

Original Research Article

Eye health knowledge among basic level science and health education teachers in Solukhumbu district of Nepal

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Abstract

Prior studies showed that school teachers have an important role in controlling blindness at the community level. A school eye health promotion program is essential because it helps cover health services for children in the community. The study aimed to assess the factors of eye-health problems and eye-health knowledge at the basic level of school teachers at the primary level of eye health problems and care. A cross-sectional study design was implemented with a self-administered questionnaire. A total of 292 health and science basic-level school teachers have been selected from the Solukhumbu district. The sample size was determined by Slovin's formula. Data were analyzed using the IBM Statistical Package for the Social Sciences (SPSS) V20. The proportion of teachers knowing eye-health problems and care of children is higher among teachers having qualifications at master level or above (mean rank = 179.99) than the bachelor level (mean rank = 146.30), grade twelve (mean rank = 149.06) and grade ten (mean rank = 116.91) which was statistically significant ($p < 0.05$). The study concluded that the level of qualification of the teacher was significantly associated with knowledge of the eye-health. Hence teachers who have low qualifications should be trained in the eye-health.

Keywords: education, eye health, eye care, teachers' knowledge, refractive errors

Introduction

Eye health education is essential to tackle blindness in the community where nearly 1.1 billion people are living blind due to there being poor or no access to basic eye care services globally (Bourne et al., 2020). According to the World Health Organization (WHO), an estimated 19 million children are visually impaired. Among them, 12 million children have visual impairment due to refractive error (Pascolini & Mariotti, 2012). They state that globally the principal causes of visual impairment are Uncorrected Refractive Errors (URE) 53%, un-operated cataracts 25%, and others. Based on the result, about 80% of visual impairment is either preventable or curable with treatment. Childhood eye health problems were one of the major causes of visual impairment such as Un-corrected Refractive Errors as well as infectious and non-infectious causes. Generally, UREs are the primary cause of visual weakening in children aged 5–15 years (Lindfield et al., 2012). It also found about 90% of people who are visually impaired live in middle or low-income countries like Nepal. A study conducted by

Shrestha et al., (2014) also reported that the prevalence of refractive error was found consistently increased with growing age. It happens in some additionally incorporate individuals who have a diminished capacity to see since they do not approach for glasses or contact lenses. A visual disability may cause individuals challenges with normal daily activities such as driving, reading, socializing, and walking in children below the age of fifteen.

According to the government of Nepal, Ministry of Education flash II report (2016) Nepal's new education structure is designating Early Childhood Education and Development (ECED) for early childhood and school education system with basic education consisting of grades 1-8, with 5-12 years and secondary education consisting of grades 9-12, with 13-16 years. The report indicated the majority of the schools in Nepal include basic levels.

For addressing eye health problems of students, primary eye care is insufficient in Nepal (Burn et al., 2020)., Nepal is still facing challenges in integrating health issues into the school education system, and administration, and delivering effective school health promotion activities and curriculum. Neupane, (2003) argued that the health education program may have been a needed segment of those vertical programs yet they had their very own health education unit being worked from the inside to the outskirts of the association just in the instructional arrangement. Nepalese health education program progress its development through the enormous duty of executives sharing with the government and private sectors. The school setting contributes a few targets, chances to convey wealth and capacities on health besides improvement issues among students, teachers and guardians. National health education information and communication centre (2003) stated that eye health education is a key part of essential medical services. Therefore, the school eye health promotion program is needed because it helps to cover health services for children in communities.

School teachers play a major role in eye health promotion in the prevention of avoidable blindness by using models that create nations from eye health and other health issues (Habiba et al., 2017). School eye health promotion and education not only help to detect and treat refractive errors related to eye diseases of others but also help to increase health awareness and healthy school environment (Singh Thakur & Anwar, 2017). This study indicates the need for effective eye health awareness programs for remote and hilly areas to help prevent and seek timely eye care services mandatorily to implement primary eye care services in basic schools.

