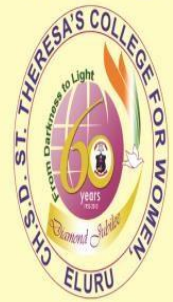




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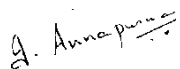
S.No.	Contents	Page No.
1.	Nutritional Deficiency Disorders in Childhood-Perspectives and Future Challenges : Dr. K. V. Padmavathi	3
2.	Effect of Prenatal Iron Deficiency on Mental Development of Children: *Meena Kumari, **Nasreen Begum	6
3.	Impact of Malnutrition on Academic Progress of Children: *B. Kusuma Neela, **Harika. M	11
4.	Prevalence of Iron Deficiency Anemia among School Age Girls: *Dr.K.N.Varalakshmi,HOD, **B. Kusuma Neela	21
5.	Food Security In India-Present Scenario: Dr.K.Rani	24
6.	Maternal Nutrition -Issues and Interventions: Dr. M. Padmaja	26
7.	Impact of Malnutrition and poor academic performance of children: Dr.C.A.Jyothirmayee	31
8.	Qualitative Assessment of How Parents Perceive Eating Patterns, Growth, and Nutritional Status in their Children with Sickle Cell Diseases and Barriers to Participation in a Nutrition Intervention Program: *Mrs. Y.Neeraja, **Sr.P.Sunila Rani	33
9.	Child Labour in Unorganized Sector: A Case Study of Krishna and Prakasam Districts of Andhra Pradesh: V. Ranjith Kumar	35
10.	Urban Poverty and Alleviation Programs In India: P. Bharathi Devi	39
11.	Business Sector Women Entrepreneurship Poverty Alleviation in India: P. Bhargavi	43
12.	The Socio-Economic Status of Tribal women in Guntur district of A. P: A. Salemraju	49
13.	Socio-Economic Status of Women Labour in Informal Sector: G. Saritha	54
14.	Post Harvest Utilization and Value Addition to Aquaculture Products for Sustainable Devt.: <sup>1</sup> *M.M. Prasad , <sup>2</sup> N.Murthy , <sup>3</sup> B. Madhusudana Rao , <sup>4</sup> Jesmi Debbarma , <sup>5</sup> P. Viji	57
15.	Role of Immunex Ds as immunostimulant on the biochemical response in	70
16.	Labeorohita (Hamilton) during aromoniasis: *Dr. Indira. R and **Dr. Viveka Vardhani. V	
17.	Socio – Economic Conditions of Fishermen in Guntur, Prakasam Districts, Andhra Pradesh: M. Luke Steeven Babu	74
18.	Role of Aquaculture Development Issues and Challenges: Y. Surya Sowjanya	77
19.	Eco friendly Nuclear power: Dr. K. Sree latha	83
20.	Green Chemistry – Challenges and Opportunities: * Mrs. N. Gayatri Devi & **Mr. N.V.N.B.Srinivasa Rao	86
21.	Waste-to-energy: A way from renewable energy sources to sustainable development: *Mr. Omkar & **Dr. M. Rama	90
22.	Studies on Satellite and Ground based measurements of SUV, UVA, and Aerosol Optical Depth over Hyderabad: *Dr. A. Nirmala Jyothsna, ** Sr. K. Showrilu***Prof. K .Samatha	93
23.	Mathematical modeling on detection of diabetics - M. Padma devi	97
24.	Applications of Differential Equations: Newton’s Law Of Cooling: Dr. Y. Praroopa <sup>1</sup> Mr. A. Shou Reddy <sup>2</sup> Mr. K. Moses <sup>3</sup>	103
25.	Education and Community Services in Developing Leadership Qualities among College Going Students: Dr. Sr. Marietta D’ Mello	106
26.	Quality in Higher Education: A Case Study of Affiliated Degree Colleges in Acharya Nagarjuna University Area: B. Prakash Babu	111
27.	Jainism- Religious Service to Environment: <sup>1</sup> S. Soma Sekhar, <sup>2</sup> Dr .V. Ramabrahmam, <sup>3</sup> Dr.K.S.V.Ranga Rao	116
28.	Perspective Education and Economic Development: A Gender: L. Kodanda Ram	120
29.	Recognition of Forest Rights Act, 2006 (The Scheduled Tribes and other Traditional Forest Dwellers): *KUBNV. Prasad, **P. Siri Varshini	125
31.	Performance of Cement Industry - A Case Study of Krishna and Nalgonda Districts: K.Narasimha Swamy.	127

## ***Editorial***

The human brain and body are most important machines which need number of inputs in the form of knowledge for brain, physical materials like "Proteins, Minerals and Vitamins etc." are needed for body. To be specific a physical body built with a variety of tissues, with a number of proteins and with the help of vitamins and minerals. Deficiency of any material in any group creates some physical deficiency and susceptible to deceases or illness in physical activities. Number of amino acids is synthesized by the body with the help of enzymes and hormones which are by it proteins. The RNAs and DNAs of the body cells are also proteins. So, the overall construction material of the body is protein. The deficiency of protein leads to serious health problems. But, the food stuffs consumed by the Indian population are differently deficient in protein supplements. So, India needs number of types of proteins in the form of pulses for vegetarians, eggs, fish, prawns, mutton and other allied food materials for non-vegetarians. Thus, this country needs to increase the production of these materials and techniques to improve the qualities of protein products. To educate the people regarding the importance of consumption of proteins and minerals which is the need of the hour our academicians making and putting efforts in Research by collecting information and relevant data preparing research reports and publishing with all the popular references, so that the public can understand the importance of these food materials to overcome the chronic problems of malnutrition and in the sustenance of public health and Indian society.

Aquaculture is one of the major suppliers of protein supplements and its meat and fat can reduce the cholesterol in the blood vessels i.e. it can reduce cardiac problems and also supplement many vitamins and amino acids. Aquaculture is currently playing, and will continue to play, a big part in boosting global fish production and in meeting rising demand for fishery products. A recent session of the FAO Committee on Fisheries (COFI) stressed the increasingly important and complementary role of aquaculture and inland capture fisheries in fish production for human nutrition and poverty alleviation in many rural areas. Aquaculture, in common with all other food production practices, is facing challenges for sustainable development. Most aqua-farmers, like their terrestrial counterparts, are continuously pursuing ways and means of improving their production practices, to make them more efficient and cost-effective. Awareness of potential environmental problems has increased significantly. Efforts are under way to further improve human capacity, resource use and environmental management in aquaculture.

This Issue of our Journal of Multidisciplinary/ Interdisciplinary Studies and Research aim to promote and encourage the research scholars gives you the analytical research articles on" Nutritional Deficiency, Aquaculture Products for Sustainable Development, Green Chemistry, Renewable energy, Mathematical modeling, Education and Community Services Quality In Higher Education, Jainism-Religious Service to Environment and Performance of Cement Industry".



Dr. Mrs. I. Annapurna  
Editor - in - chief

## Nutritional Deficiency Disorders in Childhood Perspectives and Future Challenges

Dr. Mrs. K. V. Padmavathi

### Abstract:

*Under nutrition reduces immunological capacity to defend against diseases, and in turn diseases deplete and deprive the body of essential nutrients. Women of reproductive age and children experience devastating health consequences as a result of limited resources, cultural influences, and biological vulnerabilities. Under nutrition and infectious diseases further exacerbate poverty through lost wages, increased health care costs, and—most insidiously - impaired intellectual development that can significantly reduce earning potential. So, this is a vicious cycle. Poor food and frequent infections lead to malnutrition and hold back the physical and mental development of millions of children. The problems of under nutrition and specific micronutrient deficiencies in young children are very many. Nutritional deficiency diseases such as xerophthalmia, rickets, beriberi, pellagra, scurvy, anemia, goiter, kwashiorkor, and marasmus and so on are important nutritional problems in most Asian, Latin American and African countries.*

**Key words:** immunological, devastating, biological vulnerabilities, insidiously - impaired, deficiency.

### Introduction

Under nutrition and micronutrient deficiencies contribute substantially to the global burden of disease. Impoverished communities experience high rates of under nutrition and increased exposure to infectious diseases caused by crowding and inadequate sanitation. Women of reproductive age and children experience devastating health consequences as a result of limited resources, cultural influences, and biological vulnerabilities. Under nutrition reduces immunological capacity to defend against diseases, and diseases deplete and deprive the body of essential nutrients. Under nutrition and infectious diseases further exacerbate poverty through lost wages, increased health care costs, and—most insidiously—impaired intellectual development that can significantly reduce earning potential. Health experts have recently recognized the long-term effects of early under nutrition and inadequate infant feeding for obesity and chronic diseases, including diabetes and cardiovascular diseases. Poor food and frequent infection lead to malnutrition and hold back the physical and mental development of millions of children. Main nutrients required in a balanced diet, their source, function and typical symptoms of deficiency are given in the following table:

Nutrient & Function	Deficiency Disease	Deficiency Symptoms	Food Source
A. Constituent of visual pigment, maintenance of epithelia	<b>Xerophthalmia.</b>	Poor vision. Night blindness. Dry skin. Defective epithelia lead to infections of skin, respiratory, urinary, and digestive tracts. Blindness from chronic eye infections, poor growth, dryness and keratinization of epithelial tissues	Dairy produce. Fish liver oils. Yellow Vegetables, liver, fortified milk, sweet potatoes, spinach, greens, carrots, cantaloupe and apricots
D. Calcification of bone, calcium absorption	<b>Rickets</b>	Rickets mainly in children. Soft deformed bones, weakened bones, bowed legs, other bone deformities.	Eggs, Fish liver oils, fortified milk, sun exposure.
E. Antioxidant protects cell membranes		Possibly anaemia.	Widely found. Vegetable oils, Green vegetables.
<b>K</b>		Prolonged blood clotting time	Green leafy vegetables, widely distributed in small amounts and also synthesized by intestinal bacteria.
<b>Thiamin</b>	<b>Beriberi</b>	Nerve degeneration, altered muscle coordination, cardiovascular problems	Pork, whole and enriched grains, dried beans, sunflower seeds
<b>Niacin</b>	<b>Pellagra</b>	Diarrhea, skin inflammation, dementia	Mushrooms, bran, tuna,

			chicken, beef, peanuts, whole and enriched grains
C.Maintains intercellular substances, i.e. between cells, connective tissue matrix.	<b>Scurvy</b>	Abnormal formation of bones and teeth, fragile capillaries, small haemorrhages under skin and gums, slow healing of wounds.	Citrus fruits, strawberries, broccoli.
<b>Essential Fatty Acids</b>	Components of cell membranes, precursors of <b>prostaglandins</b>	Skin sores, renal damage, mental changes.	Widely found. Required in small amounts.
<b>Iron</b>	<b>Anemia</b>	Decreased work output, reduced growth, increased health risk in pregnancy	meat, spinach, seafood, broccoli, peas, bran, whole -grain and enriched breads
<b>Iodine</b>	<b>Goitre</b>	Enlarged thyroid gland, poor growth in infancy and childhood, possible mental retardation, cretinism	iodized salt, saltwater fish

The problems of under nutrition and specific micronutrient deficiencies in young children are given below.

Micronutrient deficiencies (MND) such as Vitamin A deficiency (VAD), Iron deficiency anaemia (IDA) and Iodine deficiency disorders (IDD) have been major nutritional problems in developing countries, adversely affecting people's health, performance and income and thereby becoming major impediments to economic development. These micronutrient deficiencies continue to be of public health significance in India and nearly half of the world's micronutrient-deficient population is found in India. Vitamin A has a vital role in maintaining eye health and vision, growth, immune function and survival. Vitamin A deficiency is the most important cause of preventable blindness in young children. Incidence of morbidities, especially episodes of respiratory infection, diarrhea, measles and childhood mortality are closely associated with VAD. Iron deficiency anaemia is the most widely prevalent nutritional problem across the world affecting almost all age/sex/physiological groups; pre-school children, pregnant women and lactating mothers being the most vulnerable. About 60 – 70% of all children below 6 years of age suffer from various degrees of anaemia, significantly contributing to childhood morbidity and mortality.

