INTRODUCTION
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India is one of the major developing countries in the world. According to the recent census (1991), the population is 8443.24 lakhs, out of which Maharashtra alone accounts for 787.48 lakh people. Indeed, infants and children up to the age of 5 years contribute approximately 15-16% of total population and considered as a vital and vulnerable group with special reference to nutrition. It is well established that the infant mortality rate is around 80 and 58 per thousand live births in India and Maharashtra, respectively. It has been reported that the age specific mortality rate of infants and children between 1 and 5 years in India was as high as against below 2 per thousand live births in technologically advanced / developed countries in the year 1965. The infant mortality rate in 2000 A.D. will be below 60 per thousand live births. The morbidity and mortality among these infants and children up to the age between 1 and 5 years is generally accepted / considered as a reliable index of the nutritional status. The high percentage of morbidity and mortality among the vulnerable group in India may, therefore be taken as a real index of the severity and widespread prevalence of malnutrition. Nevertheless, the high morbidity and mortality among these vulnerable section is malnutrition, infections and lack of basic health care. Further, other social services and some unknown factors which interact and play a very important role in enhancing the morbidity and mortality rates. It is evident from the per capita per annum income (Rs 10,984) of India and Maharashtra (Rs 6,929) that India is one of the developing countries in the globe (Anon, 94).

Thus, the challenges in the sphere of health and nutrition which India faces, spring from its basic and fundamental problems of poverty. Nevertheless, population pressure is one of the major causes. It is well established that agriculture is the major occupation of more than 62% of the total population in India and contributes
approximately 33 % of the Gross Domestic Product (GDP) in the year 1988 (Econ. Survey of M.S., 94). There are only two principal crop seasons in Maharashtra namely the Kharif season which commences with South West monsoon in June followed by the Rabi season falling in winter. Due to meagre irrigation facilities, high value crops are generally taken by growers. The major source of rainfall is the South West monsoon which comes to an end by middle of October. Jowar is the crop grown over 27,90,900 hectare. In Kharif season, bajra and hybrid jowar is grown. Rice is grown in all most all Konkan area and also in Bhandara and Chandrapur districts of Vidarbha region. Wheat is also the important crop of the Maharashtra State. The staple diet of India in general and Maharashtra in particular is mostly cereal based. Thus, the standard of living of the people of Maharashtra and India is governed mainly by topography, together with poor, social and economic conditions which are mostly proved to be the major factors and give rise to some of the highest existing rates of malnutrition. Moreover, these factors also contribute to widespread infections. Thus, the agricultural crises specially the production and productivity of the food grains and soil have manifested itself in the inability which in turn, result to unable to feed an evergrowing population in the country.

Nevertheless, most of the people live below the poverty line. Further, a synergistic interaction between poverty and illiteracy existing in the country among men and women proved to be a prime factor in prevailing the malnutrition and hunger in the country. If the same situation exists in years to come, the hunger and malnutrition will continue to cause enormous human sufferings in the country in general, and Maharashtra in particular.

Nutrition has been defined as "The process whereby living organisms take in and transform extraneous solid and liquid substances necessary for the maintenance of
both the normal functions of organs and production of energy”. The science of Nutrition is concerned with nutrients, the part of food which nourishes the body. There are mainly six classes of chemical substances that nourish the body. The carbohydrates, fats and proteins which yield energy provide for growth to maintain tissues subjected to wear and tear. The vitamins, minerals and water although they do not yield energy are essential parts of the chemical mechanism for the utilisation of energy. They are also necessary for proper maintenance of health and inadequate supply of them leads to disease conditions. They are needed only in small amounts. The requirements of vitamins vary depending on the status, age and also the other factors.

Malnutrition is a gamut comprising either undernutrition or overnutrition. Reduced intake in nutrients or improper utilisation of nutrients may lead to undernutrition. This may be of mainly two types:

1) **Primary Undernutrition** :

It could be due to dietary origin because of insufficient intake of essential nutrients such as proteins, fats, carbohydrates, vitamins or minerals. It is because of lack of food intake which might be due to crop failure, poverty, war or lack of availability, improper selection of food or economic depression. In other words, the primary undernutrition is similar as in the case of food availability happens or deficiency of one or several nutrients occurs.