Methods and Materials

Sample Size

According to the record of the Education Development and Coordination Unit in Solukhumbu, there are 276 basic level schools and 1088 teachers in the district. Out of the total basic level schools, 109 were randomly selected using a random table generated through a computer from both community and institutional schools. A total of 292 (26.83%) basic-level science and health education teachers were selected as the respondents. The school principals had provided the name list of health and science subject teachers. In case of missing respondents from the sampled schools during the research period, the teachers from nearby basic schools were involved as the required respondents. The sample size was determined using the formula, $n = N / (1 + N(e)^2)$ (Israel, 1992), where N= study (1,088), e = margin of errors (0.05). Hence, the sample population size comprised of 292 basic level teachers for the administration of self-administered structured questionnaire (SAQ).

Tools and Techniques of Data Collection

The information was collected through a self-administered structured questionnaire (SAQ) grouped in demographical information of respondents and twenty eye health and care-related multiple choice and yes/ no questions. For the development of the tool, the researcher consulted references and get suggestions from the supervisor. As per the suggestions, the data collection tools format was adopted from a study conducted by Nepal Health Education Association NHEA. Due to COVID-19 risk situations such as lockdown, and social distancing including the government's rules and regulations of the pandemic (Poudel & Subedi, 2020), it was very difficult to collect data being present physically the field. Thus, the data were collected by the application of the SAQ adopting protective health behavior during the COVID-19 pandemic.

Due to the sensitive environment of the study period and the the research field, an SAQ in the Nepali language was used to obtain information. The questionnaire was developed first in English and then translated into Nepali. The researcher had taken consent from the school principals and respondents beforehand through telephone. The researcher described the purpose of the study then he requested the respondents to administer the tools. It was carried out from the second of September to the first of November, 2020. The questionnaires were sent through the post office, directly contacted by the researcher, hiring two assistants for the collection and compiling of the administrated data. The researcher was aware of the self-administrated questionnaires that may be biased in reporting their activities. He had tried to minimize bias by providing clear instructions to the respondents.

The researcher developed a self-administrative questionnaire for assessing the purpose of the study. He assessed the validity and reliability of the questionnaire. Questions were worded and response options were identified. The questionnaires were pre-tested among 30 teachers in a school in different locations from the study site before the main survey (Teijlingen van & Hundley, 2002). The researcher has observed scores on the number prominence of school teachers as per the research tools.

Ethical Considerations

The proposal for study was reviewed and approved by Nepal Health Research Council (NHRC) (Ref. no. 565). The ethical guidelines for research as guided by the NHRC were followed (Nepal Health Research Council, 2019). A consent letter and permission were sought from the Education Development and Coordination Unit (EDCU) of Solukhumbu. Informed consent was obtained from the study participants (Felzmann, 2009). They self-studied before filling in the survey form. The researcher tried to minimize bias by providing clear instructions to the respondents. The participants' participation in the main study was promoted for voluntary participation. Any participants may leave the study at any time if they wish to leave (Gordon & Prohaska, 2006)

Data Analysis

Data were entered in the International Business Machines Corporation, Statistical Package for the Social Sciences (IBM SPSS) version 20 format. Though the data entry was done by a single person, it was maintained double-checking to minimize the data entry error. Missing data were checked immediately and corrected. The monitoring of the data entry was done regularly by self. Descriptive and inferential statistics were applied for analyzing the collected data. In the

study, the Pearson chi-square test was applied to measure teachers' knowledge about an eye health problem in each issue and school practice. Non-parametric tests were conducted to test the significant difference between two or more variables as the Mann-Whitney U test was used to examine the significant differences in mean ranks of teachers across their gender, program exposure and non-exposure status. Kruskal Wallis H test was also used to examine the significant differences in the mean ranks of teachers across their age, ethnicity, teaching experience and qualification level.

Results

The demographic characteristics include distribution of the population by gender, age, ethnicity, qualification, teaching experience, and school eye health program exposure of basic level teachers in private and public. Descriptive statistics were applied for the analysis of demographic characteristics of the study population. The data provided by school teachers have been presented in terms of frequencies and percentages in the following Table.

