The present study entitled “Nutritional and health status of women and preschool children in urban slums of Kochi” is an attempt to assess the nutritional status and health status of both women and their preschool children in the slums.

From time immemorial, the Arabs, British, Chinese, Dutch, and Portuguese have left indelible marks on the history and development of Cochin. Over the years, Cochin has emerged as the commercial and industrial capital of Kerala and is perhaps the second most important city on the west coast of India. Since slum population is more concentrated in Kochi, this area was identified for the study.

The list of slums at Kochi was collected from the Urban Poverty Alleviation department. From this list eight slums were selected based on availability of the sample population and facilities for conducting medical camps.

Ten percent of the households with preschool children were randomly selected and those who expressed difficulties to cooperate with
the study were excluded. The sample thus obtained, included 334 women and 376 preschool children.

Initially the background information of the sample was collected using interview schedule, through personnel interview method, and later on medical camps were organised in the vicinity area of the slums to gather clinical, biochemical, anthropometric and morbidity data.

Anthropometric measurements of women (height, weight and waist-hip ratio) and those of preschool children (height, weight and mid upper arm circumference) were recorded. The women and children were also screened to diagnose nutritional disorders and other health problems if any, by a team of medical practitioners from T.D.Medical College, Alappuzha. Haemoglobin estimation, stool examination were also done. The data was analysed statistically using ‘t’ test, chi square and correlation.

**The major findings of the study are given below:**

Majority of the families in the slums were nuclear type (62.0%), and had only two children (66.5%). The men were mostly unskilled workers (60.5%), while women were unemployed (82.0%). The educational status was generally up to high school level for 46.7 percent of the parents.

The monthly income of most of the families (77.8%) ranged between ₹ 980/- to ₹ 2935/-, while there were families even with an income less than ₹ 980/month (1.8%). House along with land was owned by 82.0 percent. Though majority of the families had debts (70.4%) there were some families (38.0%) with savings also. Based on socioeconomic scale (as
arrived by Kuppuswamy scale, 1981) the sample were classified, which showed that there existed a significant difference (at 1% level) in the income status of families residing in different slums. Majority of the slum dwellers belonged to low socioeconomic status (87.4%), where Karithala contributed to the most (100%). This slum was located in the midst of the city area. About 12.57 percent of the families found to be in the bottom strata of middle class.

The standard of living index computed based on the index created by IIPS (2000) classified the families as high (73.7%), medium (19.8%) and low (6.6%). Also there noticed a highly significant (P<0.01) difference in the standard of living index of women, residing in different slum locations.

Demographic profile of the sample showed that most of them belonged to the age group of 25 to 30 years (44.31%), almost a quarter of the sample represented the age group of 20 to 25 years. In the case of preschool children all of them were in the age group of 3 to 5 years comprising both boys (55.6%) and girls (44.4%).

Housing conditions revealed that only 12 percent had pucca house and most of the houses were semi pucca type (61.1%). Total area of the house ranged between 100 to 300 sq.ft (64.3%). Plinth level of the houses was too low and inadequate in majority of the houses. The houses (28.1%) were at ground level without plinth level. Houses with two rooms were more common (42.5%), and 27.8 percent of houses had only one room. Floor condition was satisfactory for 31.1 percent of houses and 81.7
percent used cement as floor finishing material. The walls of the houses were built by bricks (84.1%).

Foundation for housing, was absent in the case of 7.2 percent of houses or very weak (45.2%). Water collecting inside the house (57.2%) during rainy seasons and dampness was also present (62.9%). Slope roofing was found to be more common (81.7%) and ceiling height was less than 6 feet in 21.3 percent of houses. Only 12.6 percent had concrete roofing. Separate kitchen was present in 77.8 percent of the houses, while a raised platform for cooking was available only among 63.8 percent.

Hygienic practices of the family included daily brushing the teeth (91.6%), bathing (94.0%), regular cutting of nails (84.7%), washing hands before food (85.3%) and after visiting toilet (72.2%). Regular use of slippers was present only in 56.3 percent of cases. Household hygienic practices of the family were found to be appropriate. But they were not much bothered about environmental hygiene. They practised dumping of solid waste in the near by areas like barren land (38.1%) and roadside (11.0%). This is because they don’t have a proper facility to dispose the solid waste.

Open defecation (24.9%) was practiced by the slum residents particularly at certain areas. Septic tanks were present only in 44.9 percent of the cases. Live stock (15.3%) and even pets (24.6%) were present in the households, but separate accommodation for them was not provided.

Main Source of water was public water taps, certain slums even had to depend on the lorry supply of water which was available only on
alternate days. Water stagnation and polluted canals were the main problems faced by the slum dwellers.

Electrification of households was done in 88.9 percent of cases. Basic community facilities were available in the slums, since most of these areas were located either in the heart of the city or within reachable distance.