2) **Secondary Undernutrition** :

This is caused by wasting diseases such as typhoid and smallpox, which interfere with the metabolism leading to the improper utilisation of nutrients and also caused by physiological failure beyond the ingestion stage. This is due to faulty absorption, abnormal intestinal metabolism, excessive excretion and increase in biological
requirements. It also occurs as in the case of gastro-intestinal diseases with rapid emptying time, vomiting, diarrhoea in rapid growth, closely spaced pregnancies, lactation, surgery, injuries, extensive burns, etc. Similarly certain metabolic deficiency are many and they are usually multiple or simultaneous in operation. Nevertheless, some factors such as ignorance and cultural taboos play an important role in undernutrition. Indeed, manifestations of undernutrition are retardation of growth, weakness, loss of weight, increased susceptibility to infections, anaemia, mental depression, etc. The unfortunate state of nutrition in country like India is contributed to several factors and, in turn, leads to malnutrition. In the vast biological stretch of early childhood, infancy is one of the most critical and vulnerable periods that one witness a high incidence of wastage from mortality or morbidity. This may be attributed mostly due to:

i) Inadequate and inappropriate weaning diets and,

ii) Poor nutritional status resulting from disease or illness or infection caused because of early introduction of weaning food and lack of breast feeding.

It is well established that the infancy is the most valuable, critical and vital period wherein the infant needs an utmost care specially affection and nurturance and an apt nourishment to build up the body and mind of an infant.

Data in the last decade revealed that Protein-Energy-Malnutrition (PEM) and diseases are the major and immediate causes of this high mortality rate among the vulnerable group with special reference to infants. It is well known that the infectious diseases even those of mild character have been proved to be a common cause of anorexia. It is also attributed to a significant reduction in food intake, weight loss and impaired physical and mental growth.
Indeed, severe malnutrition in infants / young children is now well recognised as a major probably the major, nutritional disease in the world in general and India in particular. The disease syndrome levelled kwashiorkar and marasmus was evidenced from recent surveys in developing countries. Indeed, it is crystal clear up course that malnutrition in infants is not a new disease. The major variant namely marasmus approached starvation and is characterised by serious wasting nearly complete loss of body weight and greatly retarded physical and mental growth. However, kwashiorkor mostly representing severe protein deficiency with adequate or nearly adequate caloric intake. It is generally characterized by hypoalbuminamia, oedema, fatty liver, dermatitis and gastrointestinal disorders. Further, psychic abnormalities have also been attributed to this one of the variants of malnutrition. It has been well established that the biochemical changes encountered / attributed due to these variants in infants which are governed by both with the severity and with the type of deficiency. Thus, kwashiorkor and marasmus are the extremes of a spectrum of manifestation of PEM. The young children and infants often show the intermediate symptoms depending on the extent of severity of the deficiencies of the vital chemical ingredients namely protein and energy.

It is well documented and accepted that the arguments which have lead nutritionists to consider the diet deprived of energy as the prime cause of PEM rather than protein in developing countries. As per the FAO / WHO (1973) the energy and protein requirements recommended daily amounts (RDA) for proteins was comparatively lower than that of recommendation internationally. According to Gopalan (1968), the individual requirements play vital role in manifestation of PEM. He also claimed from the survey of children that the only difference in the diets of the two groups was a slightly greater restriction of energy and protein in the infants suffering from kwashiorkor.
However, he did not support the difference in protein energy (PE) ratio. Similarly, Waterlow and Payne (1975) reported that the lack of energy in the diet jeopardise the use of protein for growth and maintenance. They also suggested that if the energy intake from other sources is inadequate, then the protein is used as an energy source and it will not be utilised for the growth and maintenance. These findings were also substantiated by the research work carried out by Van Steenbergen et. al. (1978). According to Gopalan (1968), the vulnerable group specially infant and children between the age group of 1-5 years were suffering from kwashiorkor exhibited to show less energy deficient than those with marasmus for the simple reason that the fat content is relatively more in their bodies.

It is well recognised that adequate nutrition is considered to be a prime and critical determinant of physical and mental growth and so also well being during the entire life span of human being specially in infancy. It has been well documented that the human breast milk possess vital and unique anti-infective properties as it is rich in anti-infective factors such as lymphocytes and antibodies as well as number of nonspecific factors namely phagocytes and macrophages.

Unless otherwise stated, various proteins like lactoferrin, lysozymes and other compliment factors are present in human milk. Further, the anti-allergic properties of human milk play an important role in diminishing the risk of developing atopic allergy as the presence of S I g. antibodies in the human milk prevent or reduce contact between antigens and mucous membrane. However, there are some possible demerits of human milk as some of the viruses or viral antigens, including rubells, hepatitis-B and cytomegalovirus were found to exist in human milk. Moreover, group B streptococci have also been isolated from the human milk and, hence, they may cause infection in infant. However, there are no reports available in the scientific literature to prove that the
streptococci was responsible to cause infection in infants when the breast feeding was advocated either in the country or elsewhere. Nevertheless, the possibility of transmission of tuberculosis via the milk to the breast fed baby can not be ruled out if the mother suffers from caseating granuloma of the breast. In other words, the human breast milk feeding has been documented to be the best suited for achieving the physical and mental health of infants. Indeed, the human milk has the capacity to protect infants against gastro-intestinal infections. It has a contraceptive effect and also facilitates / promotes bonding between mother and child. It has been established that the breast fed infants in India are having lower risk factor of death as compared to the infants who are artificially fed. It is well established that colostrum feeding plays a very unique and vital role in the growth of infant and it is claimed also that it protects the infants from various infections. It is well recognised that the first milk secreted by the mother post partum during the first two days after birth of the infant is the colostrum. The physicochemical attributes revealed that it is thick, bright, yellowish fluid relatively less in volume and low in energy, however, it is believed to be rich in macromolecules specially proteins (*i.e.* immunoglobulin and lactoferrin). It has been also reported that it is richer in some of the vitamins and minerals as compared to mature breast milk. It is evident from the scientific literature that the colostrum feeding by Indian mothers is generally avoided as it is influenced by attitudes, beliefs and customs of the various communities of the different geographical regions.