Table 1

Demographic Characteristics of the Teachers

Demographic Characteristics		Number(%)
Gender of teacher	Male	162(55.48)
	Female	130(44.52)
Age group (Years)	18-29	88(30.14)
	30-39	88(30.14)
	40-49	73(25.00)
	50-59	43(14.73)
Ethnicity of teachers	Brahamin/Kshettri	137(46.92)
	Janajati	134(45.89)
	Dalit and others	21(7.19)
Teaching experience	<10 years	145(49.66)
	11-20	73(25.00)
	>20 years	74(25.34)
Level of qualification	Grade 10	52(17.81)
	Grade 12	111(38.01)
	Bachelor	91(31.16)
	Master and above	38(13.01)
School eye health program	Exposure	116(39.73)
	No-exposure	176(60.27)

The data presented in this table indicate that a high percentage of male teachers (55.48%) participated as compared to female teachers (44.52%). Similarly, the majority (more than 60%) of them were in the age group less than 39 years (18-29 = 30.14% and 30-39 = 30.14%). Only one-fourth them was between the 40-49 age group (25.00%) similarly a few (14.73%) was between the 50-59 years. The majority of the respondents were Brahmin/Kshettri (46.92%), followed by Janjati (45.89%) but Dalits and others (Madhesi, Muslim) were only 7.19% of the ethnic group. About half (49.66%) of the respondents have below 10 years of their teaching experience. In the same way, half (50.3%) of the respondents have more than 10 years, and 25.34% of them have 11-20 and 25% have above 20-years teaching experience.

Regarding the respondents' qualifications, the highest proportion of them had grade 12 (38.01%), followed by bachelor level (31.16%). Similarly, 17.81 % of teachers have only grade 10 levels and only 13.01% of them occupied a master's degree and above. The majority (60.27%) of the study population was not exposed to eye health training but only -fourth (39.73%) number of teachers were exposed to the training. In overall observation, the results indicated that the majority of the teachers are male, junior by age and experience, qualified and non-exposure to eye care training. Only a few numbers of teachers were from Dalit and other ethnic groups with less teaching experience and exposure to the school eye health program.

Teachers Awareness of Food for Good Eye Health

Foods are very important for good eye health. Respondents were asked a question related to types of food for good eye health. All (100%) respondents understood food for good eye health. All respondents were aware of the importance of green leaf vegetables/yellow fruits, meat, egg, and milk as the sources of food for eye health over the use of the rice, biscuit, noodles and others.

Table 2

Teachers' Awareness of Ways to keep Good Eye Health

Way to keep good eye health	Gender of teacher N=292		Total Number (%)
	Male Number (%)	Female Number (%)	
Regular eye check-up	13 (8.00)	15 (11.50)	28 (9.53)
Food with vitamin A	6 (3.70)	5 (3.85)	11(3.77)
Prevent from Trauma	2 (1.20)	0 (0.00)	2 (0.70)
Ocular Hygiene	15 (9.30)	3 (2.30)	18 (6.20)
All above	126 (77.80)	107 (82.30)	233 (79.80)

The data in the table above shows that female respondents (82.30%) were more aware about way to keep good eye health than male respondents (77.80) . Total 79.8% of the teachers had responded to all (regular eye checkups, food with vitamin A, prevent from trauma and ocular hygiene) are the way to keep good eye health. Only about one-fifth (20.27%) of respondents offered a particular response.

Teachers' Awareness about Causes of Conjunctivitis

Conjunctivitis is one of the common eye infectious or allergic diseases. Respondents were asked about causes of conjunctivitis. Based on the eye health program exposure and non-exposure teachers' response is as following table 3.

Table 3 presents the proportion of teachers having knowledge about causes of conjunctivitis. It is higher among teachers from eye health exposure programme (92.24%) than Non-exposed school teachers (88.07%). Majority (89.73%) of the respondents had known about the causes of conjunctivitis.

Table 3*Teachers' awareness about Causes of Conjunctivitis*

Causes of conjunctivitis	Eye health program N=292		
	Exposure	Non-Exposure	Total
	Number (%)	Number (%)	Number (%)
Congenital	2 (1.72)	3 (1.70)	5 (1.71)
Infection/Allergy	107 (92.24)	155 (88.07)	262 (89.73)
Trauma	1 (0.86)	5 (2.84)	6 (2.05)
Age	0 (0.00)	2 (1.14)	2 (0.68)
Don't know	0 (0.00)	2 (1.14)	2 (5.82)

Teachers' Knowledge about Complaining of Refractive Errors

Refractive errors with students cannot easily be seen on the letters of the whiteboard in the classroom. The main complaint of RE is blurring of vision without pain, redness, or discharge. Respondents were asked about chief complaint of refractive errors. Their response is given in the following table.

