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Child’s growth and nutritional status in two communities-Mishing tribe and Kaibarta caste of Assam, India

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Physical growth and development studies were carried out among the populations of both tribal and non-tribal in eastern India by different scholars in different milieu and environmental factors from the eighties and onwards. Since then, the inhabitants of those areas have been doing agriculture, fishing, etc as prime occupation, but after a few decades in the same region, demographic and socio-economic changes took place under the influences of worldwide globalization of industrialization. These are evident in the increase of budget allocation of the respective governments. At the same time, people living in the regions who are under the influence of industrialization have received improved life style being marked with over nutrition; while people in the regions that do not have the impact of socio-economic improvement still struggle with under-nutrition. This co-existing situation of under- and overnutrition among the populations of Indian subcontinent is aptly described as double burden of malnutrition by Shukla et al. In this paper, growth based on anthropometric measurements of height and weight statistically treated in terms of height-for-age-, weight-for-age and BMI-for-age-z score is analyzed by lms formula with reference to WHO. The nutritional status of 3 to 10 years plus children of Mishing (a scheduled tribe) and Kaibarta (a caste population of Assam, India) is studied. The children of 3-10 years plus of Mishing and Kaibarta populations were observed to be shorter than those of the children of CDC2000, Indian, and IndUp; but are taller than their ICMR counterpart. In the present study, the proportions of stunting, underweight, and thinness categories among the boys of both populations were observed to be higher than those of girls; this indicates suffering from chronic under-nutrition due to prolonged deprivation of required nutrients and illness.

Key words: Mishing Tribe, Kaibarta caste, height, weight, BMI, Assam, India, stunting, wasting, thinness.

INTRODUCTION

Physical growth and development studies were carried out among the populations of both tribal and non-tribal in eastern India by different scholars in different milieu and environmental factors from the eighties and onwards (Das and Das, 1969, 1972; Das and Choudhury, 1982; Das, 1996; Das, 2009). Since then, the inhabitants of those areas have been doing agriculture, fishing, etc as prime occupation, but after a few decades in the same region, demographic and socio-economic changes took place under the influences of worldwide globalization of industrialization. These are evident in the increase of budget allocation of the respective governments. At the

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same time, people living in the regions who are under the influence of industrialization have received improved life style being marked with over nutrition; while people in the regions that do not have the impact of socio-economic improvement still struggle with under-nutrition. This co-existing situation of under- and over nutrition among the populations of Indian subcontinent is aptly described as a double burden of malnutrition by Shukla et al. (2002). During this transition period, the economy supplemented by different occupations of the people from other places that do not depend solely on agriculture /or fishing has been much more diversified. This has reshaped their life style including nutritional intakes; and ultimately it has broadened their horizon of economic activities (Sarma and Ali, 2005). Due to constant socio-economic changes in fields like education, job opportunities, modern amenities of communication, transports, the people have been involved in entrepreneurship to design their livelihood pattern to be more socio- biologically sustainable. This phenomenon is not restricted within certain boundaries; in other words, this part of the globe along with other global counterparts has also been experiencing the transition in the demography and socio-economic fields for the last few decades (UNDP, 2004). Physical growth is well documented as it is influenced by genetic and environmental factors-the latter being the most significant factor in assessing the health status of a population. Usually, genetic factors play important role in growth while environmental factors are prerequisite at optimal level.

On the other hand, the focus on the study of nutritional status has been shifted from malnutrition to primarily obesity and/or overweight particularly at population level both in the developed countries; in other words, the worldwide random occurrence of overweight and obesity particularly among the highly industrialized nations, which has made WHO (2000, 2005) to address it as global health problem in developing countries. Simultaneously, studies on state of malnutrition among children in the developing countries are also being carried out since positive impact of industrialization on the health of the children worldwide is not uniform in all the regions. Hence the populations living particularly in the developing countries exhibit both under nutrition/malnutrition (de Onis et al., 1992; WHO, 1995; Collins, 2007) and over nutrition (Popkin, 2001; Khadilkar and Khadilkar, 2004; York et al., 2004; Shafique et al., 2007; Agarwal et al., 2008; Janaewa et al., 2012).

