

SOCIO ECONOMIC AND NUTRITIONAL STATUS IN 'AGARIYAS': SALT CULTIVATORS' WORK AS CONTRACTUAL MANPOWER IN ORGANIZED SALT INDUSTRIES

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ABSTRACT

Background

*As dimensions of malnutrition have a complex association with social Status. Nutritional status of an individual also depicts of quality of life. Malnutrition among the low-wage workers causes a direct impact on economic growth and development as a healthy workforce to create a healthy nation with a strong economy. **Objectives:** To assess the social and nutritional status of salt cultivators (Agariyas) engaged in organized salt works. **Study Design:** Advance mixed method of study (both qualitative and quantitative). **Study Setting and Target Population:** Salt cultivator working as the contractual workforce in organized salt industries in Bhavnagar, Gujarat for more than one year in salt works. **Subjects/Methods:** Field research had an integrated approach where qualitative data comprises in-depth interview, observation, audio, and video recording and focus group discussion (FGDs). For the quantitative aspect of the study pre-tested standard modified questionnaire tested as per the local region setting having both structured and the semi-structured questionnaire. Socio-economic and demographic profile, Health Symptoms, Nutritional assessment (Height, weight, Mid Upper Arm Circumference-MUAC, Basal Metabolic Index-BMI and Waist and Hip Ratio-WHR) was recorded. Hemoglobin was analyzed using digital hemoglobin analyzer. Field Survey was conducted in semi-urban villages located near Bhavnagar city of Gujarat during the beginning phase of salt cultivation season. **Results:** Total 166 salt cultivators participated in the field survey and research, of which 102 were male and 64 were female. The research found the about 24.1% of salt workers are under-weight/ Chronic Energy Deficiency Category I & II. While small proportion (1.2%) of salt cultivators was severely underweight/ Chronic Energy Deficiency Category III. Mid-Upper Arm Circumference of the salt cultivators was 24 ± 3 cm. The mean hemoglobin of the salt cultivators in the present study was 10.7 ± 2.0 g/dl. In focus group discussion and in-depth interview, other information regarding their health hygiene and sanitation were recorded.*

Conclusions

Prevalence of under-nutrition and underweight high among the low wage salt cultivators. Both male and female salt workers have low mean hemoglobin level (lower than the standard level). Poor and monotonous diet, low income, poor housing, migration, lack of education, poor hygiene and sanitation make them more vulnerable. Integrated and comprehensive social security policy is obligatory for nutritional and social insurance for the salt cultivators and their families.

KEYWORDS: Salt Cultivator (Agariyas), Socio-Economic and Demography, Under-Weight, Chronic Energy Deficiency (CED), Under-Nutrition, Housing, Health Care Services, Low Hemoglobin

Article History

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INTRODUCTION

Paradigms of nutrition and health status in a community are ultimately linked with the availability, accessibility and efficacy of primary care services as well as social outlooks of the nation (Wilkinson, R.G. and Marmot, M. eds., 2003., Stoddart, G.L. and Evans, R.G., 2017). Malnutrition (micro and macronutrient deficiency) is the fastest growing social health concern in lower and middle-income nations (Müller and Krawinkel., 2005., Jensen and Cederholm., 2018). As per the World Health Organization global report on malnutrition, 2016, about 462 million adults are underweight. The most accepted explanation of malnutrition generally referred to as the proportion of people who are underweight as well as overweight (World Health Organization., 2018a and 2018b). National as well international agencies, organizations and institutes are working in all directions to mitigate the burden of malnutrition among the community through social integration (Ecker and Nene., 2012., Haddad et al., 2015) Efforts are instigated in all possible ways and, targeted communities are children, women elderly and low-wage workers (Khobragade and Rajan., 2017). Social factors have a complex association with malnutrition among socially and economically deprived worker's community. Malnutrition among the workers causes directly or indirectly production, efficacy, income as well as the individual health of the salt cultivators or Agariyas (Gragnolati et al., 2006. Horton and Steckel., 2015). Malnutrition not only hampers individual growth and development but also have detrimental effects on society (International Food Policy Research Institute, 2016). A close assessment of nutritional status, one can actually evaluate individual health state. Hence, periodic assessment of nutrition status in workers is essential to maintain the health workforce (Khongsdier., 2002). According to ILO researcher's report, provision for good nutritious diet among workers increases the productivity up to 20%. Health workforce has better output as well as long-term benefits, for the industry and nation (Wanjek., 2005). The immediate cause of malnutrition is inadequate dietary intake as well as subsequent infection, whereas, underlying causes are low income, poor housing, lack of access to water, sanitation and healthcare services (Refugees, U. 2018). Most standard and universal tool to evaluate malnutrition among the community is anthropometric measurement. In anthropometry measurement, height, weight, and BMI computation among adults is an inexpensive, reliable and non-invasive process to assess malnutrition (Sellen., 1998., de Onis and Habicht., 1996). Thus to evaluate the nutritional status in a worker's community, the most time and cost effective way was anthropometry method. In Gujarat state, produce 76% of salt and supports 1, 30,000 unskilled labors community (Samar, K.K., 2018., Akinaga et al., 2018). Salt cultivation and production demand heavy manual labor, yet the technology are unambiguous for the unskilled workers. Salt cultivators in Gujarat are popularly known as 'Agariyas' (Akinaga et al., 2018). Salt cultivators in Bhavnagar are mostly extracting salt from the subsoil brine, which requires intense labor.

