Health Management among Rural Women- A Case Study on the Current Health Status, Level of Awareness and Risk to Non-Communicable Diseases

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Abstract--- Creating and increasing awareness on prevention of Non-Communicable Diseases (NCDs) among the rural women in India is a challenge, where social, economic, cultural and geographical factors contribute immensely to the livelihood and health of the rural women. NCD prevalence has gradually been increasing and health policy makers are apprehensive that selected NCDs might turn into an epidemic. A study was conducted to understand the current health status, level of awareness and risk of NCDs among the rural women of 23 villages in Nemili taluk in Vellore district, Tamilnadu. The study was done in two phases. Phase 1 study was to determine the current health status, NCD awareness and NCD risk of the women. Phase 2 study was to confirm the health status of the women based on diagnostic tests. In the first phase a validated questionnaire was used to collect data from randomly selected 48 respondents by survey method. The respondents were categorised into three age groups, 18-31 (Group 1), 32-48 (Group 2) and aged 49 years and above (Group 3). Using the data collected and analysing the results based on the risk factors like age, awareness, history and hereditary factors, the respondents were categorized into two clusters, high risk and relatively low risk respondents. Phase 1 study showed 93% of the respondents to be at high risk of NCD. In the second phase of the study , the respondents of the first phase were given a brief on the importance of diagnostic tests to understand their current health status and a closed questionnaire survey was done to know whether they were symptomatic to any of the selected NCDs, like Diabetes Hypertension, Cardio vascular disease, Kidney ailments, Breast and cervical cancer. After obtaining written consent, the respondents were subjected to diagnostic tests. Two laboratories that run quality control checks were chosen for conducting the tests. The test results were then analysed to confirm the respondent's risk category based on risk factors like age, symptoms of illness, BMI, heart rate, Cholesterol, glucose and triglycerides level. Phase 2 study showed 73% of the respondents to be at high risk of NCD. The respondents were given the results of biochemical and physical tests and suitable diet charts. In addition, they were also provided with Breast cancer self-examination and cervical cancer guidelines. The data collected was analysed using SPSS software.

It was found that 20% of respondents assessed to be in the high-risk group according to phase one study showed close to normal physical and biochemical values in the second phase. However, their age, level of awareness on NCDs, hereditary factors and previous history suggests that the respondents have to take the awareness initiatives and preventive healthcare concepts seriously, since they are at a potential risk of becoming high risk patients. Ingeniously initiatives like this will trigger health consciousness and the women will become receptive to preventive

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healthcare initiatives provided periodically by healthcare service providers. A positive response from the respondents is expected to set off preventive health awareness of NCDs in the community. It is recommended the reach of such health initiatives undertaken periodically by private, public and NGOs tends to gradually penetrate deeper and wider into the community..

I. INTRODUCTION

Preventive Healthcare has been gaining momentum in the last decade. International, National and State level initiatives have been planned and executed to reduce the burden of Non-Communicable Diseases (NCD) through preventive healthcare measures. According to the Global action plan for the prevention and control of NCDs 2013-2020, the World Health Organisation had strategically planned the prevention and control of Non-Communicable diseases for the period 2013-2020 and laid 9 global targets1. Participating countries produce annual reports on the progress made in achieving the targets. Researchers earlier have concluded in their studies that in India, the reach of such programmes especially to the rural women is still a problem.

II. REVIEW OF LITERATURE

Literature on the initiatives taken in India and the outcomes has been examined further.

Studies on Indian Health policy analysis by Dr. Rajan (2014) concluded that preventive and control measures for NCDs were minimal. A National Health Mission program initiated by the Government of India in the year 2008 called the National Programme for Prevention and Control of Cancers, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) has set objectives on health prevention and early diagnosis among others.

Irrespective of global and national policies, respective state governments also used decentralised programmes at the district and village level to tackle NCDs.

Furthermore, Harvard school of public health had published in Nov 2014 that the economic threat that NCDs pose has triggered India's business community to show interest in health programmes aimed at prevention, early detection, treatment and care3.

