Nutritional deprivation among Indian tribals: A cause for concern

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Abstract
Tribes constitute approximately 10% of the total Indian population. They are found in most parts of the country and are generally economically deprived. Anthropometry is a very useful and inexpensive method that can be utilised in determining the nutritional status of human beings. This paper deals with the utility of various anthropometric cut-off points in the evaluation of nutritional status. It has been observed that various tribal populations have high to very high rates of chronic energy deficiency (CED) based on their body mass index (BMI) values. These populations are experiencing extreme nutritional stress, which may have severe health implications with respect to morbidity and mortality. Urgent proactive nutritional intervention and supplementation programmes are needed to reduce their rates of CED. Inclusive development is imperative in addressing this problem.

KEYWORDS: India, tribe, Body Mass Index, chronic energy deficiency

Introduction
In India, each state is practically equivalent to a country with its specific socio-economic level, different ethnic groups, food habits, health infrastructures and communication facilities. Thus, the nutritional status of the population shows significant variation between states since it results from a varying combination of factors (FAO 2010). Tribal peoples are acknowledged to have very close association with the ecosystem and the environment because of their fulfilment of daily nutritional requirements with food foraged from nature. Malnutrition is the condition arising due to the intake of inadequate (over/less) nutrients in diet. It includes both undernutrition (imbalanced diet and specific deficiencies) and overnutrition (Figure 1).

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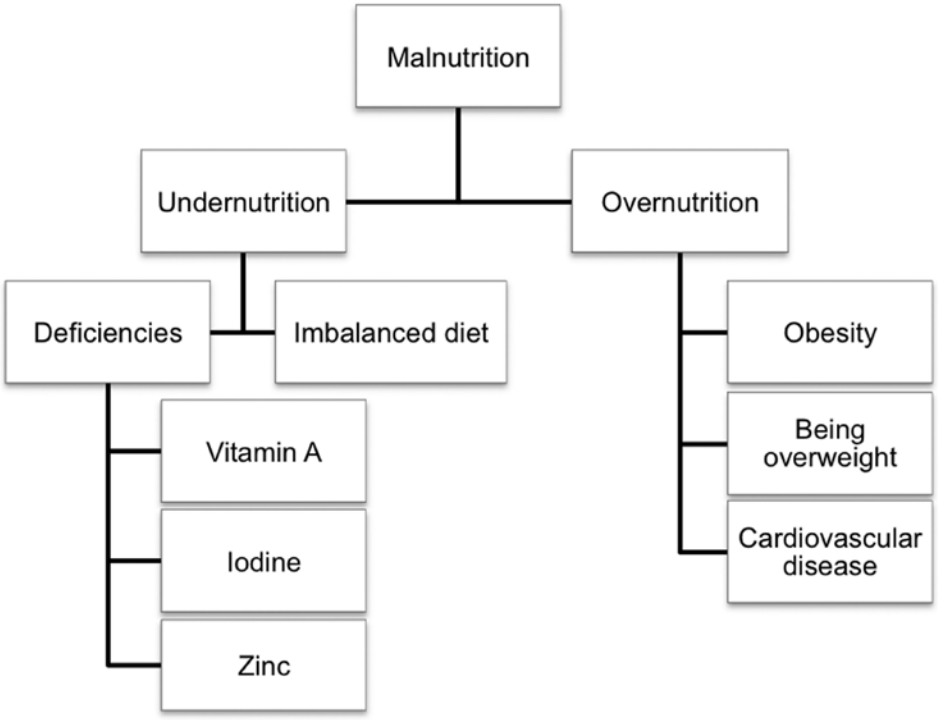

Figure 1: Classification of malnutrition

Overnutrition refers to intakes of energy/calorie that are greater than required. Undernutrition, in contrast, refers to lower intakes of nutrients than required. It can be divided into imbalanced diets and specific deficiencies. Globally, the most important micronutrient deficiencies are iron, vitamin A, iodine and zinc.

