

Demographical Determinants Associated With Undernutrition And Anaemia Among Tribal Women Of Malkangiri District Of Odisha: A Cross Sectional Survey

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Abstract

The pervasiveness of undernutrition and anaemia in tribal women is still very high. It make women weak to bear the labour pain and survive in child delivery and they becomemore prone to infection and chronic diseases. The objective of this study to determine the demographical factor responsible for undernutrition and anaemia and its consequences among rural tribal area of Malkangiri district of Odisha using WHO standards of Anthropometric measurements.

Materials and Methods:

The study has been done on 240 random sample of tribal women of Santals, Koyas, Poraja and Bhumia tribes falling into category of 15-49 year age which have child bearing potential. The socio-demographical data on nutritional status, habits etc. has been obtained through structured questionnaire which is further followed by anthropometric assessment using standards methods. The haemoglobin level measured by Mission Hb haemoglobin testing meter.

Statistical Analysis:

Chi-square test used to find the association between demographical factor responsible for malnutrition and anaemia at p-0.05 level was used along with descriptive statistics like simple proportion, mean, standard deviation calculated using SPSS 16.0 version.

Results:

In this study, it was found that 74.16% womenare underweight and 87.08% women are anaemic. Among sociodemographic factors early marriage, education, occupation and, family size, drinking water facility and age of birth of first child shows strong association with undernutrition while family size, age at birth of first child and education have negative association with anaemia.

Conclusions:

Despite the high prevalence rates of underweight among reproductive aged women, relatively few risk factors were identified for these conditions, suggesting that focused and target based strategy, community- based intervention that have effective implementation is needed to address this issue effectively.

Keywords: *Reproductive age, undernutrition, Anaemia, socio-economic status*

1. INTRODUCTION

The developing countries like India are in its transitional phase to become economically developed but it is still facing Malnutrition as silent emerging global problem, in terms of undernutrition or over-nutrition ranging from various nutrient deficiency to obesity. Despite in 2019 India emerge as fifth largest economy with a GDP \$2.94 trillion out pace UK and France, but still it's a home to one quarter of the World's poor⁽¹⁾. As GHI (Global Hunger index) 2019 Report, Out of 117 countries India got placed at 102 rank, its score 30.3 and undergo in "serious" category which indicate undernutrition is consequential issue⁽²⁾. The countries such as Bangladesh, Nepal, Myanmar where per capita income is much lower than that of India are much better than India in GHI ranking⁽³⁾. The report mainly focuses on hunger and it is found that undernutrition is mainly due to Acute hunger (famine)⁽⁴⁾. The prevalence of undernutrition in India mainly found in marginalized population like SC and ST⁽⁴⁾. As per 2011 Census, India has second-largest tribal population in the world comprising a total of 104,545,716 scheduled tribe which is 8.6% of total population in which 4.2% (51 million) are tribal females⁽⁵⁾. Study of NNMB (2007-08) on adults of Indian tribes reported that 49% tribal female are undernutrition than 40% tribal male⁽⁶⁾. As these indigenous communities are mostly habitant of forests and hilly terrains, they get completely isolated and marginalized from other elite and mainstream communities and therefore are subjected to social and political discrimination and are deprived from economic progress. It is matter of grave concern that in tribal communities mainly female and children are more vulnerable to high risk of undernutrition and anaemia⁽⁷⁾. because the inadequacy to attain nutrient intake as comparable to their heavy physical workloads so they don't get sufficient energy to perform various domestic duties along with child rearing and bearing as well as working in field with pre-agriculture technique or collecting the forest produce to sustain their livelihood^(8,9). Poor socio-economic condition, cultural constraints and detached geographically location mainly hilly terrain, low literacy rate, marginalisation in accessing health, lack of awareness about their social and physical wellbeing in different phase of life multi-dimensional factor of malnutrition among tribal women⁽¹⁰⁻¹³⁾. According to NFHS-4 Report, 54.3% rural women are suffering from anaemia⁽¹⁴⁾ it also state every second women are anaemic in India⁽⁴⁾. And when they conceive the child undergo pregnancy and lactation phase then their nutritional status become worse, because their body require more nutrients especially iron, calcium, energy, protein and vitamin A⁽¹⁵⁾. Tribal women with low intake of protein and energy are likely to give birth to a low weight infant who get exposure of undernutrition during their early age^(4,16). Undernutrition and low level of haemoglobin make women more susceptible to infection and chronic disease, then they become weak to substantiate labour pain and survive in child birth process⁽¹⁷⁾. This has escalate the vicious cycle of undernutrition and which has inter-generational effect⁽¹⁷⁾. To address this issue Government of India is taking a focused and target-oriented initiative like 'National Rural Health Mission'; providing food security through PDS; SABLE for adolescent girls to achieve the physical and mental health development goal of SDG2030 smoothly⁽¹⁸⁾.