Similarly, Iodine Deficiency Disorders (IDD), a group of disorders resulting mostly from an insufficient dietary supply of iodine is also a major public health problem in some parts of India. Iodine deficiency leads to a number of disorders including increased incidence of abortion, still birth, congenital malformations. Protein-energy malnutrition (PEM) in young children is currently the most important nutritional problem in most countries in Asia, Latin America, the Near East and Africa. Energy deficiency is the major cause. No accurate figures exist on the world prevalence of PEM, but World Health Organization (WHO) estimates suggest that the prevalence of PEM in children under five years of age in developing countries has fallen progressively. However, in some regions this fall in percentage has not been as rapid as the rise in population; thus in some regions, such as Africa and South Asia, the number of malnourished children has in fact risen.

- Failure to grow adequately is the first and most important manifestation of PEM. It often results from consuming too little food, especially energy, and is frequently aggravated by infections. A child who manifests growth failure may be shorter in length or height or lighter in weight than expected for a child of his or her age, or may be thinner than expected for height.
- The term protein-energy malnutrition entered the medical literature fairly recently, but the condition has been known for many years. In earlier literature it was called by other names, including protein-calorie malnutrition (PCM) and protein-energy deficiency.
- In the 1950s kwashiorkor began to get a great deal of attention. It was often described as the most important form of malnutrition, and it was believed to be caused mainly by protein deficiency. The solution seemed to be to make more protein-rich foods available to children at risk. This stress on

kwashiorkor and on protein led to a relative neglect of nutritional marasmus and adequate food and energy intakes for children.

- In most populations studied in poor countries, the point prevalence rate for kwashiorkor and nutritional marasmus combined is 1 to 5 percent, whereas 30 to 70 percent of children up to five years of age manifest what is now termed mild or moderate PEM, diagnosed mainly on the basis of anthropometric measurements.

### ***Children make your life important-Erma Bombeck***

- Almost one Child dies every minute.
- Despite rapid economic growth 9,00,000 newborn children die in India every year. This means more than one child dying every minute.
- Under-nutrition, respiratory infections, lack of immunization and health facilities are the underlying causes of these newborn deaths. However, most of these deaths are preventable, if you choose to support us in our efforts to ensure that every child born gets the best start in life.
- The challenge is tough. But a minute of your time and a little support every month is all that it takes to turn it around.
- After all, life is the most beautiful gift you can give to a child.
- Save a life by sparing a minute to pledge your support. Make your minute count!

### ***Conclusion***

Under nutrition is a major cause of death and disability in young children. When ranked among other causes, growth faltering and micronutrient deficiencies figure prominently, both because they are prevalent and because their consequences are devastating.

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## Effect of Prenatal Iron Deficiency on Mental Development of Children

\*Meena Kumari,

\*\*Nasreen Begum

### Abstract

Adequate nutrition for pregnant mothers and infants is necessary for normal brain development and cognitive functions. Pregnancy and infancy are important periods for the formation of the brain, laying the foundation for the development of cognitive, motor, and socio-emotional skills throughout childhood and adulthood. Several micronutrient deficiencies, especially those related to iodine and iron, are linked to different cognitive impairments, as well as to potential long-term behavioral changes. A mother who is deficient in iron stores early in her pregnancy may have a profound and long-lasting effect on the brain development of her child, even if the lack of iron is not sufficient to cause severe anemia. Low iron is so common that an estimated 35 percent to 58 percent of all healthy women show some degree of deficiency. And among women of childbearing age, one in five has iron-deficient anemia, a more serious condition. Around the world an estimated 2 billion women suffer with anemia. In India various studies conducted have shown a prevalence of 45-85% of pregnant mothers suffering with Anemia. It is found that the critical period begins in the weeks prior to conception and extends through the first trimester to the onset of the second trimester. Iron deficiency that starts in the third trimester did not seem to harm the developing brain. Given the consequences of developmental delays in cognitive function, such as, lower IQ, difficulties with learning and memory strategies to prevent prenatal iron deficiencies and to promote supplementation strategies to overcome poor iron status during key developmental periods, requires more attention.

**Key words:** iron deficiency, anemia, cognitive functions, anemia prevention.

### Introduction

This review is intended to provide critical summaries of the available experimental evidence pertinent to whether underlying linkages exist between individual micronutrient deficiencies during prenatal period and subsequent brain function. It was estimated that 41.8% of women during pregnancy suffer from anemia globally. Adequate nutrition for pregnant mothers and infants is necessary for normal brain development. Pregnancy and infancy are important periods for the formation of the brain, laying the foundation for the development of cognitive, motor, and socio-emotional skills throughout childhood and adulthood. Children with restricted development of these skills during early life are at risk for later neuropsychological problems, poor school achievement, early school dropout, low-skilled employment, and poor care of their own children, thus contributing to the intergenerational transmission of poverty. Many mothers and children in both low- and high-income countries are at risk for moderate under nutrition. Decreased fetal nutrition can be caused by poverty, maternal dieting, teenage pregnancy, and uterine vascular problems. Inadequate nutrition during infancy can result from poor infant feeding practices and/or the lack of physical or economic access to nutritious foods to complement breastfeeding. A large body of research suggests that an inadequate dietary supply of any of a number of essential micronutrients can adversely affect brain function (1-6). Some studies also suggest positive effects of multivitamin and mineral supplementation on cognitive function (7, 8). The brain is at its most vulnerable during critical periods of development, including the last trimester of fetal life and the first 2 y of childhood a period of rapid brain growth termed the "brain growth spurt" (9).

### Prevalence of Iron Deficiency and Iron Deficiency Anemia

Of all micronutrient deficiencies, iron deficiency is most prevalent worldwide. It affects all age groups and demographics. WHO has estimated that prevalence of anemia in developed and developing countries in pregnant women is 14 per cent in developed and 51 per cent in developing countries and 65-75 per cent in India. About one third of the global population (over 2 billion) is anemic (10). Prevalence of anemia in South Asian countries is among the highest in the world. WHO estimates that even among the South Asian countries, India has the highest prevalence of anemia. What is even more important is the fact that about half of the global maternal



deaths due to anemia occur in South Asian countries; India contributes to about 80 per cent of the maternal deaths due to anemia in South Asia. Prevalence of anemia in India is among the highest in the world.

Prevalence of anemia is higher among pregnant women and preschool children. Even among higher income educated segments of population about 50 per cent of children, adolescent girls and pregnant women are anemic. Inadequate dietary iron, foliate intake due to low vegetable consumption, perhaps low B<sub>12</sub> intake and poor bioavailability of dietary iron from the fiber, phytate rich Indian diets are the major factors responsible for high prevalence of anemia. Increased requirement of iron during growth and pregnancy and chronic blood loss contribute to higher prevalence in specific groups. Anemia begins in childhood, worsens during adolescence in girls and gets aggravated during pregnancy. Assuming that the absorption of iron is 8 per cent in pregnant women, their average dietary intake will meet only 30- 45 per cent of the requirement <sup>(11)</sup>

In India, anemia is directly or indirectly responsible for 40 per cent of maternal deaths. There is 8 to 10-fold increase in MMR when the Hb falls below 5 g/dl. Early detection and effective management of anemia in pregnancy can contribute substantially to reduction in maternal mortality. Maternal anemia is associated with poor intrauterine growth and increased risk of preterm births and low birth weight rates. This in turn results in higher prenatal morbidity and mortality, and higher infant mortality rate. Anemia and iron deficiency in the mother are not associated with significant degree of anemia in the children during neonatal period. However, iron stores in these neonates are low as iron content of breast milk in anemic women is low. <sup>(10,11)</sup>

### ***Effect of Prenatal Iron Deficiency on Mental Development of Children***

The prevalence as well as severity of anemia during pregnancy and lactation is grave. This is the period when brain cells grow and neurotransmitters develop, iron is essential for it. Iron is required for many essential bodily functions, including oxygen transport, ATP production, DNA synthesis, mitochondrial function, and protection of cells from oxidative damage, as discussed in many reviews. The average concentration of iron in the brain is far higher than that of all other metals, except zinc. As widely reviewed, iron is required by enzymes involved in specific brain functions, including myelination <sup>(20-22)</sup> and synthesis of the neurotransmitters serotonin (tryptophan hydroxylase) <sup>(23)</sup> and dopamine (tyrosine hydroxylase), a precursor to epinephrine and nor epinephrine <sup>(24)</sup>.

### ***Accumulation of iron by the brain***

Accumulation of iron by the human fetus begins early in pregnancy, increases dramatically in the third trimester, and continues after birth up to 30–50 y of age. Unless maternal iron deficiency is severe, term infants are generally considered to be protected from ID+A through the first few months of life, but as iron stores are used up, a sharp decline occurs in serum ferritin and the infant becomes vulnerable to deficiency if the supply of dietary iron is not adequate <sup>(25,26)</sup>. The timing of iron deficiency during pregnancy is critical. First, there is an important need for iron early in pregnancy for neural development. In a recent study in rats, four dietary-feeding regimens were used to render the developing fetuses iron deficient at different stages of gestation. Maternal iron restriction beginning prior to conception and during the first one-third of pregnancy was associated with embryonic iron deficiency, postnatal anemia, reduced iron levels in the central nervous system, and decreased neural conduction velocities in an auditory brainstem response test conducted at postnatal day 45 (Mihaila et al., 2011).

Importantly, the functional neural impairments were not induced when maternal iron restriction was initiated at the beginning of the last one-third of pregnancy. <sup>(27)</sup> One of the first studies to look at the effect of iron deficiency on cognition in humans used the Bayley Scales of Infant Development, which assess motor, language, and cognitive development in infants and toddlers, and compared 9–26 month old infants who were given iron supplements to those given a placebo. Each group was tested and then re-tested within 8 days of the initial exam. The results showed an improved scores within the Mental Development Index for the iron supplemented group (Oski and Honig, 1978), which resulted in a surge of interest in this topic (Yehuda et al., 2010). Many different studies have looked at iron deficiency during various times of development; however, the most sensitive period (and the period that can cause the most irreversible damage) is the neonatal period, which is between 0 and 24 months of age (Pollitt, 1993). Although supplementation with iron has been shown to correct some of the

cognitive deficits during this period, lower I.Q. and achievement test scores have still been found after treatment (Lozoff, 1989).

Iron as a micronutrient is required for regulation of brain neurotransmitters by altering the pathway enzymatic system. To study iron deficiency, a rat model was developed to create iron deficiency (low hepatic iron) without change in hematocrit, Agarwal (2001). In post-weaning rats, iron decreased irreversibly in all brain parts except medulla oblongata and pons. Susceptibility to iron deficiency showed variable reduction in different parts of the brain: corpus striatum, 32%; midbrain, 21%; hypothalamus, 19%; cerebellum, 18%; cerebral cortex, 17%; and hippocampus, 15%. Alterations in brain iron content also induced significant alterations in copper (Cu), zinc (Zn), calcium (Ca), manganese (Mn), lead (Pb) and cadmium (Cd) Shukla et al., (1989).

