

SOCIO-DEMOGRAPHIC PROFILE AND NUTRITIONAL STATUS OF HEARING IMPAIRED (DEAF) ADOLESCENTS

Annie Kuruvilla (Associate Professor), Preeti Hanjra (M.Sc Student)

Department of Foods & Nutrition, Faculty of Family & Community Sciences,

The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India

Email.- annikuruvillajuly@yahoo.com

Abstract: Health status of a population is a significant indicator of human development. Like mortality, disability being a potential measure of health status of population has not received much attention in research particularly in the developing countries. Hearing impairment refers to both complete and partial loss of the ability to hear and research in the area of the health and nutritional status of such a population remains largely unexplored in India. A school for the hearing impaired adolescent boys & girls in the age group of 10-19 years was chosen as the site for the study. 101 hearing impaired subjects who were in the age group 10-19 years were enrolled for the study. A pre tested questionnaire was filled by the researcher in coordination with a sign language interpreter to elicit background information and socio-demographic status. For anthropometric measurements their heights and weights were taken. For hemoglobin estimations, 5ml sample of venous blood was obtained from each subject for laboratory analysis. The subjects who were deaf by birth were 84.2% and the rest were due to accident. Stunting was more in the early adolescents in case of boys but in girls it was higher in mid adolescents. The girls who were undernourished were 57.14% & among them severe under nutrition was seen in the mid adolescents. The boys who were undernourished was 71.2% and severe under nutrition was seen in late adolescents. The mid-adolescent category of boys and girls were having maximum thinness (47.8%). Hemoglobin estimations showed 23% of the subjects to be anemic. Girls were more anemic than boys. No severe anemia was reported. The study highlights the prevalence of malnutrition. This was a genuine endeavour to bring to light the sociodemographic and nutritional status of the differently abled (hearing impaired) sections of the society.

Key Words: Differently-abled, hearing impaired, deaf, nutritional status, anemia, stunting, under nutrition, adolescent, hemoglobin, socio-demographic.

INTRODUCTION:

Hearing impairment is the most frequent sensory deficit in human populations, affecting more than 250 million people in the world. Consequences of hearing impairment include inability to interpret speech sounds, often producing a reduced ability to communicate, delay in language acquisition, economic and educational disadvantage, social isolation and stigmatisation. It may be worsened by some medical conditions such as hypothyroidism, diabetes, and possibly hyperlipidemia, among others [1,2,3]. The far-reaching implications of hearing loss, both in respect of development of communication skills, as well as in terms of social and economic quality of life, warrants an urgent need to highlight the magnitude and severity of the problem. Different prevalence rates for disability are available in India. According to the Census of India, there are 2.19 thousand people with disabilities in India who constitute 2.13 % of the total population, which includes persons with visual, hearing, speech, locomotor and mental disabilities (Census 2001)[4]. The National Sample Survey Organization (NSSO) estimated that the number of persons with disabilities in India is 1.8% (49-90 million) of the Indian population, that 75% of persons with disabilities live in rural areas, 49% of the disabled population is literate and only 34% are employed. NSSO[5] also includes the persons with visual, hearing, speech, locomotor and mental disabilities. The difference in estimates of Census (2001) and NSSO (2002) for different types of disabilities can be explained by the lack of universal definitions and criteria of disabilities used during the surveys. Percentage prevalence of hearing loss i.e. significant auditory impairment (SAI) in the general population varied from a minimum of 4.2% in Indonesia to 9% in Sri Lanka. Thailand and Nepal, which use a different protocol, have 13.3% and 16.6% prevalence respectively. Based on the figures obtained, there are over 100 million person suffering from deafness and hearing impairment in the region (WHO, 2002)[6]. The ear diseases

