3.1 Nutrition Monitoring Survey on NNMB pattern in Jodhpur district of Rajasthan –

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OBJECTIVES

1. To develop continuous monitoring service to study the nutritional status, dietary habits, food availability and the effect of changing social and environmental factors on the health status of the population
2. Comparisons with other states data so as to assess the percentage of variations among the states

PROGRESS

Project preludial activities included working on sampling plan in detail. Similar sampling design and protocol was adopted for the Nutrition Monitoring type of survey carried out in Rajasthan, as it is being done in other states where NNMB is in operation. The sampling adopted here was two stage stratified random sampling method in which the villages in selected district formed the first stage units (FSU's) while in the village households (HH's) formed the second stage units. For the study purpose the district has been divided in to different strata in rural areas as per the tehsils with agro-economic regions and based on the population size of the village i.e. <2000 and >=2000 populated villages. A total of five clusters of four households each were selected from each village. Generally, the households in a village can be divided into natural "groups/areas" by geographical location such as streets/mohallas/areas. The SC/ST population often lives in a separate group/area in the villages. One cluster was selected from SC/ST group/area while the remaining 4 clusters were selected by random sampling procedure. In each cluster, by selecting a random start, 4 contiguous households were covered. For logistic reasons Jodhpur district was decided to be covered first and later on to expand horizontally in other districts of the state in the similar pattern, is planned

Now NNMB surveys have been initiated in Pali district. Sampling has been done on similar sample design and 30 villages have been selected from 9 tehsils of Pali district. Field work has been started and data has been collected from 560 household belonging to twenty eight villages of nine tehsils Sumerpur, Rohat, Bali, Pali, Desuri, Raipur, Sojat, Marwar and Jaitaran) of Pali district. All the selected households were examined for Socio-demographic and Socio- economic aspects. All the members in the household have been examined for nutritional deficiency signs, anthropometric measurements

(Height, weight, arm circumference and FFT), Dietary intake (24 hours recall method) and examination of nutritional morbidities in preceding 15 days. Dietary intakes of the individuals information were recorded in alternate houses i.e.10 households from each village are covered. Project is going on.

Analysis of 315 households covering 1414 individuals has been done. Table 1 showed age and sex wise distribution of population (718 males and 696 females). Analysis revealed that 95.5 percent of population was Hindus. Nuclear families were significantly more (91.1 %) as compare to 2.2 % joint families (Tables 2). Table 3 revealed that illiteracy is significantly high in females (52.7 %) than males (34.8 %). Higher education is very low in this area i.e. 2.1 percent.

Table 1. Age and sex wise distribution of population covered

Age group	Males	%	Females	%	Total	%
0-5	166	23.1	140	20.1	306	21.6
6-9	70	9.7	81	11.6	151	10.7
10-14	78	10.9	78	11.2	156	11.0
15-17	40	5.6	36	5.2	76	5.4
18– 29	161	22.4	175	25.1	336	23.8
30 - 39	101	14.1	92	13.2	193	13.6
40-49	52	7.2	41	5.9	93	6.6
50 -59	25	3.5	26	3.7	51	3.6
>=60	25	3.5	27	3.9	52	3.7
Total	718	100	696	100	1414	100

Table 2. Distribution of households according to type of family

Type of family	N	%
Nuclear	287	91.1
Extended Nuclear	21	6.7
Joint	7	2.2
Total	315	100.0

Main morbidities observed in population were, fever (21.5%), acute respiratory infection (43.7%), and diarrhoea (2.8 %). Regarding nutritional deficiency signs, it is observed that discoloration of hair, a sign of protein calorie malnutrition was observed to be high i.e. 15.5 percent which was significantly higher in males than females (Table 4). Marasmus was observed only in females (0.2 %). Angular stomatitis and glossitis were 3.4 and 0.2 percent. Vitamin A deficiency i.e. Bitot spot were 0.2 percent. Dental caries (59.7%) and dental fluorosis (50.0%) observed high in this area. Koilonychia, a sign of anaemia, was observed only in females i.e. 0.2 percent.