Many studies have investigated the impact of neonatal iron status at various times during this critical period and the effects that decreased iron levels have on cognition. In Papua New Guinea, infants who were given an iron dextran shot at 2 months of age had longer attention spans at 1 year of age when compared to control (Heywood et al., 1989). A study done in Costa Rica found that infants who had lower iron levels scored lower in the Bayley Scales of Infant Development tests in both cognitive and motor skill tests (Lozoff, 1989). In Guatemala, researchers found that an intramuscular injection of iron dextran improved Bayley Scales of Infant Development test scores in babies 6–24 months old after just one week, while oral supplementation did not show an effect within the week studied (Lozoff et al., 1982). In Chile, infants 3 months of age were given either iron fortified formula or control diet for 12 months (Walter et al., 1983). At the conclusion of the diet intervention, Bayley Scales of Infant Development were administered. After the initial test, all infants received a trial of orally administered ferrous sulfate daily and then retested within 15 days (Walter et al., 1983). A similar relationship between low iron levels and lower Bayley Scales of Infant Development scores were found (Walter et al., 1983).

Studies in Indonesia found that 8 weeks of oral supplementation of iron in anemic preschool aged children reduced deficits in visual attention and concept acquisition compared to children who were not given supplementation (Soewondo et al., 1989). Also in Indonesia, when 12–18 month old infants that were diagnosed with iron deficiency anemia were given an oral iron intervention, Bayley Scales of Infant Development scores significantly improved compared to those given a placebo, even after only 4 months of supplementation (Idjradinata and Pollitt, 1993). Nine and twelve month old infants were tested for their ability to discriminate a highly familiar stimulus, their mother's face, from a stranger's face using an electroencephalogram (Burden et al., 2007). At 9 months infants that were iron sufficient showed greater attention response to the mother's face and greater updating of memory to the stranger's face, while iron deficient infants did not show this response until 12 months of age, suggesting a delay in cognitive development (Burden et al., 2007). It has also been demonstrated that infants with low serum ferrite concentrations have abnormal auditory recognition memory (Siddappa et al., 2004). The infants in this study did not discriminate a familiar stimulus (mother's voice) from a novel stimulus (stranger's voice) with the same vehemence as an iron sufficient infant (Siddappa et al., 2004).

These findings suggest abnormalities in structures that mediate recognition and memory function, including the hippocampus (Georgieff, 2008). Being iron deficient at birth seems to cause long term deficits as well. Five year old children, who were born either iron deficient, scored lower on tests of language ability, fine-motor skills, and tractability, when compared to children who were iron sufficient at birth (Tamura et al., 2002). In Israel, it was found that children who were born premature and had low ferrite levels at birth performed significantly worse on tests involving spatial cognition and processing of auditory signals when tested at 9 to 10 years of age, even though their hemoglobin levels had returned to normal (Armony-Sivan et al., 2004; Yehuda and Yehuda, 2006). Another study showed similar results in that Costa Rican teens that were severely iron deficient during infancy, despite resolution of anemia while an infant, showed deficits when given neurocognitive tests (Trail Making test, Intra-Extra-dimensional Shift, Stockings of Cambridge, Spatial Working Memory, Rapid Visual Information Processing, Pattern Recognition Memory, and Spatial Recognition Memory) at the age of 19 years old, when compared to teens that were iron sufficient during infancy (Lukowski et al., 2010).

### ***Prevention and Management of Anemia in Pregnancy***

Children who do not receive adequate nutrition during prenatal life are at risk for failing to reach their developmental potential in cognitive, motor, and socio-emotional abilities. The development of these abilities is

linked to academic achievement and economic productivity. Therefore, preventing or reversing this loss in early childhood is crucial for fostering economic development in low- and middle-income countries as well as reducing economic disparities in high-income countries. Food supplementation programs and Iron supplementation programs for low-income families have been found to improve children's IQ, behavior, and school performance. Several studies have evaluated such programs by comparing a child born while the mother participated in the program to a sibling born before participation. These studies demonstrated a benefit on school achievement in Canada, higher IQ, higher estimated learning potential, and fewer behavior problems at age 6 to 8 years in the U.S. and higher IQ and school achievement in the first year of school in Mexico <sup>(27)</sup> Although these sibling studies suggest benefits of food supplementation in early life, the trials that provided supplements to both mothers during pregnancy and children throughout the first 2 years of life showed the strongest evidence. In a rural South Asian population, overall outcomes of general intellectual test performance and aspects of executive and motor function in 7- to 9-year-old children were better among those whose mothers had received prenatal iron and folic acid supplementation compared with controls. Based on this emerging data it can be believed that current practices of iron supplementation to targeted groups must be modified as follows:

1 - The target for iron supplementation should be expanded to cover all women of fertile age who might become pregnant, with a different philosophy and practice of iron supplementation so they enter pregnancy with iron reserves.

2 - Current philosophy of iron supplementation is basically therapeutically oriented, dominated by the aim of correcting established iron deficiency: short courses, large daily doses, rigid schedule and centered in the health network. This philosophy must be changed to one that is primarily oriented to prevent iron deficiency: longer courses, smaller doses possibly administered intermittently, flexible schedules and centered in community organizations. Preventive supplementation should increase coverage (47% of the rural population in the developing world has no access to established health care networks). In all cases, the adequate supply and distribution of tablets and motivation of suppliers and recipients are essential.

The following interventions are promising for preventing developmental loss. However, additional robust research in low- and middle-income countries that evaluates the long-term effects of these interventions is needed.

- Supplementation with iron and folic acid and/or multiple micronutrients during pregnancy
- Provision of multiple micronutrients (in addition to iron) during infancy
- Supplementation with essential fatty acids during pregnancy and infancy
- Fortified food supplements provided during pregnancy and infancy

Strategies to improve the home environment and the quality of caregiver-infant interaction are also recommended to complement and enhance the effect of nutrition interventions and to address the negative effects of adverse environmental conditions (for example, poverty and low maternal education) that often co-exist in populations where under nutrition is common

#### **Conclusion:**

1) Adequate nutrition during pregnancy and the first two years is necessary for normal brain development, laying the foundation for future cognitive and social ability, school success, and productivity.

2) Under nutrition may influence brain development both directly and indirectly.

- Nutrient deficiencies directly affect neuro developmental processes.
- Under nutrition affects children's experiences and behavior, which in turn influence brain development.

3) Priority should be given to the prevention of severe acute malnutrition iron-deficiency anemia, and iodine deficiency. There is strong evidence that they affect the developing brain and compromise long-term cognitive, motor, and socio-emotional development.

4) There is growing evidence that breastfeeding promotion, pre- and post-natal multiple micronutrient supplementation, pre- and post-natal supplementation with essential fatty acids, and fortified food supplements provided during pregnancy and to the child from 6 to 24 months of age can have beneficial effects on early child development. Few data exist on the long-term effects of these interventions.

5) An integrated approach is likely to be most effective for promoting optimal child development, i.e., interventions that combine improved nutrition with other strategies such as enhancing the home environment and the quality of caregiver-child interaction.

All children should have the opportunity to fulfill their developmental potential. Integrated interventions targeting multiple risk factors, including nutrition, are necessary to reduce inequality and promote cognitive, motor, and socio-emotional development in disadvantaged children worldwide.

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## Impact of Malnutrition on Academic Progress of Children

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### **Abstract:**

*Good nutrition is vital for the cognitive and physical development and has both short and long term impacts on the quality of life experienced by individuals. Although good nutrition is vital throughout the course of individual's lives it is particularly important during the period of conception until when the child is approximately two years of age. Pregnancy and infancy are the most important periods for brain development. Health and nutrition during early childhood is a strong reflection of countries' level of development as these conditions are directly linked to existing policies, programmes and national plans which focus on early childhood well-being and children's rights.*

*Some children affected by malnutrition do survive, but suffer lifelong physical and cognitive impairments because deficiencies in nutrients that they suffered early in their lives when their growing bodies and minds were most vulnerable. For children who start their lives malnourished, the negative effects are largely irreversible. Mothers and babies need good nutrition to lay the foundation for the child's future cognitive, motor and social skills, school success and productivity. Children with restricted brain development in early life are at risk of developing neurological problems, poor school achievement, early school dropout, low skilled employment and poor care of their own children, thus contributing to the intergenerational transmission of poverty.*

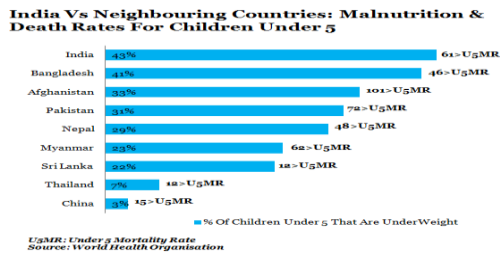
**Key words:** *Malnutrition, deficiency, metabolism, maternal education, supplementation, Anaemia Rates.*

### **Introduction**

**Malnutrition** or **malnourishment** is a condition that results from eating a diet in which nutrients are not enough or are too much such that it causes health problems. The nutrients involved can include: calories, protein, carbohydrates, vitamins or minerals. It is often used specifically to refer to under nutrition where there are not enough calories, protein or micronutrients; however, it also includes over nutrition. If under nutrition occurs during either pregnancy or before the age of two years of age it may result in permanent problems with physical and mental development. Extreme undernourishment, known as starvation, may have symptoms that include: a short height, thin body, very poor energy levels, and swollen legs and abdomen. People also often get infections and are frequently cold. The symptoms of micronutrient deficiencies depend on the micronutrient that is lacking. Condition resulting from inadequate diet or from inability to absorb or metabolize nutrients. Food intake may be insufficient to supply calories or protein or deficient in one or more essential vitamins or minerals. The latter case can lead to specific nutritional deficiency diseases (including beriberi, pellagra, rickets & scurvy). Metabolic defects, especially of the digestive system, liver, kidney, or red blood cells, prevent proper digestion, absorption, and metabolism of nutrients.

### **Current Statistics: Malnutrition and Anaemia Rates Are High among Children**

- 38.4% of children under age three are stunted, that is too short for their age and 46% are underweight that is too thin for their age. Both indicators have slightly improved from 1998-99.
- Wasting, defined as an abnormally low weight for the child's height affects 19% of children under age three with a slight deterioration from 1998-99.
- Overall, girls and boys are about equally likely to be undernourished. Under-nutrition is higher in rural areas and is strongly correlated with the level of maternal education showing a two-fold difference between non-educated mothers and 10-year and above educated mothers. This may be linked to a stark difference in access to a nutritious diet and complementary feeding at 6-9 months.
- Most children under age three are anaemic (79.2%). The prevalence is slightly higher in rural areas and among non-educated mothers. High prevalence of anaemia may be linked to poor variety of diet, poor hygienic conditions and limited access to iron supplementation.



### ***A significant percentage of Women and Men are either too Thin or too Fat***

- Malnutrition and anaemia are common among Indian adults. Both malnutrition and anaemia have increased among women since 1998-99.
- 33% of married women and 28% of men are too thin, according to the body mass index (BMI), an indicator derived from height and weight measurements. Underweight is most common among the poor, the rural population, adults who have no education and scheduled castes and scheduled tribes.
- Overweight and obesity, the other side of malnutrition, is a growing problem in India, affecting almost 15% of women and 12% of men. Overweight and obesity are most common in urban areas, in wealthier households, and among older adults, Sikhs and those with more education.

### ***Causes:***

Major causes of malnutrition include poverty and food prices, dietary practices and agricultural productivity, with many individual cases being a mixture of several factors. Clinical malnutrition, such as in cachexia, is a major burden also in developed countries. Various scales of analysis also have to be considered in order to determine the socio political causes of malnutrition. For example, the population of a community may be at risk if the area lacks health-related services, but on a smaller scale certain households or individuals may be at even higher risk due to differences in income levels, access to land, or levels of education. The people that are majorly affected by this malnutrition are children below 12 years. The affects of malnutrition varies from one age group to other age group. The 4 most important diseases caused due to malnourishment are **KWASHIORKAR, MARASMUS, Pellagra and Scurvy**.

