

# Application of Health Literacy Tools to Understand the Status of Health Literacy

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## ABSTRACT

*Health is one of the most important elements of human development and growth. People with better awareness about their health are able to maintain a good health trajectory throughout. People with limited health literacy are more likely to make medication errors, and they have less health knowledge, worse health status, more hospitalisations, and higher healthcare costs than people with adequate literacy. An earnest effort is made to understand the health literacy levels of literate adults review the health literacy position among literate adults who are able to read and understand English in urban and rural Mangaluru with the help of REALM-Teen, REALM-SF, REALM-R and NVS health literacy tools. Health literacy scores observed among the respondents in this study were very poor. It means that most people would struggle to understand different healthcare information. By improving people's access to health information, and their capacity to use it effectively, health literacy can be improved. More interactions must take place between the healthcare workers, doctors, nurses and the general public so as to increase the awareness regarding the health in the society.*

**Keywords:** Human Development, Healthcare, REALM-Teen, REALM-SF, REALM-R, Newest Vital Sign, Health Literacy

## INTRODUCTION

In terms of literacy in Karnataka, Dakshina Kannada (D. K.) district has the highest literacy rate of 88.62 percent as compared to other districts, with Mangaluru city with 94 percent literacy (District Census, 2011). Identification of people with low health literacy levels is a social

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challenge. The literacy rate in our country is 74.04 percent according to 2011 census though the world average was 84 percent in 2010 (Census of India, 2011). Out of this 74.04 percent of the populace, there is definitely no absolute guarantee that all will be able to understand the official documents, by reading and writing fluently. Health is one of the most important elements of human development and growth and people with better awareness about their health are able to maintain a good health trajectory throughout. Health literacy, along with general literacy, is an important determinant of health (Kickbusch, 2011). Thus, health literacy means more than being able to read pamphlets and make appointments. Health literacy is itself dependent upon more general levels of literacy. Poor literacy can affect people's health directly by limiting their personal, social and cultural development, as well as hindering the development of health literacy (Sarbhadrhikari, 2010). Even people with adequate literacy skills may find understanding healthcare information a challenge. They may not understand medical vocabulary and the basic concepts in health and medicine (Wolf, Gazmararian, & Baker, 2007). Persons with limited general literacy skills usually also have limited health literacy (Nielsen-Bohlman, Panzer, & Kindig, 2004). In this respect it is interesting to know the health literacy position among the adults who are literates from Mangaluru in Dakshina Kannada district.

Previous definitions of health literacy described ability to read and comprehend health and medical information. The World Health Organization (WHO) defines health literacy as representation of the cognitive and social skills which determine the motivation and ability of individuals to gain access to understand and use information in ways which promote and maintain good health. Many aspects of health like health knowledge, health status, use of health facilities, and cost have been found to be closely related to literacy levels by many studies. Health literacy is defined as the ability to obtain, process, and understand basic information and services needed to make appropriate health decisions (Wallace, 2006).

Patient's educational status may not always indicate his or her reading ability of medical literature and instructions. Patients are often found to mask their deficiencies out of embarrassment. To overcome these problems many tools are developed to measure health literacy status. There are numerous methods developed to test the literacy skills of patients (Davis, n.d.). Poor health literacy is also linked with higher hospitalisation rates (Baker, Parker, Williams, & Clark, 1998) and higher healthcare

costs (Eichler & Brugger, 2009). There are many tools available for the measurement of health literacy. Some of the tools used to measure health literacy status are:

1. Rapid Estimate of Adult Literacy in Medicine (REALM)
2. Rapid Estimate of Adult Literacy in Medicine - Short Form (REALM-SF)
3. Rapid Estimate of Adult Literacy in Medicine-R
4. Newest Vital Sign (NVS)

Test of Functional Health Literacy (TOFHLA) is one of the most popular tests but lengthy and complex. The Test of Functional Health Literacy in Adults (TOFHLA) was developed using actual hospital materials. The TOFHLA consists of a 50-item reading comprehension and 17-item numerical ability test, taking up to 22 minutes to administer. TOFHLA is a functional literacy assessment tool designed to evaluate adult literacy in the healthcare setting. The instrument measures the functional literacy on the assumption that more than classroom reading ability the instrument assesses a patient's level of comprehension of health-related material. It is available in a full-format (a 22-minute test, with 50 reading comprehension items in three passages and 17 numeracy items), an abbreviated format (a 12-minute test, with 36 reading comprehension items in two passages and four numeracy items) and a shortened version (the S-TOFHLA, a 7-minute test, with 36 reading comprehension items in 2 passages) (Parker, Baker, Williams, & Nurss, 1995).