Salt Cultivation Phase

At the initial phase, contractual workers prepare the saltpans expanded in acres of land. Next phase is the collection of water to prepare the concentrated brine. Formulation of salt depends on brine concentration and temperature required for evaporation (Image 1 and 2).

In Bhavnagar, salt farming has shown a gradual transition from unorganized to organized salt works. Some of the salt industries were established before independence hence involved in salt cultivation for more than 7 decades. Low wage workers employed on contract basis suffer from multiple issues due to lack of social security, health security, lack of basic amenities (like housing, potable water, sanitation, food, and nutrition). Although the majority of small and large-scale salt industries are using various types of machinery for salt production yet it demands heavy manual work. The present research conducted extensive field investigation in Bhavnagar region to assess the social and nutritional status of the salt cultivators working in organized salt industries.

METHOD AND MATERIALS

In the pilot field survey, 13 organized salt farms were randomly selected located 15-20 km from Bhavnagar City including one experimental salt farm of CSMCRI (Council for Scientific and Industrial Research) was also included.

Study Design

In this social epidemiological research, an advanced mixed method (Sequential Explanatory Method) of the study was opted to achieve the research objectives. Qualitative as well as quantitative data were collected simultaneously followed by report analysis. Complete layout of the field research and study is elaborated in Figure 1

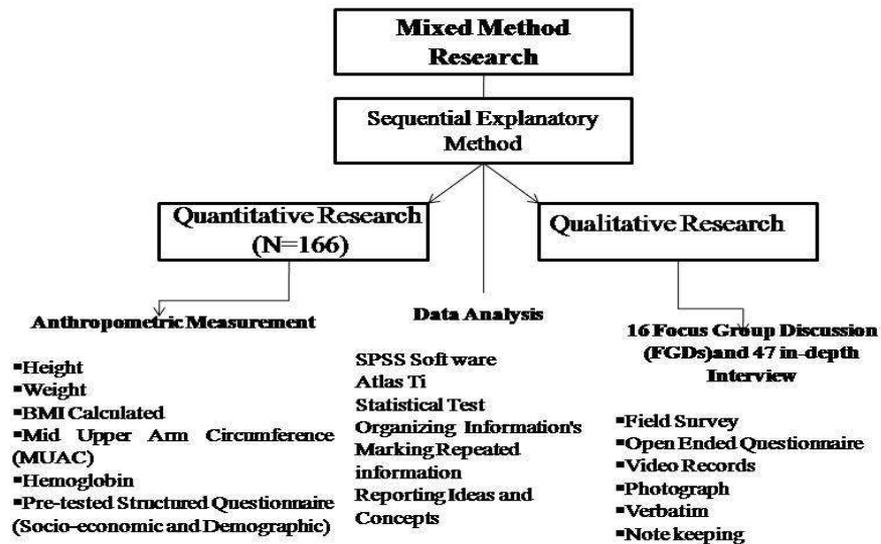


Figure 1: Conceptual Frame Work of Advance Mixed Method of Study Design

Study Duration, Sample Size, and Sampling Technique: Study duration was 7 months, where, data collection was done in 3 months (October to December). Total 166 salt cultivators participated in the research. Purposive sampling or selective sampling technique was used, salt cultivator working on contractual basis in organized salt industries and have one than one year of work experience in salt cultivation were included in the study.