The Nutritional profiles of women (n=334) showed that, women at slum had marginal height deficit ranging from (6.2% to 7.25%) which may be considered as normal but in the case of body weight the negative deviation was reported to be between 16.6 percent to 24.17 percent depicting chronic energy deficiency.

Both height and weight measurements of women found to deviate negatively from the standard values to a highly significant (P<0.01) extent.

The BMI of women also clearly indicated that only 50.3 percent of them had normal body weight. The remaining had either energy deficiency (32.1%) or surplus (17.7%). Chronic energy deficiency of varying degrees were reported among 17.1 percent of women.

Age, slum locations, socio economic status and standard of living index all had no significant influence on BMI status of women. But it was observed that women with normal body mass index was more among the high standard of living index group. The percent of chronic energy deficiency III cases were found to be less in this group and more among low standard of living category.
Waist-hip ratio the most important measure of abdominal obesity level, indicated that 91.9 percent of women had the ratio above normal level ($\geq 0.8$). The problem existed irrespective of age socioeconomic or standard of living index. The haemoglobin status revealed highest prevalence of mild anaemia (67.7%) among the women at slums. The incidence of anaemia tend to increase significantly with age (P<0.05) and to reduce with hike in standard of living (P<0.05). A highly significant difference (P<0.01) was reported in the incidence of anaemia among the slums, with Karithala having highest number (87.5%).

General food habits of the sample showed that non-vegetarianism was more popular. Ease of preparation (97.9%) and freshness of food (95.8%) were given more priority than cost (44.6%) while purchasing food items. Boiling was the most common method of food preparation followed by stewing and shallow frying.

Frequency of consumption of cereals (100%) sugar (100%) oil (100%), fish (75.8%) and milk (74%) was on daily basis. Meat (88.31%) and pulses (68.6%) were on weekly basis. Leafy vegetables and fruits were rarely consumed. Regular use of iodised salt was reported only by 62.3 percent of sample.

Mean food intake of mothers when compared with RDA indicated gross inadequacy which was significant at 1 percent level. The percentage adequacy of green leafy vegetables (1.2%), fruits (3.3%), milk (25.4%) and
other vegetables (48.7%) was so low. Intake above the RDA was observed with fat and oils (166%), fish and meat (156%).

Nutrient intake of mothers was also found to be deplorable. The intake was totally inadequate to meet the requirements of energy (76.7%), calcium (63.9%), iron (26.3%), vitamin C (33.9%) and vitamin A (17.44%). The deficit was statistically significant at 1 percent level.

The above situation triggered the incidence of serious deficiency disorders like anaemia (84.43%), goitre (44.31%) and chronic energy deficiency (17.06%) among the mothers. Age wise analysis did not show any significant difference in the incidence of deficiency diseases except anaemia, which showed a significant (P<0.05) difference with age.

Common metabolic problems noticed among the mothers included diabetes (11.4%), hypertension (10.5%) and cardio vascular diseases (7.8%). It was found to increase with age; and significantly (P<0.01) so with diabetes.

Other ailments like thyroid enlargement (49.4%), asthma (41%), back pain (20.1%) were also present along with reproductive health problems.

Statistical analysis revealed a highly significant (P<0.01) influence of various slum locations on the incidence of anaemia, goitre, diabetes and back pain. Similarly socioeconomic status found to influence significantly the incidence of cancer (P<0.01) and asthma (P<0.05) with women of middle class status exposed more than low class group. Standard of living
had an impact only on incidence of anaemia ($P<0.05$) involving more mothers from low standard of living.

Irrespective of age, socioeconomic status and standard of living, goitre of all grades were reported among women. But slumwise distribution of goitre incidences showed a significant variation ($P<0.01$).

Profile of preschool children indicated a highly significant ($P<0.01$) weight and height deficits among boys as well as girls. But a progressive increase in these measurements with age was also observed irrespective of gender.

Gomez classification revealed that only 26.79 percent of boys and 29.94 percent of girls had normal nutritional status. Grade I malnutrition was more prevalent among boys (44.01%) and girls (44.91%) than Grade II and Grade III. Girls in general were in a slightly better status than boys. Incidence of the grades of malnutrition found to vary significantly ($P<0.01$) with the slums studied, but no significant difference was observed due to socioeconomic or standard of living index.

The mean MUAC values of preschool children were 14.87 cm for boys and 14.57 cm for girls. Based on MUAC values 91.4 percent of boys and 87.4 percent of girls were categorized as having normal nutritional status.

Haemoglobin status of children indicated that majority of the preschoolers in the slums had either mild (boys-55.5% and girls-52.7%) or moderate (boys-38.8% and girls-45.5%) type of malnutrition. Normal cases
included only 5.3 percent boys and 1.8 percent girls. Incidence of anaemia was found to be influenced significantly (P<0.05) by the socioeconomic status of sample and not by standard of living index.