From last two decades, Odisha has been facing continuous challenge of high frequency of malnutrition in state. Out of all 30 district, Malkangiri is stronghold Maoist isolated dense hilly forest region in southern part of Odisha and touches the frontiers of Chhattisgarh and Andhra Pradesh. There are 54% population are Schedule tribe and 23% constitute Schedule caste⁽¹⁹⁾. The Government of India take multi-sectoral teamwork to achieve the goal of National Nutrition Program by commencing Special programme for Promotion of Millets in Tribal Area⁽²¹⁾, so that the country's malnutrition problem can be effectively dealt. And to revive millet cultivation and promote millet as promising nutritional source and National Nutrition Mission (NMM) also calls for multi-sectoral interventions for household food security, and crop diversification, popularization of subsidiary and protective foods, Kishori Shakti Yojana for improving nutrition status in adolescent girl⁽¹⁸⁾. Nevertheless, even basic malnutrition indicators prevalence of stunting, underweight, thinness and anaemic is high in high in rural tribal population of

Malkangiri. According to NFHS-4 report of Malkangiri district stated that 45% women are underweight and 71.3% are anaemic⁽²⁰⁾.

This study is aimed at estimating demographical factors which are primarily accountable for under nutrition and anaemia among reproductive aged 15-49 years women of rural-tribal area of Malkangiri district of Odisha. This study further tried to estimate the potential risk factor associated with low BMI and Low Haemoglobin level among tribal females. It was expected that this research work can be helpful to inform the authority to design community based policies intervention to reduce the statistics of under nutrition and anaemia.

2. Methods

The present study was undertaken on nutritional status of Malkangiri tribal women. The total sample include 240 tribal women, reproductive aged between 15-49 years for this study. The Santals, Koyas, Poraja and Bhumia tribal women of this district were participants of the study. The study village were selected where these tribes were inhabitant. A self- prepared structured interview schedule was used for data collection in the present study through house to house visits by individual scheduling -general information regarding age, sex, marital, literacy status, occupation, personal habits and health status of individuals, immunization status of pregnant women and children, Physical activity information, Health related question like communicable and non- communicable, method of treatment, family history of disease were elicited. Information about drinking, chewing and smoking were also collected.

The anthropometric assessment was done using standard method according to growth parameter mentioned training manual of WHO. To collect the anthropometric measurement weighing balance was use for weight with minimum clothing, anthropometric rod was used for height, non-stretchable tape was used for waist circumference, hip circumference individuals was recorded for calculation of Body Mass Index. BMI defines as the ratio between weight in kilogram to height in meter square, which is mathematically written as: $BMI = \text{Weight (kg)} / [\text{Height}^2 (\text{m}^2)]$ ⁽²²⁾. The nutritional level among tribal female was assessed using globally accepted guidelines of James's classification of BMI (James 1988)^(23,24).

Laboratory parameters performed in our study were haemoglobin estimation by Mission Hb haemoglobin testing meter. As per WHO recommendation, the person was considered as anaemic when the haemoglobin level was $<12.0\text{g/dl}$ ⁽¹⁵⁾. The statistical software SPSS version 16.0 for windows were used for data analysis. The data were entered, checked and analysed by using SPSS 16.0 version for required statistical parameters including, descriptive statistics as well as simple proportion, mean, frequency distribution, standard deviation. The chi-square test was used to find the association between demographical factor vs BMI and haemoglobin level at significance level $p < 0.05$. The descriptive statistics used to analyze the general demographical findings.

3. Consent Of Respondents

The verbal consent was taken prior investigation of anthropometric measurements from the participants. The information provided by subjects and their identity are kept confidential. The subject have every right to separate themselves from being the part of this research and study, at any point of time.