Study Location: Bhavnagar city in Bhavnagar District is largest coastal region abutting Gulf of Khambhat in Arabian Sea Coast and located in the extreme west, having 152 km sea line coast in the Gujarat state in India (Figure 2). The average temperature in Bhavnagar during summer is 40°C which starts from March to June. Maximum temperature is 44°C and minimum is 9°C. Rainfall average is 732 mm. Average sunrise time in Bhavnagar is after 7 am and sunset time is after 6.30 pm.

The primary phase of salt cultivation, which is mainly preparation of saltpans, begins from October or November when the temperature is 9-15°C. The peak seasons for salt farming start at very high temperature during the summers when the temperature reaches to 44°C. The salt farmer's works in salt industries for 8 months (October-June). Bhavnagar District has 127 coastal villages, of which 25 villages are partially saline and 25 villages are fully saline.

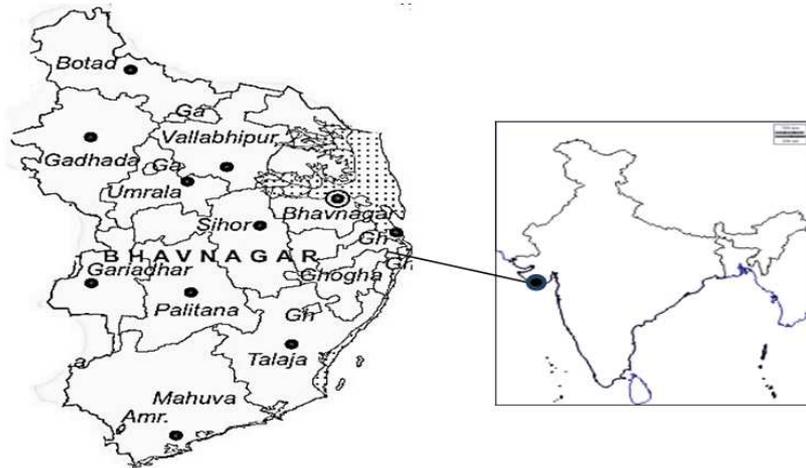


Figure 2: Map of India Showing Location Bhavnagar District of Gujarat

Data Collection Methods and Tool: For qualitative data, one peer person was identified from salt cultivators' community from each organized salt industries. Salt industries owners also participated in some of the discussion. Total 16 focus group discussions (FGDs) and 47 in-depth interviews were conducted. In FGDs, both male and salt cultivators were divided into separate groups, where, 7 to 8 salt workers constituted in each group. A detailed discussion on the subject related to their tradition as salt cultivators, alternate work and source of income; use of personal protective equipment (PPEs), availability of portable and drinking water and, housing facilities, and provision for toilets in work setting or labor shed was recorded.

Pre-tested structured questionnaire was used to record socio-economic and demographic profile. The anthropometric measurement was done using the standard procedure as shown in Figure 1. BMI was computed by using the standard formula. Hemoglobin was recorded using digital hemoglobin analyzer. Photographs, verbatim and videos were also recorded.

RESULTS

Socio-Economic Demographic Characteristics

In the field research and survey, total 166 salt cultivators working as the contractual workforce in salt industries near Bhavnagar city participated. Table 1, depicts that significant proportion of the cultivators involved in salt cultivation were males (61.4%). Majority of salt workers or Agrarians were young and belong to age group between 18 to 28 years (37.3%). However, a small proportion (13.3%) of salt cultivators was also below 18 years. Furthermore, a large proportion of workers were married (71.1%) and the considerable proportion (25.9%) was single or unmarried. On probing the social position and migratory status of Indian Agariyas or salt cultivators, the research found that majority (70.5%) of the salt cultivators belongs to other backward class (OBC) category, which is collective terminology used by Government of India (GOI) for socially and educationally deprived class. Likewise, other social categories, Schedule Tribes (ST) were

considerable in proportion (12.7%) working in salt industries. Majorities of these tribal's migrated from Chhattisgarh, Jharkhand, and Bihar to Bhavnagar Gujarat (6.6%, 2.4%, and 2.4%). A significant proportion (53%) of the salt cultivators lives in the traditional family system (joint family type). In addition, the noteworthy proportion (31.3%) lives in nuclear family type (father, mother, and children).

On gathering information on the daily wages of all individual salt cultivators, the research found that initial phase of salt cultivation (at the beginning of salt season) majority (63.3%) of them receive 200-300 Rupees later, they also notified that when salt cultivation starts at full phase they receive higher payment on daily biases.