Table 3. Distribution of population   according to educational status

Educational status	Males	%	Female	%	Total	%
Illiterate	250	34.8	367	52.7	617	43.6
Read & Write	28	3.9	8	1.1	36	2.5
1-4 Standard	137	19.1	110	15.8	247	17.5
5-8 Standard	134	18.7	106	15.2	240	17.0
9-12 Standard	80	11.1	28	4.0	108	7.6
College	25	3.5	4	0.6	29	2.1
N. A.	64	8.9	73	10.5	137	9.7
Total	718	100.0	696	100.0	1414	100.0

Table 4. Distribution of population   according to nutritional deficiency signs

Deficiency Signs	Males N=198	%	Females N=440	%	Total N=638	%
N.A.D.	71	35.9	76	17.3	147	23.0
Hair Discoloured	49	24.7	50	11.4	99	15.5
Marasmus	0	0.0	1	0.2	1	0.2
Bitot Spot	0	0.0	1	0.2	1	0.2
Angular stomatitis	3	1.5	19	4.3	22	3.4
Cheilosis	7	3.5	51	11.6	58	9.1
Glossitis	0	0.0	1	0.2	1	0.2
Koilonychia	0	0.0	1	0.2	1	0.2
Gums-Spongy bleeding	18	9.1	146	33.2	164	25.7
Dental Caries	70	35.4	311	70.7	381	59.7
Dental Fluorosis	52	26.3	267	60.7	319	50.0
Thyroid gland palpable	0	0.0	1	0.2	1	0.2

The weights of pre-school children were expressed as percent of NCHS standards and categorized into different nutritional grades, based on Gomez classification. The overall prevalence of under nutrition was very high i.e. 80.9 percent. The overall prevalence of severe under nutrition was high i.e. 9.0 percent (Table 5).

The extent of different types of malnutrition   viz. stunting (Height for age) and under nutrition (Weight for age) were computed by adopting standard deviation classification using NCHS as well as WHO standards. All the children with any of the above anthropometric measurement less than Median-2SD of NCHS values were considered as undernourished. Prevalence of under nutrition computed using Gomez classification and SD classification differ as the cut off values are different.

Table 5.   Distribution of 1-5 years children according to Gomez distribution and type of house

Type of House	N	Nutritional Grades			
		Normal	Mild	Moderate	Severe
Kutcha	94	20	34	32	8
	100	21.3	36.2	34.0	8.5
Semi Pucca	41	5	17	14	5
	100	12.2	41.5	34.1	12.2
Pucca	43	9	16	15	3
	100	20.9	37.2	34.9	7.0
Pooled	178	34	67	61	16
	100	19.1	37.6	34.3	9.0

Underweight (Weight for age) in preschoolers observed was 65.2 %, higher than NFHS III (44.0 %). The proportion of severe underweight was high (34.3 %). Underweight were observed higher in males than females though statistically insignificant. Declining trend has been observed in underweight in comparison to DMRC Phase one (71.6%), but higher than Phase II (59.5%), Phase III (58.3 %), and Phase IV (49.8 %) and Phase V study (59.3%) in Jodhpur district. Underweight in preschoolers observed was 64.1 percent using WHO standards.

Stunting (Height for age) was 58.4 percent in preschoolers with the prevalence of severe stunting 37.0 %, which needs attention. It's lower than DMRC Phase I (71.6 %), DMRC Phase II (62.1 %), and DMRC Phase IV (59.5%) but higher than NFHS III (33.7 % - up to 3 years), NNMB (49.3 %), and DMRC Phase III (57.1%). Stunting computed by adopting standard deviation classification using WHO standards was 41.0 percent in preschoolers with the prevalence of severe stunting 39.8 percent. Wasting (Weight for Height) computed by adopting standard deviation classification using WHO standards was 35.4 percent in preschoolers with the prevalence of severe wasting 13.1 percent.

The distribution of adults according to BMI grades has been shown in Tables 8. At the aggregate level, 28.3 percent had normal BMI (20-25.0), while 46.6 percent had chronic energy deficiency (Fig. 4). Severe chronic energy deficiency was observed to be 16.5 percent.