The following indicators recommended internationally for assessing children’s growth and nutritional status are stunted growth (low height-for-age) (de Onis and Habicht, 1996) and underweight children (low weight-for-age) and BMI-for-age by de Onis et al. (2007) and US CDC. While stunting, as coined by Waterlow (1972), reflects a failure to reach linear growth potential due to suboptimal health and/or nutritional conditions and underweight reveals low body mass relative to chronological age, which is influenced by both a child’s height and weight (WHO, 1995).

In this paper, an attempt has been made to assess the physical growth and nutritional status of children of Mishing- a scheduled tribe and Kaibarta- a caste population of Assam. There is a dearth of study on the children of 3 to 10 years plus and the same data are compared with the reference populations at national level viz., Indian Council of Medical Research (ICMR) (ICMR, 1989), Indian schoolchildren belonging to the upper socioeconomic strata (IndUp) (Marwaha et al., 2011), (Khadilkar et al., 2009), National Health and Nutrition Examination Survey (NHANES) (Frisancho, 1990), CDC 2000 (CDC, 2002) and WHO (2006, 2007) reference populations at International level.

MATERIALS AND METHODS

Population of Mishing

Mishing or Miris being the second largest plain tribes of Assam, Northeastern India is affiliated to the Mongoloid race. The tribes’ primary occupation is agriculture and rice is their staple food. They relish pork meat along with Apong (rice beer) in all their ethnic festivals (Bordoloi et al., 1987). Their occupation is supplemented by wage labour, shop keeping and small scale business. The Mishing people are very fond of green leaf/vegetables that they grow in their kitchen garden, and they include any one of them at least in their diet almost every day (Basu and Gajbhiye, 2004). Usually, the Mishing claim to be Hindus by religion, but at the same time they observe all their ethnic traditional rituals and festivals. In the course of cultural evolution, their religions, along with their traditional belief, Vaishnavism and Christianity have become part of their life. Their literacy rate is much higher than the Kaibarta people Mishing people consume leafy vegetables in higher frequency than the Kaibarta people.

Kaibarta

The Kaibartas, a scheduled caste community of Assam, North-eastern India, belong to the Indo-Aryan linguistic group of Caucasoid racial stock. They follow Hinduism. They survive on fishing – an old-age occupation which is also supplemented with small scale business, daily labour, shop keeping, rickshaw pulling, etc. The Kaibartas are non-vegetarian but pork is prohibited in table menu (Khongsdier and Basu, 2004).

A cross-sectional method was used to study the anthropometric measurements among the children of Mishing, a scheduled tribe and Kaibarta - a scheduled caste population of Lakhimpur- and Cachar districts of Assam respectively during December-January, 2005-07. The anthropometric measurements were taken by well trained anthropometrists (GI, RG, and JD) following standard techniques. A total number of 604 Mishing children (Boys: 313; Girls: 291) and 452 Kaibarta children (Boys: 225; Girls: 227) were anthropometrically measured. The children were compared in terms of their physical growth status with references to Indian schoolboys and girls belonging to the upper socioeconomic strata (IndUp) (Marwaha et al., 2011), Indian Council of Medical Research (ICMR) (ICMR, 1986), Indian Affluent Children (Indian) (Khadilkar et al., 2009), National Health and Nutrition Examination Survey (NHANES) (Frisancho, 1990), and CDC 2000 (CDC2002). The children in both places- Mishing and Kaibarta- were assessed in terms of Z-scores (WHO, 1986) of Weight-for-age, Height-for-age, BMI-for-age with reference to WHO (2006, 2007) since linear growth (height-for-age)
and ponderal growth (weight-for-age) have different nutritional requirements. The states of stunting, wasting, and thinness of low height-for-age $Z$, weight-for-age $Z$, and BMI-for-age $Z$-scores respectively are denoted by $<2$. The occurrence of weight-for-age in children have been selected as an indicator of under nutrition, as it combines information on both chronic (height-for-age) and acute under-nutrition (weight-for-height) and it is one of the most widely used nutritional indicators (WHO, 1986; UNDP; 2004; UNICEF, 2004; World Bank, 2004). The individual z-score for a measurement $y$ at age $t$ was computed by LMS formula (WHO, 2006) as follows:

$$SD- \text{score} = \frac{\text{measurement} - M(t)}{L(t)S(t)}$$

Where $M$ denotes median; $L$ is the power needed to transform the data in order to remove skewness (that is to normalize the data), and $S$ is the coefficient of variation.

The three Indian references were not considered for calculating the measurement-for-age $Z$ score since the IndUp (Marwaha et al., 2011) does not have the lms values of the same measurements; Indian (Khadilkar et al., 2009) does not provide information of the measurements of the Indian children aged 3 to 4 years; and finally the ICMR (1989) sample lacks lms values and moreover, the data were collected more than three decades ago. The curves in all the figures were smoothed by line style of Format Data Series option in Windows 7 OS.

**RESULTS**

Table 1 describes the arithmetic means and SDs of height, weight and BMI by age and sex of Mishing and Kaibarta children of 3 to 10 yrs. It shows that the difference of values of weight between 3 and 10 yrs among the Mishing girls being 12.70 kg is higher than those of their boys’ counterpart (11.05 kg); and the value of difference of height among the Mishing boys and girls are 36.61 and 38.61 cm, respectively. Total increase of weight gain being 16.78kg among the Kaibarta girls of between 3+ years and 10+ years is higher than the Kaibarta boys being 11.00kg. Again, the difference of values of height of the Kaibarta girls in same age groups being 38.61 cm is also higher than those of their boys’ counterpart (36.61 cm); the same trend in terms of weight and height in the Kaibarta children is also observed. While the ranges of BMI values in both populations – Mishing (boys: 13.77 and 15.5; girls: 13.59 and 14.77) and Kaibarta (boys: 12.71 and 14.39; girls: 13.59 and 14.77), respectively are hereby reported to be almost increasing in tandem.

Figures 1 to 4 show the graphical comparison of height and weight of the children aged 3 to 10 years by age and sex of the two populations - Mishing and Kaibarta, respectively with the NHANES - , Indian -, ICMR -, IndUP and CDC 2000 Children.

Among these two communities the boys of the Kaibarta are taller than their Mishing boys’ counterpart at the age of 8 and thereafter same growth curves for height of the boys in both communities move in tandem at 10 years of age. The 3 to 10 years boys belonging to the groups of CDC 2000, Indian, and IndUp are taller than those of the Mishing and Kaibarta boys; while the same boys of both

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**Table 1. Anthropometric means (m) and SDs of weight, height and BMI of Mishing and Kaibarta children.**