Southern states like Kerala and Tamilnadu have also implemented programs towards the same. Kerala health department and National Rural Health Mission (NRHM), with three prevention objectives had implemented NCD prevention and control programme and covered the entire population of the state. This was the first in the country. Further, NPCDCS had been implemented in 5 districts in Kerala4. By Mar 2012 Tamilnadu had scanned 100 districts for cancer, CVD, Diabetes and stroke as per the policy initiated by NPCDCS in 2010-2011. In an effort to address the lifestyle diseases, Tamilnadu Health Systems Project (TNHSP) has undertaken two pilot schemes, one for prevention, screening and treatment of cardiovascular diseases and another for Cervical Cancer5.

A similar study in a block in Vellore district by OOmen(2016) revealed that Diabetes, hypertension, abnormal cholesterol, physical inactivity and overweight were higher in the urban area as compared to the rural area which

had higher rates of smokeless tobacco use and alcohol consumption. Smoking and inadequate consumption of fruits and vegetables were equally prevalent in both the urban and rural samples. He suggests an urgent need to address behavioural risk factors such as smoking, alcohol consumption, physical inactivity and inadequate intake of fruits and vegetables through primary prevention.6

Creating or increasing awareness on prevention of NCDs among the rural women in India is a challenge, where social, economic, cultural and geographical factors contribute immensely to the livelihood and health of the rural women. Deplorably, in India the sex of the individual is a strong determinant of the education and healthcare they receive. A significant fact revealed by WHO is that if a woman is affected by NCD, it not only affects the health of the individual but also affects the health and life chances of their children and unborn foetus. Research clearly says that a malnourished mother contributes to the under-nutrition of the baby. Physical development and cognitive skills are compromised and there is a reasonable possibility of NCD developing in adulthood7. A women's role in most families is multifaceted. She is the home-maker, carer of young and elderly, cook and generator of revenue through full time or part time work. Therefore, it is wise to educate the women in a household on preventive healthcare concepts, since she is capable of transforming the health status of every individual in her family.

Hence, this case study is an attempt made by the researcher to study the current health status, risk and level of awareness on preventive healthcare among the rural women of Nemili taluk in Vellore district of Tamilnadu towards Non-Communicable Diseases.

III. DESCRIPTION OF STUDY AREA

The study conducted in Nemili taluk of Vellore district was selected purposefully for this research. This Taluk encompasses 77+ villages in Vellore District of Tamil Nadu State, India. It is situated 62 km east from the District headquarters Vellore. It extends 298.3+ sq.km, with the Taluk Head Quarters as Nemili town. It has a total population of 153586, male-76486, female-77090. Total literates were 102546 female literates 45279 and male literates 57267[8]. 2014-15 district reports 6 PHCs and 27 sub centres in Nemili block. [9] However, there is lack of literature or concise data available on NCD prevention or control measures in the Taluk, since the Taluk was formed in Aug 2015. This research gap has been recognised and the research problem has been identified..

IV. RESEARCH PROBLEM

Lifestyle diseases like Diabetes, Hypertension independently pose a threat and when left untreated for a prolonged time lead to cardio vascular diseases and kidney ailments. Further, breast and cervical cancer are the two cancers seen predominantly in rural women. These lifestyle diseases can be prevented with changes in lifestyle like diet regulations, regular exercise, increase in fruit and vegetable consumption, periodical check-ups etc. However, socio-economic status, geographical location, gender, illiteracy, marital status, occupational status etc can be cited as the reasons for lack of healthcare awareness among the chosen population10. Literature shows that health problems prevalent from teen years to menopause are under- cared due to uneven distribution of specialist Obstetrics and Gynaecology clinics in the district. Females face many health disorders like early puberty, breast/cervical cancer, hormone deficiency, cystic fibrosis etc. Currently the NCD health status of the rural women of Nemili taluk in

Vellore district of Tamilnadu is unknown. Hence this case study was made to be a true representation of the health status of the women in Nemili taluk, their NCD awareness and their awareness on preventive healthcare with the following objectives.