Malnutrition can be a consequence of health issues such as gastroenteritis or chronic illness, especially the HIV/AIDS pandemic. Diarrhea and other infections can cause malnutrition through decreased nutrient absorption, decreased intake of food, increased metabolic requirements, and direct nutrient loss. Parasite infections, in particular intestinal worm infections (helminthiasis), can also lead to malnutrition. A leading cause of diarrhea and intestinal worm infections in children in developing countries is lack of sanitation and hygiene. People may become malnourished due to abnormal nutrient loss (due to diarrhea or chronic illness) or increased energy expenditure (secondary malnutrition).

### ***Impact on Children:***

Malnutrition is one of the major problems being faced by the whole world. The future of the world the children are the major victims of this malnutrition. There are several surveys were conducted and still being conducted. The EFA Global Monitoring Report (UNESCO 2011) states that more than a quarter of children below fifteen years of age in sub-Saharan Africa are underweight due to poor diet and malnutrition, making them more vulnerable to disease and less able to concentrate at school. Children who do not consume adequate amounts of key nutrients, including calcium, potassium and vitamin C may be unable to work to their full potential at school (Nabarro et al. 2012).

A study by Connell (2010:127) revealed that 34 percent of low birth weight children were either repeating grades or placed in special education classrooms while only 14 percent of normal birth-weight children experienced the same outcomes. Another research also reports elevated levels of grade repetition as a result of low birth weight due to poor nutrition (Bray et al., 2010, Duncan et al., 2008). Knowing more about what nutritional deficiencies can lead to, in terms of learning, will help families to feed their children adequately to succeed in class. This shows that nutrition is of paramount importance in the academic performance of children.

A number of studies in Latin America, Africa and the U.S reported that on intelligence tests, children with a history of malnutrition attained lower scores than children of similar social and economic status who were properly nourished. Thus protein energy malnutrition, iron deficiency, anaemia, Vitamin A deficiency, these poverty related conditions decrease resistance to disease in general. Malnutrition therefore causes illness, brain damage, delayed physical growth, delayed development of motor skills and delayed intellectual development

In a project carried out by the Institute of Central America and Panama in 2008, children and young adults in Guatemala who had received nutritional supplements at infancy were studied to assess the influence of early diet and poverty on later intellectual development. Individuals who regularly consumed a highly nutritious supplement called Atoll performed well on most tests. But the performance of those given a less nutritious supplement called fresco varied with poverty level (Ferguson et al. 2012: 453).

Evidently, good nutrition early in life can help counteract the destructive effects of poverty on intellectual development. Those who consumed Atole scored significantly higher than those who received Fresco, an indication that poor nutrition in infancy can subsequently undermine the benefits of schooling. There is therefore ample evidence to support the view that early nutrition when children are already at school have strong beneficial effects on their ability to learn and conversely, poorly fed children find it difficult to concentrate at school, which provides strong support for school feeding schemes in poor countries and communities.

Poverty leads to malnutrition which causes an array of psychosocial problems like illness, brain damage, delayed physical growth, delayed development of motor skills and delayed intellectual development. Malnutrition therefore alters intellectual development by interfering with overall health as well as the child's energy level, rate of motor development and rate of growth. In addition, poverty/ low economic status can exacerbate all these factors, placing impoverished children at particular risk for cognitive impairment later in life. On an annual basis malnutrition contributes to the death of 5.6 million children under the age of five in non-industrialized societies. A malnourished child is up to 10 times as likely to die from an easily preventable or treatable disease as a well-nourished child and a chronically malnourished child is more vulnerable to acute malnutrition during food shortages, economic crises and other emergencies.

In the developing world, malnutrition causes millions of children to develop too slowly and prevents millions of people from achieving their full development potential. Children are particularly vulnerable to the effects of malnutrition predominantly those of infectious secondary immune deficiency, learning deficits and, subsequently, school drop-out. Furthermore, malnutrition risks girls' ability to have healthy children in the future thus perpetuating the generational cycle of poverty. Alternatively good nutrition, is a fundamental component of survival, health and development for current and future generations. Good nutrition reduces the risks women face during pregnancy and labour and helps their children to develop better physically and mentally.

Good nutrition has economic benefits, as a well nourished population is more productive individually, it has fewer ongoing health issues and associated care costs and higher economic performance levels. It is estimated that good infant and child nutrition leads to 2–3% growth annually in the economic wealth of developing countries. Additionally addressing malnutrition in early life can increase lifetime earnings by 20%. Persistent and worsening malnutrition in developing countries is a fundamental obstacle to achieving a number of the Millennium Development Goals (MDGs). MDG 1 includes halving the proportion of people living in hunger. MDG 2 is to ensure all children complete primary school. MDG 4 aims to reduce the world's 1990 under-5 mortality rate by two thirds. MDG 5 aims to reduce the 1990 maternal mortality ratio by three quarters. And MDG 6 is to halt and begin to reverse the spread of HIV/AIDS and the incidence of malaria and other major diseases. Improving nutrition assists progress towards achieving all of these MDGs.

**Forms of malnourishment:** Malnutrition takes several forms, however it applies to persons suffering chronic loss of muscle mass and subcutaneous fat owing to insufficient energy and protein intake. In its

early acute stages, malnutrition affects only weight and body composition, however when it becomes more deeply chronic, individuals suffer from altered stunted growth, height and impaired physical and intellectual ability.

**Stunting** – Refers to when a child is too short for their age caused by an inadequate diet and frequent infections. Most commonly stunting occurs before age 2, and the effects are mostly irreversible. Effects include delayed motor development, impaired cognitive function and poor school performance. 171 million children – 27 percent of all children globally are stunted.

**Wasting** - Refers to when a child is too low for their height due to acute malnutrition. Wasting is a strong predictor of mortality among children under 5. It is usually caused by severe food shortage or disease. In total, over 60 million children – 10 percent of all children globally are wasted.

**Underweight** – Refers to when the weight of a child is too low for his/her age due to stunting, wasting or both conditions. Weight is a sensitive indicator of short-term/acute under nutrition. Deficits in height (stunting) are difficult to correct; deficits in weight (underweight) can be addressed if nutrition and health are improved later on in childhood. Throughout the world, more than 100 million children are underweight and being underweight is associated with 19 % of child deaths.

**Micronutrient deficiency** - Refers to when a child lacks essential vitamins or minerals including vitamin A, iron and zinc. Micronutrient deficiencies are due to a long-term lack of nutritious food or infections such as worms. They are associated with 10 % of all children's deaths, or approximately one-third of all child deaths due to malnutrition. Protein-energy malnutrition (PEM), vitamin A deficiency, iodine deficiency disorders (IDD) and nutritional anaemias which primarily result from iron deficiency or iron losses are the most common serious nutritional problems in almost all countries of Asia, Africa, Latin America and the Near East.

#### ***The current situation of child malnutrition in the world***

One in four of the world's children are chronically malnourished, or stunted. These children have not received the essential nutrients they require causing their bodies and brains to not develop properly. Throughout the world 171 million children are experiencing chronic malnutrition meaning that a large portion of the world's children are not only shorter than they otherwise would be, but face long term cognitive impairment. More than 80 countries in the developing world have child stunting rates of 20 percent or more. Thirty of these countries have very high stunting rates of 40 percent or more. Four countries – Afghanistan, Burundi, East Timor and Yemen – have stunting rates close to 60 percent. Up to a third of children in Asia are stunted (100 million of the global total) and in Africa, almost 2 in every 5 children are stunted equaling a total of 60 million children.

Due to issues of food insecurity and children's sensitivity to even short term food constraints, it is argued that analysis of health and nutrition indicators should include the environmental and social determinants of disease, mortality, poor population groups' quality of life and the yawning inequality gaps between and within countries. These indicators are effective to characterize the type of malnutrition, the people who suffer from it and where they are to obtain an indication of the level of risk to various population groups and accordingly an overview of the situation for the purposes of diagnosis and formulation of overall evaluation strategies – some differentiated and others targeted. It is challenging to make an accurate assessment of a person's nutritional status. As a concept it may can be gauged through a series of clinical, physical or functional characteristics, which may be used as additional indicators if a threshold value for separating the malnourished from the well-nourished is incorporated. It is necessary to include mothers and children when measuring child nutrition due to the dependence of the nutritional well-being of children on their mothers during first 1000 days, comprising pregnancy and the first two years of life.

***Brief Brazilian feeding status scenario:*** According to data from the National Household Sample Survey / PNAD of 2001, 74.6% of the economically active population earns up to three minimum wages; of those, 35.7% earn up to one minimum wage and 24.1% earn less than one minimum wage.

If we compare the purchasing power of a minimum wage (MW) to the basic-needs grocery package, we notice that the wage earners can't afford it with what they earn. Its cost in 1996 ranged close to 100% of



the minimum wage. In 2002, the minimum wage corresponded to 77% of the packages price, according to Disease. According to the data from PNAD of 2001, it can be verified that, in the Northeast, the workers who earn the equivalent of one minimum wage or less represent 41% of the occupied labour force. In other words, almost half of that regions population can't afford a basic-needs grocery package, since the MW is enough to pay only for a part of its foods. Besides, when they analyze the items of the basic-needs grocery package idealized to serve as a reference to calculate the minimum wage, Moyses & Collares (1997) reveal that its composition is not enough to feed the idealized family (a couple and two children) as a basis for the calculation. The basic-needs grocery package idealized by the law includes: 6 kg of meat; 4.5 kg of beans; 3 kg of rice; 7.5 l of milk; 1.5 kg of wheat flour; 6 kg of potatoes; 9 kg of tomatoes; 6 kg of bread; 600 g of coffee; 3 kg of sugar; 750 g of oil; 750 g of butter and 7.5 dozens of bananas. Dividing that package by the four people, in relation to the most calorific foods, we have: 50 g of meat per person per day, as well as two glasses of milk and three bananas per person per day.

In short, an insufficient basic-needs grocery package is almost inaccessible to a considerable share of the Brazilian workers. For that reason, the statements that indicate incorrect eating habits, the inexistence of eating patterns, the lack of care by the mother or neglect in the children feeding as the malnutrition causes in Brazil must be reviewed. In other words, malnutrition is caused by a social exclusion scenario that turns the access of a considerable share of the population to adequate feeding in viable. Another set of explanations that became the object of scientific challenge involves, on the one hand, the confusion between two distinct concepts – hunger and malnutrition are used as synonyms , and, on the other hand, the statement that malnutrition affects all Brazilian poor people.

#### ***Confusion between hunger and malnutrition***

The conceptual confusion between malnutrition and hunger is present in the statements by teachers and health practitioners and even in the public policies (cf. Moyses & Collares, 1997). It is stated that every poor child starves and/or is malnourished, when people try to explain his or her learning problems at school. They still believe that school snack will indeed solve the problems. The confusion is not limited to a conceptual mistake. It also conceals the fact that a reduced number of currently or previously malnourished children patronize school. In the 1980's, studies already registered that only between 10% and 15% of the children enrolled in the public schools were currently or previously malnourished. However, those children suffered from moderate or light malnutrition. In other words, they were not among the children so seriously malnourished that this situation would have left irreversible damages in the central nervous system. those children often die. Moyses & Collares (1997) explain: hunger is the basic need for food which, when not fulfilled, reduces the availability of any human being for both the daily and the intellectual activities. However, once that need is fulfilled, all its negative effects cease, without any damages.

Malnutrition, in turn, occurs when hunger goes on in such intensity and for such a long period of time that they start to interfere in the bodies energy supply. to keep its metabolism working, the body adopts several "expenditure contention" measures. In the lighter cases (the so –called level 1 or light malnutrition), it reduces the growth rate: the body maintains all the metabolism normal at the expense of sacrificing the growth rate. But the children who suffer from serious malnutrition and, because of it, from neurological impairment are not in school, among other reasons, because the infant mortality rate is very high. Thus, the school snack offered does not reach them. It has also been insufficient to change the nutritional status of any child. In 1986, each child received, in the food supplement program, only 12 kg per .We know that the school snack can solve, however, the "daily hunger", that is, the empty stomach problem, which jeopardizes any human beings awareness capacity and disposition to learn.