Nutritional status can be assessed by dietary, anthropometric, biochemical and clinical methods. Ideally, a combination of methods should be used when assessing nutritional status using standardised techniques. Anthropometric measurements (such as height and weight) are used to construct indices for malnutrition. BMI is considered to be the most suitable, objective anthropometric indicator of nutritional status of adults. It was chosen because this anthropometric indicator, derived from measures of weight and height of individuals of both sexes, is consistently and highly correlated with body weight (or energy stores within the body) and is relatively independent of the height of the adult. A BMI < 18.5 kg/m² is widely used as a practical measure of chronic energy or hunger deficiency (CED), i.e., a "steady" underweight in which an individual is in energy balance irrespective of a loss in body weight or body energy stores (Khongsdier 2005: 93). Thus, the use of BMI as an anthropometric indicator of nutritional status can be more appropriate in a country with diverse ethnic groups, such as India (Khongsdier 2001: 28). The assessment is done by observing the deviations of the anthropometric measures from the normal standard. The basic causes of undernutrition in

developing countries are poverty, poor hygiene conditions and little access to preventive and health care (Mitra 1985; WHO 1990: 797). In developing countries like India, anthropometry, despite its inherent limitations, remains the most practical tool for assessing the nutritional status of the community (Ghosh 2001: 28).

India is a land of numerous cultures and people. Many different ethnic groups found here outnumber many countries (Wikipedia 2012). Indian tribal people account for 8.14% of the total population of the country, numbering 84.51 million, according to the 2001 census. These tribal people reside in approximately 15% of the country's area. Indian tribals primarily reside in various ecological and geo-climatic conditions ranging from plains, forests, hills and inaccessible areas, scattered throughout India. According to Article 342 of the Indian Constitution, at present, there exist 697 tribes recognised by the central government. These Indian tribal groups have been recognised to reside in more than one state. More than half of the Indian tribal population is concentrated in the states of Madhya Pradesh, Chhatisgarh, Maharastra, Odisha, Jharkhand and Gujarat (India Netzone 2012). It is due to the presence of these tribes that the country has such a diverse and varied flavour. West Bengalis a state in the eastern region of India and is the nation's fourth most populous. It is also the seventh most populous sub-national entity in the world (WorldGazetteer 2012). To date, there has been limited data on the anthropometric and nutritional status of various tribal populations of India (Arlappa 2005: 25; Bose & Ckakrabarty 2005: 14; Bose et al. 2006a: 18; b: 114; c: 45; d: 30). It has been recently suggested (Bose & Ckakrabarty 2005: 14) that there is urgent need to evaluate the nutritional status of various tribes of India. In this paper, the anthropometric status of adults within different states of India is discussed. The purpose is to review all available nutritional studies published using body mass index (BMI), and also to give a general overview of the prevalence of undernutrition in India, and the consequences thereof.

Materials and methods

This study is a review work, done to understand the prevalence of undernutrition among the adult tribal people of different states of India. The papers presented also analyse these studies to conclude the present level of knowledge regarding the problem of adult tribal undernutrition. The implications of the discussed research will help in formulating better recommendations for further research so as to reduce this nutritional burden.

BMI was computed using the following standard equation: BMI = weight (kg)/ height² (m^2).

Nutritional status was evaluated using internationally accepted BMI guidelines (WHO 1990: 854). The following cut-off points were used: CED BMI <18.5, normal: BMI = 18.5–24.9, overweight: BMI ≥ 25.0.

We followed the World Health Organisation's classification (WHO 1995: 854) of the public health problem of low BMI, based on adult populations worldwide. This classification categorises prevalence according to percentage of a population with BMI< 18.5: low (5–9%): warning sign, monitoring required; medium (10–19%): poor situation; high (20–39%): serious situation; very high (≥ 40%): critical situation.

Results and discussion

Adult undernutrition very simply happens, when you are hungry, and you consistently don't get anything to eat. Adult malnutrition can be measured by Body Mass Index (BMI) and a BMI below 18.5 indicates chronic undernutrition. Statistics have shown how 37% of adult Indians, 50% of adults belonging to the Scheduled Tribes and 60% of adult Indians belonging to the Scheduled Castes have a BMI below 18.5, which makes them chronically undernourished. Large sections of the Indian population are caught up in the middle of an enormous famine, while only child malnutrition which the Prime Minister recently labelled "a national shame" has come under the spotlight.