V. OBJECTIVES OF THE STUDY

The Objectives of this study are

1. To understand the current health status of the rural women of selected villages in Nemili taluk in Vellore district, Tamilnadu

2. To determine their level of awareness to Non-Communicable Diseases (NCD)

3. To establish the risk of Non-Communicable Diseases (NCD) among the respondents.

4. To increase the awareness on prevention of selected Non-Communicable Diseases (NCD) among the respondents.

VI. SIGNIFICANCE OF THE STUDY

Nemili block ranks fourth in mortality with 1181 out of a 12257 in the division as reported in 2015-16 district medical records9. Though communicable diseases may be a major contributor, it is to be noted that NCDs and its consequences are growing rapidly and there is a fear of selected NCDs turning into an epidemic. Therefore, beyond studying the level of awareness of the Taluk women towards NCDs and determining their current health status, introduction to preventive health measures like changes in diet, physical fitness, periodical check-ups etc was planned. It was intended that a positive response from the study samples will activate awareness towards preventive health care in the individual, family and in the community.

VII. NULL HYPOTHESIS

The null hypothesis has been stated that 'there is no association between the dependent variable- risk of NCD and independent variables-age, awareness of NCDs, history of illness and hereditary factors in the questionnaire survey' as well as 'the independent variables- age, symptoms, BMI, heart rate, Glucose level Cholesterol and Triglycerides levels in the diagnostic tests'.

VIII. SCOPE OF THE STUDY

In rural India, rigid customs and preconceived notions fail to address the effective measure of addressing the health of family through the women in the family. Provoking the health consciousness of any individual in the family particularly a responsible member could yield a positive response to, Government, Private and NGO promotions and campaigns on preventive health care.

IX. RISKS

Ethical consent from the Ethics committee prior to the study was mandatory since the research involves human participants and written consent from the participants was necessary since body fluids had to be drawn from the

respondents. The survey had to be done in the local language to avoid errors in misinterpretation of information provided by the respondents.

X. RESEARCH STRATEGY

The research strategy adopted in this study is shown in the table below:

Research Design	Descriptive
Study Population	Nemili Taluk
Population Source	Vellore District, Tamilnadu, India
Study Area	23 villages
Sample Frame	women
Sampling Unit	3 age groups 18-31 (Group 1), 32-48 (Group 2) 49 + (Group 3)
Sampling Method	random
Sample Size	48
Nature of Data	Ordinal
Sources of Primary Data	Survey and test results
Sources of Secondary Data	Censuses, Government department records, Global health organization reports, publications in peer reviewed journals
Tool used for Data collection	Questionnaire survey, Blood test results
Type of Questions	Demographic details, awareness testing and signs and symptoms of illness

XI. RESEARCH METHODOLOGY

A case study was conducted in Nemili Taluk of Vellore district. Figure 1 shows the research design of the study. The study designed was done in two phases.
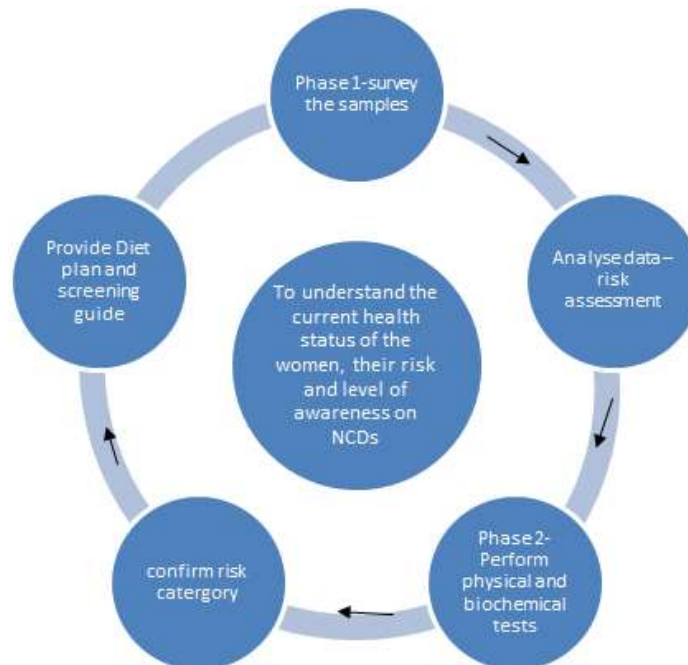
Figure 1- Study design

Phase 1- research

The objective of this study was to understand the current health status of the rural women and to determine their level of awareness towards selected NCDs.

Among the 77+ villages in the taluk, 23 villages were randomly chosen. 3 age groups of women participated in the study, 18-31 (Group 1), 32-48 (Group 2) and aged 49 years and above (Group 3).