Table 4*Teachers' Knowledge about Complain of Refractive Errors*

Complain of refractive errors	Gender of teacher N=292		Total Number (%)
	Male	Female	
	Number (%)	Number (%)	
Redness	21(12.96)	9 (6.92)	30 (10.27)
Blur vision	107 (66.05)	84 (64.62)	191 (65.41)
FB sensation	3 (1.85)	1 (0.77)	4 (1.37)
Discharge	1 (0.62)	5 (3.85)	6 (2.05)
Don't know	30 (18.52)	31(23.85)	61 (20.89)

According to this table, the knowledge of students' complain of refractive errors is higher among teachers from Males (66.05%) than females (64.62%). Majority (65.41%) of the respondents had known about the complaint of refractive errors but still, one fifth (20.89) responded unaware of refractive errors. Similarly, 13.70% had a misknowledge about the complaint of refractive errors whereas response to redness (10.27%), discharge (2.05%), and foreign body sensation (1.37%). One fifth (34.59%) teachers need to be awareness of the complain of refractive errors.

Teachers' Knowledge about Easily Care of Refractive Errors

Refractive errors can easily be cared by contact lens or glasses. This is more inexpensive than a surgical procedure. Refractive errors could not be cared by any medicine or exercise. The respondents were asked how to easily care for refractive errors. Their response has been presented in the following table .

Table 5

Teachers' Knowledge about Easily Care of Refractive Errors

Care of refractive errors	Gender of teacher N=292		
	Male Number (%)	Female Number (%)	Total Number (%)
Medicine	44(27.16)	27(20.77)	71(24.32)
Contact lens/Glasses	78 (48.15)	59(45.38)	137(46.92)
Surgery	4(2.47)	8(6.15)	12(4.11)
Exercise	6(3.70)	5(3.85)	11(3.77)
Don't know	30(18.52)	31(23.85)	61(20.89)

Table 5 shows that the male respondents (48.15%) were more conscious than female respondents (45.38%) about refractive error correction by contact lens or glasses. In total, only (46.92%) of respondents had knowledge about treatment of refractive errors. Based on the result, More than fifty percent of respondents need to be aware of the treatment of refractive errors.

Teachers' Knowledge about students' Common Eye Problem

Teachers' understanding of students' common eye problems and eye diseases has been presented by their qualification and eye health program exposure under the table 6:

Table 6

Teachers' Knowledge about Students' Common Eye Problems

Eye Problem	Qualification of teacher N=292					Sig. value
	Grade 10 (Number, Yes%)	Grade 12 (Number, Yes%)	Bachelor (Number, Yes%)	Masters and above (Number, Yes%)	Total (Number, Yes%)	
Refractive errors	37 (71.15)	85 (76.58)	75 (82.42)	34 (89.47)	231 (79.11)	0.139*
Conjunctivitis	44 (84.62)	108 (97.30)	85 (93.41)	37 (97.37)	274 (93.84)	0.013*
Cataract	46 (88.46)	105 (94.59)	84 (92.31)	38 (100.00)	273 (93.49)	0.155*
Glaucoma	31 (59.62)	86 (77.48)	63 (69.23)	32 (84.21)	212 (72.60)	0.032*
Night blindness	43 (82.69)	103 (92.79)	85 (93.41)	38 (100.00)	269 (92.12)	0.019*

Eye problem	Program exposure and non exposure teacher N=292			Total (Number, Yes%)	Sig. value
	Exposure Yes%)	Non exposure Yes%)			
Refractive errors	93 (80.20)	132 (75.00)	225 (77.10)	0.304*	
Conjunctivitis	108 (93.10)	161 (91.50)	269 (92.10)	0.614*	
Cataract	106 (91.40)	159 (90.30)	265 (90.80)	0.710*	
Glaucoma	83 (71.60)	125 (71.40)	208 (71.50)	0.982*	
Night blindness	111 (95.70)	167 (94.90)	278 (95.20)	0.377*	

