



Malnutrition and indigenous plants: A case Study of Nandurbar District in Maharashtra

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Abstract

Death of children below 6 years in tribal districts of Maharashtra is not a phenomenon of recent origin. From last several years this is taking toll of large number of children. Many reasons are attributed by experts from various disciplines. Tender leaf fall is death of young ones. In Nandurbar district of Maharashtra death of children below 6 years over a period of last six years is becoming a concern of very serious nature for social worker, the State and Central Government. Present paper deals with the review of the malnutrition deaths in the district and its possible explanations. Possible measures to avert this phenomenon on a sustainable basis are also looked at. The paper focuses on methods of rural nutritional intervention identification, propagation and introduction of nutritionally rich, indigenous plant species in existing cropping system is looked at.

Key words: Malnutrition, indigenous plants, millets, *Moringa oleifera*, Nandurbar, Maharashtra.

Introduction

Planners for poor had always kept in mind the household food security in our country. Uncertainty in rainfall and low adoption level of improved technologies in crop production have resulted in low levels of food availability and accessibility in many parts of the country especially the under developed tribal dominated areas. At places despite the availability of food, people experience malnutrition that ultimately results in hunger deaths. The estimates of malnutrition show that about 20 % of rural children are severely malnourished and another 30 % are moderately malnourished (Radhakrishna, 2005). The cost of malnutrition to the GDP of India was estimated to be between 3 and 9 percent (Measham and Chatterjee, 1999). Moreover, it is a channel for intergenerational transmission of poverty. Generally, the risk of child malnutrition is high among, the poor households where mothers have poor nutritional levels. The situation worsens in case of tribals where the malnutrition more seriously expressed in terms of hunger deaths. The tribal dominated areas mostly has forests and are inaccessible having hilly terrain with poor infrastructure.

These areas are bypassed by the process of development and even after 58 years of independence visible development have not taken place. On the contrary their livelihood has been threatened by the process of development. They had once upon a time, in recent past, lush green thick forests fulfilling their needs of food, fodder and livelihood. However, due to indiscriminate cutting of forests the area has become dry and barren. The locals, who were more dependent of forest than on agriculture to meet their nutritional needs, are now facing problem of feeding their young

ones and the lactating and pregnant mothers. The locals cultivated ragi, jowar, bajara and other minor millets on the scanty unfertile and sloppy land. Their agricultural practices were of primitive type and hardly involved any modern methods of cultivation. In absence of local employment opportunities they are compelled to migrate in search of jobs during the post monsoon period. They stay away from their homes for almost eight months of a year at different places of the state or other state.

The state government had taken some steps to avert the problem of malnutrition and hunger deaths. These measures include provision of health facilities and providing food grains through Public Distribution System (PDS) and Food for Work Programme. However, these measures have proved to be short lived to tackle the perennial problems of malnutrition and deaths of the young ones.

Ashtekar et al (2004) has reported the causes of malnutrition as deficiency of essential components in diet leading to malnutrition, protein calorie malnutrition and micronutrient deficiencies (vitamin A, iron and iodine) are common. Goiter of various grades is also endemic in some of the tribal areas. Water borne and communicable diseases: Gastrointestinal disorders, particularly dysentery and parasitic infections are very common, leading to marked morbidity and malnutrition. Malaria and tuberculosis still remain a problem in many tribal areas, while the spectrums of viral and venereal diseases have not been studied in-depth. High prevalence of genetic disorders mostly involving red blood cells:

Genetically transmitted disorders like sickle cell anemia, glucose 6 phosphate dehydrogenase deficiency and different forms of Thalassaemia are also common. All these defects lead to the early destruction of red blood cells and add to the overall anemia. Excess consumption of alcohol: The brewing of alcohol from Mohua flower and fruits has been practiced traditionally. However, the switch over to commercially available liquor is likely to be a major threat. Superstition, particularly related to health, aggravates their problems. Extreme poverty is considered as the major cause of malnutrition.