It is simple to detect the status of health literacy with the Rapid Estimate of Adult Literacy in Medicine (REALM) (Murphy, Davis, Decker, Arnold, & Jackson, 1993). There are three types in REALM, viz., REALM-Teen, REALM-SF, and REALM-R. REALM-Teen tests the patient's ability to pronounce 66 common medical words and lays terms for body parts and illnesses and can be administered in less than two minutes. This technique is used in this study to test the health literacy skills of the patients. The Rapid Estimate of Adult Literacy in Medicine—Short Form (REALM-SF) is a 7-item word recognition test to provide clinicians with a valid quick assessment of patient health literacy. The REALM-SF has been validated and field tested in diverse research setting, and is said to have excellent agreement with the 66-item REALM instrument in terms of grade-level assignments. It can be administered much quicker than the longer version of REALM (Arozullah, Yarnold, Bennett, Soltysik, Wolf, & Davis, 2007, Agency for healthcare research and quality). The REALM-SF is a word recognition test, not a reading comprehension instrument. Adults are

asked to de-code or pronounce words. The test takes less than 2 minutes to administer and score. The words are menopause, antibiotics, exercise, jaundice, rectal, anemia, and behaviour. (Ref: Agency for healthcare research and quality. Rapid Estimate of Adult Literacy in Medicine-Short Form (REALM-SF) - <http://www.ahrq.gov/populations/sahlsatool.htm>)

Word recognition tests are useful predictors of general reading ability and typically require an individual to read aloud from a list of words (Davis, Long, Jackson, Mayeaux, George, Murphy, & Crouch, 1993; Davis, Michielutte, Askov, Williams, & Weiss, 1998). These tests do not measure reading comprehension or interpretation but assess the ability to recognise or read and pronounce individual words. These literacy tests offer the advantage of being quick and easy to administer and score, but they do not offer an assessment of functional literacy. If patients have difficulty with word recognition, which is a beginning-level reading skill, they are likely to have difficulty comprehending written information. The assumption could be made that those who cannot recognise written words will have difficulty comprehending written instructions (Andrus & Roth, 2002). The Rapid Estimate of Adult Literacy in Medicine (REALM-R), REALM-R is a new 8-item instrument designed to rapidly screen patients for potential health literacy problems is a brief screening instrument used to assess an adult patient's ability to read common medical words. It is designed to assist medical professionals in identifying patients at risk for poor literacy skills. The REALM-R is a word recognition test – not a reading comprehension instrument. Adults are asked to de-code or pronounce words. The test takes less than 2 minutes to administer and score (Bass, Wilson, & Griffith, 2003). Other tests include the Newest Vital Sign (NVS) and Test of Functional Health Literacy (TOFHLA). Using these tools clinicians can determine the health literacy of patients in their practice and adjust their communication style to meet the needs of all of their patients (Barry, 2007). The Newest Vital Sign is a new tool designed to quickly and simply assess a patient's health literacy skills. It can be administered in only three minutes and is available in English and Spanish. The patient is given a specially designed ice cream nutrition label to review and is asked a series of questions about it. Based on the number of correct answers, healthcare providers can assess the patient's health literacy level and adjust the way they communicate to ensure patient understanding (Hubbard, 2011). There are many ways to integrate the Newest Vital Sign (NVS) into a private practice or clinic setting to improve communication with patients. Improved communication can help increase

your patients' ability to understand and act upon the information you provide; ultimately improving patient satisfaction and health outcomes.

