 (11.9%)
TOTAL	120 (100%)	169 (100%)	101 (100%)

Chi squrare value 8.131 p value – 0.087

A - LOWER & UPPER LOWER
B - LOWER MIDDLE
C – UPPER MIDDLE AND UPPER

The socio-economic level was assessed using modified Kuppuswamy scale as said earlier and the lower and upper levels were clubbed for assessing level of knowledge. No statistical significance was observed between level of knowledge and socio-economic status, negating the popular belief that those having high socio-economic status have higher level of knowledge.

TABLE No. **22**
ASSOCIATION BETWEEN OCCUPATIONAL STATUS AND PRACTICE OF HOUSEHOLD MOSQUITO CONTROL MEASURES

OCCUPATIONAL STATUS	PRACTICE LEVEL		TOTAL
	POOR	GOOD	
UNEMPLOYED	281(87.8%)	39(12.2%)	320(100%)
EMPLOYED	62(88.6%)	8(11.4%)	70(100%)

Chi square value - 0.031 p value - 0.860

The study revealed that there was no significant variation between the employed and unemployed. This may due to the fact that the employed housewives may not get time to look after mosquito control measures effectively.

TABLE No. **23**
ASSOCIATION BETWEEN RELIGION AND PRACTICE OF HOUSEHOLD MOSQUITO CONTROL MEASURES

RELIGION	PRACTICE LEVEL		TOTAL
	POOR	GOOD	
HINDUS	196(88.3%)	26(11.7%)	222(100%)
OTHERS	147(87.5%)	21(12.5%)	168(100%)

Chi square value - 0.056 p value - 0.813

It was seen that practice levels were almost same between Hindus and others.

TABLE No. **24**
ASSOCIATION BETWEEN SOCIO ECONOMIC STATUS AND PRACTICE OF HOUSEHOLD MOSQUITO CONTROL MEASURES

SOCIO ECONOMIC STATUS	PRACTICE LEVEL		TOTAL
	POOR	GOOD	
LOWER & UPPER LOWER	109(90.8%)	11(9.2%)	120(100%)
LOWER MIDDLE	148(87.6%)	21(12.4%)	168(100%)
UPPER MIDDLE & UPPER	86(85.1%)	15(14.9%)	101(100%)

Chi square value - 1.712 p value - 0.425

It is seen that the practice levels are improving though marginally, as the level of socio- economic status improves.

TABLE No**. 25**
ASSOCIATION BETWEEN KNOWLEDGE LEVEL AND PRACTICE OF HOUSEHOLD MOSQUITO CONTROL MEASURES

KNOWLEDGE LEVEL	PRACTICE LEVEL		TOTAL
	POOR	GOOD	
LOW	312(88.4%)	41(11.6%)	353(100%)
HIGH	31(83.8%)	6(16.2%)	37(100%)
TOTAL	343(87.9%)	47(12.1%)	390(100%)

Chi squrare value 0.669 p value – 0.413

The above table shows that low level of practice of mosquito control measures is invariably due to low level of knowledge though, the association between knowledge level and practice level was not found statistically significant.

Discussion

The study brings out the alarming gap between knowledge and practice regarding mosquito control among rural women. It may be noted that Kottayam was the first district in Kerala to be declared as fully

literate. But this level of literacy is not evident in this study, at least in the case of knowledge on vector borne diseases. There should be planned effort to provide health education focusing household women to take preventive measures to keep mosquito borne diseases at bay. Kudumbashree[7] units can take it as a challenge and educate the household women during their weekly meetings. Surely it will be a women empowerment action process which will have economic proportions as well, since disease reduction ensures saving considerable amount on account of medical expenses, that too to the poor and marginalised.

IV. CONCLUSION

It was about 7 years ago that WHO alerted the world about the threats human beings are facing from the small bites of mosquitoes by making its world health day theme as "big threat, small bite". This study is to find out how the rural housewives manage to ward off the mosquito menace by household practices.

The finding that elder housewives had good practice of mosquito control is a sign of changing priorities of housewives of the present day. Mosquito control practice was poor among low socio-economic group. However, practice improves with the increase in educational qualification. It is interesting to note that the interventions of the field health staff and ASHA workers were not satisfactory. Television and news paper are the important source of information about mosquito control measures. The *Breteau Index* was found to be 41.02% which indicates that intensive vector control activities have to be initiated urgently. The *Household index* was also high suggesting that the area need urgent mosquito control activities including focused Health education activities to increase the practice of mosquito control measures. Since majority the housewives take, the upkeep of household hygiene as their important task, educating them about effective anti larval and anti adult mosquito control measures will be useful in preventing *BIG* threat through *SMALL* bites.

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