Our survey revealed that the government is unaware of the scale of malnutrition in the area. Only 10 % of malnourished children figure in the government records. Around 70% of the children below the age of six years suffer from various grades of malnutrition. The survey also showed that not only were the children malnourished, their mothers' were too. The weight of adult mothers ranged between 40-45 kg. Girls constituted around half the total number of malnourished children indicating the precarious condition of these future mothers.

The survey revealed that although generations of malnourished children are born in this region, the policy of the government still does not look beyond the singular health aspect of the problem, on the basis of which mitigation measures are designed. The issue of malnutrition is required to be addressed comprehensively otherwise the tribal community in this part of the country is headed for extinction (Bhatia, 2005). The tribal's of Nandurbar are engaged in a continuous struggle for existence. Malnutrition and child mortality are part of their everyday life, even as issues related to rights over natural resources and means of livelihood gain greater urgency with each passing year. Apart from these problems 25.18 % tribal's of this region are carriers of sickle cell anemia a genetic disorder that aggravates the problem of malnutrition leading to the death of children. The government then declared a nutrition enhancement programme to address the problem but for some reasons it was discontinued. The government is now promising to revive it by pumping more money. Allowing access to food resources like forest is a better policy measure than distribution of food. Poverty in terms of income and availability of food is also cited as one reason for high levels of malnutrition in India. Mathur (2005) has reported that in 1993-94, Tamil Nadu and West Bengal had similar levels of income poverty (35-36 % BPL) and yet in 1998-99, only 37 % of Tamil Nadu.

Children below three years were malnourished as against 49 % in West Bengal. Similar evidence are available for other states such as Assam and Hariyana. It is generally believed that families who are too poor to feed their children have malnourished child members. However, it has generally been seen that inadequate knowledge about

feeding practices proves to be a more prominent cause for occurrence of malnutrition. In order to solve the problem on a sustainable basis one needs to look for locally available potential resource that the tribals were using since many generations. If such resources are depleted or forgotten they need to be resorted.

The natural resources including indigenous plants that provided food and nutrition to the locals need immediate intervention. Earlier little work has been reported from this part of the country (Deore and Somani, (2005), Patil et al, 2005). Babu (2000) has suggested solution to a problem of vitamin A deficiency in Malawi of South Africa using locally available *Moringa oleracia*. In Nandurbar district also such an approach can be helpful in solving the problem of child death due to malnutrition. Adequate information on the existence and use of indigenous plants that provide protein, iron, calcium and vitamin A should be searched and made available to the rural households through better designed and implemented nutrition education and agricultural interventions. The tribals of the district were once cultivating minor millets including jowar, bajara, dadar, and ragi. Indigenous plants should therefore be protected as a source of food.

The importance of traditionally used plants as food and vegetable crops, their uses and their nutritional value are discussed.

Material and Methods

A survey was conducted in 10 villages, five each from Akkalkuwa and Dhadgaon talukas of Nandurbar district of Maharashtra in April- May 2006. From each village ten respondents were randomly selected for recording the indigenous plants they used as food. All the 100 respondents were tribal's and had one or more of their child undernourished. The information given by the respondent regarding the plants they used in local language was scientifically translated into botanical terms. Inquiries were made about the staple food that the respondents are consuming now and its cultivation practices.

Results and Discussion

The inquiry with local people revealed that there was a drastic change in their dietary habits. Earlier almost all the respondents (98 %) were using Ragi (*Eleusine coracana*), Jowar, Dadar and various minor millets as staple food. The local breeds of Jowar and the minor millets used by the tribal of the area are given in table 1.

TABLE: Local breeds of Jowar and minor millets used as staple food by tribal's of Nandurbar district.