## **STATEMENT OF THE PROBLEM**

People though educated are found to be poor in understanding the health related information. People with limited health literacy are more likely to make medication errors, and they have less health knowledge, worse health status, more hospitalisations, and higher healthcare costs than people with adequate literacy. By improving people's access to health information, and their capacity to use it effectively, health literacy can be improved. Sincere effort is made to understand the health literacy levels of literate adults who are able to read and understand English in Mangaluru taluk of D. K. District with the following objectives.

## **OBJECTIVES**

1. To understand the health literacy position among literate adults with the help of REALM-Teen, REALM-SF, REALM-R and NVS.
2. To analyse the correlation between the scores of the respondents in REALM-Teen, REALM-R, and NVS tests of health literacy.
3. To analyse the link between the gender and the level of health literacy
4. To identify if there is any relationship between area of the respondent and the level of health literacy.
5. To understand the association between health literacy levels to the educational qualification of the respondents.
6. To understand the relationship between the category of the respondents and the level of health literacy.

## **RESEARCH METHODOLOGY**

Keeping in mind the objectives of the study, respondents were selected from urban and rural areas those are able to read and understand English. Primary data on health literacy was collected from 425 respondents by administering the questionnaire of background information along with the health literacy measuring instruments such as REALM-Teen, REALM-SF, REALM-R, and Newest Vital Sign (NVS). Respondents were being given following instructions- 'This test enables to get an idea of what

medical words you are familiar with. Look at the list of words, beginning from the first word say all the words you know. If you come to a word you don't know, you can sound it out or just skip it and go on'. If the respondent took more than five seconds on a word, he/ she was asked to try the next one and next word was pointed. If the respondent began to miss every word, he/ she was asked to look at the rest of the list and say any words that he/ she knew. Any word not attempted or mispronounced was counted as an error. It is not required to know the comprehension of words by the patient. Even if the respondent claims that he knows the meaning but cannot read, credit was not given. Generally accepted pronunciation was accepted as correct with no regard for accent. Respondents should not make any additions or deletions. Eg. 'alcoholism' should not be read as 'alcohol'. Scores were tabulated and grade range equivalent was assessed for each respondent.

## DEMOGRAPHIC PROFILE OF THE RESPONDENTS

The respondents belonged to the category of students, professionals, businessmen, and others. The respondents were picked from both rural and urban areas of Mangaluru Taluk and 206 (48.5%) were from rural area and 219 (51.5%) were from urban area. Amongst the respondents, 305 (71.8%) have studied in English medium and 120 (28.2%) in Kannada medium. The sample comprised 218 students (51.3%), 51 professionals (12%), and 79 businessmen (18.6%) while others constituted 77 respondents (18.1%). The respondents were chosen from four different qualification criteria. It constituted 14.38 percent diploma holders, 40.71 percent graduates, 21.41 percent post-graduates, and others 23.5 percent. 65.42 percent were males and 34.58 percent were females. 60.71 percent of respondents surveyed in this research visited hospitals 1-5 times a year, 32.71 percent visited less than once a year, 6.58 percent visited more than 6 times a year. 250 (58.8%) respondents belonged to the age group below 25 years as majority of the respondents were students. 114 (26.8%) respondents belonged to the age group between 25 to 35 years, 45 (10.6%) in the category of 35-45 years and 16 (3.8%) respondents belonged to above 45 years of age. The background information survey consisted of the information regarding the marital status, location of the survey, religious background and also perceived health status of the respondents.

## FINDINGS

### Health Literacy Position with the Help of REALM-Teen and REALM-SF, REALM-R and NVS Test

Table 1 depicts the results of REALM-Teen test. 9.8 percent of the respondents have pathetically low health literacy and 42.82 percent have neither good nor poor health literacy skills. Only 20 percent are good in reading health related stuffs and understand patient education materials, though 28 percent can manage to understand the health education materials with little difficulty.