Thus, breast feeding plays an important role in infants to have healthy mental and physical growth and also development as it possess specific psychological, emotional and physical care, nutrition and defence against infection. Further, it is a natural
care eliciting behaviour giving food, oral contact and psycho-physiological interactions and, in turn, bonding and maternal response have a synergistic effect.

According to Bhandari and Goyal (1983), the mortality and morbidity of infants in developing countries particularly in India is found to increase not only due to poverty but also due to the ignorance of mothers regarding the importance and nutritional functionality of colostrum. In the light of the above facts, the breast feeding has contributed a great deal in a gamut of developments in infancy and has nutritional immunologic and biochemical anti-economic advantages.

It has been proved beyond doubt that breast milk is the best for the infant, however, it has been pondered on the facts that whether the breast feeding can be advocated to infants for a prolonged period. It is well known from the scientific literature that the breast milk may not be sufficient alone to cater the needs of the infants to achieve a reliable physical and mental growth. And, therefore, weaning may be a process by which human milk may be complemented and progressively may be replaced or substituted by a variety of liquid, semisolid, and solid foods to effect a smooth and adaptable shift to a mixed diet. Thus, weaning is a very crucial event in the life span of an infant. However, the less pathologic effects that can be encountered at weaning include malnutrition, specially undernutrition and overnutrition. An inappropriate quality and quantity of some liquid or semisolid or solid diets may exhibit some syndromes, for example, the weaning foods which are high in energy proteins or minerals may exhibit syndromes of overnutrition, and therefore, it seemed worthwhile to alert parents and health practitioners to advocate or recommend weaning foods at the correct time to avoid the dangers of an imaginary or badly formulated weaning foods. It is well recognised that there is a lack of readily available information on the formulation and preparation of weaning foods in
developing countries. It is also well known that the commercial weaning foods available in the developing countries particularly in India were too expensive except for the elite.

It is generally believed and accepted that an appropriate immediate technology for the preparation of weaning foods should be adopted in local conditions rather than imitation of foreign type preparations. Moreover, the precaution must be seriously taken in formulating the weaning foods to avoid an addition of foreign raw materials and also as it is to be supplemented or complemented with human milk, and therefore, no vitamin and mineral mix should be incorporated. It should be also taken into consideration the fact that, it must possess adequate energy intake (*i.e.* low energy density) containing low fat and high dietary fibre content as infants may have difficulty in consuming the necessary volume of diet while preparing the weaning food. Nevertheless, the dietary bulk should be reduced either by altering the ingredients of weaning food or by adopting appropriate processing technology. There are several reports (Desikachar, 1983, Brandtzaeg *et. al* 1981) on the production of weaning foods with a high energy density at an acceptable apparent viscosity using germinated / malted seeds of legumes and cereal grains. Apart from the above reports, no systematic studies on the preparation of home scale weaning foods utilising locally available legumes and cereals are available in the scientific literature, except for some meagre and qualitative information on weaning foods and also the weaning practices in India in general and Maharashtra in particular. And hence, a systematic and detailed investigation is undertaken on "Studies on Formulation and Evaluation of Home made Weaning Foods" with the following objectives:

2. Studies on nutritional composition with special reference to carbohydrate, protein and amino acid make up of the cereal and pulses and also their blends,

3. To investigate the changes in nutritional functionality during processing (i.e. germination and roasting) of cereals and legumes and their blends with special reference to flatulence inducing / causing factors such as raffinose family sugars and their apparent relation to enhancement of α-galactosidase activity during germination,

4. The pasting characteristics of native flours and processed flour blends containing cereals and legumes,

5. Studies on in vitro digestibility of starches and proteins,

6. An assessment of nutritional functionality of resultant weaning foods containing cereal-legume blends as a function of storage (i.e. keeping quality),

7. An organoleptic evaluation of the fresh weaning foods developed in this laboratory, using commercial weaning foods as Cerelac, Farex, etc. as control, the microbial status of the weaning foods,

8. Studies on growth characteristic of infants during feeding trial experiments, and finally,

9. Studies on economical feasibility of the weaning foods developed in this laboratory during course of investigation have been worked out.