#### ***Malnutrition and development disorders***

Studies (Dobbing, 1972) show that only in the serious malnutrition cases there are changes in the central nervous system (responsible for the intellectual functions of the individuals) that fall upon the brains anatomy (reduction of the weight, size, volume, number of cells, amount of myelin, etc.). But those anatomic changes don't allow for any conclusion about the effects on the functioning of the brain. It is not known how the nervous synapses produce intelligent actions. There is no consensus about how the

environmental stimuli cause functional changes in the brain (if there's an increase of nervous junctions, if they activate skills that would be activated if there was no opportunity for use). In short, it is not known to what extent the environmental stimuli; the cultural and educational opportunities change the nervous system. However, studies (Stein et al., 1975) show that children who have suffered from serious malnutrition early in their lives and, therefore, had irreversible changes in their nervous system, but weren't poor, and were tested when they were 18 years old, revealed an intellectual development equivalent to that of the normal adolescents, and presented good academic performance. Therefore, it is necessary to question the intellectual performance evaluation methods of the currently or previously malnourished children, to avoid the mistaken conclusion, in such countries as Brazil, that the children are deficient.

### ***The several material shortages and children malnutrition***

The proposition that poverty causes linguistic, cognitive and emotional deficiencies has already been exhaustively discussed, when applied to explain the poor academic performance of the lower classes children (Cunha, 1977; Houston, 1997; Patto, 1990, 1997; Sawaya, 2001, among others). Those authors claim that there's a lack of solid scientific evidences to attribute to the material shortage and to the precarious life conditions of the families and their children from the lower classes a supposed deficit or delay in the cognitive and linguistic development and to relate the latter to the causes of the children's poor academic performance. However, those discussions didn't prevent the study of the intra-school causes in the production of the schooling difficulties of those children, to be neglected for a long time.

A reorientation in the focus of the surveys about the causes of the academic failure of the huge contingent of poor children revealed the countless school mechanisms and processes responsible for learning difficulty (Patto, 1990). The difficulties identified in the pedagogical action no longer allow us to state that the school problems are problems of the poor children and their families, considered in an isolated manner. Among other factors, the assumption that the students don't have certain skills that they often do have, the expectation that the clients don't learn, the bureaucratic obstacles to achieve the works at school – such as the constant displacement of the teachers throughout the school year, the frequent changes in educational programs and projects, the excessive hierarchy of the functions and the authoritarian relations that circulate through all levels of the school structure, besides the low remuneration of the teachers and their professional devaluation – produce a "familiarization of the pauperized student" (Patto, 1990).

However, that reality is not well-known (Azanha, 1995), even among health practitioners to whom the children with difficulties at school are directed. Even with a high professional background level, such as in the case found in a large town of the São Paulo state inland, the psychologists interviewed in the survey (Cabral & Sawaya, 2001) ignore the school reality and still attribute the supposed deficiencies of the children to their poor academic performance. In a study that we carried out, we registered that 63% of the practitioners have specialization and graduate courses in their respective fields: psycho-pedagogy and clinic psychology. Among them, 26% have a masters degree and 5%, a doctorate degree (Cabral & Sawaya, 2001). Asked about the complaints that lead the schools to direct, every year, many children to the psychological attendance services, they invariably allege problems of the child and his or her health conditions, feeding and family structure problems. School is secondary in the evaluation. When they do refer to it, they seldom even mention the intra-school causes that produce the difficulties presented and that have direct repercussion on the behavior of the children, such as the constant teacher change in a same class during the school year.

The inadequacy of the diagnoses centered in medical issues to explain the learning problems of the great contingent of initial grades students, directed to the health services, and of the adopted measures, has also already been identified (Moyses & Collares, 1997). But the assumption of the existence of neurological diseases still lead to the countless directions of children with poor academic performance to computerized tomography exams (used to identify brain damages or bad functioning) and psychiatric treatments. We found children enrolled in special classes (destined to people with special needs) to whom microcephaly is attributed without any medical diagnosis proof: the only symptom verified is "being disorderly, not being interested in school". Many times, we find in the classes children who are indifferent, sleepy, cognitively confused, because they are under the effect of psychiatric drugs without a proved diagnosis.

Also widely questioned by the linguists are the complaints, very frequent both in the health services and in school, according to which poor mothers and children suffer from language impairments, since nobody understands what they say or because they don't follow the indications of the doctors, nutritionists, psychologists and social assistants. Such statements are based on assumptions that are not scientifically supported in linguistic studies (Cagliari, 1997; Houston, 1997). The mistakes identified as a linguistic deficit are nothing but phonetic and syntactic errors, and, therefore, are not linguistic structure failures that could jeopardize the understanding and the logical framework of the statements. Those authors also believe there is no pertinence in the statements according to which a restrictive linguistic performance, in which few words and simple structures are used, is a sign of cognitive impairment. In order to communicate, every speaker uses highly complex and abstract cognitive processes, and the ability to understand the language overcomes the verbal performance.

***The factors often considered as causes of the high malnutrition and poverty rates***

For example, few cognitive resources of the mothers, their affective problems and their absence of family structure – are questioned by the very knowledge developed in the direct contact with those families and their children, in the neighborhoods. The extended familiarity with the researcher – who avoids long hours to listen to the stories of the families, their explanations about life, their difficulties and their survival strategies – reveal a distinct universe from what would be characterized by shortage in all senses.

The same children who are identified at school as suffering from development disorders and from the lack of logical thinking can be found working in the fair, selling products in the traffic lights, changing money, making math operations without a calculator. They invent stories, make puns, tell jokes, use metaphors and resort to folk or country songs to dissuade the adults from an aggression, to get food, to make a community of listener's laugh, since they must conquer their space and their survival. They only don't use language that proves slyness and intelligence, but they also use the word as a resource in the quest for their survival in very adverse conditions. In the same way, the normative models used to evaluate the families, which designate them as without structure since they don't correspond to the model of the nuclear family, are questionable (Mello, 1992). The model – considered as ideal and source of all the mental health virtues and guarantees – prevents us from seeing that the family rearrangements guarantee subsistence and the affective ties. As a true survival strategy, the reorganization of the family nucleus – by including relatives, pals and other possible relationships –, more than revealing anomy or lack of structure, reveal possibilities in the support, in the preservation of the affective ties, possibilities of changes and mutual help among their members.

Far from stating that misery has no devastating effects on the life of the individuals, we are calling the attention both to the social exclusion mechanisms, and to the strategies used by the poor families in their daily struggle to survive and to have a worthy life. The understanding of the social processes that generate exclusion and of the ways to face adverse life conditions of the lower classes families must be, from that perspective, the starting point for the social actions against poverty and malnutrition. Some data reveal that, despite the countless problems that population faces, in the last few decades there was a decline in the malnutrition rate in the population under five years old. The explanations that are often attributed, in the health area, to the decline of the malnutrition rate in Brazil are the rural exodus and the greater access to the health services, even though during the same period there was an increase of poverty and of unemployment in Brazil.

Thus, the improvement of the malnutrition rates can't be explained by the improvement in the income conditions of that population. Rather, the decline must also be considered according to the countless survival strategies that the low income populations find to avoid hunger and absolute misery, among which some have already been mentioned, such as the family rearrangements. However, if we can already rely on survey results that reveal the limits of some statements about malnutrition and the poor academic performance, allowing for a broader understanding of the problem, the great challenge is to find strategies that provide a change in the conceptions that still guide educational policies, attendance programs to poor families and instruments used to know them. It's in this sense that we have tried to move in recent years, be

it through the qualification of teachers or through the development of projects in the teaching units themselves.

***For an educative project among education and health practitioners, parents and children***

Our proposition is a different approach to the school failure problem. The intervention projects to fight it must emphasize not the individuals alone, but the relations, the practices, the conceptions that develop in the scope of family/neighbourhood/health and academic institutions, supported by a critical reading of the society in which they are included. The families are part of a broader context. They live in a neighbourhood and interact with institutions that, in turn, relate to them according to conceptions that guide their actions. The behaviours and the relations that the practitioners verified in the mothers and in the families ("there was no pre-natal care", "she doesn't take her medicine", "she doesn't follow the diet proposed by the health unit", "she resorts to midwives", etc.) may only be understood and changed when the multiple processes that produce the conditions of the families are considered. Because survey data reveal that, many times, the very relations established between public institutions and poor families contribute with the verified ideas and behaviours: lack of hope, low self-esteem, resignation, resulting from the sense of guilt, of the lack of qualification, of the humiliation, of terrifying statements ("your son has development disorders", "he's not learning, he has no logical thinking", etc.). The mother and the child are characters involved in several circumstances and actions which lead to malnutrition.

In general, the role of the practitioner is limited to punctual interventions, centered in the nutritional re-education, in the development of eating and hygiene habits, as if those actions were enough for the social reintegration of the mother and the child. The attempts to develop positive behaviours are often based on the assumption that they don't exist. The punctual actions eventually don't foster the questioning of the very quality of the academic and health services offered to the low income population, to the extent that they ignore the multiplicity of social, economic and political factors involved in the production of malnutrition and in the low educational quality. A first issue that teachers and health practitioners must face is the development of a critical view of the role they play next to the poor populations and to their malnourished children and/or with poor academic performance.

We have seen that, even though we can already rely on a body of critical knowledge's about the approach and acting forms next to those populations, the ideas that still guide many actions go in the direction of blaming and of taking for granted the ignorance of the mother and the lack of family structure, transforming the assumptions in facts and identifying them as sources of the children's problems. If, on the one hand, according to our experience, the review of those ideas is considered essential for practical changes to occur, on the other hand, it reveals itself to be ineffective when it is implemented only by means of qualification courses.

One of the work strategies that we have been using to qualify teachers is to foster reflections in the schools and neighbourhoods themselves, where the families, the teachers, the students and the technical team are heard. The traditional interview and observation techniques, such as the tests, the anamneses and the closed interviews, are substituted for orientations brought according to anthropological studies which, in school psychology, has been done based on surveys such as those carried out by ezpeleta & Rockwell (1989), among others. The investigation of the poor academic performance causes, as well as of other problems, must be done by plunging into the daily life of the teaching institutions and knowing directly the people involved, in their neighbourhoods, in their houses, in their relations with the neighbourhood and with the public institutions. By means of the extended familiarity and of the creation of dialogue spaces, we identified the presence of biases against poor families, which become resources used by the teachers and by the school to free themselves from the blame that falls upon themselves. An easy target of an education that doesn't produce results, the teachers appoint the mother, the family that they often don't know and the supposed malnutrition of the children as the causes of the academic problems.

To the discovery that, at school, the act of directing the children to the health services is often motivated by indiscipline complaints, it should be added the verification that, in the health services, the children undergo not only psychological exams, but also medical exams that identify doubtful diseases. The

punctual analyses and the often hurried diagnoses, which result from endless lines in the health services, go back to the school as diagnoses that confirm the previous hypotheses: those are children with problems and impairments, which justifies the act of directing them to reinforcement programs, acceleration classes, special classes, therapeutic attendances, etc. Countless reports of those stories and of the explanations associated to them reveal a profound lack of knowledge of the real causes of the schooling difficulties of the poor children, such as the constant class and school change and the high teacher mobility throughout the entire school year, among so many other aspects already identified by many studies (Patto, 1990; Machado, 1994; among others).