Furthermore, table 1 also illustrates that about slightly less than half of the proportion (48.8%) of salt cultivators had no formal education and they were illiterate cannot read or write and never went to school. On the other hand, a very insignificant proportion of salt cultivators were literate (read and write Gujarati, their local language) but never attended school. Likewise, 13.9% and 24.1% of salt cultivators had education up to primary and middle school level.

Table 1: Socio-Economic and Demographic Profile of Salt Cultivators in Bhavnagar (N=166)

Variables	Sub-Category	Frequency (%)
Gender	Male	102 (61.4)
	Female	64 (38.6)
Age (In Years)	Below 18	22(13.3)
	18-28	62(37.3)
	29-38	38(22.9)
	39-48	23(13.9)
	49-58	16(9.6)
	Above 58	5(3)
Marital Status	Single	43 (25.9)
	Married	118 (71.1)
	Divorced/ Separated	1 (0.6)
	Widowed	4 (2.4)
Social Position	General	23 (13.9)
	Schedule Caste (SC)	5 (3)
	Schedule Tribe (ST)	21 (12.7)
	Other Backward Class (OBC)	117 (70.5)
Native State	Gujarat	130 (78.3)
	Bihar	4 (2.4)
	Uttar Pradesh	5 (3.0)
	Himachal Pradesh	4 (2.4)
	Chhattisgarh	11 (6.6)
	Rajasthan	8 (4.8)
	Jharkhand	4 (2.4)
Family Type	Single Member	17 (10.2)
	Nuclear Family	52 (31.3)
	Joint Family	88 (53.0)
	Extended Family	9 (5.4)
Individual Income (Daily in Rs)	Below 200 Rs	45 (27.1)
	200-300 Rs	105 (63.3)
	Above 300 Rs	16 (9.6)
Education	No education	81 (48.8)
	Literate, but no formal education	5 (3)
	Primary school (up to 4 years)	23 (13.9)
	Middle school (5 to 9 years)	40 (24.1)
	SSC	7(4.2)
	Pre-degree (XII Standard)	7 (4.2)
	Diploma	1 (0.6)
	Graduate/post graduate	2 (1.2)

Mean Value of Age, Anthropometry, BMI, Hemoglobin and WHR of Salt Cultivators

Table 2, shows the mean of continuous variables (age, height, weight, mid-upper arm circumference (MUAC), BMI, hemoglobin, and WHR) of 102 male and 64 female salt cultivators. The mean age of male salt cultivators in the study is 32.1 ± 11.7 years, whereas female farmer's mean age is 30.4 ± 13.1 years. National mean age is 27.9 years; where for Indian male average age is 27.2 years and female slightly higher 28.6 years, however, in the present study mean age of workers is higher as compared to the national average age (Factbook, C.I.A., 2018). Mean height and mean weight of female workers are lower than the male workers. Similarly, the mean BMI and MUAC are also lower among female workers as compared with the male. According to WHO for diagnosis of anemia hemoglobin level for an adult man is ≥ 13 g/dl and for an adult female is ≥ 12 g/dl (World Health Organization., 2018c). Mean hemoglobin among male salt cultivators was 11.5 ± 1.8 g/dl and female salt cultivators was 9.6 ± 1.6 g/dl that is lower than the standard value of blood hemoglobin as per WHO guideline, cut off for anemia. In the anthropometric measurement, waist and hip circumference was also recorded to compute the waist to hip ratio. According to WHO Waist and the Hip ratio (where waist circumference is divided by hip circumference), more precisely suggest body fat distribution and is an important indicator along with BMI to assess the nutritional status (Christian et al., 2009). The waist-hip ratio above 0.9cm for males and above 0.85 for females indicates increase the risk of coronary heart diseases, diabetes, and hypertension (Qiong et al., 2017). The mean WHR of male salt workers was 0.84 ± 0.10 cm and female salt workers were 0.73 ± 0.05 cm. About, 19.6% male worker had WHR more than 0.9 cm whereas, 11% female salt workers reported to have WHR more than 0.85 cm.