A questionnaire survey for randomly chosen samples of 48 was done. The questionnaire was descriptive in nature and included the demographic details of the respondents like age, education, monthly income, family structure and number of members along with NCD awareness testing questions. The NCD awareness testing variables were, awareness on NCDs, infrastructure awareness, government policy awareness, private and government tests available and treatment awareness. Furthermore, the questions focussed on history of illness, hereditary illness awareness, testing frequency, doctor consultation frequency, lifestyle modifications advised earlier, changes in lifestyle adopted, health insurance awareness, funding for any treatment received, allopathic medicines prescribed and consumed and finally alternative medicine considered.

Group 2 and group 3 age group respondents who exhibited either one of the following traits

1. Minimal awareness towards the selected NCDs or

2. Previous history of illness or

3. Hereditary factors contributing to the selected NCDs were assessed to be at high risk.

XII. RESULTS AND DISCUSSION

On assessment 45 respondents hypothetically belonged to the high-risk category i.e the phase 1 showed that 93%

of the respondents belonged to the high risk group and 6% at a relatively low risk level based on variables like age, NCD awareness, history of illness and hereditary factors.

An analysis was done with level of risk as the dependent variable and NCD awareness, age, previous history of NCD and hereditary factors as the independent variables. Each independent variable did not show direct relation with risk apart from hereditary factor, however combining two or more independent variables, it could be seen that their relation with risk gets magnified.

Pearson's chi-square test	Value	Asympsig (2 sided)	df	No. of valid cases
Awareness of NCD	3.434	0.180**	2	48
History of NCD	0.457	0.796**	2	48
Hereditary factors	7.999	0.018*	2	48
Age group	1.969	0.374**	2	48

Table 1: chi square value of the independent variables

**The p value greater than 0.05 shows acceptance of null hypothesis indicating that awareness of NCD, history of NCD and age do not have any influence on the risk category of the respondents. Scientifically, these variables contribute significantly towards NCD risk. This type II error can be avoided by increasing the sample size.

*Since the p value is less than 0.05, the null hypothesis that the independent variables does not have any impact on NCD risk, is rejected at 5% significance level with regard to Hereditary factors. Hence hereditary factors have a significant influence on the risk category of the respondents. Extrapolating this result the cross tabulation was done. The results are shown in table 2. Here the hereditary factors of the selected 5 NCDs have been categorised as

Low- 'no' to all 5 NCDS

Borderline- 'no' to 2 NCDs

High- 'yes' to 3 or more NCDs

Crosstab					Chi square Value is 7.99, df is 2, p value is .018 (< 0.05)
Risk level	Hereditary of NCD			Total	
	Low	Borderline	High		
Low	8 (57.1%)	5 (35.7%)	1 (7.1%)	14 (100.0%)	
High	23 (67.6%)	2 (5.9%)	9 (26.5%)	34 (100.0%)	
Total	31 (64.6%)	7 (14.6%)	10 (20.8%)	48 (100.0%)	

Table 2: Risk level vs Hereditary of NCD

P value is less than .05, the null hypothesis is rejected at 5% level. Hence there is a significant difference in risk with respect to the selected hereditary diseases observed in the family.

In this analysis, awareness of NCDs has been taken as the independent variable, but for further analysis

awareness has been treated as a dependent variable and age, hereditary factors and previous history of illness have been be taken as independent variables to study their indirect relation with risk.

A Regression analysis shows the relationship between Awareness level with respect to Age group, History of NCD and Hereditary factors.

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	24.641	3	8.214	56.834	.000a
	Residual	6.359	44	.145		
	Total	31.000	47			

Table 3: ANOVA with awareness as the dependent variable
a. Predictors: (Constant), Age group, History of NCD, Hereditary of NCD

P value less than .001, shows that there is significant correlation between awareness and age group, history of illness and hereditary factors.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.892a	.795	.781	.380	1.775

Table 4: correlation between awareness and the predictors

Predictors: (Constant), Age group, History of NCD, Hereditary of NCD

The correlation coefficient closer to +1, indicates that the variables- awareness, age, history of illness and hereditary factors have a close relation. Based on this the risk category of the respondents can be determined. If the respondents had more than two variables suggesting NCD risk, then they were categorised as high risk.