Considering healthcare in India, it is a moral and social obligation to ensure that nobody is denied healthcare because of their inability to pay bills. The current proposal to increase GDP spending in India for healthcare to 2.5% is a major, positive level of development for healthcare in India (Medindia 2012). The states of Karnataka, Gujarat, Madhya Pradesh and Odisha are highly affected by adult malnutrition with more than half of the adults having a BMI less than 18.5 kg/m². Patterns of adult malnutrition show extremely poor nutritional status in the states of Gujarat, Odisha, Arunachal Pradesh, Karnataka, Maharashtra, Madhya Pradesh and Andhra Pradesh (FAO 2010).The comparative mean BMI (among males and females) of the studied tribals of India are shown in Table 1.

From this, it is clear that Santal (20.5 kg/m²) males of West Bengal (Mukhopadhyay 2010: 118) have the highest mean BMI and Warli (16.8 kg/m²) males of Maharastra (Adaket et al. 2006: 12) have the lowest mean BMI. Similarly, Jarwa females (19.8 kg/m²) (Sahani2003: 52) have the highest and Munda females (17.7 kg/m²) (Ghosh & Bharati 2006: 18) of West Bengal have the least mean BMI out of all the studied tribal populations.The state- and community-based sex-combined prevalence of CED are presented in (Figures2 to 5),it is clear from the figures that the overall CED was highest in Madhya Pradesh (76.0%) followed by Maharastra (71.9%), Jharkhand (58.5%), Tamil Nadu (55.0%), Andhra Pradesh (50.1%), Odisha (49.5%), West Bengal (45.9%), Kerala (37.8%), Andaman & Nicobar Island (29.5%), Assam (21.5%), while Meghalaya shows the least (14.3%) prevalence of undernutrition among the all studied states of India.

This discrepancy in the prevalence rate of undernutrition may be due to the varied reasons, such as non-representative sampling, small sample size, etc. Whatever may be the reason of this, the situation of the tribals with respect to their health as far as morbidity and mortalityis extremely alarming and critical. Almost all the tribals mentioned in this study were experiencing very high to high CED rate excluding few communities from the North-Eastern region. It is prudent to say that research must be conducted among tribal communities from other areas of India before a more comprehensive picture arises.

According to National Family Health Statistics-3 report (NFHS-3 2005–2006), the prevalence of undernutrition in India is 33.0% among males and 28.1% among females. In urban areas, these figures were 19.8% and 17.5%, respectively. In rural areas, these were 38.8% and 33.1%, respectively. However, the situation is much worse in West Bengal with corresponding prevalence of 37.7% and 31.6%, respectively. Among urban males and females, they were 19.9% and 15.5%, respectively. The corresponding rural figures were 44.9% (males) and 38.0% (females).

Table 1: Comparison of mean BMI among tribal communities of India

State	Community	Male BMI Mean	Female BMI Mean	Overall	Reference
West Bengal	Bhumij	18.7	18.4	18.6	Ghosh, 2007
	Dhimal	19.5	19.1	19.3	Datta Banik et al., 2007
	Kora Mudi	18.7	18.3	18.5	Bose et al., 2006b
	Kora Mudi	18.6	18.3	18.5	Bisai et al., 2008
	Lodha	19.5	19.3	19.4	Mondal, 2007
	Munda	18.7	17.7	18.2	Ghosh & Bharati, 2006
	Oraon	18.8	19.7	19.3	Mittal & Sivastava, 2006
	Santal	20.0	19.3	19.7	Bose et al., 2006c
	Santal	18.5	18.7	18.6	Ghosh & Malik, 2007
	Santal	20.5	19.5	20.0	Mukhopadhyay, 2009
	Lodha	19.5	--	--	Bose et al., 2008
	Bhumij	18.7	--	--	Bose et al., 2008
Odisha	Bathudi	18.4	--	--	Bose & Chakrabarty, 2005
	Bhuiya	19.4	--	--	Chakraborty et al., 2008
	Gond	18.1	--	--	Chakraborty et al., 2008
	Khond	19.2	--	--	Chakraborty et al., 2008
	Munda	19.1	--	--	Chakraborty et al., 2008
	Paroja	17.3	--	--	Chakraborty et al., 2008
	Santal	18.3	--	--	Chakraborty et al., 2008
	Savara	18.5	--	--	Chakraborty et al., 2008
Jharkhand	Oraon	18.5	--	--	Datta Banik , 2008
	Oraon	18.0	--	--	Chakraborty & Bose, 2008
Maharastra	Andh	17.1	--	--	Adak et al., 2006
	Bhil	18.0	--	--	Adak et al., 2006
	Gond	18.3	--	--	Adak et al., 2006
	Kathodi	17.0	--	--	Adak et al., 2006
	Korku	18.3	--	--	Adak et al., 2006
	Mahadeokoli	18.2	--	--	Adak et al., 2006
	Warli	16.8	--	--	Adak et al., 2006
	Kol	18.8	--	--	Adak et al., 2006
	Manjhi	19.4	--	--	Adak et al., 2006
	Sonr	17.6	--	--	Adak et al., 2006
	Korwa	20.8	--	--	Adak et al., 2006
	Sahariya	18.1	--	--	Adak et al., 2006
Kerala	Mannan	20.2	19.1	19.7	Philomenamma & Ramadas, 2008
Andaman &	Jarwa	18.9	19.8	19.4	Sahani, 2003
Nicobar Island	Onge	--	--	21.0	Rao et al., 2005
Assam	Boro-Kacharis	19.8	--	--	Khongsdier, 2001
	Lalung	19.2	--	--	Khongsdier, 2001
	Mechs	20.5	--	--	Khongsdier, 2001
	Miris	19.6	--	--	Khongsdier, 2001
Meghalaya	Phars	19.9	--	--	Khongsdier, 2001