include impacted cerumen, which is the most prevalent. Prevalent are chronic supportive otitis media and chronic non supportive otitis media. Over 10% of the population in India and 4.1% in Indonesia were suffering with presbycusis. Nepal and Myanmar could provide estimates for the prevalence of noise-induced hearing loss. Only Myanmar provided estimation on the prevalence of deafness due to ototoxicity. These two are known to be under reported causes of hearing loss. This data is based on the WHO protocol in most countries except Nepal and Thailand. The WHO protocol takes into account the estimation of significant auditory impairment. This is the level of hearing impairment which causes significant disruption in the auditory abilities. Significant auditory impairment is based on the assessment of the ear which has better hearing capacity. It includes all adults with hearing loss of more than 40 dB (decibel) in the better ear and all children with hearing loss with more than 30 dB in the better ear. The onset of deafness and hearing impairment early in life has a debilitating effect on the linguistic and communication skills of the child as well as on academic performance, education and employment opportunities. The prevalence of adult onset hearing loss is significantly higher than childhood onset, however, in terms of years of lives lived with disability (YLD), childhood deafness accounts significantly.

METHODS:

There are 3 schools catering to the education of hearing impaired children in Vadodara city, Gujarat, India. They are, Smt.Kamlaben Badhir vidyalaya, Ishara foundation, Akshar Centre for Hearing Impaired, all together catering to approximately 500 students. Akshar Centre for Hearing Impaired Children, Lehipura Vadodara was chosen as the site for the present study as it was fulfilling all the criteria in the study design. The students were taught in two vernacular languages-Gujarati and Hindi. The curriculum followed was that of the Gujarat Board of Exams. They dealt extensively and daily with amplification devices like hearing aids, group hearing aids, and speech trainers. 101 hearing impaired subjects who were in the age group 10-19 yrs. were enrolled for the study. The objectives of the study were to assess the socio-economic status of the subjects, to find the prevalence of anaemia by estimating blood haemoglobin levels and to measure the growth pattern of the hearing impaired children in terms of anthropometric measurements. For eliciting the background information and socio-economic status, a pretested questionnaire which included structured and semi structured questions was explained by the researcher, in coordination with a sign language interpreter. The questions were explained and interpreted to the students by signs and actions and lip reading. After full comprehension, the hearing impaired children individually filled in the questionnaire. Hemoglobin test was done for all the samples to check the anemia levels and blood group was also done as they did not know their blood groups. The most feasible quantitative measurement for iron deficiency anemia is estimation of haemoglobin levels. The gold standard for assessing haemoglobin concentration is the direct cyanmethaemoglobin method which was used for the present study and the results were interpreted according to WHO, 2007 standards. Assessment of nutritional status of community is one of the first steps in the formulation of any public health strategy to combat malnutrition. For assessment of nutritional status of the early adolescents two body measurements were used. All the anthropometric measurements of height and weight were taken twice for individual subjects using standard procedures and average of the readings was finally recorded and body mass index (BMI) was calculated. BMI indicates current nutritional status. It is considered as an indicator of weight that is relatively independent of height. Undernutrition is defined as a BMI i.e. less than the 5th percentile of the WHO reference data. The body mass index provides a relation between body weight and body height and is defined as follows: $BMI = \text{body weight in kg} / (\text{body height in m})^2$ Quantitative data included close ended questionnaire and numeric data. The height and weight data along with age was used to compute BMI for age and Height for age, which was compared with the standards and the data was subjected to statistical analysis using Statistical Package for Social Sciences (SPSS) version 17. Qualitative data i.e. responses obtained from open ended interviews, semi structured questionnaire, were compiled and categorized. Major trends in responses were obtained and summarized. The data was entered in SPSS and subjected to appropriate statistical analysis.

RESULTS:

The present study was conducted on hearing impaired adolescent boys and girls aged 10 to 19 years in Urban Vadodara, all belonging to the same socio economic status. In all 101 adolescents were enrolled for the study. From the total population 84.2% were deaf by birth and 17.8% were deaf by accident. **Table:1** shows the age-

wise & gender wise classification of the subjects. There were 25.7% subjects in the early adolescent group(10-12 yrs.), 43.6% subjects were in mid adolescent group(13-15 yrs),30.7% subjects in the late adolescent group(16-19 yrs). Accurate age of the students was obtained from the school records.