| Age | Mishing |         |         |         |         | Kaibarta |         |         |         |
|-----|---------|---------|---------|---------|---------|----------|---------|---------|---------|
|     | Boy     | Girl    | Boys    | Girls   | Boys    | Girls   | Boys    | Girls   |
|     | N       | N       | m       | sd      | m       | sd      | m       | sd      | m       | sd      |
| 3+  | 22      | 16      | 13.00   | 1.61    | 12.28   | 1.78    | 91.30   | 5.30    | 91.15   | 6.53    | 15.5     | 1.16    | 14.75    | 1.23    |
| 4+  | 33      | 29      | 13.80   | 1.94    | 14.06   | 2.12    | 96.70   | 6.63    | 98.10   | 5.17    | 14.76    | 2.21    | 14.68    | 1.59    |
| 5+  | 58      | 35      | 15.29   | 1.99    | 16.17   | 1.85    | 105.41  | 5.47    | 108.16  | 5.21    | 13.76    | 1.44    | 13.80    | 0.98    |
| 6+  | 50      | 50      | 16.38   | 2.10    | 16.72   | 2.09    | 109.35  | 7.34    | 110.85  | 6.27    | 13.71    | 1.34    | 13.59    | 1.21    |
| 7+  | 50      | 37      | 19.24   | 2.24    | 19.09   | 2.62    | 116.21  | 6.06    | 117.84  | 6.06    | 14.25    | 1.31    | 13.75    | 1.61    |
| 8+  | 37      | 45      | 21.27   | 2.70    | 20.51   | 3.46    | 121.99  | 7.86    | 121.07  | 6.16    | 14.27    | 1.09    | 13.91    | 1.42    |
| 9+  | 21      | 36      | 22.79   | 2.88    | 22.54   | 3.26    | 122.59  | 7.76    | 124.59  | 5.31    | 15.25    | 2.24    | 14.47    | 1.40    |
| 10+ | 42      | 43      | 24.05   | 2.37    | 24.98   | 3.56    | 127.91  | 5.64    | 129.76  | 5.50    | 14.75    | 1.66    | 14.77    | 1.35    |
communities are taller than their ICMR boys' counterpart. The phenomenon of the boys' height of these two studied communities being lower as compared to those of the boys of CDC 2000-, Indian-, and IndUp samples may be due to environmental factors like better socio-economic condition, better nutrition, food habits, etc. and of course, different ethnicity (Tables 1-2).

The mean height growth curve of the Mishing boys shows almost similar growth pattern compared to ICMR boys, but the Kaibarta boys of 8 yrs show higher growth pattern than those of the ICMR boys; and again show similar growth pattern with ICMR at 10 yrs. Overall, the growth patterns of height among the Mishing and Kaibarta children do lag behind the other three CDC 2000-, Indian Affluent-, and NHANES boys population.

Table 2 describes the mean values of weight-for-age Z-scores, height-for-age Z-scores, and BMI-for-age Z-scores of the children aged 3+ years to 10+ years by age and sex of the Mishing and Kaibarta populations. The values of above mentioned anthropometric indices in

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**Figure 1.** Distance growth curves for Height of Mishing and Kaibarta boys with reference to Indian-, IndUp-, ICMR-, NHANES-, CDC 2000 and WHO (2006 & 2007) boys (K: Kaibarta; M: Mishing; B:Boys).

**Figure 2.** Distance growth curves for height of Mishing and Kaibarta children with reference to Indian-, IndUp-, ICMR-, NHANES-, and CDC 2000 Girls (G:Girls).
Figure 3. Mean growth curves for weight of Mishing and Kaibarta children with reference to Indian -, IndUp -, ICMR -, NHANES -, and CDC 2000 boys (B:Boys).

Figure 4. Mean growth curves for weight of Mishing and Kaibarta children with reference to Indian -, IndUp -, ICMR -, NHANES -, and CDC 2000 girls (G:Girls).

terms of measurement-for-age z-score were calculated based on the reference of CDC 2000. Among the boys of both groups the boys aged 3+ years of Mishing tribe show mean values of weight-for-age Z-scores below-2SD. Among the boys mean values of weight-for-age Z-scores increase with the increase of age in both the population; while the Z-scores of height-for-age at the age of 3+ through 10+ years in the Mishing sample are negatively higher than -1.50 and there is a trend of increase, negative in nature, of z-scores as the age increases. Table 2 shows that the girls of both populations are reported to have negative values of weight-for-age Z-scores, height-for-age Z-scores, and BMI-for-age z-scores with reference to the WHO.

Figures 1, 2, 3, and 4 exhibit the growth patterns of height and weight of the boys and girls in the Mishing and Kaibarta populations respectively. Figures 1 to 4 show that the mean values by age of height and weight of the
children in both communities increase in tandem with the children of same age of ICMR with an exception of Kaibarta girls being recorded with higher mean values of weight than those of the girls of ICMR at age 10 years. But the mean values by age and sex for height and weight for the children of both communities do lag behind the other three reference populations of CDC 2000, Indian Affluent, and NHANES (Figures 1 to 4).