Note. N=292, *Pearson chi- square test at 95% CL

The table 6 highlights the proportion of teachers having knowledge about refractive errors in children. This proportion of it is higher among teachers from master and above level

(89.47%) than bachelor level (82.42%), grade twelve (76.58%) and grade ten (71.15%). This is not statistically significant with P value (0.139). The proportion of teachers having knowledge about conjunctivitis is also higher among teachers with master degree and above level (97.37%) than the teachers with grade 12 (97.30%), bachelor level (93.41%) and grade 10 (84.62%). This is statistically significant with P value (0.013). Proportion of teachers having knowledge about cataract is higher among teachers with master and above level (100%) than the teachers with grade 12 (94.59%), bachelor level (92.31%) and grade 10 (88.46%). This is not statistically significant with P value (0.155).

Similarly, the proportion of teachers having knowledge about glaucoma is higher among teachers from master and above level (84.21%) than grade twelve (77.48%), bachelor level (69.23%) and grade ten (59.62%) This is statistically significant with P value (0.032). Similarly the proportion of teachers having knowledge about night blindness is higher among teachers from master level (100%) than bachelor level (93.41%), grade twelve (92.79%) and grade ten (82.69%). This is statistically significant with P value (0.019). This means that master and above level teachers have good knowledge but the qualification level with grade 10 have poor knowledge.

Regarding the eye health program exposure, the proportion of teachers having knowledge of refractive errors in children is higher among teachers with program exposure (80.20%) than the teachers with non exposure (75.00%). This is not statistically significant with P value (0.304). Proportion of teachers having knowledge of conjunctivitis is higher among teachers with program exposure (93.10%) than non exposure (91.50%). This is not statistically significant with P value (0.614). Similarly, Proportion of teachers having knowledge about cataract is higher among teachers from program exposure (91.40%) than non exposure (90.30%). This is not statistically significant with P value (0.710).

The proportion of teachers having knowledge about glaucoma is higher among teachers from program exposure (71.60%) than non exposure (71.40%). This is not statistically significant with P value (0.982). Proportion of teachers having knowledge about night blindness is higher among teachers from program exposure (95.70%) than non- exposure (94.90%). This is not statistically significant with P value (0.753). As per result, eye health program exposure teachers have good knowledge than non exposure but not statistically significant result with P Value(0.05).

Eye Health Care Knowledge in Teachers with Different Demographic Characteristics

Regarding the total score of knowledge, the basic level school teachers' knowledge is interpreted in the following table based on the teachers' six demographic characteristics: gender, age, ethnicity, experience, qualification and program exposure. In this study, non-parametric test as a label of Mann whitney U and Kruskal Wallis H test was occupied using the rank data.

Table 7*Eye Health Knowledge across the Demographic Characteristics of Teachers*

Demographic characteristics		Mean ranks	Degree of freedom	Asymp Sig. (2-tailed)	Inferential statistics
Gender	Male	147.04	1	0.901	Mann Whitney U Test
	Female	145.82			
Age group (Years)	18-29	152.09	3	0.785	Kruskal Wallis H Test
	30-39	141.07			
	40-49	152.01			
	50-59	136.81			
Ethnicity	Brahamin/Kshettri	155.12	2	0.180	Kruskal Wallis H Test
	Janajati	141.09			
	Dalit and others	124.76			
Teaching experiences	Below 10 years	144.90	2	0.548	Kruskal Wallis H Test
	10-20 years	155.36			
	Above 20 years	140.90			
Level of qualification	Grade 10	116.91	3	0.005	Kruskal Wallis H Test
	Grade 12	149.06			
	Bachelor	146.30			
	Master and above	179.99			
SEH program	Exposure	152.06	1	0.356	Mann Whitney U Test
	Nonexposure	142.83			

Table 7 shows that the proportion of teachers having knowledge of eye health problem and care is higher among teachers from male (= 147.04) than the mean rank of female (= 145.82). Despite the different descriptive statistical values (mean ranks), there was no statistically significant difference on eye health knowledge across the gender of teachers as the P value (= 0.901) was greater than the level of significance (= 0.05). The teachers ages that lower the ages of category was the higher ranks of knowledge about eye health problem and care (mean ranks: 152.09 > 152.01 > 141.07 > 136.81 ~ age: 18-29 > 40-49 > 30-39 > 50-59). The result showed that was not statistically significant (P = 0.785 > 0.05).