Dietary Factors: Dietary intake from 280 households was collected. Trends revealed that stunting and underweight in preschoolers and chronic energy deficiency in adults was more in Pali district in comparison to Jodhpur district as covered earlier in DMRC Phase II and DMRC Phase III, DMRC Phase IV and DMRC Phase V studies (Fig. 5 & 6). Project is going on. Data will be collected from 40 households from 2 villages from Marwar tehsil of Pali district in first phase. Comparison of results of different Phases will be done in order to develop continuous monitoring service to study the nutritional status, dietary habits, food availability and the effect of changing social and environmental factors on the health status of the population and will continue year wise

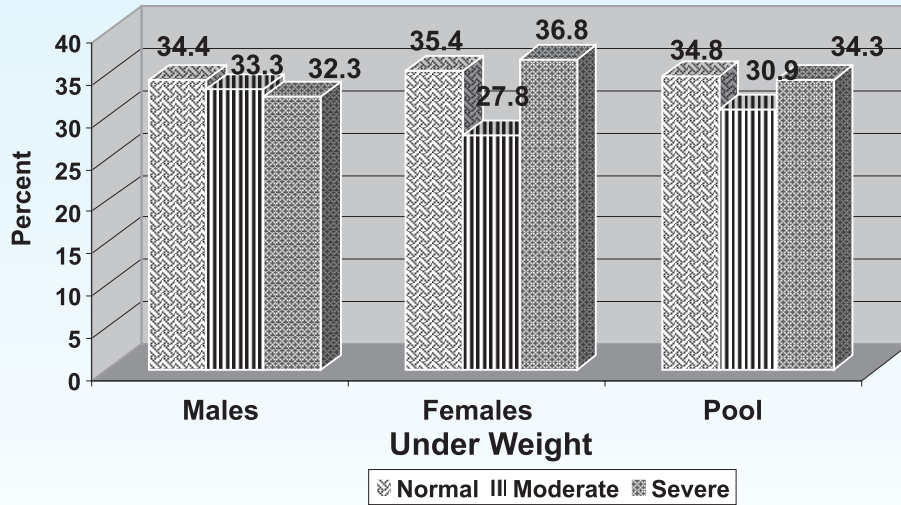## Fig 1. SD classification for weight for Age in Preschoolers

Under Weight

Normal Moderate Severe

Fig 2. SD Classification for Height for Age in Preschoolers
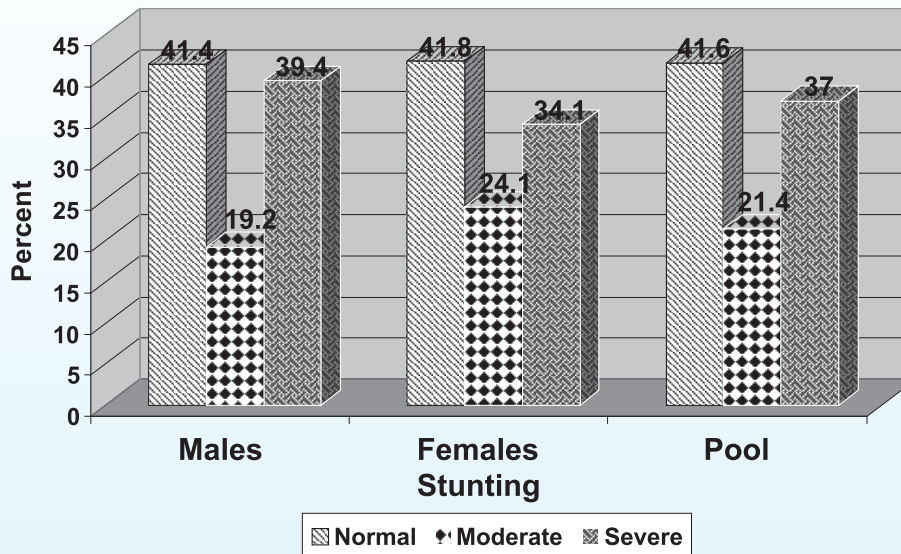