Table 3 indicates the values of proportions of children by age and sex falling under the stunting, underweight, and thinness categories in both communities. The proportion of Mishing boys being 26.84% under the stunting category is higher than their girl counterpart (21.31%) and the same trend is also observed in other two underweight and thinness categories in the same population having the boys and girls of the same age range who are 31.63, 4.47, 30.99 and 15.81% respectively; while 33.33 % of the Kaibarta boys falls under the stunting category being higher than their girl counterpart (18.06 %) in the same population – the same trend is also observed in both categories of underweight and thinness in the Kaibarta population having the boys and girls of the same age range who are 35.11, 7.93, 52.44 and 24.23%, respectively. Among the Mishing children the girls aged 5+ years to 10+ years not a single girl child is reported hereby not to suffer from underweight; while the girls of the Kaibarta of the same age range like Mishing girls is also observed not suffering from underweight. So far the proportions of children of both populations under all categories are concerned; the boys as compared to their girls’ counterpart are thinner in higher proportions. In Mishing population, the proportions of stunting, underweight, and thinness are observed to be 28.91, 22.18 and 28.32% respectively; while the proportions of stunting, underweight, and thinness being 22.79, 21.46 and 17.92% respectively are observed in the Kaibarta population (Figures 5-8).

**DISCUSSION**

In the present paper, the present samples of Mishing scheduled tribal- and Kaibarta scheduled caste children aged 3+ years through 10+ years surviving on agriculture and fishing occupations respectively, were assessed in terms of physical growth and nutritional status resorting to anthropometric measurements which have been used globally to evaluate nutritional assessment at population level. WHO (1995) and Gelander (2006) report that child growth is internationally recognized as an significant indicator of nutritional status and health at population level. The physical growth of the children may indicate the factors playing important impact upon, viz. poor environments including low income that limits the children to have access to quality housing, diet, and healthcare, increasing risk of poor health and nutrition, which in turn affect growth and development (Crooks, 1999).

Analysis of growth data based on height measurement indicates that mean values of both communities were observed to be lower than the mean values of height of

| Age | Boys          |          |          |          |          |          |
|-----|---------------|----------|----------|----------|----------|----------|
|     | WAZ-M         | WAZ-K    | HAZ-M    | HAZ-K    | BMIZ-M   | BMIZ-K   |
| 3+  | -0.91         | -1.12    | -1.29    | 0.97     | -0.12    | -2.71    |
| 4+  | -1.45         | -1.11    | -1.57    | 0.40     | -0.61    | -2.16    |
| 5+  | -1.58         | -1.24    | -1.06    | -0.36    | -1.42    | -1.65    |
| 6+  | -1.83         | -0.97    | -1.34    | -0.13    | -1.46    | -1.44    |
| 7+  | -1.39         | -1.55    | -1.04    | -0.70    | -1.08    | -1.72    |
| 8+  | -1.40         | -1.83    | -0.09    | -0.12    | -1.19    | -1.61    |
| 9+  | -1.56         | -2.34    | -1.66    | -1.72    | -0.78    | -1.76    |
| 10+ | -1.79         | -1.94    | -1.55    | -1.53    | -1.33    | -1.51    |

| Girls |          |          |          |          |          |          |
|-------|----------|----------|----------|----------|----------|----------|
| 3+    | -1.06    | -1.78    | -1.02    | -0.57    | -0.57    | -2.14    |
| 4+    | -1.02    | -0.86    | -1.08    | -0.08    | -0.52    | -1.25    |
| 5+    | -0.94    | -1.39    | -0.30    | -0.31    | -1.13    | -1.83    |
| 6+    | -1.40    | -1.57    | -0.84    | -0.78    | -1.30    | -1.61    |
| 7+    | -1.17    | -1.61    | -0.54    | -1.15    | -1.32    | -1.32    |
| 8+    | -1.45    | -1.55    | -0.95    | -0.99    | -1.28    | -1.37    |
| 9+    | -1.53    | -1.53    | -1.29    | -1.50    | -1.08    | -1.44    |
| 10+   | -1.62    | -1.02    | -1.39    | -0.76    | -1.14    | -0.80    |
Table 3. Proportions of Mishing and Kaibarta children by age and sex falling under stunting, underweight, and thinness categories.