**Table 1: Interpretation of REALM-Teen Test**

| <i>Raw Score</i>  | <i>Grade Range Equivalent</i> | <i>Literacy Skills</i>                                                                                                                                        | <i>No. Of Respondents</i> | <i>Percent Respondents</i> |
|-------------------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------|
| 0-37              | 3rd grade and below           | These adolescents will have a 5-fold quarter likelihood of reading below grade level. They are reading below grade level and may be at risk of school failure | 17                        | 4.00                       |
| 38-44             | 4th to 5th grade              | Slightly better than 3 <sup>rd</sup> grade                                                                                                                    | 22                        | 5.18                       |
| 45-58             | 6th to 7th grade              | Will struggle with most patient education materials; may have skills to pass GED                                                                              | 182                       | 42.82                      |
| 59-62             | 8th to 9th grade              | Will pass GED                                                                                                                                                 | 119                       | 28.00                      |
| 63-66             | 10th grade and above          | Will be able to read most patient education materials                                                                                                         | 85                        | 20.00                      |
| Total Respondents |                               |                                                                                                                                                               | 425                       | 100                        |

Ref: (Murphy *et al.*, 1993).

Interpretation of the test REALM-SF, from Table 2, and the grade equivalent of general literacy levels as perceived based on the scores

obtained from the test from 425 respondents is as follows. About 35 people, 8.24 percent are not able to read prescription labels. 197 respondents (46.35 %) struggle to read patient education materials. As per the test, 193 respondents (45.41%) are able to read patient education materials. Compared to REALM-Teen REALM-SF performance scores are better as it contains only 7 items to read that are simplistic versions of REALM-Teen test.

**Table 2: Scores and Grade Equivalents for the REALM-SF**

| <i><b>Raw Score</b></i> | <i><b>Grade Range Equivalent</b></i>     | <i><b>Literacy Skills</b></i>                                                                                                                                      | <i><b>No. Of Respondents</b></i> | <i><b>Percent Respondents</b></i> |
|-------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------|
| 0                       | 3 <sup>rd</sup> grade and below          | Will not be able to read most low-literacy materials; will need repeated oral instructions, materials composed primarily of illustrations, or audio or video tapes | 0                                | 0.00                              |
| 1-3                     | 4 <sup>th</sup> to 6 <sup>th</sup> grade | Will need low-literacy materials, may not be able to read prescription labels.                                                                                     | 35                               | 8.24                              |
| 4-6                     | 7 <sup>th</sup> to 8 <sup>th</sup> grade | Will struggle with most patient education materials; will not be offended by low-literacy materials                                                                | 197                              | 46.35                             |
| 7                       | High school                              | Will be able to read most patient education materials                                                                                                              | 193                              | 45.41                             |
| Total Respondents       |                                          |                                                                                                                                                                    | 425                              | 100                               |

(Ref: Agency for healthcare research and quality. Rapid Estimate of Adult Literacy in Medicine-Short Form (REALM-SF)-<http://www.ahrq.gov/populations/sahlsatool.htm>)

The findings from the Realm R test show that only 87 (20.47 %) respondents have scored more than 60 percent and 338 (79.53%) respondents have scored less than 60 percent. This means majority

(79.53%) were not able to read at least four health related words correctly out of the seven words from REALM-R manual which contained the words such as, allergic, jaundice, anemia, fatigue, directed, colitis, constipation, and osteoporosis.

The findings from Newest Vital Sign (NVS) show that out of 85 respondents, 23(27.05%) have scored more than 60 percent and 62 (72.94%) have scored less than 60 percent. Score is assessed by giving 1 point for each correct answer (maximum 6 points). Score of 0-1 suggests high likelihood (50% or more) of limited literacy. Score of 2-3 indicates the possibility of limited literacy. Score of 4-6 almost always indicates adequate literacy ([www.pfizerhealthliteracy.com](http://www.pfizerhealthliteracy.com)). Majority (72.94%) in the study have scored less than 3 on 6 which indicates limited literacy, meaning ability to read and analyse any kind of nutrition label that requires the analytical and conceptual skills are missing with the sample respondents. This also shows that people have very less awareness regarding nutrition facts, protein, calories, carbohydrates, cholesterol, sugar, sodium, fat and many more.

#### **Correlation between the Scores of the Respondents in REALM-Teen, REALM-R and NVS Tests of Health Literacy**

The correlation between the scores of the respondents in REALM-Teen, REALM-R and NVS tests of health literacy was analysed with the help of Correlation and the results are depicted in Table 3.