Stunting

Normal Moderate Severe

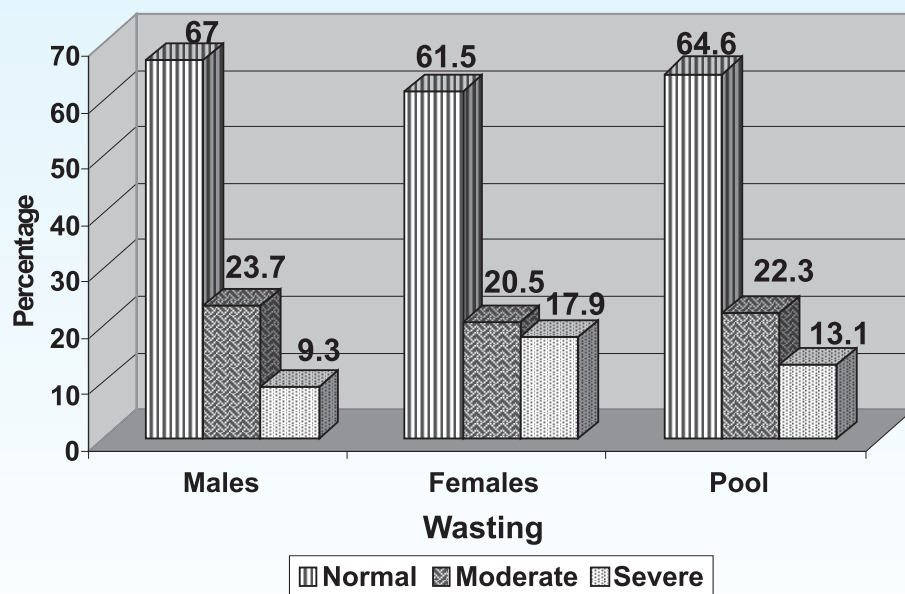## Fig 3. SD classification for Weight for Height in Preschoolers

Table 8. Distribution of adults (>=18 years) according to BMI classification

Gender	Obese II ≥ 30	Obese I 25-30	Normal 20-25	Low wt Normal 18.5-20	CED I 17-18.5	CED II 16-17	CED III <16
Male (N=38)	0	2.6	34.2	18.4	15.8	10.5	18.4
Female (N=301)	0.3	5.0	27.6	20.3	22.9	7.6	16.3
Total (N=339)	0.3	4.7	28.3	20.1	22.1	8.0	16.5

Fig 4. Body Mass Index in adults

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Fig. 5. Distribution of preschoolers according SD classification
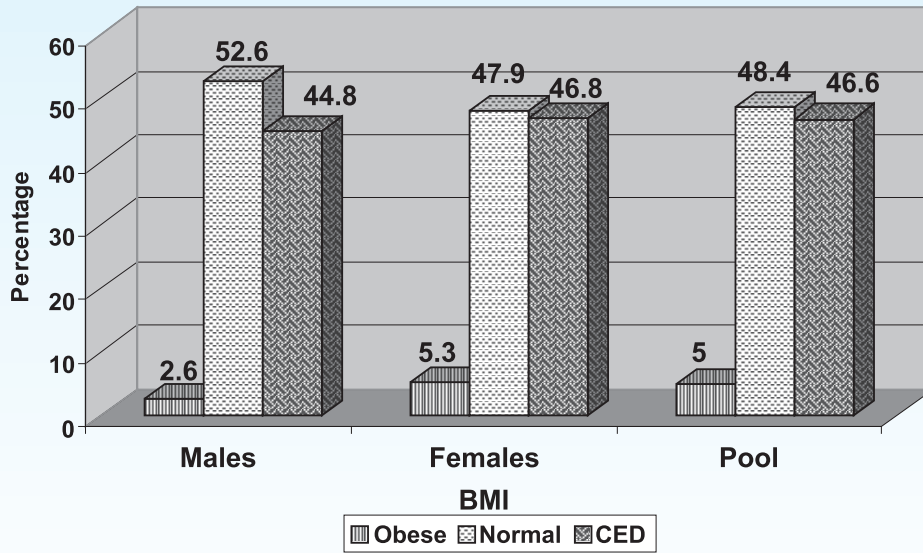