| Age | Mishing | | | | Kaibarta | | | | Mean growth curve-Boys' BMI |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|
|     | Stunting | Underweight | Thinness |     | Stunting | Underweight | Thinness | |
|     | Boys (%) | Girls (%) | Boys (%) | Girls (%) | Boys (%) | Girls (%) | Boys (%) | Girls (%) |
| 3+  | 27.27 | 37.50 | 22.73 | 56.25 | 0.00 | 6.25 |
| 4+  | 45.45 | 31.03 | 27.27 | 13.79 | 0.00 | 3.45 |
| 5+  | 24.14 | 5.71 | 25.86 | 0.00 | 13.79 | 14.29 |
| 6+  | 30.00 | 18.00 | 46.00 | 0.00 | 0.00 | 24.00 |
| 7+  | 24.00 | 10.81 | 25.86 | 0.00 | 0.00 | 14.29 |
| 8+  | 0.00 | 24.44 | 21.62 | 0.00 | 70.27 | 20.00 |
| 9+  | 42.86 | 25.00 | 13.79 | 0.00 | 66.67 | 13.89 |
| 10+ | 30.95 | 27.91 | 38.10 | 0.00 | 73.81 | 13.95 |
| Total | 26.84 | 21.31 | 31.63 | 4.47 | 30.99 | 15.81 |
|     | Boys (%) | Girls (%) |     |     | Boys (%) | Girls (%) |     |     |
| 3+  | 21.31 | 16.67 | 29.41 | 88.89 | 76.47 | 55.56 |
| 4+  | 0.00 | 0.00 | 11.54 | 8.00 | 0.00 | 12.00 |
| 5+  | 3.85 | 10.00 | 25.00 | 0.00 | 14.29 | 36.67 |
| 6+  | 21.43 | 17.86 | 13.79 | 0.00 | 0.00 | 28.57 |
| 7+  | 3.45 | 20.69 | 38.71 | 0.00 | 64.52 | 20.69 |
| 8+  | 16.13 | 17.65 | 41.38 | 0.00 | 79.31 | 17.65 |
| 9+  | 0.00 | 39.39 | 62.50 | 0.00 | 100.00 | 21.21 |
| 10+ | 46.88 | 16.67 | 48.48 | 0.00 | 78.79 | 13.33 |
| Total | 33.33 | 18.06 | 35.11 | 7.93 | 52.44 | 24.23 |

Figure 5. Mean growth curves for BMI of Mishing and Kaibarta with reference to Indian, IndUP, CDC 2000 and WHO boys (B: Boys).

the samples of CDC2000, IndUP, WHO (2006, 2007); and NHANES boys with the children of Kaibarta boys aged 3+ years to 5+ years being observed to be little higher than the boys of the same age groups of WHO (2006), NHANES, and ICMR samples. This indicates that the boys of the Kaibarta sample struggle with poor environmental factors including low income, less than enough food quantitatively and qualitatively, less than required
amount of nutrients, etc. The same phenomenon of not getting their height gain in the other Mishing boys’ sample is also applicable. And the difference of height gain among the boys of both the samples was due to ethnicity in combination with the other environmental factors evidenced through 32.00% stunting among the Kaibarta boys aged 3+ years through 10+ years as compared to those of Mishing boys (41.53%); while the proportions of stunting among the girls of both communities were observed to be close to each other, but the same were much lower than their boys’ counterpart.