Table 2: Age, Anthropometry, BMI, Waist and Hip Ratio (WHR) and Hemoglobin, of Salt Cultivators in Bhavnagar (N=166)

Gender (N=166)	Mean Age (Years) \pm SD	Mean Height (cm) \pm SD	Mean Weight (Kg) \pm SD	Mean Waist Circumference (cm)	Mean Waist Circumference (cm)	Mean MUAC (cm) \pm SD	Mean BMI (kg m ² \pm SD)	Mean Hemoglobin (g/dl) \pm SD	Mean Waist: Hip (WHR) (cm) \pm SD
Male (102)	32.1 \pm 11.7	162.8 \pm 7.5	57.6 \pm 11.5	73.1 \pm 10.6	85.6 \pm 9.1	25.2 \pm 2.6	21.8 \pm 3.9	11.5 \pm 1.8	0.84 \pm 0.10
Female (64)	30.4 \pm 13.1	152 \pm 5.1	47.4 \pm 10.0	66.5 \pm 8.12	83.3 \pm 9.4	23.1 \pm 3.2	20.9 \pm 3.9	9.6 \pm 1.6	0.73 \pm 0.05

Nutritional Status Assessment of Salt Cultivators or Agrarians

BMI is an essential parameter and indicator of Chronic Energy Deficiency (CED) or under-nutrition. Nutritional Status was computed using universally accepted WHO guideline for adults

- Normal - BMI=18.5-24.9 kg/m²
- CED or under-nutrition -BMI<18.5 kg/m²
- Over Weight – BMI \geq 25.0 kg/m²

To assess the nutritional status of the salt cultivators in Bhavnagar BMI was computed and was compared with standard guideline shown in table 3. A proportion of underweight or CED (Grade I and Grade II) was 24.1%, however, very a small proportion of cultivators (1.2%) severely underweight. Hence, it can be concluded, that overall the prevalence of chronic energy deficiency among the salt cultivators were 25.3%. The present field research also found the proportion of salt farmer who was overweight and obese is 12.7% and 3% respectively.

Table 3: Nutritional Status of Salt Cultivators Based on Basal Metabolic Index (BMI) N=166

BMI Categories	Range (kg/m ²)	Frequency (%)
Severely underweight / CED (III)	<16	2 (1.2)
Under weight/CED (I & II)	16-18.4	40 (24.1)
Normal	18.5-24.9	98 (24.9)
Over weight	25-29.9	21 (12.7)
Obese	30-34.9	5 (3)

Association of Nutritional Status with Gender and MUAC

Mid-Upper Arm Circumference (MUAC) is another important parameter to assess the existing the nutritional status of the adult individuals as well as it's a very useful indicator of malnutrition (Roy, N.C., 2000). MUAC is easy, inexpensive and the reliable tool to assess the nutritional status among adult individuals. Furthermore, MUAC is popular in several community bases nutritional screening programs. For healthy adult male MUAC is >23 cm, whereas, for healthy adult female MUAC is >22 cm. MUAC is the circumference of the right upper arm measured at the midpoint between the tip of the shoulder and the tip of the elbow (Yallamraju et al., 2014., Goossens et al., 2012). In the present field study to assess the nutritional status of male and female salt farm workers, MUAC was recorded and the chi-square test was applied to find the association between gender and MUAC (Nutritional Status). The research found that under-nutrition status among male and female salt cultivators was 38.2% and 32.8% respectively (Table 4). Chi-square test value is 16.1 and p-value is 0.00 (p-value < 0.05) with 95% confidence interval and 5 % error. Hence, the statistical test result shows that there is a significant association between Nutrition Status with reference to MUAC and gender.

Table 4: Assessment of Nutrition Status base Gender and Mid Upper Arm Circumference (MUAC)

Nutritional Status (MUAC)	Male Salt Worker(n= 103) Frequency (%)	Female Salt Worker (n=64) Frequency (%)
Under-Nutrition (Male-MUAC<23cm Female MUAC < 22 cm)	39 (38.2)	21(32.8)
Normal	63 (61.8)	43(67.2)
*Chi Square test value =16.1, p value =0.000 (p value >0.05), 95% CI, α=0.05 (level of significance)		

Association of BMI with Age and Gender of Salt Cultivators

Table 5 exemplify that young salt farmer age between 18-28 years and 29-38 years are underweight/chronic energy deficiency (CED I & II) (BMI<18.5 kg/m²). However, 1.2% of salt cultivators between age 18-28 years are severely underweight / CED II. The proportion of underweight / CED I and II is higher (31.3%) among female workers as compare to male salt workers (19.6%). Moreover, the proportion (2.4%) of salt farmer age between 18-29 years and 49-58 year are overweight (BMI25-29.9 kg/m²). The proportion of over-weight was higher among male salt workers (15.6%) as compared to the females (7.8%).