**Table 3 : Correlation between the Scores of the Respondents in REALM-Teen, REALM-R and NVS Tests**

|                                                            |                     | <i>Score in<br/>Realm T<br/>Test</i> | <i>Score in<br/>Realm R<br/>Test</i> | <i>Score in<br/>Newest<br/>Vital Sign</i> |
|------------------------------------------------------------|---------------------|--------------------------------------|--------------------------------------|-------------------------------------------|
| Score in Realm T Test                                      | Pearson Correlation | 1                                    | .692**                               | -.123                                     |
|                                                            | Sig. (2-tailed)     |                                      | .000                                 | .261                                      |
|                                                            | N                   | 425                                  | 425                                  | 85                                        |
| Score in Realm R Test Pearson Correlation .692**           |                     |                                      | 1                                    | -.229*                                    |
|                                                            | Sig. (2-tailed)     | .000                                 |                                      | .035                                      |
|                                                            | N                   | 425                                  | 425                                  | 85                                        |
| Score in Newest Vital Sign                                 | Pearson Correlation | -.123                                | -.229*                               | 1                                         |
|                                                            | Sig. (2-tailed)     | .261                                 | .035                                 |                                           |
|                                                            | N                   | 85                                   | 85                                   | 85                                        |
| **Correlation is significant at the 0.01 level (2-tailed). |                     |                                      |                                      |                                           |

The test reveals that Pearson  $r=.692$ ,  $\alpha=0.01$ ,  $P=.000<0.01$  which shows that there is a significant and positive correlation between the scores of Realm-Teen and Realm-R. The study interprets that greater scores in Realm-Teen are matching with greater scores in Realm-R. Correlation is hovering between low positive to high positive correlation and bent towards the higher level. There is a low negative correlation between the scores in NVS and Realm-Teen (Pearson  $r=-.123$ ,  $\alpha=0.01$ ,  $P=.261>0.01$ ) and NVS and Realm-R (Pearson  $r=-.229$ ,  $\alpha=0.01$ ,  $P=.035>0.01$ )

Since there is moderately high correlation between the scores of Realm-Teen and Realm-R, in order to understand the influence of independent variable on dependent variable (Realm-Teen score on Realm-R score) Regression analysis was also used and the results are depicted in Tables 4, 5, and 6.

### Table 4: Model Summary

| <i>Model</i> | <i>R</i> | <i>R Square</i> | <i>Adjusted R Square</i> | <i>Std. Error of the Estimate</i> |
|--------------|----------|-----------------|--------------------------|-----------------------------------|
| 1            | .692a    | .479            | .478                     | 1.17346                           |

a. Predictors: (Constant), Score in Realm T Test

Table 5: ANOVAa

| <i>Model</i> | <i>Sum of Squares</i> | <i>df</i> | <i>Mean Square</i> | <i>F</i> | <i>Sig.</i> |       |
|--------------|-----------------------|-----------|--------------------|----------|-------------|-------|
| 1            | Regression            | 536.332   | 1                  | 536.332  | 389.489     | .000b |
|              | Residual              | 582.477   | 423                | 1.377    |             |       |
|              | Total                 | 1118.809  | 424                |          |             |       |

a. Dependent Variable: Score in Realm R Test  
b. Predictors: (Constant), Score in Realm T Test

### Table 6: Coefficients

| <i>Model</i> | <i>Unstandardised Coefficients</i> | <i>Standardised Coefficients</i> | <i>t</i> | <i>Sig.</i> |        |      |
|--------------|------------------------------------|----------------------------------|----------|-------------|--------|------|
|              | B                                  | Std. Error                       | Beta     |             |        |      |
| 1            | (Constant)                         | -1.265                           | .371     |             | -3.405 | .001 |
|              | Score in Realm T Test              | .130                             | .007     | .692        | 19.735 | .000 |

a. Dependent Variable: Score in Realm R Test

Regression analysis test results state that R squared is .479 which indicates that 47.9% of the score in Realm R Test has been explained and adjusted r squared value is .478 which is close to the r squared value .479. This level of predictability is lower as score in Realm R Test is affected by many other variables and there could be .479 variability of data response around its mean. The test shows that the equation  $Y=a+bx$  is interpreted as score in Realm R Test =  $-1.265+.130$  times of the score in Realm T Test which indicates that the level of score in Realm-R is influenced by the score in Realm T Test to the extent of  $-1.265+.130$  times.