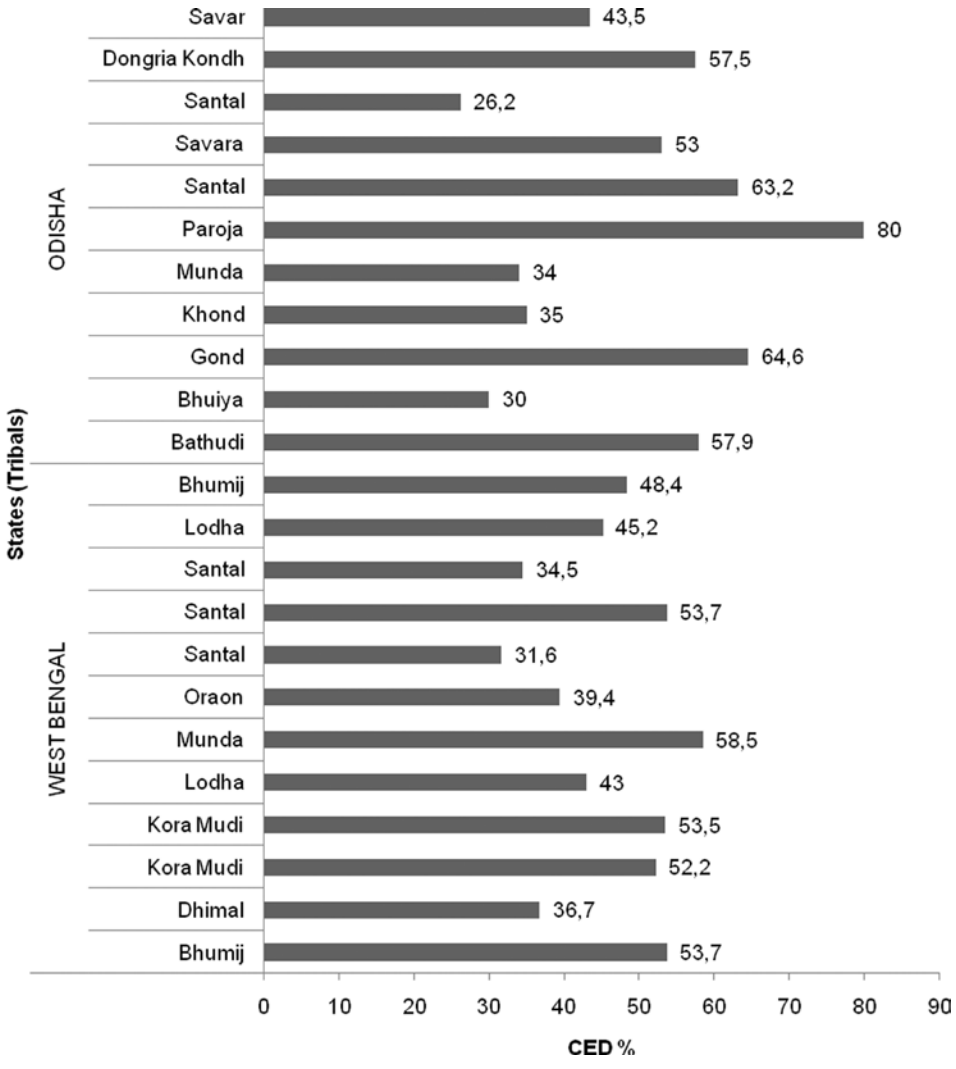

Figure 2: Prevalence of CED (%) among tribals of West Bengal & Odisha

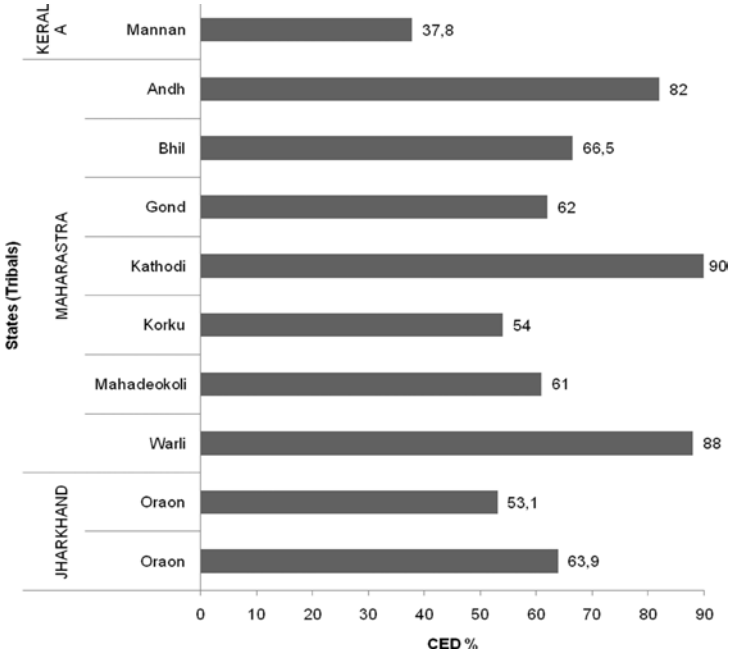

Figure 3: Prevalence of CED (%) among tribals