No.	Name of the grain	Common breeds
1	Jowar, Dadar (<i>Sorghum bilcolor</i>)	Lal chikni, safed chikni, satpani, dudh mogra, rajwadi, badi jawar, mani, safedburi dadar, lalburi dadar, kaliburi dadar, andheri dadar, safed dadar, pivli dadar
2	Foxtail millet (<i>Setaria glauca</i>)	Bhadi
3	Foxtail millet (<i>Setaria italica</i>)	Buralirala, rata.
4	Proso millet (<i>Panicum miliaceum</i>)	Kalimor
5	Ragi, Finger millet (<i>Eleusine coracana</i>)	Pekhari, goliv
6	Kodo millet (<i>Paspalum scrobiculatum</i>)	Kodra
7	Little millet (<i>Panicum miliare</i>)	Badimor
8	Barnyard millet (<i>Echinocola frumentosa</i>)	Lahan batri
9	Barnyard millet (<i>Echinocola colonum</i>)	Mothi baru

Source: field data

Nutritional composition of rice, wheat, jowar and other minor millets is given in table 2. The figures reveal that the energy levels of all the grains are almost similar ranging from 309 kcal in kodo millet to 349 kcal/100 g seed in jowar. Significant differences were, however, found in the protein content ranging from 7.5 g to 12.5 g/100g seeds of proso millet. Also there were significant variations in the content of iron, calcium and phosphorous within the grains scanned. Deficiency of iron, calcium and phosphorous in the daily die of the tribal's of this region is a matter of great concern. Along with the protein energy deficiency, mineral deficiency also plays a major role in malnutrition. Minerals like iron, calcium and phosphorous play a major role in growth, development and food metabolism.

Local races of Jowar and minor millets require low inputs and can withstand scarcity of water. They can grow in any type of soil and are resistant to common diseases and pests of the crop. Thus cultivation of local Jowar and minor millets should receive priority in planning for averting protein-energy-mineral deficiency. The farmer needs to be introduced with improved agro technologies developed in the country through intensive extension programme to popularize the forgotten crops and also to increase its production for preventing malnutrition sustainably at local level. Minor millet is getting attention world wide as a weaning food and as a food for future (FAO, 1995). Surplus grains grown by the tribals can be sold in the market to get cash money for fulfilling other needs.

TABLE 2: Nutrient composition of sorghum, millets and other cereals (per 100 g edible portion; 12 percent moisture)

Food	Protein ^a (g)	Fat (g)	Ash (g)	Crude fiber (g)	Carbohydrate (g)	Energy (kcal)	Ca (mg)	Fe (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)
Rice (brown)	7.9	2.7	1.3	1.0	76.0	362	33	1.8	0.41	0.04	4.3
Wheat	11.6	2.0	1.6	2.0	71.0	348	30	3.5	0.41	0.10	5.1
Maize	9.2	4.6	1.2	2.8	73.0	358	26	2.7	0.38	0.20	3.6
Sorghum	10.4	3.1	1.6	2.0	70.7	329	25	5.4	0.38	0.15	4.3
Pearl millet	11.8	4.8	2.2	2.3	67.0	363	42	11.0	0.38	0.21	2.8
Finger millet	7.7	1.5	2.6	3.6	72.6	336	350	12.6	0.42	0.19	1.1
Foxtail millet	11.2	4.0	3.3	6.7	63.2	351	31	2.8	0.59	0.11	3.2
Common millet	12.5	3.5	3.1	5.2	63.8	364	8	2.9	0.41	0.28	4.5
Little millet	9.7	5.2	5.4	7.6	60.9	329	17	9.3	0.30	0.09	3.2
Barnyard millet	11.0	3.9	4.5	13.6	55.0	300	22	18.6	0.33	0.10	4.2
Kodo millet	9.8	3.6	3.3	5.2	66.6	353	35	1.7	0.15	0.09	2.0

Sources: Hulse, Laing and Pearson. 1980: United States National Research Council/National Academy of Sciences. 1982. USDA/HNIS. 1984.

The diet of the locals also contained seasonally available flowers, fruits, seeds, leaves, tubers and roots. The information regarding the plants used by the locals as food is shown in table 3. It was found that there are 45 plant species known to the locals having nutritive value. During the field work it was noticed that the respondents were conservative about sharing the information that they had with them. Therefore, it is quite possible that the list presented here is incomplete. Some of the plants listed here were used frequently while others were used occasionally. The table also lists the plant parts used as food.