TABLE:1 AGE WISE CLASSIFICATION OF THE SUBJECTS

AGE WISE	BOYS	N%	GIRLS	N%	TOTAL	
					N	%
10-12 yrs	17	25.8	9	25.7	26	25.7
13-15 yrs	26	39.4	18	51.4	44	43.6
16-19 yrs	23	34.8	8	22.9	31	30.7
Total	66	100	35	100	101	100

Table:2 depicts the socio-economic characteristics of the population. It was seen that 66.3% of them were living in joint families, with maximum family size of 6-8 members, cutting into the food security of the family and thereby compromising the food intake of the adolescents. The majority of the present population(53%) of the parents had temporary jobs like small- time food joints & vegetable vendors,19.8% were labourers with daily wages. More than half the population lived in pucca houses(permanent fixed dwellings) whereas 17.8% resided in kuchha houses(houses made of clay, cow dung, and wood).

TABLE:2 SOCIO ECONOMIC PROFILES OF THE SUBJECTS

Sr. No	Characteristics	Male		Female		TOTAL	
		N	%	N	%	N	%
1	RELIGION						
	Hindu	55	83.3	25	71.4	80	79.2
	Muslim	11	16.7	9	25.7	20	19.8
	Christian	0	0.0	1	2.9	1	1.0
	Total	66	100.0	35	100.0	101	100.0
2	TYPE OF FAMILY						
	Joint	47	71.2	20	57.1	67	66.3
	Nuclear	18	27.3	14	40.0	32	31.7
	Extended	1	1.5	1	2.9	2	2.0
	Total	66	100.0	35	100.0	101	100.0
3	OCCUPATION						
	Wage labourer	12	18.2	8	22.9	20	19.8
	Cultivation	10	15.2	6	17.1	16	15.8
	Driver	7	10.6	4	11.4	11	10.9
	Temp. Shop & Food Joints	37	56.1	17	48.6	54	53.5
	Total	66	100.0	35	100.0	101	100.0
4	MOTHER TONGUE						
	Hindi	26	39.4	13	37.1	39	38.6
	Gujarati	34	51.5	20	57.1	54	53.5
	Marathi	6	9.1	2	5.7	8	7.9
	Total	66	100.0	35	100.0	101	100.0
5	TYPE OF HOUSE						
	Kucha	12	18.2	6	17.1	18	17.8
	Semi pucca	9	13.6	4	11.4	13	12.9
	Pucca	45	68.2	25	71.4	70	69.3
	Total	66	100.0	35	100.0	101	100.0

6	Total Income						
	Daily wages	22	33.3	13	37.1	35	34.7
	Weekly wages	1	1.5	1	2.9	2	2.0
	Monthly wages	37	56.1	19	54.3	56	55.4
	Acc. To Availability	2	3.0	6	17.1	8	7.9
	Total	66	100.0	35	100.0	101	100.0

Data on anthropometric measurements were collected and calculated on all the study subjects (N=101). WHO 2007 standards were used for height for age and BMI for age & CDC standards for weight for age. Among the subjects 35.6% were stunted (Table:3). A total of 36.4% of boys and 34.3% of girls were stunted. Stunting was more in the early adolescents in case of boys (41.7%) but in girls it was higher in mid adolescents (66.7%).