of Jharkhand, Maharastra & Kerala

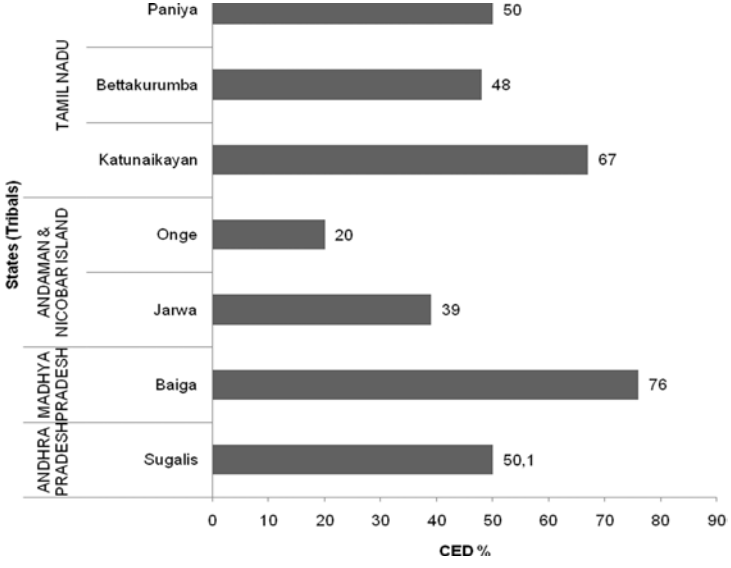

Figure 4: Prevalence of CED (%) among tribals of Andaman & Nicobar Island, Tamil Nadu, Madhya Pradesh & Andhra Pradesh