According to the total score of teachers, the proportion of teachers having knowledge about eye health problem and care is higher among teachers from Brahamin and Chhetri Category (155.12) than the mean rank of Janajati (141.09) and Dalit (124.46). However, this observed difference was not statistically significant (P= 0.180 > 0.05). Regarding the total score towards the knowledge of eye health and care of teachers based on their teaching experience, the particular mean rank was higher among teachers from 10-20 years (155.36) than category below 10 years and above 20 years (mean ranks = 144.90 and 140.90). There was no significant difference on knowledge about eye health problem and care across the experience years as the P value (= .0548) was greater than value (= 0.05). Regarding qualification level of teachers, the proportion of teachers having knowledge about eye health problem and care in children is higher among teachers from master and above level (mean rank = 179.99) than bachelor level (mean rank = 146.30), grade twelve (mean rank = 149.06) and grade ten (mean rank = 116.91). This was statistically significant with P value (0.005) less than the level of significance (= 0.05). Regarding the training exposure and non-exposure of teachers as per the mean ranks, proportion

of teachers having knowledge about eye health problem and care in children was higher among teachers from school eye health program exposure (152.06) than non-exposure (142.83). However, this was not statistically significant with P value (0.356) greater than the level of significance (= 0.05).

The above discussed information indicates that the level of qualification has significant result on the eye health knowledge of school teachers. However, the other demographic characteristics (gender, age, ethnicity, teaching experiences and program exposure) were not so significant in determining their knowledge of eye health and care.

Discussion

The basic level science and health teachers had understood about food for good eye health. They were aware of green leaf vegetable/yellow fruits, meat, egg, milk as the sources of food for eye health. The findings are very similar with the study conducted by Agrawal et al., (2018) on the awareness levels of school teachers regarding healthy vision and eye screening in UP India. The findings showed that most of the school teachers were aware of the micronutrients which are good for eye health. Such positive knowledge operates best in performance with general lifestyle changes, including eye health knowledge and the provision of social support for example higher consumption of vitamin A sources foods. It changes teachers' attitudes and intentions for the eye health education and promotion program in the schools. The basic level school teachers have adequate awareness about refractive errors in children. It has similar results as the study conducted by K & Nair, (2013) on the awareness of primary school teachers regarding refractive errors at Mysore. Such results would be helpful in detecting early manifestations of refractive error in school going children. Uncorrected refractive error causes reduced vision in Bhutanese schoolchildren, which is a public health issue (Sharma et al., 2020). Knowledge sharing, knowledge giving and receiving behaviors were found to be the best predictors of self-efficacy (Ergun & Avci, 2018). So, eye health promotion interventions considerably increase schoolchildren's eye health knowledge, attitudes, and practices (Paudel et al., 2019). The findings of this study also indicate that the majority of schools are concerned on eye health awareness activities around the identification and treatment of uncorrected refractive errors.

The findings of this study show that majority of the teachers had known about the complaints of refractive errors but still one fifth had a false knowledge about the refractive errors such as redness, discharge and foreign body sensation. The qualification also affects the possession of teachers' knowledge of eye problems. These studies found higher qualification level of school teachers have significant difference in eye health knowledge. A cross-sectional survey of primary school teachers conducted at Rawalpindi, Pakistan by Habiba et al., (2017) showed significant difference in eye health knowledge scores among different age groups and levels of education. The findings of this study were similar to have proved the Teachers' knowledge about eye health.

Conclusion

As the conclusion, the level of qualification has the significant result of school teachers' eye health knowledge. However, other demographic characteristics (gender, age, ethnicity, teaching experiences, and programme exposure) were not so significant factors to determine their

knowledge of eye health. Therefore, higher qualification level teachers are potential to organize school eye health promotional program. Teachers who have low qualifications should be trained in the eye-health. It is important to enhance knowledge and skills for the basic level school teachers to increase self-efficacy in school eye health activities.

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