Dietary assessment of preschoolers in the slums clearly brought out the preference of non-vegetarian food (89.5%), ready to eat foods (31.4%) by quite a good number of children, and fast food consumption (48.8%).

Infant feeding practices, which had a distinct role to play in nutritional well being of children during preschool age was also studied. The observations were that breast feeding initiated soon after birth (96.4%) but discarding colostrum was still practised by mothers. Early introduction of bottle feeding (34.5%) over dilution of milk (49.5%), and absence of bottle sterilization (24.6%) were some of the erroneous practices noticed.

Food consumption pattern of preschoolers indicated grave inadequacies, significant statistically at 1 percent level in the case of all food groups except meat and fish; where intake was significantly (P<0.01) higher than RDA.

With regard to nutrient intake, also there observed a wide gap, which was significant statistically (P<0.01) in the case of almost all nutrients except protein. Where the inadequacy due to poor representation of pulses and milk in the diet was being compensated by surplus intake of fish and meat.
As a result the clinical manifestations of protein energy and mineral deficiencies and vitamin deficiencies were diagnosed among preschoolers. Lack of luster of hair (19.2%), pale tongue (7.8%), chalky patched teeth (26.9%) were observed. Symptoms of vitamin A deficiency such as night blindness (0.5%), conjunctival xerosis (15.6%) corneal xerosis (1.4%) and bitots spot (0.5%) were identified. Angular stomatitis (4.19%) and glossitis (5.4%) were also there.

Regarding morbidity pattern, frequent occurrences of cold (95.8%), asthma (93.1%), cough (92.8%), fever (88.3%) were reported among the children. Occasional incidence of diarrhoea (97.3%) and worm infestation (96.7%) was also observed. Prevalence of respiratory infections and diarrhoea among the slums, ranged between 35.4 percent to 66.7 percent and 36.7 percent to 88.9 percent respectively. This variation in the prevalence was found to be statistically significant. Karithala and Fort Kochi slums were more seriously affected in this respect. Stool examination revealed the presence of helminthus (40.0%) and round worm (33.3%) infestations.

As far as immunisation coverage is concerned, 93.2 percent reported completion or continuation of immunisation. Incomplete or laps due to neglect was found among 5.6 percent and not immunised cases were 1.2 percent.

Correlation of parameters like age and anthropometric measurements and the haemoglobin levels indicated that age had a significant ($P<0.01$) positive correlation with height and weight.
measurements of boys, weight with height (P<0.01) and MUAC (P<0.01), height with weight (P<0.01) and MUAC (P<0.05) and MUAC with height (P<0.05) and weight (P<0.01). Haemoglobin status did not find to correlate significantly with any other parameters. In the case of girls also the same trend was seen. But here, a significant correlation of haemoglobin with age, height, weight and MUAC was also found.

Weight of the mothers correlated significantly (P<0.05) with weight of preschoolers. But the haemoglobin status of the mother failed to show any significant correlation with haemoglobin status of preschool children.

The spearman rank correlation of factors affecting nutrition and health profile of mothers and children revealed that nutritional status index of preschoolers significantly correlated with their own health status (P<0.01), health status of mothers (P<0.05), nutritional status of mothers (P<0.01) and also housing conditions (P<0.05), environmental sanitation (P<0.01) and hygienic practices (P<0.05).

Health status index of the children correlated well with health index of mothers (P<0.01), housing conditions (P<0.01) and environmental hygiene (P<0.01).

But nutritional status index of mothers did not show any significant correlation with any of the parameters studied. Where as health status index of mothers reported significant correlation with housing conditions (P<0.01) and domestic hygiene (P<0.05) only.
Finally, the interdependency of nutrition and health status of mothers and their preschool children was brought out very clearly as:

- Health status of mother significantly correlated with both health (P<0.01) as well as nutritional status (P<0.01) of preschool children.
- Nutritional status of mother significantly correlated with nutritional status (P<0.05) of preschool children.
- Nutritional status of preschool children significantly correlated with their health status (P<0.01).
- Nutritional status of mothers failed to show any significant correlation with health status of mother or health status of preschoolers.

CONCLUSIONS

From the results it is emerged that people residing in slums had low socioeconomic status, high standard of living index, poor housing and hygienic conditions.

The insanitary living conditions coupled with grave inadequacies (significant at 1% level) in food and nutrient intakes of both women and children in the slums, resulted in significant (P<0.01) height and weight deficits in the sample. BMI status of women and nutritional status based on Gomez classification of preschoolers, also indicated malnutrition of varying grades among women (50.0%) and preschool children (70.0%).
This was irrespective of age, socioeconomic status and standard of living index.