So, if the investigation of the causes of the school failure made us refer to the conceptions, relations and practices present in the school institutions and in the society, the debate on malnutrition turns necessary for us to study the broader context that produced it. Thus, we found cases in which the malnutrition of the children occurs in a complex context, with such situations as the family's eviction from the slum tenement, flood in the wooden shack, unemployment, the choice between buying a plot and feeding the children and, in addition to that, the extended breastfeeding due to the lack of resources to feed everybody. The eating inconstancy and the irregularity of certain foods, such as meat, might not be a passing episode, but are related to the financial impossibility to buy the foods and prepare them.

For that reason, if the school failure is produced by school processes that create difficulties, malnutrition can also be generated by processes that produce difficulties. For example, we verified that the explanation for the fact that many pregnant women and adolescents don't do the pre-natal exam can't be generalized in statements about disdain for the medical services, lack of interest, ignorance or undesired pregnancy. The low frequency in the health services can also be associated to the conflicting relations between the health units and the poorest families, to the biases against people who live in slums and suspect groups (drug dealers and consumers) and to the precariousness of the health services. In our journeys through the neighbourhoods, in the visits we made to the families, in the contact with dwellers associations, with neighbourhood leaders – trying not to avoid the occasional meeting with the drug trafficking leader, with the crook's family, etc. –, we found, however, groups of women organized in mothers' clubs, in neighbourhood associations, in organizations to fight for land and home, which meet in the parish, in dweller associations, or even in their own homes to discuss their problems and help each other mutually, in an intelligent and creative manner. On the other hand, we found teaching institutions isolated by walls and gates, transformed into jails, protecting themselves from the population that patronize them and, often, without noticing that the violence and the social exclusion are caused by the school practices themselves.

Finally, the systematic hearing job next to the several groups involved in the issues of malnutrition, poverty and school failure reveals an unknown and unique universe, in which poverty produces deep signs, but has different shades in the different groups. It is necessary to know that reality to review the practices, relations and conceptions that, many times, jeopardize the propositions to fight poverty, low schooling and malnutrition.

### ***Prevention***

The effort to bring modern agricultural techniques found in the West, such as nitrogen fertilizers and pesticides, to Asia, called the Green Revolution, resulted in decreases in malnutrition similar to those seen earlier in Western nations. This was possible because of existing infrastructure and institutions that are in short supply in Africa, such as a system of roads or public seed companies that made seeds available. Investments in agriculture, such as subsidized fertilizers and seeds, increases food harvest and reduce food prices. For example, in the case of Malawi, almost five million of its 13 million people used to need emergency food aid.

However, after the government changed policy and subsidies for fertilizer and seed were introduced against World Bank strictures, farmers produced record-breaking corn harvests as production leaped to 3.4 million in 2007 from 1.2 million in 2005, making Malawi a major food exporter. This lowered food prices and increased wages for farm workers. Such investments in agriculture are still needed in other African countries like the Democratic Republic of the Congo. The country has one of the highest prevalence of

malnutrition even though it is blessed with great agricultural potential John Ulimwengu explains in his article for D+C. Proponents for investing in agriculture include Jeffrey Sachs, who has championed the idea that wealthy countries should invest in fertilizer and seed for Africa's farmers.

Breastfeeding education helps. Breastfeeding in the first two years and exclusive breastfeeding in the first six months could save 1.3 million children's lives. In the longer term, firms are trying to fortify everyday foods with micronutrients that can be sold to consumers such as wheat flour for Beladi bread in Egypt or fish sauce in Vietnam and the iodization of salt. Restricting population size is a proposed solution. Thomas Malthus argued that population growth could be controlled by natural disasters and voluntary limits through "moral restraint." Robert Chapman suggests that an intervention through government policies is a necessary ingredient of curtailing global population growth. However, there are many who believe that the world has more than enough resources to sustain its population. Instead, these theorists point to unequal distribution of resources and under- or unutilized arable land as the cause for malnutrition problems.

For example, Amartya Sen advocates that, "no matter how a famine is caused, methods of breaking it call for a large supply of food in the public distribution system. This applies not only to organizing rationing and control, but also to undertaking work programmes and other methods of increasing purchasing power for those hit by shifts in exchange entitlements in a general inflationary situation." One suggested policy framework to resolve access issues is termed food sovereignty, the right of peoples to define their own food, agriculture, livestock, and fisheries systems in contrast to having food largely subjected to international market forces. Food First is one of the primary think tanks working to build support for food sovereignty. Neoliberals advocate for an increasing role of the free market. Another possible long term solution would be to increase access to health facilities to rural parts of the world. These facilities could monitor undernourished children, act as supplemental food distribution centers, and provide education on dietary needs. These types of facilities have already proven very successful in countries such as Peru and Ghana. New technology in agricultural production also has great potential to combat under nutrition.

By improving agricultural yields, farmers could reduce poverty by increasing income as well as open up area for diversification of crops for household use. The World Bank itself claims to be part of the solution to malnutrition, asserting that the best way for countries to succeed in breaking the cycle of poverty and malnutrition is to build export-led economies that will give them the financial means to buy foodstuffs on the world market.

### ***Conclusion/ Recommendations***

On the basis of the findings of this study, recommendations were made. It is recommended that all people and stakeholders should work hard to minimize the root causes of poor. Nutrition support programs, such as food support programs for pregnant women, children in schools, introduction of Nutrition gardens by Non-Governmental Organisations (NGO) called God's garden who give food hand-outs to the children comprising, soya beans, soya blend porridge, cooking oil, mealie-meal and sometimes peanut butter. Such nutrition programmes have gone a long way in alleviating developmental problems in children due to poor nutrition. The teachers need to be warm, supportive and nurturing towards learners who are psychologically unstable due to poor nutrition so as to raise their self-confidence, self-direction, self-esteem and self-image. The sense of belonging as advocated by Maslow motivates the learners to work and co-operate with peers as they engage in co-operative learning mastery of concepts is enhanced. In support, Snowman & Biehler (2011) assert that teachers should approach their students with love, acceptance and respect and empathize with their fears, expectations and disappointments as this boosts a positive self-concept.

"We are guilty of many errors and many faults, but our worst crime is abandoning the children, neglecting the foundation of life. Many of the things we need can wait. The child cannot. Right now is the time his bones are being formed, his blood is being made and his senses are being developed. To him we cannot answer "Tomorrow". His name is "Today".

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## Prevalence of Iron Deficiency Anaemia among School Age Girls

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\*\* B. Kusuma Neela

### Abstract:

Iron deficiency anaemia is widely prevalent amongst women and children in India. The most highly affected population groups in the developing countries are the pregnant women (56%), school aged children (53%), non pregnant women (44%). It is estimated that above 20-40% of maternal deaths in India are due to anemia. India contributes to about 50% of school maternal deaths due to anemia. Aim of the study was to observe the epidemiological profile of anemia among school age girls. Study area was Government school in Vijayawada. Sample size was 230. Questionnaire method, clinical examinations, Anthropometry – height, weight and estimation of BMI and laboratory examination – Hb estimation by Shli's method. Among 230 samples, it was observed 73 students are normal and 157 were anemic, of those who are anemic most of the people (70.9%) are in moderate anemia when compared to mild and severe. Prevalence of anemia is more in lower socio-economic class students and more common in those who have poor nutritional status. Prevalence of anemia is more common in students who are not aware of iron rich foods. Anemia was highly prevalent in the studied population had low haemoglobin levels. It is recommended that the school system be used for micro nutrient supplementation to improve their nutritional status as the students are more registered here for distribution of nutrient fortified food products.

**Key words:** Anaemia, epidemiological, deficiency, under nutrition, chronic, Anthropometry.

### Introduction:

Anaemia is caused by the absence of dietary essentials that are involved in hemoglobin formation or by poor absorption of these dietary essentials. Some anaemia are caused by lack of either dietary iron, pyridoxine, vitamin-c or folic acid. Anemia is concerned as a public health problem in humans as all ages living over anemia is also important. Iron deficiency effects, people in the 3.5 billion people in the developing world. The most highly affected population groups in the developing countries are the pregnant women (56%) school age children (53%) non pregnant women (44%). In both men and women the prevalence of anemia is highest among those with severe under nutrition. An estimated 56 % of adolescent girls in India are anemic, and this amounts to an average 64 million girls at any point in time. It is estimated that about 20%-40% of maternal deaths in India are due to anaemia; India contributes to about 50% of global maternal deaths due to anaemia. In India, the prevalence of anaemia is high because of

- low dietary intake, poor iron (less than 20 mg /day) and folic acid intake (less than 70 mgs/day);
- Poor bioavailability of iron (3-4 percent only) in phytate fiber-rich Indian diet; and
- Chronic blood loss due to infection such as malaria and hookworm infestations.

Iron therapy should be continued for several months even after restoration of normal haemoglobin levels to allow for repletion of body iron stores.

#### Types of Anemia

Microcytic Anemia, Iron deficiency anemia

Thalassemia, Anemia of chronic disease

Normocytic Anemia's, Acute blood loss

Anemia of chronic disease, Infection

Medications, Macrocytic Anemias,

Megaloblastic

Vitamin b<sub>12</sub> deficiency, Folate deficiency

Non Megaloblastic, Chemotherapy

Liver disease, Reticulocytosis, Myxedema

#### Symptoms Of Anemia

Pale skin, Dizziness, Fatigue, Irritability, Low

body temperature, Numbness / cold hands or

feet, Shortness of breath, Weakness, Chest

pain.

- The Nutritional Requirements of pre adolescent are influenced primarily by the normal event of puberty

and simultaneous spurt of growth

#### Assessment Of Anemia

##### Clinical

- General Appearance- Normal Built / Thin Built / Sickly

- Face- Diffuse Depigmentation

- Eyes- Conjunctival Pallor

- Lips- Angular Stomatitis, Cheilosis

- Tongue- Pale/ Red And Raw

- Nails- Koilonychia

- Edema- In Dependent Part

##### Anthropometry

- Height, Weight, BMI

##### Laboratory

- Hb Estimation –Sahli's Method

- Puberty is an intensely anabolic period with increase in height and weight , alteration in the body composition resulting from increased lean body mass and change in the quantity and distribution of fat and enlargement of many organ systems

- Pre adolescent are particularly susceptible to iron deficiency anemia in view of the increased need for dietary iron for hemoglobin and myoglobin synthesis during the rapid period of growth when blood volume and muscle mass are increasing

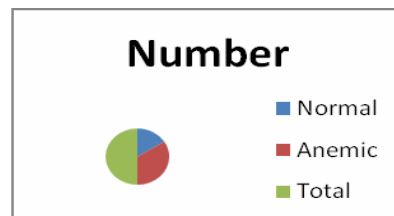
**Risk Factors of Anemia**

- Low Socio Economic Status
- Poor Nutritional Status
- Excessive Menstrual Loss
- Recent Blood Loss
- Worm Infestations
- Infections

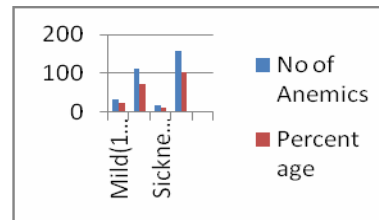
**Observation**

**Grading Of Anemia Among School Girls**

Students	Number	Percentage
Normal	73	31.7
Anemic	157	68
Total	230	100



	No of Anemics	Percentage
Under Weight(195)	88	56
Normal(221)	61	38.8
Obese(44)	8	5
Total(460)	157	

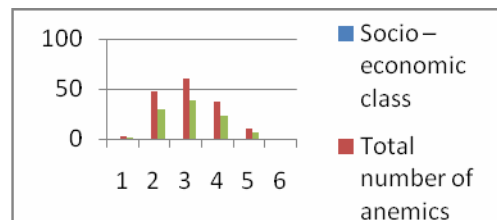


	No of Anemics	Percentage
Mild(10-12)	32	20.3
Moderate(7-10)	111	70.7
Sickness(<7)	14	8.91
Total	157	100

Observation – above shows that anemia is more prevalent in lower socio –economic classes when compared to higher socio –economic classes.