To find an association between age, gender and BMI chi-square test was applied. Result stated that at 95% CI and α=0.05 (level of significance the p-value is >0.05. Hence, research data shows no statistically significant association between age and BMI as well as between gender and BMI.

Table 5: Nutritional Status among Salt Cultivator Based BMI, Age and Sex

BMI	Severely underweight <16 kg/m ² Frequency (%)	Under weight 16-18.4 kg/m ² Frequency (%)	Normal 18.5-24.9 kg/m ² Frequency (%)	Over weight 25-29.9 kg/m ² Frequency (%)	Obese 30-34.9 kg/m ² Frequency (%)
Categories					
Age (in Years)					
<18	-	-	14(8.4)	-	-
18-28	2(1.2)	16(9.6)	38(22.8)	6(3.6)	-
29-38	-	15(9.1)	23(13.8)	4(2.4)	4(2.4)
39-48	-	3(1.8)	14(8.4)	5(3.0)	1(0.6)
49-58	-	5(3.0)	7(4.2)	4(2.4)	-
>58	-	1(0.6)	2(1.2)	2(1.2)	-
Gender					
Male (n=102)	2(2.0)	20(19.6)	61(59.8)	16(15.6)	3(3)
Female (n=64)	-	20(31.3)	37(57.8)	5(7.8)	2(3.1)
*Chi-square test between different variable value Age and BMI=28.1, p value=0.1(p value >0.05) Gender and BMI=5.2, p value =0.2 (p value >0.05), 95% CI, $\alpha=0.05$ (level of significance)					

Qualitative Result Summarization: A set of the questionnaire including semi-structured and open-ended were design to gather credible information. All transcripts of 16 focus group discussion (FGDs) and 47 in-depth Interviews were coded and reports of codes were generated. The main theme was identified and the reports were analyzed, photographs, short video recordings were examined carefully.

Interstate and intrastate migratory Salt cultivators from (Chhattisgarh, Bihar, Jharkhand, Rajasthan, region near to Bhavnagar district Gujarat) live in the company built labor shed rooms or small hut built near the vicinity (1-2 km) of the salt pans (Image 3,4,5). Out of 13, less than

Half of the labor-shed has toilets built outside the migratory settlement. However, almost 95% of workers are not using toilets. The common marked reason was no water in the toilets, and toilets do not have proper door locks. Majority of the women mentioned that we feel shy to go toilets in the daytime when men workers are in the surrounding. Another common reason was no electricity in the toilets and toilets are too small with a lack ventilation. Almost all the salt cultivators practice open defecation. The migratory settlements of the salt cultivators were unhygienic with no proper waste disposal system. Of thirteen organized salt works, eight salt industries purchase water tanker for portable water, whereas rest of the salt work has the public tap for water.

Section 1: Housing, Toilets and Potable Water facilities

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Section 2: Traditional Food Eating Habits

The salt workers from Chhattisgarh, Bihar, and Jharkhand eat rice as their main food. They start the day at early morning, at 6 am and eat rice either with some vegetables or with pulses. They carry the same food in their lunch pack and eat in the afternoon time during their lunch break. In the night, they eat rice and some locally available vegetables; however, occasionally they eat rice with fish curry. The market area is located far from their work zone; in the main Bhavnagar city, which is 15 – 20 km from every salt farm.

The workers from Gujarat state eat Indian bread made from either wheat or millet flour made bread; along with that, they eat buttermilk and vegetables. Majority of the salt workers in organized salt works eat fish, while some eat other animal products like egg, meat etc. Out of 13, only two salt industries provide canteen facilities for the workers. Salt workers need to pay 1000 Rs and they received three meals and including evening snacks. Some workers also mentioned that the factory owner gives them sweets, snacks, or tea during the festivals times or annual day.

None of the workers eat any fruits, juice, milk, and butter. On asking them the reason, they mentioned as followed:

Verbatim

“We eat as per our pocket and we know that we cannot afford to eat daily milk or fruit juices”

We purchase grocery items on the monthly rental basis. If we start eating butter or milk, our household budget will get disturbed” (Salt cultivator in Organized Saltworks)

“Some time I wanted to eat milk or uncooked cheese. But I know I can’t afford that and it is waist to thinking about that food that we can’t get” (Salt cultivator in Organized Saltworks)

“I wait for festivals so that we can eat good food. As during festival time owner give good foods.” (Salt cultivator in organized salt industries)

“They will not waste money on food. Rather they will save the money to buy alcohol or tobacco” (Salt Industry Owner)

“Most of their hard earned money is gone in tobacco. In one day, they eat more than five packets of tobacco and each packet cost 6 to 8 rupees hence per day cost is more than 30-40 Rupees and the monthly cost is 900-1200 Rupees. They will not waste even 20 Rupees for one milk packets. As milk packets are costly” (Salt Industry Manager).