TABLE 3 : PERCENT PREVALENCE OF STUNTING ACCORDING TO WHO STANDARDS

Sex	Age (Years)	WHO 2007						Chi Square
		STUNTED		NORMAL		TOTAL		
		N	%	N	%	N	%	
Boys	10-12	10	41.7	7	16.7	17	25.8	4.31
	13-15	5	20.8	21	50.0	26	39.4	
	16-19	9	37.5	14	33.3	23	34.8	
	Total	24	100	42	100	66	100	
Girls	10-12	1	8.3	8	34.8	9	25.7	
	13-15	8	66.7	11	47.8	19	54.3	
	16-19	3	25.0	4	17.4	7	20.0	
	Total	12	100	23	100	35	100	
Total	10-12	11	30.6	15	23.1	26	25.7	
	13-15	13	36.1	32	49.2	45	44.6	
	16-19	12	33.3	18	27.7	30	29.7	
	Total	36	100	65	100	101	100	

Table:4 shows the distribution of different grades of stunting in the population. Equal prevalence of severe was seen in early and mid-adolescents(38.5%). Stunting is a long term chronic deficiency. During periods of severe deprivation, linear growth rate slows down and leads to stunting in an individual. Since height is affected only by long term nutritional deprivation, it is considered as an index of chronic or long duration malnutrition (NIN 2009). It is possible that stunting started at an early age. School based programs aimed at improving health and nutrition status may have the potential to bring about catch -up growth in stunted adolescents. The prevalence of stunting was 47.4% among adolescent boys in a study on 605 tea garden workers in Assam[7].

TABLE 4: DISTRIBUTION OF DIFFERENT GRADES OF STUNTING IN SUBJECTS

Age (Years)	WHO 2007 STANDARDS									
	SEVERE (a)		Moderate (b)		Mild (c)		Total (a+b+c)		Normal (d)	
	N	%	N	%	N	%	N	%	N	%
10-12	5	38.46	5	22.73	1	100	11	30.6	15	22.7
13-15	5	38.46	8	36.36			13	36.1	32	48.5
16-19	3	23.08	9	40.91			12	33.3	19	28.8
Total	13	100	22	100	1	100	36	100	66	100

Note : a. <-3SD; b. <-2SD; c. <-1to -2 SD ; d. -1 to +1

More than half the population of girls were undernourished(57.1%) & among them severe under nutrition was seen in the mid adolescents (31.4%) (Table:5) Nearly three-fourth boys (71.2%) were undernourished and severe under nutrition was seen in late adolescents(22.7%) (Table:6).**Boys were more undernourished than girls and severe under nutrition was also more prevalent in boys** in the present study. The percentage of obese and overweight subjects were less(6%).

TABLE:5 Age wise classification of malnutrition - girls - according to WHO Standards

Age (Years)	Total		Under nutrition			Normal	Over nutrition	
			Moderately	Severely	Total		Over weight	Obesity
	N	%	N	N	N	N	N	
10-12	10	28.57	3 (8.6%)	4 (11.4%)	7 (20%)	3 (8.6%)		
13-15	17	48.57		11(31.4%)	11 (31.4%)	5 (14.3%)	1 (2.85%)	
16-19	8	22.86		2 (5.7%)	2 (5.7%)	5 (14.3%)		1 (2.85%)
Total	35	100	3 (8.6%)	17 (48.6%)	20 (57.1%)	13 (37.1%)	1 (2.85%)	1 (2.85%)

TABLE:6 Age wise classification of malnutrition - boys - according to WHO Standards

Age (Years)	Total		Under nutrition			Normal	Over nutrition	
			Moderately	Severely	Total		Over weight	Obesity
	N	%	N	N	N	N	N	
10-12	17	25.76	3 (4.5%)	8 (12.1%)	11 (16.7%)	3 (4.5%)	1 (1.5%)	2 (3%)
13-15	26	39.39	7(10.6%)	14(21.2%)	21 (31.8%)	5 (7.6%)		
16-19	23	34.85		15 (22.7%)	15 (22.7%)	7 (10.6%)	1 (1.5%)	
Total	66	100.0	10 (15.1%)	37 (56.1%)	47 (71.2%)	15 (22.7%)	2 (3%)	2 (3%)

Note : Value in parenthesis indicates percentage in the total

Table:7 shows the percent prevalence of thinness of the overall population. It was seen that 66.3% of the subjects were undernourished. The mid-adolescent category was having maximum thinness (47.8%) i.e.44.7% of mid adolescent boys and 55% mid adolescent girls.Out of the total population in the study, 53.5% were severely undernourished(**Table:8**).