From phase 1 study it can be concluded that 93% of respondents are at high risk of the selected NCDs and age, awareness, hereditary factors and history of NCD contributes to NCD risk.

Phase 2- research

In the phase 2 study, the respondents of phase 1 study were given a brief, and a closed questionnaire was administered to know whether the respondents were symptomatic to any of the selected NCDs, Diabetes, Hypertension, Cardio vascular disease, Kidney ailments, Breast and cervical cancer since the objective is to conduct diagnostic tests to ascertain the risk category of the respondents studied in phase 1. All the 48 respondents in the phase 1 study participated in this study.

Written consent was obtained from the respondents and a brief questionnaire survey was taken to learn if the respondents had any known symptoms suggesting the risk of NCDs. Further physical measurements and biochemical tests were done. Height, Weight, heart rate and blood pressure of the respondents were taken. Basic Metabolic Index (BMI) was calculated using figure 2.
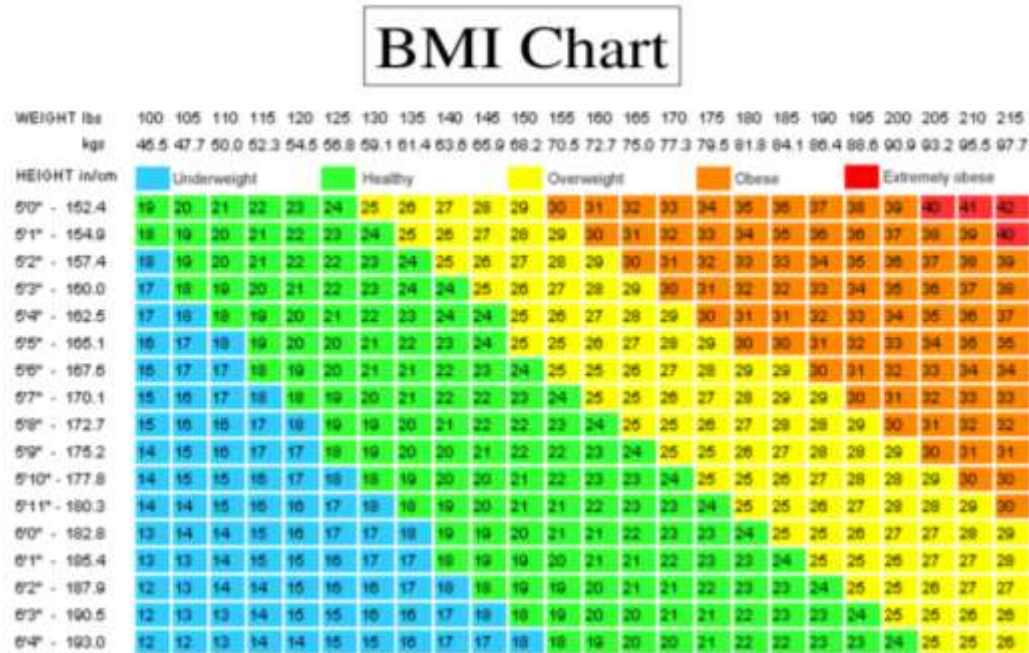
Figure 2: Basic Metabolic Index calculation

From the respondents, 3ml blood was drawn and tested for random Glucose level, total cholesterol and triglycerides level. The laboratories performing the tests produced accurate results since they routinely performed quality control tests. Including age, BMI, presence of two or more symptoms, Glucose level, Cholesterol level and triglyceride level as independent variables and risk as the dependent variable, analysis was done. Irrespective of age group if the test results showed abnormal values for

1. Heart rate, BMI, Glucose, cholesterol and triglycerides level and/or

2. More than 2 symptoms suggesting NCD risk,

they were assessed to be at high risk.

With a vision to initiate NCD prevention, stepwise changes in the lifestyle of the chosen samples had been incorporated based on stages of change model as described by Slater (1999) ,i.e.