The above results indicate that the respondent who has scored well in Realm-Teen has also scored well in Realm-R. There is a proportionate link between the test outcomes of Realm-Teen and Realm-R, however, the link between the scores of NVS and Realm-Teen and also Realm-R are totally disproportionate and negative, that means, the person who has scored higher grade in Realm-Teen or Realm-R might not have scored even 50 percent.

### **Link between the Gender and the Level of Health Literacy**

With a view to understand the link between gender and level of health literacy, chi-square test was applied and the results are presented in Tables 7, 8, and 9. Since a. 49 cells (58.3%), b. 4 cells (25.0%), c. 7 cells (58.3%) have expected count less than 5, Fisher's exact test value .184, .598 and .412 are considered. P values are greater than  $\alpha$  0.05 and are not significant. Thus it is understood that there is no association between the gender of the respondents and their health literacy position measured through REALM-Teen, REALM-R and NVS.





**Table 9: Chi-Square Test Showing the Association between Gender and Level of Health Literacy using NVS**

| <i>Asymp. Sig. (2-sided)</i>                                                           | <i>Monte Carlo Sig. (2-sided)</i> | <i>Monte Carlo Sig. (1-sided)</i> |                    |                                |                    |
|----------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------|--------------------|--------------------------------|--------------------|
|                                                                                        | <i>Sig.</i>                       | <i>95% Confidence Interval</i>    | <i>Sig.</i>        | <i>95% Confidence Interval</i> |                    |
|                                                                                        |                                   | <i>Lower Bound</i>                | <i>Upper Bound</i> |                                | <i>Lower Bound</i> |
| .357                                                                                   | .365b                             | .319                              | .410               |                                |                    |
| .375                                                                                   | .442b                             | .395                              | .490               |                                |                    |
|                                                                                        | .412b                             | .365                              | .459               |                                |                    |
| .312                                                                                   | .304b                             | .260                              | .347               | .174b                          | .138               |
|                                                                                        |                                   |                                   |                    |                                |                    |
| a. 7 cells (58.3%) have expected count less than 5. The minimum expected count is .25. |                                   |                                   |                    |                                |                    |

### Relationship between Area of the Respondent and the Level of Health Literacy

Independent sample t-test was applied to identify if the area of the respondent had any role in influencing the health literacy position of the sample respondents. Table 10 shows the t-test output. Out of 425 respondents, 206 are from rural area and 219 are from urban area. The mean value of the rural respondents is on the lower side i.e.  $54.39 \pm 9.690$ ,  $5.6311 \pm 1.74742$  and  $1.5581 \pm 1.31479$  compared to the urban respondents i.e.  $57.20 \pm 7.354$ ,  $6.3059 \pm 1.42794$  and  $1.6667 \pm 1.26234$  for REALM-Teen and REALM-R and NVS tests respectively. The output from Table 6 shows that REALM-Teen ( $t=-3.377$ ,  $DF=423$ ,  $P=.012$ ,  $\alpha=0.05$   $P=.012<0.05$ ) and REALM-R ( $t=-4.371$   $df=423$ ,  $P=.000$ ,  $\alpha=0.05$   $P=.000<0.05$ ) health literacy results have significant difference between the performance of the respondents based on their area. Urban respondents have performed marginally better as compared to rural respondents. However the results of NVS did not have any significance with the area of the respondents as  $t=-.388$ ,  $DF=83$ ,  $P=.484$ ,  $\alpha=0.05$   $P=.484>0.05$  which is depicted in Table 11. Out of 85 respondents, 43 were from rural area and 42 were from urban belt. NVS is a different type of health literacy measuring tool to

assess the respondent's ability to read and understand nutrition label that requires conceptual and analytical ability which may not be influenced by the area of the respondent but his/ her analytical and conceptual skills in understanding the labels on the food packets.