Coexistence of over nutrition (17.7%) and associated health problems such as diabetes (11.4%), hypertension (10.5%) and CVD (7.8%), along with chronic energy deficiency (17.1%), was yet another feature noticed among women. Further incidence of micronutrient deficiencies like anaemia (84.4%) and Goitre (44.3%) was also found to pose serious problems to their nutritional well being.

Preschool children also presented a pitiable state in this respect. Irrespective of gender they were effected seriously by anaemic (94.5%). Besides signs of B complex deficiency (9.5%) and Vitamin A deficiency as conjunctival xerosis (15.42%), corneal xerosis (0.26%) bitot’s spots (0.26%) and night blindness were also identified along with the incidence of communicable diseases like respiratory infection (66.7%) and diarrhoea (88.9%) worm infestation like helminthus (hookworm-40.0%) and round worm (33.3%) were also reported.

The correlation matrix clearly brought out the significant relation between the associated risk factors and the health / nutritional status of mother and child:

Such as nutritional status of preschool children was totally depended on nutritional status (P<0.05) and health (P<0.01) status of mother; health status (p<0.01) of preschoolers, housing conditions (P<0.05), hygiene (P<0.05) and environmental sanitation (P<0.01).

Health status of preschool children was found to be the product of
their own nutritional status (P<0.01), health status of mothers (P<0.01) housing (P<0.01) and environmental sanitation (P<0.01).

Whereas health status of the mothers was significantly influenced by their housing conditions (P<0.01) and hygienic (P<0.05) practices only.

Hence it can be summed up that health status of mothers was a major determinant of the health and nutritional status of children. At the same time nutritional status of the mothers could contribute significantly only to the nutritional status of preschool children in slums and not to their health status.

These findings clearly pointed out the role of health / nutritional status of mothers and the housing and hygienic facilities on the nutritional / health status of preschool children in the slum areas.

The ongoing process of rapid urbanisation therefore has its deleterious repercussions on the health / nutrition of its population, especially preschool children. Malnutrition in young children has long term negative impacts on physical and cognitive development.

So addressing this issue of urban poor residing and slums, becomes highly imperative for the overall development of the country.

Our health system so far accorded higher priority to rural population, as rural people far out number their urban counter parts.

Development authorities still feel that facilities and living conditions in urban areas were far superior to those in country side.
But the urban poor do not benefit much in terms of nutrition or well being by migration from rural areas, inspite of the better employment opportunities and health care facilities, likely to be available in urban areas. So the urban sector now needs increasing attention and organization.

The world is urbanising rapidly. The urban population is growing at about twice the rate of general population; and population in slums and shanty towns are going at twice rate of city population. Much of the growth can be attributed to migration from rural areas due to rural poverty, population growth coupled with unemployment and underemployment.

The services rendered by slum population in the city, by way of their livelihood should also we considered in the context. But visual disparities between the slums and better off neighborhood and the anxiety or fear of eviction and migration tend to increase the social tension among the urban poor.

Rehabilitation of slum dwellers is one of the proven strategies for slum development, adopted by the state of Tamil Nadu in Chennai and recently in Bangalore. In Bangalore nearly 300 slum dwellers evicted from the heart of the city were rehabilitated in newly constructed one bedroom flats (Patta given in the name of women), with provision for drinking water, separate kitchen and toilet facilities attached. The location is also not far away from the city.
Side by side women in house were also given sum awareness and capacity building programmes to bring in behaviour modifications so as to be the custodian of the health and wealth of their own families. The residence association formed in this regard, is taking it forward.

To quote the words of a resident (T.V. report October 2010), this change in life style of slum dwellers facilitated to bring in self confidence and a positive attitude towards their life.

This strategy could be emulated in our state also on a trial basis; with due emphasis on the role of community organizations to maintained / sustain the benefits of resources / facilities provided by the Government, for the development of slum community.

Thus it could be concluded that only a comprehensive strategy with a focused and integrated approaches to promote behaviour modifications through community action, to mitigate the most pressing problems of slum dwellers, would go a long way to uplift them from the plight of absolute poverty and related complications and to provide them with a promising future.

**Further studies recommended**

1. Similar studies may be conducted among the slum population of other cities of Kerala.

2. A detailed study with a wider sample coverage could be undertaken to obtain more information on these lines.
3. An in-depth exclusively on goitre prevalence among women and preschool children of slum could be done.

4. A field based research on behaviour modifications of women to improve the health / nutritional status of women and children may be conducted.

5. An action research could be undertaken on slum development: “to uplift one or two selected slums by providing cost effective infrastructural and service needs by a joint action of Governmental and Non- Governmental agencies and slum organizations and an evaluation study on its impact on nutrition /health profile of vulnerable groups.