TABLE:7 Percent prevalence of thinness according to WHO Standards

Sex	Age (Years)	WHO 2007				
		Total N	Thinness		Normal	
			N	%	N	%
Boys	10-12	17	11	23.4	6	31.6
	13-15	26	21	44.7	5	26.3
	16-19	23	15	31.9	8	42.1
	Total	66	47	100	19	100
Girls	10-12	10	7	35.0	3	20.0
	13-15	17	11	55.0	6	40.0
	16-19	8	2	10.0	6	40.0
	Total	35	20	100	15	100
Total	10-12	27	18	26.9	9	26.5
	13-15	43	32	47.8	11	32.4
	16-19	31	17	25.4	14	41.2
	Total	101	67	100	34	100

TABLE:8 Grade wise distribution of thinness

Age (Years)	WHO 2007						
	Total N	Under nourished			Normal	Over weight	Obesity
		Moderately	Severely	Total			
10-12	27	6	12	18	6	1	2
13-15	43	7	25	32	10	1	
16-19	31		17	17	12	1	1
Total	101	13	54	67	28	3	3
Total (%)		12.9%	53.5%	66.3%	27.7%	3.0%	3.0%

Similar results were observed in a cross sectional study carried out in Gujarat where underweight was about 66%, of which 27% had severe degree of under nutrition and about 49% of the children had various degrees of stunting [8] Venkaiah. Young adolescents tend to be more undernourished than older adolescents[9].The same results were found in the study on nutritional status of rural adolescent school children in Paschim Medinipur district in West Bengal, where prevalence of under nutrition was higher among early adolescents (49%) and 21% among late adolescents[10].A study carried out in rural areas of Wardha showed the overall prevalence of thinness was 54% and it was significantly higher among early adolescents (57%) than late adolescents (48.6%)[11].

TABLE:9 Overall prevalence of Anemia

Hb Level (g/dl)	N	%
7 - 9.9 (Moderate Anemia)	5	7.25%
10.0 - 11.9 (Mild Anemia)	11	15.94%
> 12 (Normal)	53	76.81%
Total	69	100%

The blood samples were collected from 69 adolescents and Hemoglobin estimation done by Cyanmethaemoglobin method and they were classified according to the WHO 2007 standards. Majority of the subjects(77%) were normal,16% were mildly anemic (10.0 g/dl-11.9 g/dl) and 7% were moderately anemic.No severe anemia was reported(**Table:9**).Prevalence of anemia was more in girls (27.3%) than boys (21.3%).In boys mild anemia was more prevalent whereas in girls moderate anemia was prevalent (19.15%)(**Table:10**). Girls were more anemic than boys.The prevalence of anemia in girls was more and it was highly significant. (p>0.001).

Severely anemic subjects were also less (only one) in a study carried out in Western Kenya where the overall prevalence of anemia was 21.1%. [12].

TABLE:10 Gender wise Prevalence of Anemia

Hb	Boys		Girls		Total		Chi sq.
	N	%	N	%	N	%	
Normal (a)	37	78.72	16	72.73	53	76.81	6.35
Mild (b)	9	19.15	2	9.09	11	15.94	
Moderate (c)	1	2.13	4	18.18	5	7.25	
Total (b + c)	10	21.28	6	27.27	16	23.19	

a - Normal - Hb -> 12 gm/dl - WHO (2007) standards

b - Mild Anemia - Hb 10 to 11.99 gm/dl – WHO (2007) standards

c - Moderate Anemia - Hb 7 to 9.99 gm/dl – WHO (2007) standards

DISCUSSION:

The study population was of a low socio-economic status, with majority of them in joint families. The family size consisted of 6-8 family members, which might be the factor responsible for the compromise in food intake. 84.2 % subjects were deaf by birth. Proper care of health during pregnancy and lack of good nutrition might have been the causes for complete development of the child. Overall under nutrition was more prevalent (66.3%) and it was maximum in the mid- adolescent category. Boys were more undernourished than girls (but not statistically significant). Half of the girls were undernourished and severe under nutrition was seen in 13-15 yrs category whereas in boys severe under nutrition was seen in 16-19 yrs. Girls were more anemic than boys and it was statistically significant. ($p < 0.001$) Moderate anemia (7-9.99 gm/dl) was more in girls therefore if proper intervention is not done at the opportune moment the girls might become severely anemic in their puberty due to additional menarche losses also. Adolescents are particularly susceptible to iron deficiency anemia in view of the increased need for dietary iron for hemoglobin synthesis. During this rapid period of growth when blood volume and muscle mass are increasing, the requirement of iron increases in puberty and has a close relationship to growth and weight gain. The iron requirement remains higher in girls after menarche to replace menstrual losses. Adolescent girls lose about 25-54 ml of blood per day containing approximately 15.5 mg of iron during menstruation (WHO, 1995). The daily requirements for absorbed iron increases from 0.5 mg/day before puberty in girls to 3.3 mg/day after puberty which has to be compensated by increased intake. This study was a genuine endeavour to study the health and nutritional status of the hearing impaired adolescent children.

LIMITATIONS OF THE STUDY : Subjects were hearing impaired so it was difficult to communicate with them.

CONCLUSIONS:

The study highlights the prevalence of malnutrition. This was a genuine endeavour to bring to light the needs and problems faced by the differently abled (hearing impaired) sections of the society.

REFERENCES:

1. Murray CJ, Lopez AD. The Global Burden of Disease: a comprehensive assessment of mortality and disability from diseases, injuries and risk factors in 1990 and projected to 2020. Cambridge, MA, Harvard School of Public Health, (Global Burden of Disease and Injury Series, vol. I), 1996.
2. Smith A. Global burden of hearing loss. Mental health: New hopes: World Health Organisation Health Report, 2001 .
3. Concha M. Global burden of hearing loss. WHO Report of the Informal Working Group on Prevention of Deafness and Hearing 1991.
4. Census of India. Disabled population by type of disability, age, sex and type. 2001
5. Disabled Persons in India: National Sample Survey Organization. Ministry of Statistics and Program Implementation, New Delhi. 2002
6. World Health Organization. International Classification, Functioning, Disability and Health 2002
7. Medhi G K, Hazarika N C, Mahanta J. Nutritional Status of Adolescents among Tea Garden Workers. Indian Journal of Paediatrics, 2007, 74, 25-29
8. Hari Kumar, Venkaiah K et al. Diet & Nutritional Situation of the Population in the severely drought affected areas of Gujarat. Journal of Human Ecology, 2005, 18(4): 319-326
9. Kurz K M . Adolescent nutritional status in developing countries. Proceedings Nutrition Soc. 1996, 55(1B): 321-31.
10. Bisai S, Bose K, Ghosh D. Growth Pattern and Prevalence of Underweight and Stunting Among Rural Adolescents. J Nepal Pediatric Soc 2011; 31(1): 17-24
11. Deshmukh P R, Garg B S, Bharambe M ; Effectiveness of weekly supplementation of iron to control anaemia among adolescent girls of Nashik, Maharashtra, India; J Health Population & Nutrition. 2008; 26(1): 74-8.
12. Leenstra T, Peterson LT, Kariuki Sk, Oloo AJ, Kager PA and Kulie FO : Prevalence and severity of malnutrition and age at menarche; cross-sectional studies in adolescent school girls in western Kenya. European Journal of Clinical Nutrition, 59: 41-48. 2002.