**Table 10: Independent Samples t-Test Showing the Relationship between the Area and the Health Literacy**

|                       |                             | <i>Levene's Test for Equality of Variances</i> |          | <i>t-test for Equality of Means</i> |                        |                        |                              |                                                  |              |         |
|-----------------------|-----------------------------|------------------------------------------------|----------|-------------------------------------|------------------------|------------------------|------------------------------|--------------------------------------------------|--------------|---------|
|                       |                             | <i>Sig.</i>                                    | <i>t</i> | <i>df</i>                           | <i>Sig. (2-tailed)</i> | <i>Mean Difference</i> | <i>Std. Error Difference</i> | <i>95% Confidence Interval of the Difference</i> |              |         |
|                       |                             |                                                |          |                                     |                        |                        |                              | <i>Lower</i>                                     | <i>Upper</i> |         |
| Score in REALM-T Test | Equal variances assumed     | 6.441                                          | .012     | -3.377                              | 423                    | .001                   | -2.808                       | .831                                             | -4.442       | -1.174  |
|                       | Equal variances not assumed |                                                |          | -3.349                              | 381.895                | .001                   | -2.808                       | .838                                             | -4.456       | -1.159  |
| Score in REALM-R Test | Equal variances assumed     | 13.484                                         | .000     | -4.371                              | 423                    | .000                   | -.67487                      | .15440                                           | -.97836      | -.37138 |
|                       | Equal variances not assumed |                                                |          | -4.344                              | 396.358                | .000                   | -.67487                      | .15535                                           | -.98028      | -.36946 |

**Table 11: Independent Samples t-Test Showing the Relationship between the Area and the Health Literacy through NVS**

| <i>F</i>                   |                             | <i>Levene's Test for Equality of Variances</i> |          | <i>t-test for Equality of Means</i> |                        |                        |                              |                                                  |              |        |
|----------------------------|-----------------------------|------------------------------------------------|----------|-------------------------------------|------------------------|------------------------|------------------------------|--------------------------------------------------|--------------|--------|
|                            |                             | <i>Sig.</i>                                    | <i>t</i> | <i>df</i>                           | <i>Sig. (2-tailed)</i> | <i>Mean Difference</i> | <i>Std. Error Difference</i> | <i>95% Confidence Interval of the Difference</i> |              |        |
|                            |                             |                                                |          |                                     |                        |                        |                              | <i>Lower</i>                                     | <i>Upper</i> |        |
| Score in Newest Vital Sign | Equal variances assumed     | .493                                           | .484     | -.388                               | 83                     | .699                   | -.10853                      | .27967                                           | -.66479      | .44773 |
|                            | Equal variances not assumed |                                                |          | -.388                               | 82.976                 | .699                   | -.10853                      | .27954                                           | -.66452      | .44747 |

### Association between the Health Literacy Levels and Educational Qualification

With a view to understand the association between health literacy levels and educational qualification of the respondents ANOVA was used and

the results are shown in Table 12. The test results of REALM-Teen and REALM-R were taken for the analysis. Table 13 shows the relationship between health literacy of the respondents through NVS and their educational qualification.

**Table 12: ANOVA Showing the Relationship between Health Literacy Position and the Educational Background**

|                  |                | <i>Sum of Squares</i> | <i>df</i> | <i>Mean Square</i> | <i>F</i> | <i>Sig.</i> |
|------------------|----------------|-----------------------|-----------|--------------------|----------|-------------|
| Score in REALM-T | Between Groups | 4240.098              | 4         | 1060.025           | 16.112   | .000        |
|                  | Within Groups  | 27633.022             | 420       | 65.793             |          |             |
|                  | Total          | 31873.120             | 424       |                    |          |             |
| Score in REALM-R | Between Groups | 89.029                | 4         | 22.257             | 9.078    | .000        |
|                  | Within Groups  | 1029.780              | 420       | 2.452              |          |             |
|                  | Total          | 1118.809              | 424       |                    |          |             |