The proportions of stunting in both populations of the present study are higher than the children of Santal (Chowdhury et al., 2008), Bangladesh (Chisti et al., 2007), Karnataka (Joseph et al., 2002), Nigerian (Fetuga et al., 2011a), West Bengal (Bose and Bisai, 2008a), Karachi (Jafar et al., 2008), Sagamu of Nigeria (Fetuga et al., 2011b) but lower than the children of West Bengal (Som
et al., 2007), Pakistani (Mian et al., 2002), Malaysian (Marjan et al., 1998), Indonesian (Hadju et al., 1995), Bihar (Rao and Vijay, 2006), WB preadolescent children (Bose et al., 2008b), Nepalese (Ghosh et al., 2009), Nepal (Ghosh et al., 2009). While comparing the present two populations with the rest of the populations as in the case of stunting, the proportions of underweight in these two populations are lower than the children of all the samples mentioned earlier but higher than the Bangladeshi children (Chisti et al., 2007) and estimated prevalence of childhood underweight for Asia (de Onis et al., 2004). The situations among the girls in both populations in terms of stunting reflecting a failure to reach linear growth potential due to suboptimal health and/or nutritional conditions are better than their boys’ counterparts of respective populations. In both communities the boys as compared to the girls of the respective populations suffered more from high level of chronic under nutrition because of consistent lack of required nutrients’ consumption both in quantity and as well quality and illness.

Weight-for-age reflects body mass relative to chronological age. It is influenced by both the height of the child and his/her weight. This index is often taken as a composite index integrating the first two anthropometric indices, as it reflects both chronic and acute malnutrition. The proportions of underweight among the boys of both populations were observed to be almost same while among the girls too of both the populations same trend was observed; but the boys of both populations exhibited higher proportions of underweight category than in the girls by which- the phenomenon indicating the boys suffering from chronic and acute malnutrition. In other words, they were deprived of getting sufficient amount of required quality nutrients leading to prolonged under nutrition. The proportions of underweight category among these two groups were observed to be higher than the children of Karnataka (Joseph et al., 2002), Santal children of Purulia district (Chowdhury et al., 2008); Nigerian school children (Fetuga et al., 2011a and 2011b), Pakistani school aged children (Mustaq et al., 2012) and estimated prevalence of childhood underweight for Asia (de Onis et al., 2004a). While discussing the other two indices like height-for-age and weight-for-age for stunting and underweight respectively the boys in both the tribal and caste populations as compared to those of their girls’ counterpart suffered from prolonged undernutrition to a larger extent; and at the same time the index –bmi-for-age for thinness with both compartments of height and weight the children suffered more from chronic and acute under-nutrition; thereby the results of their consistent lack of appropriate nutrients intake throughout the present age range and unfavourable socio-economic factors hindered them to attain expected height gain. The proportion of thinness among the boys of the Mishing population was observed to higher than the Nigerian school children (Fetuga et al., 2011), and Pakistani children (Mustaq et al., 2012) but, the proportion of thinness category in the Kaibarta population remained lower than the Nigerian school children (Fetuga et al., 2011). The phenomenon of the higher proportion of the boys suffering from thinness may indicate that the nutrients rich in protein responsible for height they consumed were far below the required amount, evidenced through the higher proportions of stunting than of the underweight category.

Overall, the situation of health of the children aged 3+ years to 10+ years among the Kaibartas at population level is jeopardize since the socio-economic status in the
same population is still same as they had earlier with a negligible amount of development. This is because their occupation —fishing follows with their age old traditional infrastructure leading to financial insecurity and making them unable to have access to state-of-the-art technology in fishing; and the children of the Mishing tribe surviving through their primary occupation—agriculture also failed to achieve growth potential due to suboptimal nutritional conditions that lead to low body mass relative chronological age, which is the resultant of the inadequate nutrients intake in combination with other environmental factors like poor socio-economic condition, quality housing, diseases, etc—the phenomenon which is applicable in both populations. Taking the facts as mentioned earlier into consideration, malnourishment among the children in both population was due to under nutrition as their diet did not provide them adequate nutrients like calories and protein for maintenance and growth; or the nutrients consumed by the children were not fully utilized due to their illness.

Overall, the children of both population based on the values of three indices remain vulnerable to suffer from malnutrition for which some interventions through multispectral programmes need to be implemented.

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