Moringa is a tree species bearing leaves throughout the year while rest of the plants are annuals and are available only up to the end of October-November. It is reported that the leaves of Moringa contains 3767 iu of vitamin A per 100 g of edible portions of the leaves. Also it has 440 mg Calcium, 220 mg vitamin C and 70 mg phosphorous per 100 g edible portion of the leaves (Gopalan et. al. 1985). In spite of the fact that Moringa leaves contains a large amount of vitamin A, calcium and phosphorous, it was not included by the tribal in their regular diet. Babu (2000) had enumerated cost effectiveness of Moringa leaves with other available vegetables in East African country Malawi. He had reported use of Moringa leaves in solving the problem of vitamin A deficiency in Malawi. The agro-climatic condition of Nandurbar district is suitable for growing Moringa. While cultivation is possible only on the irrigated land one sapling per household can be easily sustained on the waste water from the house. The sustainable approach of intervention would be identifying vitamin A rich indigenous plants found in the region, developing methods of multiplication, cultivation and extension services. Indigenous Knowledge System (IKS) that include a system of collecting, documenting and using indigenous knowledge for development interventions,

During our study it was found that depending on their availability in the near by area leaves of *Acalypha indica*, *Achyranthus aspera*, *Cassia tora*, *Amaranthus spp.*, *Chenopodium album*, *Corchorus capsularis*, *Dioscoria pentaphylla*, *Ipomoea aquatica*, *Moringa oleifera*, *Oxalis corniculata*, *Portulaca oleracea*, *Polygonum glabra*, *Tribulus terrestris*, and *Vigna unguiculata* were used by the locals as vegetable

Thus indigenous crops like jowar and minor millets, indigenous food plants and Moringa has a great potential in fighting the problems of protein-energy-mineral and vitamin A deficiency in the malnutrition affected area of Nandurbar district of Maharashtra. With proper planning and coordination between various government and non-government agencies the problem of hunger deaths of children can be solved on a sustainable basis with minimum input from the external sources.

REFERENCES

1. Ashtekar, S; Mankad D. and Raimane K. (2004) Child mortality determinants in three backward districts of Maharashtra. [http:// hetv.org/pdf/maharashtra/3-D maharashtra.pdf](http://hetv.org/pdf/maharashtra/3-D%20maharashtra.pdf).
2. Babu S C (2000) Rural nutrition interventions with indigenous plant foods- A case study of vitamin A deficiency in Malawi. **Biotechnol. Agron. Soc. Environ** 4:169-179.
3. Babu S C and Rajasekaran B (1990) Agroforestry, attitude towards risk and nutritional availability- A case study of south India farming systems. **Agrofor. Syst.** 15:1-15.
4. Bhaskar V.V.(2000) Grain sorghum and small millet germplasm collection from Nandurbar district of Maharashtra state. **Indian J. Pl.Genet. Resources** 13:83-85.
5. Bhatia Arun (2005) Denial as Policy. **Frontline** (Sept-23) pp. 16-18.
6. Cohen N, Rahman H; Mitra M; Spirague J; Islam S, LeenhivisdeRegt E., and Jalil M A (1987) Impact of massive doses of vitamin A on nutritional blindness in Bangladesh **Am. J. Clin. Nutr.** 45:970-976.
7. D' Souza M (1983). Tribal Medicines. Society for Promotion of Wasteland Development, New Delhi.
8. Deore, C.R. and V.J. Somani (2005) Nutritional status of tribal in Nandurbar. Paper presented at the ISEE National Seminar at IARI, New Delhi
9. FAO (1995). Sorghum and millets in human nutrition. Food and nutrition series No. 27, FAO, Rome.
10. Gopalan C, Ramasastri B V, and Balasubramaniam S C (1981) Nutritive values of Indian foods. Hyderabad, India. National Institute of Nutrition, ICMR (Indian Council of Medical Research).
11. Hulse, J.H., Laing, E.M. & Pearson, O.E. 1980. Sorghum and the millets: their composition and nutritive value. New York, Academic Press. 997 p.
12. Hussain A (1998) Preventing and controlling micronutrient malnutrition through food based action in South Asian countries. **Food Nutr. Agric.** 22:63-68.