**Table 13: ANOVA Showing the Relationship between Health Literacy Position through NVS and the Educational Background**

|                | <i>Sum of Squares</i> | <i>df</i> | <i>Mean Square</i> | <i>F</i> | <i>Sig.</i> |
|----------------|-----------------------|-----------|--------------------|----------|-------------|
| Between Groups | 17.161                | 3         | 5.720              | 3.828    | .013        |
| Within Groups  | 121.027               | 81        | 1.494              |          |             |
| Total          | 138.188               | 84        |                    |          |             |

Output from Table 12 indicates that educational qualification of the respondents do have significance with the level of health literacy both in case of REALM-Teen ( $F=16.112$ ,  $DF=4$ , and  $P=.000<0.05$ ) and REALM-R ( $F=9.078$ ,  $DF=4$ , and  $P=.000<0.05$ ). Post Hoc (LSD) test interpretation indicates that there is a difference in the level of health literacy position with the graduates, post-graduates, diploma holders and others. This shows that educational qualification enables the people to be better health literates by performing well in the specified tests. Output from Table 13 shows that the health literacy measured with the help of NVS and the educational qualification of the respondents are also related as  $F=3.828$ ,  $DF=3$  and  $P=.013<0.05$ .

### Relationship between the Category of the Respondents and the Level of Health Literacy

ANOVA was used to understand the relationship between the category of the respondents and the level of health literacy.

**Table 14: ANOVA Showing Relationship between the Category of the Respondents and the Level of Health Literacy through Score in REALM-Teen and REALM-R**

| <i>Sum of Squares</i> | <i>df</i>      | <i>Mean Square</i> | <i>F</i> | <i>Sig.</i> |        |      |
|-----------------------|----------------|--------------------|----------|-------------|--------|------|
| Score REALM-T Test    | Between Groups | 4637.515           | 3        | 1545.838    | 23.895 | .000 |
|                       | Within Groups  | 27235.605          | 421      | 64.693      |        |      |
|                       | Total          | 31873.120          | 424      |             |        |      |
| Score in Realm-R Test | Between Groups | 95.152             | 3        | 31.717      | 13.044 | .000 |
|                       | Within Groups  | 1023.657           | 421      | 2.431       |        |      |
|                       | Total          | 1118.809           | 424      |             |        |      |

**Table 15: ANOVA Showing Relationship between the Category of the Respondents and the Level of Health Literacy through Score in Newest Vital Sign**

|                | <i>Sum of Squares</i> | <i>df</i> | <i>Mean Square</i> | <i>F</i> | <i>Sig.</i> |
|----------------|-----------------------|-----------|--------------------|----------|-------------|
| Between Groups | 5.850                 | 3         | 1.950              | 1.193    | .318        |
| Within Groups  | 132.339               | 81        | 1.634              |          |             |
| Total          | 138.188               | 84        |                    |          |             |

Output from Table 14 indicates that the category of the respondents (students, professionals, businessmen, and others) do have significance with the level of health literacy both in case of REALM-Teen ( $F=23.895$ ,  $df=3$  and  $P=.000<0.05$ ) and REALM-R ( $F=13.044$ ,  $df=3$  and  $P=.000<0.05$ ).

Post Hoc (LSD) test interpretation indicates that there is a difference in the level of health literacy position with the Students, Professionals, Businessmen and others. This shows that category has influenced the people to be better health literates by performing well in the specified tests. Output from Table 15 shows the health literacy measured with the help of NVS and the category of the respondents. The results ( $F=1.193$ ,  $DF=3$  and  $P=.318 > 0.05$ ) show that the health literacy position measured with the help of NVS does not have any relation with the category to which they belong to. This shows that people do read the labels on the food packets and understand them irrespective of whether they are students, professionals, businessmen, and others.

## CONCLUSION

Mangaluru, though scores high in literacy, has a low health literacy scores observed among the respondents. It means that people need extra training to understand and even pronounce health related literature. Most people would struggle to understand different healthcare information which shows that the level of health literacy among literate adults in Mangaluru is lower than expected. People have very less alertness regarding the understanding of food labels which shows that education has not influenced much in raising awareness about health. It is up to the individuals to take interest in understanding health related terms and meanings as this awareness will build a stronger and healthier society. Hospitals must take a lead in disseminating the knowledge regarding the healthcare to the society so that they become positive stakeholders in building a healthy society.

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