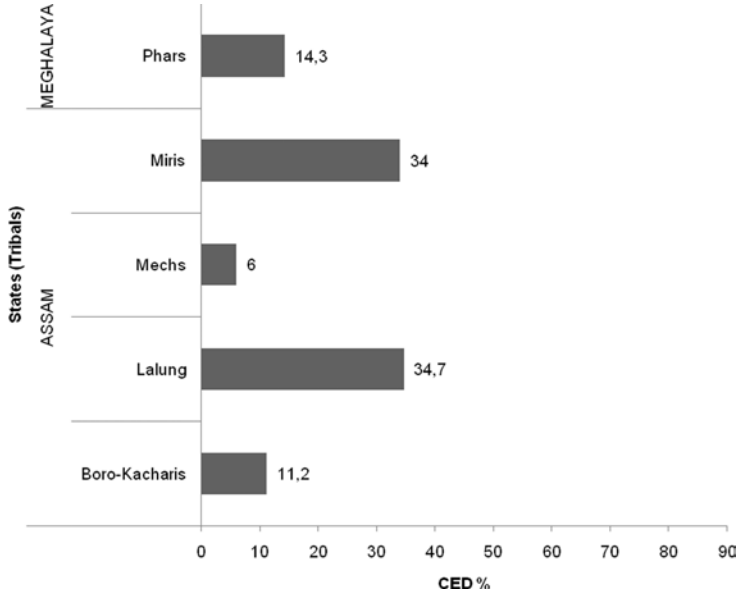

Figure 5: Prevalence of CED (%) among tribals of Assam & Meghalaya

The study done by Adak et al. (2006: 12) shows that the prevalence of CED among the Kathudi (90.0%) of Maharastra was the highest. However, it should be kept in mind that the sample size of the studied tribals from Maharastra was very small (n=50) and with the increase of sample size (n= 200 or 300) the prevalence of CED also declines. Several recent studies from India (Yadav 1999: 30; Gogoi & Sengupta 2002: 13; Sahani 2003: 52; Bose & Chakrabarty 2005: 14; Bose et al. 2006a: 18) have utilised BMI to study nutritional status of tribal populations. Therefore, the use of BMI based cut-off points for the evaluations of CED are valid for use among tribal populations of India.

The primary importance, from the public health perspective is the need for immediate nutritional intervention programs to be implemented among all the tribal groups experiencing very high to high nutritional stress. The Indian government should play an active role in reducing the rates of undernutrition among tribal people. Although priority must be given to tribal groups having the highest rates of undernutrition, all groups must be incorporated in these food supplementation programs. It is imperative that the recommendations should include not only adequate dietary intake but also various ways in which they can enhance their socio-economic status through improved education and employment opportunities. It is expected that better educational attainment will lead to more scope for employment and healthier dietary practices.

Conclusions

Since nutritional status is intricately linked with dietary habits as well as the ecology of the population, further research should be undertaken to investigate, in details, these factors. Each tribal population has its unique food habits (Mandal 2002). Moreover, there are distinct inter-tribal differences in the environment in which they reside, i.e. the ecology of the population (Lee & Nieman 2003). The studies reviewed here did not deal with these factors as they were beyond the scope of study. It is, therefore, imperative that future studies on tribal populations include these parameters when investigating their nutritional status. Similar studies should also be undertaken among other tribal populations in India, since they constitute a sizeable portion of India's population. Moreover, since undernutrition has several underlying causes (Medindia 2012; Lee & Nieman 2003), future investigations should aim at identifying the likely cause(s) of high rates of undernutrition among Indian tribal populations.

The present review revealed that the nutritional status of the adult tribals is in a critical state. To overcome this problem, there is an immediate requirement for appropriate steps to be taken to improve the nutritional status of these groups on the basis of severity of the burden they are facing.

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POVZETEK

Plemena predstavljajo približno 10 % celotne indijske populacije. Najdemo jih v večini delov države in so navadno ekonomsko prikrajšana. Antropometrija je zelo uporabna in poceni metoda, ki jo lahko uporabimo za določanje statusa prehranjenosti ljudi. V prispevku se ukvarjamo z rabo različnih kriterijev določanja statusa prehranjenosti in ugotavljamo, da ima plemenska populacija visoko do zelo visoko stopnjo kroničnega pomanjkanja energije (CED), katere ocena temelji na indeksu telesne mase (BMI). Ta populacija se sooča z ekstremnim prehranskim stresom, ki ima lahko resne zdravstvene posledice z vidika obolevnosti in umrljivosti. Za zmanjšanje stopnje CED so potrebni nujni proaktivni prehranski intervencijski programi, inkluzivni razvoj pa je nujni pogoj pri soočanju s tem problemom.

KLJUČNE BESEDE: Indija, pleme, indeks telesne mase, kronično pomanjkanje energije

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