4. Result

Table 1 shows that 19.1% tribal female were 15-19 year age group and 30.4 % in 20 to 29 years age group. Most of the women (86.2%) were married. About 2.92% were illiterates and 50.4% had completed up to 7 year of schooling, 27.5% have completed higher secondary 19.1% had achieved any professional course from ITI like tailoring, beautician, bamboo artisan, handicraft or through ORMAS group. Majority of the women (76.25%) belong to joint family or have

more than 5 member in family. 80.41% tribal women were working in farming activity or in Haat. Out of the 240 sample of tribal women, 38.75 % of women were below poverty line while 50.83 % had family income 6000-12000INR. Majority of tribal women (63.75%) are still using burning wood in traditional chulha. Around over the two fourth of women (67.0%) are using govt. hand pump water for drinking purpose and 24.1% had were using borehole water. Rest of the tribal family (8.7%)were using irrigation channel for drinking water facility. 53.75% adult women goes to fetch water at home and 31.67% young girls below age of 15 are travelling long distance to carry water from Govt. hand pump. 88.33% were not using any method of filtration of water for drinking. Around two third women (73.75%) family have household animals.

Table 2 depict the mean age of 240 random sample of women age group 15-49 years are 32.98 and standard deviation are 10.01. In the study population height ranged from 130 - 167 cm. Mean height of study population was 151.1±5.65 cm. Weight of the study women ranged from 29-53 kgs. Mean weight was 39.12 ±4.44 kgs. BMI was calculated for all the study subjects, the mean value 17.20±1.85 kg/m². BMI is classified using James' classification into 3 categories underweight, normal and overweight. Table 2 shows that, frequency of under nutrition i.e. Chronic Energy Deficiency among the tribal females of Malkangiri district was 74.16%. Among them 21.25% respondents had severely thin (CED III) and the mean value is 14.63±1.48 kg/m², and 21.25% respondents had moderate thin (CED II) the mean value were 16.46±0.27 kg/m², 31.66% respondents had mild thinness (CED I) their mean value is 17.66±0.35 kg/m². The 23.33% women were in normal BMI category (18.5-20.0kg/m²), very less number 2.50% were in overweight category of BMI. While, their mean value were 19.22± 0.48 kg/m² and 20.77± 0.69 kg/m² respectively. However the mean waist circumference among the study population was found to be 70.66 ±8.14cm which is low as per recommendation of American council of exercise (2014) and the mean hip circumference was 80.14 ±7.75. In this study it was found that 87.08% respondents had haemoglobin level less than 12.0g/dl and only 12.91% had <12.0g/dl. The mean value haemoglobin level of all respondents was found to be 10.16± 2.22.

Relationship between Socio-demographic characteristics and underweight and Anaemic:

Table 3 depicts Age groups was significantly related to low BMI (chi=18.716; p=0.004) and also significant with anaemia (chi=19.78; p=0.000).aged 20-29years had more frequency of under nourished. 21.25% women are under CED III (<16.66kg/m²i.e severely thin), while 31.66% women are under CED I(17-18.5kg/m²i.e mild thin). The level of literacy shows association with prevalence of under nutrition statistically as it has significant relation with CED (chi=45.612; p=0.000), but it shows non- significance relation with anaemia (chi=5.314; p=0.150). Occupation was also found to have direct relationship with under nutrition (chi=21.141;p=0.001) and anaemia (chi=60.732; p=0.000). In this study family size was significantly related with prevalence of malnutrition(chi=25.594; p value=0.000)and but not significant with Anaemic women (chi=1.184; p =0.276). Economic status also independent with undernourishment (chi=10.63;p-value=0.100) but have significant relation with anaemia (chi=104.48;p=0.000). It was found that drinking water facility had association with underweight and anaemia among tribal women of study area (chi=49.49;p=value0.000 and chi=10.626;p=0.004 respectively. Mother age at birth of first child also show strong association with Chronic Energy Deficiency, underweight (chi=14.68;p=0.000) but show non-significant relation with Anaemia (chi=1.595;p=0.206).