Section 3: Healthcare Services Availability and Utilization

Primary Healthcare (PHC) unit located in Bhavnagar has one mobile van. Mobile Health van and has a one-lady ayurvedic doctor and one para-medical staff. They distribute some common drugs like antipyretic, analgesic, antibiotics, multivitamins, iron and folic acid, antacid antiseptic lotions etc. Medical staff also checks blood pressure and blood sugar of the patients. The medical van visit once a week to every saltpan regions located near the surrounding area of Bhavnagar city on the fixed days. The workers belonging to Gujarat region prefer to go to private health care practitioner or nursing home in case of illness. However, many wait for the medical van in case of minor ailments like abdominal pain, diarrhea, muscle pain, fever, cough, and cold. Few salt companies have recognized doctors where workers visit for treatment. Certain case company provides 30% reimbursement on medical and pharmacy bills. For each medical consultations, fees range from 500-600 Rupees (excluding medicines). Hence, out pocket health expenditure is very high. None of the workers has health care or social insurance, except workers in CSIR-CSMCRI is under ESI and PF scheme. Some worker migrated from other state are aware of the government hospitals and PHC located in near village. Majority of the migrated worker, travel using private transportation Bhavnagar city (15 km) to avail the medical facilities. Newly migrated salt farmer, working since one year is not aware of healthcare resource availability in Bhavnagar. They also hesitate to approach mobile health van in case of illness.

Section 4: Use of Personal Protective Equipment (PPEs)

The workers are aware of the health-related hazards related to salt works. They know that chronic exposure to brine cause skin problems. Heat and environmental dust are injurious to eyes. The worker is aware of that use of safety boots, goggles, the hamlet; protective clothing is beneficial and necessary to protect health. Few of the salt industries have provided PPEs while rest there is no provision of PPEs. None of the salt cultivators uses PPEs, however, female workers wear long full sleeves gents T-shirt to cover the body and hands (Image 6). Reasons for not using PPEs are as followed:

- The female salt workers mentioned that the boots given to them were a large size as well as while working in salt pan water penetrate inside the boots hence it becomes very slippery.
- It is also difficult to walk in the muddy salt pan after wearing the safety boots.
- Majority of women salt workers cover their head with cloths as part of tradition hence wearing helmet above the head cover is not easy and the helmet was also oversized.

- Male salt workers mentioned that helmet is necessary while working on the construction site, as chances injuries are very high in construction work.
- Goggles provided lack grip, none had any band or holder to tie thus during bending they fall therefore rejected by salt workers.

DISCUSSIONS

To understand the social dynamics associated with malnutrition among salt farmers an advanced mixed method of research was designed (Sequential Explanatory Field Research) was preferred. The low socio-economic status subsequent migration has an adverse effect on nutritional status of the salt farmers. More than half of the salt farmers (60.2%) were young age between 18-38 years. In the present field, study suggest that the salt cultivators were illiterate or had education up to primary level, the main reason was frequent migrations and salt cultivation last for 8 months. They stay in vicinity of salt farms with no school or only primary school. A study on West Bengal agriculture farmers had reported similar observations, that the farmers were either illiterate or had education till primary school (Kar, S.K., and Dhara, P.C., 2007). On investigating on the social position of the Salt farmers in the present study, we found that majority (70.5%) of salt workers belongs to other backward class of the society. As per the National Sample Survey Organization (NSSO), the total national population of OBCs in Indian is 40.9% (News, I., 2018). Hence, the present study shows the proportion of OBCs were very high more than national proportion.