13. Joshi Yogendra (2005). Daritale Mrityu : Pratiksha Purnaviramachi. Joshi Y. Publisher, Nandurbar, Maharashtra.
14. Kate S L.(2000) Health problems of tribal groups from the state of Maharashtra. http://sickle.bwh.harvard.edu/india_scd.html
15. Kennedy E T and Alderman H (1987) comparative analysis of nutritional effectiveness of food subsidies and other food related interventions. Occasional Paper No. 7. International Food Policy Research Institute, Washington DC.
16. Mallaisse F and Parent G (1985) Edible and wild vegetable products in Zambesian woodland area: A nutritional and ecological approach. **Ecol. Food Nutr.** 18:43-82.
17. Martorell R (1989). Vitamin A deficiency and child health and survival. **Food Nutr. Bull.** 11:3-4.
18. Mathur S S. (2005) Malnutrition among children <http://www.vakindia.org/child-malnutrition.html>
19. Measham, A.R. and M. Chatterjee (1999). Wasting Away: The crisis of Malnutrition in India, World Bank, Washington D.C.
20. Ogle B M and Grivetti L E (1983) legacy of the Chameleon. Edible wild plants in the kingdom of Swaziland, Southern Africa. A cultural, ecological nutritional study. **Ecol. Food Nutr** 16: 193-208.
21. Pande and Oommachan M (1992) Studies on certain less known wild food plants in rural areas around Jabalpur. **Indian J. Applied and Pure Biol** 7:129-136.
22. Patil H M and Bhaskar V V (2003) Cultivation and utilization of grain sorghum and small millets from Nandurbar district of Maharashtra state. **Indian J Plant Genet. Resources** 16:99-105.
23. Patil M B, Deore C R and P V Ramaiah (2005) Studies of certain less known wild food plants in tribal areas of Nandurbar district Maharashtra. Paper presented at National Conference on Human health and Nutrition : Biotechnological Approach, held at B.N. Bandodkar College, Thane, Maharashtra.
24. Radhakrishna R. (2005). Food and nutrition security of the poor: Emerging perspectives and policy issues. Thirteenth Dr. D.T.Lakadawala memorial lecture, Gujarat Institute of Development Research, Ahmedabad, India.
25. Rajasekaran B, Warren M D and Babu S C (1990) Indigenous national resource management systems for sustainable agricultural development- A global perspective. *Int. J. Dev* 3:1-14.
26. Ramachandran C (1980) Drumstick (*Moringa oleifera*): A multipurpose Indian vegetable. **Econ. Bot** 34: 276-283.
27. Shinde P. (2005). Maranatach He Jag Jagate. Research Group Rehabilitation Action Committee Publisher, Taloda Maharashtra.
28. Swaminathan, M S (2000). An Evergreen Revolution, *Biologist*, 47(2): 85-89
29. Tielsch S and Sommer A (1984) Epidemiology of vitamin A deficiency and xerophthalmia. **Annu. Rev. Nutr.** 4:183
30. UNICEF (1990) Strategy fir improved nutrition of children and women in developing countries. A UNICEF Policy Review, NICEF, New York.
31. United States National Research Council/National Academy of Sciences. 1982. United StatesCanadian tables of fred composition. Washington, DC, National Academy Press. 3e rev. van Heerden, I.V. 1989. The nutritive content of African beers brewed with maize grits or sorghum adjuncts. *J. Inst. Brew.*, 95: 17-20. van Heerden, I.V. & Glennie, C.W. 1987. Availability of B vitamins in sorghum beer. *Nutr Rep. Int.* 35: 147- 155. van Heerden, I.V., Taylor, J.R.N. & Glennie, C.W. 1987. The contribution of minerals, trace elements, phytin starch and amino acids to the nutritional quality of sorghum beer. **S. Afr. J. Sci.**, 83: 5-7.
32. Warren D M., Sikkerveer L J and Brokensha D (1995). The cultural dimension of development: Indigenous Knowledge systems. Intermediate Technology Publications London pp 103-105.
33. WHO (1989). World Health Organisation – Priorities for 1990s. Geneva, Switzerland.