5. Discussion

The design of current studies was to investigate the nutritional status responsible for malnutrition among tribal women aged 15-49years by determining BMI, Haemoglobin level with socioeconomic status and relationship of all these values in tribal population. In this study, it was found that the women who have not attended the school and have 7 year of schooling show higher frequency of underweight as compared to women with matric or higher education which show significant association with BMI. This may be because lack of effective education and not

aware about balance diet and living in patriarchal society restricting their purchasing power to a substantially lower level⁽²⁵⁾. Tribal are more vulnerable about the uncertainty of available food resources due to pre- agricultural technique, climatic conditions frequent flood and drought in their geographical location^(26,27). In this study, malnutrition and low level of haemoglobin found higher among the women who are occupied in farming activities. It could be due to the fact the women are considered as extra labour, they are working long hours in their own paddy field. But due to harsh climate conditions and frequent flood in this district cause insufficient food that eventually lead to malnutrition and lower intake of food containing iron lead to anaemia. Food insecurity also accelerate the rate of prevalence of under nutrition in India⁽²⁸⁾. It was found that family size were dependent with underweight but not with anaemia. This study revealed that monthly income is significantly associated with low value of haemoglobin at the $p < 0.000$ level. Low economic background families failed to afford diversity in their food basket. That could be another leading factor of undernourishment in term of macro and micronutrient deficiency and lack of energy supplement diet. Several research suggested that poverty had association with lack of pucca house, lack of possession of property and even not able to get the facility of basic amenities like safe drinking water and proper sanitation^(4,28-29). Consequently Government should take action to support poorest individual household to improve the nutritional level of females and children of marginalised society where they are deprived from basic resources and knowledge of balanced diet⁽²⁹⁾.

It is also found that tribal females who used to drink water from unprotected sources like irrigation channel or borehole without filtration had more frequency of under nutrition than the females who were fetching drinking water from Govt. hand pump. Several study also reveal that the people who were drinking water from unprotected sources or have unavailability of safe drinking water suffer from parasitic infections such as amoeba, giardia and helminthic infestation which lead to diarrhoea and malnutrition⁽³⁰⁻³²⁾. The marital age of girls is an important indicator of women health in reproductive phase. India has adopted 18 years of marital age for girls, so that they have adequate maturity to take the upcoming responsibilities. Several study support that early age of marriage can increase risk for premature birth and death as neonates, infants, or children⁽³³⁾. In this study it is found that majority of girls got married before 18 year which is legal age of marriage as per Prohibition of Child Marriage Act, and Indian Penal Code. It found that 207 women were married and their mean value of their age of marriage is 17.756 ± 2.10 and having a first child at mean age is 18.83 ± 2.24 . The undernourished mother give birth to a low weight babies or have high probability of infant mortality^(33,34). Anthropometric measurements which are indicator of nutritional status by helping in calculation of BMI, haemoglobin level, waist circumference and hip circumference. The study findings reveals that there is deficit in weight of tribal women as compared to ICMR standard of 151cms as average height for Indian tribal women and 55kg as average body weight of tribal females. However the mean height among the study population was found to be 151.1 ± 5.65 cm and the mean weight was 39.12 ± 4.44 which shows the tribal women were have a deficit of 15.88% in their weight as compared to the average Indian tribal women. It was also found that majority were in underweight category, very less percentage was found to be in overweight category. Around 74.16% of tribal women were having Body Mass Index less than 18.5 kg/m^2 depict underweight status of these females which are further classified into CED III, II, I^(23, 24). Around two third of the women were in moderate to mild categories which suggests that any further nutritional deficiency may lead to severe deficiency. Malnutrition could have long term negative consequences on health which could lead to poor growth and development during the developmental phase of childhood to adulthood that continued throughout life⁽³⁴⁾. The mean haemoglobin value among women was 10.92 ± 2.64 g/dl with 87.08% having lower than normal haemoglobin level < 12 g/dl. This finding was higher than the prevalence of anaemia in women of Malkangiri according to NFHS-4 report i.e 71.4%. It can be due to low intake of dietary iron, or may be consuming the some food or drink which inhibit the absorption of both heme or non-heme iron in blood due to lack awareness on healthy food habits along with high menstrual blood loss (menorrhagia)^(8, 18).