**Prevalence Of Anemic Among School Girls According To Socio Economic Status**

Socio – economic class	Total number of anemics	Percentage
Upper(5)	3	1.9
Upper Middle(75)	47	29.9
Lower Middle(95)	60	38.2
Upper Lower(43)	37	23.5
Lower(12)	10	6.3



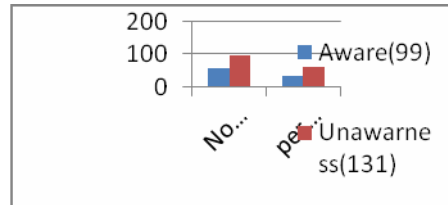
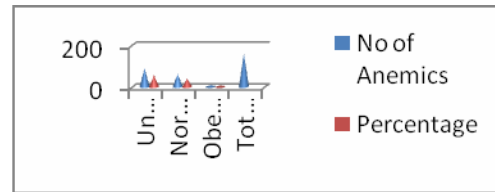
**Prevalence of Anemia among School Girls according to Nutritional Status**

Observation above table shows anemia is more prevalent in underweight followed by normal followed by others.



## Prevalence of Anemia By Awareness of Iron Rich Foods

Awareness of iron rich foods	No of anemia	Percentage
Aware(99)	57	36.3
Unawareness(131)	100	63.6
Total(230)	157	



Observation – Above shows that percentage of anemia is more prevalent in those people who are not aware of iron foods when compared to people who are aware.

### Discussion

- Among of 230 students studied 157(68%) were anemic
- 731 students (31.96%) are normal not anemic
- Of those who are anemic most of the people (70.9%) are in moderate anemia when compared to mild and severe
- Prevalence of anemia is more common in lower socio –economic class people
- Prevalence of anemia is more common in those who have poor nutritional status
- Prevalence of anemia is more common on people who are not aware of iron rich foods

### Suggestions'

Your diet is the best source of iron. It is better for you to eat a balanced diet than it is to take dietary supplements. Red meats, shellfish, eggs, beans, dried fruits, nuts and green leafy vegetables are the best sources of iron.

- Vitamin C improves the absorption of iron. Be sure your diet includes 40 mg of vitamin C a day.
- Consume foods with plenty of vitamin C, Folic Acid, and vitamin B12 to help your body absorb more iron.
- Avoid restrictive or fad diets that prevent a healthy balance of vitamins and minerals.
- Don't drink coffee or tea with meals. They make it more difficult for your body to absorb iron.

### Medical Therapy

- Nutritional education
- Antibiotics to treat infections
- Hormones to treat teenage girl who have heavy menstrual bleeding
- A man –made version of erythropoietin to stimulate your body to make more red blood cells. This hormone has some risks.

### Recommendations

- To encourage the students to cultivate kitchen gardens in the college premises so that, later on they can adopt the same practice in their daily life.
- Nutrition education should be included in the curriculum in order to create awareness regarding the intake of balanced diets to improve the Haemoglobin levels of Adolescents.
- School system be used for micronutrient supplementation to improve their nutritional status as the students are more registered here in distribution of nutrient fortified food products.

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## **Food Security In India-Present Scenario**

**Dr. K. Rani**

### **Abstract**

*"Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life" (FAO website). In the other hand, adequate nutrition is essential for economic growth, good health and physical and cognitive development. It requires a diverse diet including staple foods, vegetables, fruits, animal-source foods, while levels of nutrition are affected not only by food availability and access but also by sanitation – such as access to safe drinking water. In addition, education can also play a vital role in improving nutritional intake and balance (FAO statistical Year Book, 2012). In the world number of people without enough food to eat on a regular basis remains stubbornly high and over 60% of the world's under nourished people live in Asia, and a quarter in Africa.*

**Keywords:** *food security, malnutrition, infectious diseases, susceptibility, immunomodulating.*

### **Introduction**

#### **India's scenario**

The Indian economy is growing in historical way with an unprecedented rates and adding, second fastest-growing economies in the Asia after the china. The real GDP grew at 3.95% a year per head from 1980 to 2005, and at 5.4% a year from 2000 to 2005 (Deaton and Dreze, 2009). Besides, rice and wheat are the staple food products and government of India maintains buffer stock of these two commodities to face the irregularities emerged in future. Right now India has self sufficient food grains. In general, sustains in food security stands on three basic pillars: namely, (i) Sufficient quantities of food available on a consistent basis. (ii) Having sufficient resources to obtain appropriate foods for a nutritious diet. (iii) Appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation. Once the country fulfils all these targets, feed the population efficiently. Here, matter of concern that the cereal production has kept pace with the increasing requirements and average per capita intakes of cereal have remained satisfactory, there has been a fall in the per capita consumption of pulses. And New York Times cited analysts saying that 40 per cent of subsidized food never reaches its intended recipients because of India's inefficient distribution system (APFS Update, Jan 2012). It is important not only to improve production but also make them available at affordable cost. Furthermore, malnutrition is a gigantic problem, especially in children and women.

According to the International Food Policy Research Institute's (IFPI) 2011 around 60 million children in India are underweight and malnourished and nearly 21 per cent of the population are malnourished. Micronutrient deficiencies and infectious diseases often coexist and exhibit complex interactions leading to the vicious cycle of malnutrition and infections among underprivileged populations of the developing countries, particularly in preschool children. Several micronutrients such as vitamin A, beta-carotene, folic acid, vitamin B<sub>12</sub>, vitamin C, riboflavin, iron, zinc, and selenium, have immunomodulating functions and thus influence the susceptibility of a host to infectious diseases and the course and outcome of such diseases. Certain of these micronutrients also possess antioxidant functions that not only regulate immune homeostasis of the host, but also alter the genome of the microbes, particularly in viruses, resulting in grave consequences like resurgence of old infectious diseases or the emergence of new infections. India is at the top in vegetable and fruit production in the world, but vegetable intake of Indians remains low; consequently prevalence of anaemia and vitamin A deficiency continue to be high.

#### **Reasons for Malnutrition**

a) Inadequate coverage of children below three years of age who are at greatest risk of malnutrition; b) Irregularity of food deliveries to anganwadis and hence irregular feeding and inadequate rations; c) Poor nutrition education (of mothers and communities) to improve feeding practices at home; d) Inadequate training of workers in nutrition, growth monitoring, and communication; e) Poor supervision; f) Poor co-ordination and linkage with health workers; g) Lack of community ownership and participation (Planning Commission, GoI).

### ***Factors Determining Malnutrition***

Poverty and lack of purchasing power have been identified as two major factors responsible for low dietary intake. Poverty is usually mentioned as the main cause of malnutrition and others, such as lack of education and information about good or adequate nutrition, failure to consume vitamin supplements or fortified foods, and the cost of food. In general, protein intake is far below the World Health Organization's cut-off limits and shows that it continues to be a public health problem in India.

### ***Prevention and management of infections***

Health professionals have been concerned about the loss of nutrients during illness and stress on the importance of safe drinking water and environmental sanitation in preventing infections. National Rural Health Mission<sup>8</sup> aims at convergence between water, sanitation, education, nutrition and health programmes (Figure).



***Suggestions for Improving Food and Nutrition Security in India*** has taken many efforts to build up a food security system to ensure that the threat of famine like, Investment in agriculture and the green revolution have ensured that the food production has kept pace with the population growth; establishment of adequate buffer stocks has ensured availability of food stuffs within affordable cost even during the times of drought. Moreover, India is currently undergoing demographic, economic, social, educational, and agricultural and health transition. These factors individually and collectively can bring about substantial alteration in health and nutritional status of the population. If through effective planning and inter-sectoral coordination, appropriate synergy is brought about, it will be possible to achieve substantial improvement in nutritional and health status of the population.

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## **Maternal Nutrition - Issues and Interventions**

**Dr. M. Padmaja**

### **Abstract**

*Malnutrition is a fairly wide-spread and complex problem that poses a serious threat to life in some parts of the world. Poor nutrition contributes to about 5.6 million child deaths per year and more than half of the total deaths take place in India. A more serious concern is the fact that the number of children under-five who are underweight has remained almost unchanged since 1990 (UNICEF, 2006). This is particularly true for India where the number of malnourished children has not changed significantly as seen from the National Health and Family Survey data in all the three surveys. The percentage of underweight children in the country was 53.4 in 1992; it decreased to 45.8 in 1998 and again rose to 47 in 2006 (IIPS, 1995, 2000, 2007). Malnutrition can influence various aspects of child development, leading to children being admitted to school late, dropping out of school, or being silently excluded by illness and poor cognitive development. Children are vulnerable to malnutrition from conception. Pregnant women who are undernourished are more likely to have low birth weight babies who, in turn, are susceptible to developmental delays. These early deficits sustained with post-natal malnutrition often result in diminished cognitive functioning. Malnourished children are also more prone to illness. A review of such studies examining the relationship between mental development and severe malnutrition concluded that school-age children who suffered from early childhood malnutrition generally have poorer IQ levels, cognitive function, school achievement and greater behavioural problems than matched controls, and to lesser extent siblings. The disadvantage was found to last at least until adolescence.*

**Key words:** *malnourished, macronutrient, micronutrient, nutritional stress, adolescent, anthropometry, deficiency.*

### **Introduction**

Malnutrition among women manifests itself at the macronutrient and/or the micronutrient level. Many women, particularly in developing countries, have inadequate weight and/or height. Micronutrient deficiencies such as iron, iodine, vitamin A, and others are highly prevalent among women in many regions of the world. Maternal malnutrition has numerous causes and significant negative functional consequences. Women are vulnerable to malnutrition throughout the life cycle for both biological and social reasons. Most young girls living in poor environments are sub optimally breastfed in infancy and early childhood, receive infrequent and poor complementary foods (both in quantity and/or quality), and suffer frequent infections. Such nutritional neglect during the first two years of life has immediate and long-term negative consequences on women's survival, growth, development, and productivity. At two years of age, many of the girls who survive under such nutritional stress are stunted with little chance of recovery. Moreover, in some parts of the world, girls are discriminated against in access to food, health care, and education throughout childhood. During adolescence, girls experience rapid physical growth and sexual maturation which significantly increases their needs for macronutrients and micronutrients (especially iron). Adolescent girls' growth spurt occurs before menarche (first menstruation). Adolescent girls continue to grow in height long after menarche. Linear growth, particularly of the long bones, is not complete until the age of 18, and peak bone mass is not achieved until the age of 25. A malnourished adolescent girl whose menarche has been delayed may achieve full height as late as 23 years and will, therefore, be capable of conceiving before her body size is fully developed. Moreover, the development of the birth canal is slower than that of height and does not reach mature size until about two to three years after the growth in height has ceased. Pregnancy puts adolescent women at increased risk of malnutrition (diverting nutrients from the mother to the fetus), pregnancy complications, and poor pregnancy outcomes (including death).

Early pregnancy contributes to the cycle of maternal malnutrition in two ways:

- Indirectly, through the premature cessation of the mother's growth.
- Directly, through the increased risk of delivering a low birth weight baby.

In most developing countries, women spend a large proportion of their reproductive years pregnant, lactating or pregnant and lactating. McGuire and Popkin (1990) estimate that on average African and Asian women between the ages of 15 and 45 are pregnant or lactating 30–48 percent of their time. The nutritional demands during pregnancy and lactation are multiple to support fetal growth and breast milk

production. These added nutritional requirements specific to pregnancy and lactation manifest themselves both at the macronutrient and the micronutrient level.