• Precontemplation- informed on positive and negative effects of NCDs

• Contemplation- consider treatment or tests

• Preparation- prepare for action

• Action- carry out the behaviour

• Maintenance11

The researcher followed the guidelines below for doing this research;

1. Ethical approval from the Deputy Director of health services in Vellore District was obtained.

2. Approval was also obtained from the ethical committee of the University the research scholar belonged to.

3. Nurses and Laboratory technicians were involved in data and sample collection with prior permission from the Hospital Managing Director for the hospital staff to be involved in the study.

4. The staffs were given appropriate training for data collection and sample collection.

5. The staffs made sure that the respondents were not pregnant or fasting or under any medication.

6. The respondents were educated on the benefits of understanding their current health status

7. If the respondents were receptive then explanation on the tests that were going to be done was given

8. A written consent in the local language was obtained

9. The respondents were then assured that they can withdraw from the study if they are not comfortable

10. The respondents were informed that 3ml blood will be drawn from them

11. Physical measurements were first taken

12. 3 ml of blood for diagnostic tests were drawn from them by laboratory technicians who accompanied the researcher.

13. Towards the close of each day feedback forms were issued for the sample population with the results of biochemical and physical measurements. Suitable diet charts for the appropriate health conditions were provided. Breast cancer self-examination and cervical cancer guidelines were also provided.

XIII. RESULTS AND DISCUSSION

Phase 2 study showed 73% of the respondents had abnormal physical and biochemical values. They were confirmed to belong to the high-risk group (Figure 3).
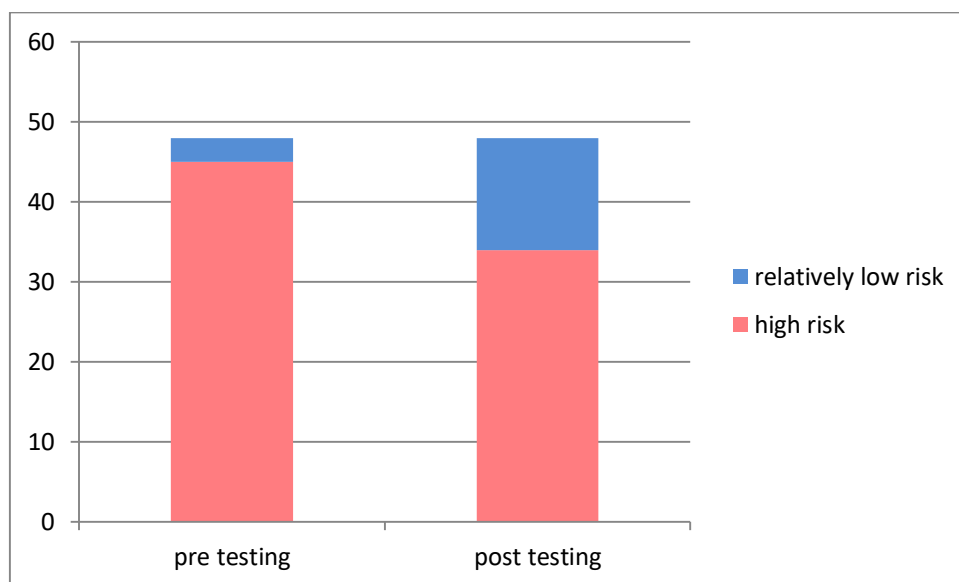
Figure 3: phase 1 and phase 2 results

Here the risk factors were,

- Respondents in the age group 2 and 3 (i.e) above 32 years,

- Abnormal blood pressure,

- Abnormal BMI

- Abnormal random glucose level

- Abnormal total cholesterol and

- Abnormal Triglycerides level.

A group statistic of the categorisation of the respondents into low and high risk of the test results (table 5) showed the standard deviation to be less than 1, indicating that the prediction of low and high-risk categorization is almost certain.

	Risk level	N	Mean	Std. Deviation	Std. Error Mean
Blood Pressure	Low	14	1.14	.535	.143
	High	34	1.65	.734	.126
BMI	Low	14	1.29	.726	.194
	High	34	2.03	.969	.166
Glucose Level	Low	14	1.14	.363	.097
	High	34	1.32	.475	.081
Cholesterol	Low	14	1.07	.267	.071
	High	34	1.62	.817	.140
Triglycerides Level	Low	14	1.14	.535	.143
	High	34	1.88	.844	.145
Symptoms	Low	14	1.21	.426	.114
	High	34	1.82	.387	.066

Table 5:group statistics

Assuming equality of variances in using the Levene's test for equality of means, it is possible to accept or reject null hypothesis based on risk factors (table 6).