Table I. Socio demographic profile of tribal women

Characteristic	Categories	Frequency	Percent
Age of Participants	15-19	46	19.1
	20-29	73	30.4
	30-39	84	35.0
	40-49	37	15.4
Marital status	Married	207	86.2
	Unmarried	33	13.7
Qualification of Participants	Illiterate	7	2.9
	7 year of schooling	121	50.4
	intermediate	66	27.5
	higher education	46	19.1
Family members	<5	54	22.5
	>=5	186	77.5
Occupation	Farming	193	80.41
	Waged Labour	19	7.92
	Public Sector	17	7.08
	SHG group	11	4.58
Family monthly income	Below 6000	93	38.75
	6000-12000	122	50.83
	12000-15000	19	7.92
	above 15000	6	2.50
Cooking fuel	Chulha	153	63.75
	LPG	87	36.25
Drinking Water facility	Govt. Hand pump	161	67.0
	Irrigation Channel	21	8.75
	Borehole on their yard	58	24.1
Who goes to fetch water	Female child under age 15	76	31.67
	Adult women	129	53.75
	male child under 15	7	2.92
	male	28	11.67
Water filtration technique	Yes	28	11.67
	No	212	88.33
Method of Filtration	Chlorine	21	75.00
	Settle down using cloth	7	25.00
Household Animals	Yes	177	73.75
	No	63	26.25

Table II. Nutritional status of women according to their anthropometric measurements.

VARIABLES	CATEGORY	N (%)	MEAN ± SD
Age (in years)		240 (100)	32.98 ± 10.01
Marital age (in years)		207 (86.2)	17.75± 2.10
Age during birth of first child (in years)		191(79.58)	18.63 ±2.24
Height (in cm)		240(100)	151.1 ± 5.65
Weight (in kg)		240	39.12 ±

		(100)	4.44
BMI GRADES (James 1988)		240(100)	17.20 ± 1.85
Undernutrition	CED III (<15.9 kg/m ²)	51 (21.25)	14.63± 1.48
	CED II (16-16.9 kg/m ²)	51 (21.25)	16.46 ±0.27
	CED I (17-18.4kg/m ²)	76 (31.66)	17.66± 0.35
Normal (<18.5 – 20.0 kg/m ²)		56 (23.33)	19.22± 0.48
Overweight (20.0-25.0kg/m ²)		6 (2.50)	20.77± 0.69
Waist circumference (in cm)		240(100)	70.66± 8.14
Hip circumference (in cm)		240 (100)	80.14 ± 7.75
Anaemia (g/dl)		240(100)	10.16 ± 2.22
	Yes (<12g/dl)	209 (87.08)	9.56 ± 1.63
	No (>12g/dl)	31 (12.91)	14.24 ±1.07

Table III. Socio-demographic variables Vs BMI vs Anaemia

DEMOGRAPHIC VARIABLES	N (%)	BMI			Chi-Sq. (p-value)	Anaemia		Chi-Sq. (p-value)
		<15.9	16-18.5	17-18.5		Present	Absent	
AGE								
15-19 n (%)	46(19.1)	4(10.6)	2(8)	13(28.7)	18.79 (0.00)	33(13.7)	1(5.4)	19.79 (0.00)
20-29 n (%)	73(30.1)	27(11.1)	1(8)	21(8.7)	61.00 (0.00)	71(29.5)	2(0.8)	61.00 (0.00)

	4)	25)	7. 5))	0 0 4))	8)	
30-39 n (%)	84 (35)	9 (3. 75)	2 4(1 0)	30(12. 5)		68(28.3)	1 6(6. 6)	
40-49 n (%)	37 (15. 4)	11 (4. 58)	7(2. 9 1)	12(5)		35(14.5)	2(.8)	
EDUCATION								
Illiterate n (%)	7 (2.9)	4(1 .6)	1(.0 4)	2(8)	4 5. 6 1 2 0 0 0	6(2. 5)	1(0. 4)	5. 31 4 (0. 15 0)
7 year of schooling n (%)	121 (50. 4)	37(15. 4)	3 8 (1 5. 8)	21(8.7 5)		106 (44. 16)	1 5(6. 2 5)	
Senior. Sec. school n (%)	66(27. 5)	8(3 .3)	7(2. 9)	42(17. 5)		52(21.6)	1 4(5. 8)	
Higher education n (%)	46 (19. 1)	2(8)	5(2. 0)	11(4.5)		43(17.9)	3(1. 2)	
OCCUPATION								
Farming n (%)	193 (80. 41)	36(15)	4 3(1 7. 9)	54(22. 5)	2 1. 1 4 1 0 0 1	176 (73. 3)	1 7	60 .7 32 (0. 00 0)
Waged Labourer n (%)	19 (7.9)	12(5)	3(1. 2)	4(1 .66)		17 (7.0)	2(0. 8)	
SHG Group n (%)	11 (4.5)	1(0 .4)	1(0. 4)	9(3 .7)		10(4.1)	1(0. 4)	
Public Sector	17 (7.0 8)	2(0 .8)	4(0. 8)	9(3 .7)		4(1. 6)	1 3(5. 4)	
FAMILY SIZE								
<5 n (%)	54 (22. 5)	17(7.0 8)	2 1(8. 7 5)	4(0 .8)	2 5. 5 9 4	49(20.4 1)	5(2. 0)	1. 18 4 (0. 27 6)
>5 n (%)	186 (77. 5)	34(14. 1)	3 0(1 2. 5)	72(30)	(. 0 0 0)	158 (65. 8)	2 8 (1 1. 6)	