Anthropometry survey where height, weight, mid-upper arm circumference, waist and hip circumference of the salt worker found that prevalence of underweight or CED (Grade I and Grade II) was 24.1%, however, very a small proportion of farmers (1.2%) severely underweight (Chronic Energy Deficiency III). Chitra et al research on Sweepers in Bangalore City Corporation 39.5% males and 24.4% female have chronic energy deficiency (CED) (Chitra et al., 2004). Furthermore, Gazipur District of Uttar Pradesh Factory 100 workers were selected randomly in the cross-sectional study where, 57.7% male and 56.5% female suffered from chronic energy malnutrition among adult members (Dipti et al., 2008). A similar study was carried out to estimate the prevalence of under-nutrition among brick kiln workers in Midnapore West Bengal (Ghosh, M. and Bose, K., 2016). In anthropometric, BMI, as well as MUAC, was calculated. The resulting state that the prevalence of undernourished brick kiln workers was 25% (CED-Grades III, II AND I were 1.4%, 4.4%, and 19.2%) (Ghosh, M. and Bose, K., 2016). Moreover, research conducted by in Bankura West Bengal among conch shell workers reported that 27.27 % of the workers were in the underweight (BMI \leq 18.5) category (Ganguly et al., 2016).

MUAC of salt farmer showed that that under-nutrition status among male and female salt farmers was 38.2% (< 23 cm) and 32.8% (<22cm) respectively (Table 4). A cross-sectional study conducted in Ranchi District of Jharkhand among the male tribes reported that 38.28% of adult Oraons (tribal's) suffer from under-nutrition when the nutritional status of their population is evaluated by the standard cut-off points of MUAC (Banik, S.D., 2008). Thus the proportion of under-nutrition was the same above discussed study. Furthermore, the tribal study also noted that high proportion (53.10%) of adult Oraons also had chronic energy deficiency (CED) (Banik, S.D., 2008).

Hence, the present research findings on nutritional status assessment are nearly similar to those studies, where; the participant has comparable socio-economic indicators like low income, education, awareness and poor access to health care.

CONCLUSIONS

Inter and intra-state migratory salt cultivators or Agariyas of Gujarat are not only contributing to one national development but also working hard to earn their livelihood. Field survey and research found that these daily wage salt cultivators have low literacy, low income, poor housing, and toilets still they migrate to Gujarat state for salt cultivation. Some are traditional salt workers working from the generation in the salt industry while some are migratory. They have all experience, knowledge, and information regarding salt each phase of salt cultivation, however, they are under the unskilled labor category, therefore, they receive the low daily wage. Young workers, age between 18 to 28 years were reported to have lower BMI < 18.5 kg/m² and suffer from under-weight/Chronic Energy Deficiency (CED). Anemia due to low hemoglobin is also prevailing among them. The mean hemoglobin of male and female salt cultivators is lower than the international standard level set as per the gender.

Migratory salt cultivators are unaware of PHC or CHC location therefore initial orientation regarding provision for health care service in Bhavnagar Gujarat must be given to the workers. Workers hesitate to approach to mobile medical van because of language barrier thus, it is necessary to bridge the gap in communication so that workers can avail the service of the mobile health unit. 38.2% and 32.8% male and female workers reported having under-nutrition considering MUAC value. The worker involved in the heavy manual job needs good nutrition and proper diet to maintain good health. Furthermore, the integrated nutritional approach is required to improve the social as well as nutritional status among the workers. Except few contractual workers rest all the workers mentioned that they didn't have any social or health insurance. Therefore, every worker should have one social and health insurance. Just like ESI scheme which a comprehensive social insurance provide financial and health security to employees. Similarly, a comprehensive social and nutrition insurance scheme is required for social and food security of the employees. Nutrition security among low wage migrant workers should be the priority among for the decision and policy maker to revolutionize in health and social status.

Conflict of Interest: The authors declare that they have no conflict of interest.

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APPENDICES



Image 1: Solar Salt Pan (Initial Phase)

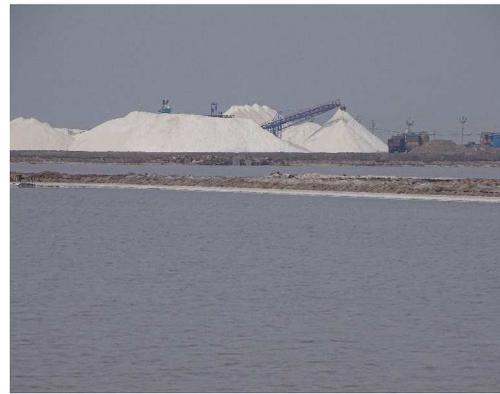


Image 2: Salt Pan with Refinery (Final Phase)



Image 3: Labor Shed (No Waste Management)



Image 4: Labor Shed (Migratory Settlement)



Image 5: Individual housing (Temporary)



Image 6: Agariya Women