	Levene's test for equality of means		T test for equality of means	
	F	Sig	f	df
Blood Pressure	10623	.002*	-2.324	46

equal variances assumed				
BMI equal variances assumed	13.431	.001*	-2.583	46
Glucose level equal variances assumed	9.414	.005*	-1.275	46
Cholesterol equal variances assumed	33.818	.000*	-2.435	46
Triglycerides equal variances assumed	11.689	.001*	-3.026	46
Symptoms equal variances assumed	0.341	.562**	-4.817	46

Table 6: Independent sample test results

**The p value is greater than .05 suggesting that the null hypothesis is accepted and there is no significant relation between the symptoms of the respondents and the NCD risk category identified.

*P value less than.05, suggests null hypothesis is rejected at 1% level with respect to blood pressure, BMI, glucose level, Cholesterol, triglycerides level and overall risk category.

Hence 5 out of 6 independent variables have a significant impact on the risk category of the respondents.

Further, the categorization of the high and low risk group based on the physical and biochemical tests has shown to be 91.2% accurate in the high-risk group and 64.3% accurate in the low risk group.

			Predicted		
Observed			Risk Factor-final		Percentage Correct
			Low	High	
Step 1	Risk Factor-final	Low	9	5	64.3
		High	3	31	91.2
	Overall Percentage				83.3

Table 7: Classification table with the cut value .500

Comparing the results of phase 1 and phase 2, the null hypothesis is stated as -there is no significant difference between the results of the phase 1 and phase 2 study.

Though phase 2 results show a reduced number of respondents belonging to the high-risk group (73%) as compared to phase 1 results (93%), in all the study shows majority of the respondents belong to the high-risk group.

A paired t test was done to understand if there is significant difference between the risk categories before and after performing the physical and biochemical tests.

Paired Samples Test for Risk Initial and Final							
		Mean	N	Std. Deviation	t	df	Sig. Value
Pair 1	Risk Initial	.94	48		2.861	47	.006
	Risk Final	.71	48	.459			

Table 8: before and after tests

The P value is less than 0.05. Null hypothesis is rejected. It can be concluded that there is significant difference between the risk categories of the respondents based on phase 1 and phase 2 of the study. There is a reduction in the number of respondents belonging to the high-risk group. The results show with 95% confidence that the reduction in number is within the calculated limits.

XIV. LIMITATIONS OF THE STUDY

The study is restricted to the women of the 23 villages in the taluk.

XV. CONCLUSION

The current health status of the respondents is now known. The data from the questionnaire survey substantiates the lack of awareness of the women towards NCDs and preventive care. The awareness of their current health condition coupled with the test results provides concrete evidence to initiate a change in their lifestyle. The diet chart further throws light on the diet restrictions and physical activity they need to follow. These women will now be receptive to initiatives taken by private and public sectors that promote health checks at subsidised rates during WHO initiated health days.

The two phased study examined the relationship between demographic factors and NCD risk as well as physical and biochemical factors and NCD risk. This information is vital for healthcare providers to plan policies that can reach every member of every household in the rural areas.

However, the fact that the test results of 20% of the respondents assessed to be in the high-risk group in phase 1 study showed close to normal physical and biochemical values post testing cannot be ignored. Phase 1 study indicates that these respondents should change their current lifestyle, to avoid risk of becoming high NCD risk patients.

The 100% turnover of the respondents from the questionnaire survey to provide samples for testing was encouraging. This positive response from the study samples is bound to initiate awareness towards preventive health care in the family and community at large. However, one off programs will have a negligible impact on the community, therefore periodical preventive health programs is recommended to target the rural women in order to penetrate deeper and wider into the community. The reach of such repeated health initiatives undertaken by private, public and NGOs will eventually prevent NCDs from growing into an epidemic.

XVI. SUGGESTIONS FOR FUTURE RESEARCH

This study can be extended to women in other Taluks in the district as well as other districts and states in the country. The non-communicable diseases predominant in the geographical area can be included to benefit the chosen population, since such studies will help policy makers to frame strategies customized to the local population.

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