Fig. 5. Distribution of preschoolers according SD classification
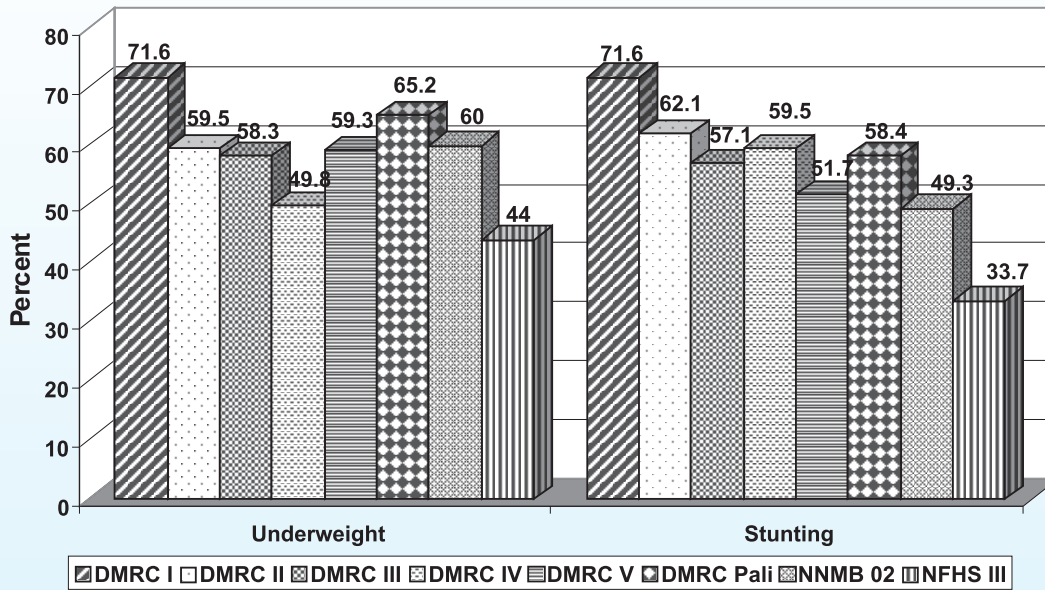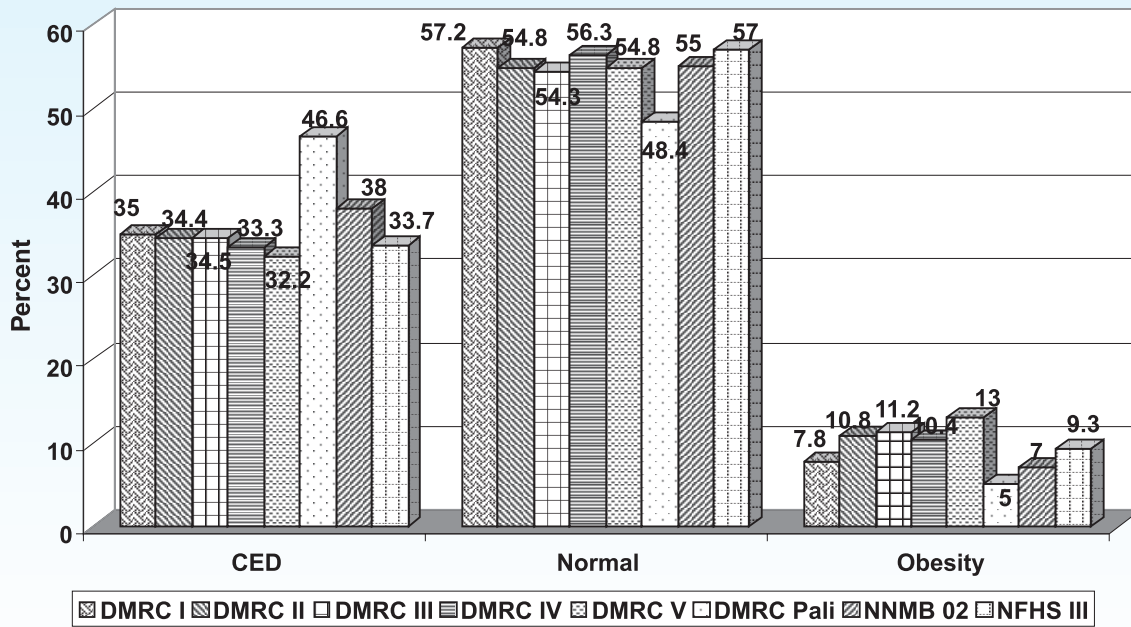
Fig.6. Distribution of adults by BMI Grades

IMPORTANT LEADS/ OUTCOMES

The results of the study carried out on representative segment of the population in desert areas as well as non-desert areas would provide information and useful guidelines for food policies and also to assess the impact of the nutritional programs currently in progress and for future planning in the state of Rajasthan.