ECONOMIC STATUS									
Less than 6000 INR n (%)	93 (38.7)	22(9.16)	34(14.1)	22(9.1)	106(44.1)	87(36.2)	6(2.5)	104(42.7)	
6000-12000 INR n (%)	122 (50.8)	27(11.2)	50(20.8)	11(4.5)	115(47.9)	7(2.9)	100(40)		
12000-15000 INR n (%)	19 (7.9)	10(4)	3(1.2)	4(1.6)	3(1.2)	1(0.4)	6(2.3)		
Above 15000	6 (2.5)	10(4)	2(0.8)	1(0.4)	2(0.8)	4(1.6)	1(0.4)		
DRINKING WATER FACILITY									
Govt. Hand-pump n (%)	161 (67.0)	13(5.4)	31(12.6)	47(19.58)	131(54.5)	3(1.2)	106(42.7)		
Irrigation channel n (%)	21 (8.7)	16(6.6)	2(0.8)	3(1.2)	19(7.9)	2(0.8)	104(42.7)		
Borehole n (%)	58 (24.1)	22(9.1)	10(4.1)	26(10.8)	57(23.7)	1(0.4)	100(40)		
MOTHER AGE AT BIRTH OF FIRST CHILD									
15-19 n (%)	107 (56.02)	49(20.4)	31(12.6)	15(6.2)	106(44.1)	1(0.4)	100(40)		
20-29 n (%)	84 (43.97)	20(8)	17(7)	6(2.5)	81(42.4)	3(1.2)	100(40)		

6. CONCLUSION

The result of this study highlights the grimmer situation of undernutrition and anaemia among the tribal female of reproductive age. It is multi-pronged and inter-generational problem in nature. From the overall discussion, it was concluded that age, education level, occupation, economic status, family size, source of drinking water, motherhood age were main demographical factor to understand the problem of undernutrition and anaemia in tribal area among females of reproductive phase. These factors shows association with malnutrition and low value of haemoglobin level. Present study reveals that the prevalence of CED I was higher in tribal women. Although there are various government initiative like National Health Mission,

POSHAN Abhiyaan, SABLA to enhance the statistics of nutritional level among adolescent girls, women and ensure food security. But a multi-sectorial intervention is needed to improve the present health facilities and make these programme implementation effective. Mass awareness can be enhanced through various audio and video programme on mass media and providing them job and knowledge about balanced diet in their food habit can be helpful in achieving ZERO Hunger goal of SDG 2030.

7. Limitations of the Study

If this study focused on specific tribe to address the issue of malnutrition then may be significant outcome will occur. The study was restricted to the tribal women of Malkangiri district of Odisha which is an area of higher frequency of under nutrition from last 20 years. The data of male of this region could help us in comparative study and give better perspective of study area. And comparison with an area of low prevalence of malnutrition among tribal population could not be made to compare the varied results of those indexes.

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Abbreviation

WHO- World Health Organisation

SES- Socio-Economic Status

GDP- Gross Domestic Product

GHI- Global Hunger Index

NNMB- National Nutrition Monitoring Bureau

NFHS- National Family Health Survey

PDS- Public Distribution System

ORMAS- Odisha Rural Development and Marketing Society

POSHAN- Prime Minister's Overarching Scheme for Holistic Nourishment

SDG- Sustainable Development Goal

ITI- Industrial Training Institute

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