- More calories are needed to achieve adequate pregnancy weight gain and build stores for lactation.
- More iron is needed because of the growth of the fetus and placenta and the expansion of plasma volume. More vitamin A may be needed to ensure adequate vitamin A concentration in breast milk.
- Closely spaced reproductive cycles, negative energy balance, and micronutrient deficiencies can lead to a condition known as “maternal depletion syndrome”. Nutritional stress is greatest when an adolescent woman is pregnant and lactating.

Most women living in developing countries experience various biological and social stresses that increase the risk of malnutrition throughout life. These include—Food insecurity, inadequate diets, recurrent infections, poor health care, heavy work burdens and gender inequities. The percentage of women giving birth before the age of 18 is 18 percent in Asia, 21 percent in Latin America, and 28 percent in Africa (World Fertility Survey, UN, 1986). In adult women, BMI<18.5 kg/m<sup>2</sup> is used as an indicator of Chronic Energy Deficiency. The high proportion of women falling below this cut-off value in developing countries shows that women’s under nutrition is a staggering problem. Women who suffer from chronic energy deficiency: have a higher prevalence of infections because of reduced immune competence. They are at increased risk of obstructed labor because of disproportion between the size of the baby’s head and the space in the birth canal. Obstructed labor accounts for eight percent of maternal deaths worldwide (WHO and UNICEF, 1996). They are also at increased risk of giving birth to low birth weight babies. Low birth weight is a well-known risk factor for neonatal and infant mortality.

Maternal nutritional factors account for approximately 50 percent of intrauterine growth retardation in developing countries. Most low birth weight in developing countries is due to intrauterine growth retardation. There is a very strong association between low pre-pregnancy weight and height and intrauterine growth retardation, as shown in a meta-analysis of 25 studies of maternal anthropometry and pregnancy outcome from 20 countries. Low caloric intake is another major risk factor influencing birth weight, the single most important determinant of a child’s chances for survival.

**Iron Deficiency:** Iron deficiency occurs when an insufficient amount of iron is absorbed to meet the body’s requirements. Iron deficiency is the most common form of malnutrition, affecting as many as 4-5 billion people worldwide. The major clinical manifestation of iron deficiency is anemia or low blood hemoglobin concentration. Iron deficiency and iron deficiency anemia are major public health problems, affecting an estimated 2 billion people - 30% of the world’s population - with adverse consequences especially for women of reproductive age and young children. Over 90 percent of affected women and children live in developing countries. Although anemia rates are often used to assess the severity of iron deficiency in a population, iron deficiency is not the only cause of anemia. Nevertheless, in regions where anemia is highly prevalent, iron deficiency is usually its most common cause. This may result from increased need for iron (e.g., during infancy, adolescence or pregnancy), inadequate iron intake, or chronic blood loss. Other common causes of anemia include parasitic infection and malaria. Iron requirements are highest during infancy, early adolescence, and pregnancy. In infancy and early childhood, iron is required for rapid growth. In early adolescence, iron requirements are high because of the growth spurt; they are even higher for girls who experience both a growth spurt and the onset of menses at this time. In pregnancy, iron requirements are driven by tissue synthesis in the mother, the placenta, and the fetus, and by blood loss at delivery.

Dietary iron deficiency is the result of insufficient iron intake to meet requirements.

- Dietary iron deficiency may be the consequence of: Low dietary iron intake (resulting, for example, from a diet with low iron density), and/or low bioavailability of dietary iron (when dietary iron is not easily absorbed by the body).
- WHO estimates that over one billion women in the developing world are infected with hookworms? Hookworm infection contributes to anemia by causing blood loss in stool. Blood loss increases iron loss. Blood, and the iron in it, are lost in proportion to the number of adult worms in the gut and the duration of infection.

- Malaria causes anemia by destruction of red blood cells. Malarial infection, particularly that caused by *Plasmodium falciparum*, can lead to very severe anemia. Anemia resulting from malarial infection can be life-threatening for pregnant women.

Anemic women are more likely to die from blood loss during delivery. Obstetric hemorrhage is the leading cause of maternal death in developing countries, accounting for approximately 25 percent of all maternal deaths. Severe anemia can lead to heart failure or circulatory shock at the time of labor and delivery. Anemic women are more susceptible to reduced transfer of iron to fetus. Anemic women are more likely to deliver low birth weight infants. Physical work capacity and fitness are reduced in anemic women because iron is needed by the blood to carry oxygen to the brain and muscles and by the muscles for normal functioning. Anemic children show lower intellectual scores than non-anemic children infection.

**Vitamin A Deficiency in Pregnancy:** Night blindness is associated with low levels of serum retinol. High rates of night blindness have been reported among pregnant women in most countries where vitamin A deficiency is prevalent increased risk of maternal mortality, miscarriage, stillbirth, and low birth weight. Available data from vitamin A supplementation studies in Nepal suggest a causal relationship.

**Iodine Deficiency in Women:** Iodine is required for the synthesis of thyroid hormones that in turn are required for the regulation of cell metabolism throughout the life cycle. Up to the 1980s, goiter (i.e. enlargement of the thyroid) was considered the single and almost exclusive consequence of iodine deficiency. Today we know that goiter is only the tip of the iceberg and that the consequences of dietary iodine deficiency during pregnancy are much broader. Thyroid hormones ensure normal growth, especially of the brain, which occurs from fetal life to the end of the third postnatal year. Iodine deficiency during pregnancy, when severe, will impair thyroid function resulting in a lower metabolic rate, growth retardation, brain damage, increased prenatal mortality, and other defects. Dietary iodine deficiency during pregnancy is known to hinder the development of the fetus and results in the birth of cretins (newborns with extreme forms of brain damage and physical impairment) and infants who show severe forms of mental retardation. The mental retardation resulting from iodine deficiency during pregnancy is irreversible. Iodine deficiency is the most prevalent cause of preventable mental retardation in the world. Endemic cretinism is prevented by the correction of iodine deficiency, especially in women before and during pregnancy.

**Maternal Zinc Deficiency:** Zinc plays a role in a large number of metabolic synthetic reactions. During periods of rapid growth and higher micronutrient requirements, such as infancy, adolescence, and late pregnancy, girls and women are most susceptible to zinc deficiency. Prevalence of zinc deficiency is probably similar to that of nutritional iron deficiency because the same dietary pattern induces both. Where diets are plant-based and intakes of animal foods low, the risk of inadequate intakes of both zinc and iron is very high, even when energy and protein intakes meet recommended levels. A high proportion of pregnant women in developing countries are likely to be at risk of zinc deficiency because of habitually inadequate zinc intakes. Maternal zinc deficiency has negative health consequences for women and their infants. Women with low plasma zinc concentrations have three to seven times higher risk of premature rupture of membranes, two to nine times higher risk of prolonged second-stage labor and increased risk of preterm delivery and low birth weight. A zinc supplementation trial of pregnant women increased gestation time and reduced preterm delivery by 25–50 percent.

**Maternal Folic Acid Deficiency:** In some developing countries, pregnant and lactating women are at increased risk of folic acid deficiency because their dietary folic acid intake is insufficient to meet their physiological requirements. Women's dietary intakes will be low wherever effective access to foliate-rich foods is limited, or where cooking practices lead to high loss. Maternal folic acid deficiency is associated with: Folic acid deficiency causes Megaloblastic anemia because of folic acid's role in DNA synthesis. Folic acid deficiency interferes with DNA synthesis, causing abnormal cell replication. Low folic acid levels around the time of conception may cause neural tube defects in infants. Folic acid supplementation of women during the peri-conceptual period reduces the incidence of neural tube defects such as anencephaly and spina bifida.. Low folic acid levels are associated with an increased risk of low birth weight.

**Maternal Vitamin B-6 and B-12 Deficiency:** Vitamin B-6 and vitamin B-12 deficiency increases the risk of maternal anemia. Vitamin B-6 is important for the development of the infant's brain. Maternal vitamin B-6 deficiency in lactating women leads to inadequate breast milk concentrations of vitamin B-6 in breastfed infants which in turn may impair their neurobehavioral development. Vitamin B-12 plays a key role in the synthesis of myelin in the nervous system. Maternal vitamin B-12 deficiency can lead to neurological disorders in infants.

**Major Interventions in Maternal Nutrition**

There are two types of interventions to improve maternal nutrition:

- Those targeting an improvement in women's weight and/or height
- Those targeting an improvement in women's micronutrient status

**Improving Maternal Weight:** Increases in weight can be achieved within a woman's reproductive life by: Increasing caloric intake and/or by reducing energy expenditure and/or by reducing caloric depletion (delaying the first pregnancy and increasing birth intervals)

**Improving Maternal Height:** Increases in height cannot be achieved once an adolescent girl reaches her adult height. Improvements in maternal height therefore require a life cycle approach by increasing birth weight so infant girls are larger from birth, and/or enhancing growth in children less than two years of age to maximize their growth, and/or improving adolescent growth.

**Optimal Behaviors to Improve Women's Nutrition:** *Exclusive breastfeeding to six months of age.* Breast milk should be a baby's first taste. Breastfeeding should be initiated within about one hour of birth to stimulate breast milk production, provide the infant with the antibodies present in colostrums (baby's first immunization), minimize maternal postpartum hemorrhage, and foster mother-child bonding. Breast milk covers completely the infant's nutritional and fluid needs for about the first six months of life. Infants should not receive any prelacteal feed such as water, other liquids, or ritual foods to maintain good hydration, not even in hot and dry climates. Offering water and foods to infants before six months is both unnecessary and dangerous because it reduces breast milk intake, interferes with the absorption of breast milk nutrients, and introduces pathogens and contaminants that put the baby at a greater risk of illness and death. Studies show that exclusively breastfed infants are at a much lower risk of infection from diarrhea and acute respiratory infections than infants who receive other foods or fluids. Moreover, exclusive breastfeeding contributes to a delay in the return of fertility.

By about six months of age, breast milk alone cannot meet most babies' energy, protein, and micronutrient requirements. Complementary foods need to be introduced at this time. Guidelines on the best combinations of foods and feeding practices should be based on local research. General principles are: As the child gets older, gradually increase the consistency, energy density, and variety of the food using a combination of age-appropriate meals and snacks adapted to the child's requirements and abilities. Feed fruits and vegetables daily, especially those rich in vitamin A and other vitamins. Feed meat, poultry, fish, or other animal products as often as possible (even small quantities). Use micronutrient-enriched foods (especially those with iodine, iron, and/or vitamin A) when available and economically accessible.

Practice active feeding (positive reinforcement, persistence, and supervised feeding), good hygiene, and proper food handling to optimize a child's food intake. During and after illness practice frequent and active feeding. Patiently encourage the sick child to eat favorite foods and, after illness, give food more often than usual and encourage the child to eat more at each sitting.

Although adequate complementary foods need to be introduced at six months, breast milk remains a very important source of energy, protein, and micronutrients. Infants should continue to breastfeed frequently (on-demand), including night feeding.

Pregnant women need to increase food intake to support fetal growth and future lactation. Weight gain during pregnancy depends on pre-pregnancy weight, body size, and activity level, among others. The average woman gains about ten kilograms during pregnancy. Yet, in many developing countries women gain barely half this amount as a consequence of poor diets and heavy workloads.

For women who enter pregnancy with good nutritional status, the additional food intake required is about 350 kcal/day after the first trimester. For women who enter pregnancy underweight, more calories are needed to achieve adequate weight gain. The beneficial effect of food supplementation on maternal nutritional status and infant birth weight is greatest when food supplementation targets undernourished women, particularly at times of the year when food is scarce and/or workload is high. Pregnant women should take iron/folic acid tablets daily. Iron requirements increase significantly during the last two trimesters of pregnancy because of the growth of the fetus and placenta and the expansion of the mother's blood volume. Pregnant women should take a daily supplement of iron and folic acid (60 mg of iron and 400 ug folic acid) during the last two trimesters of pregnancy. In regions where the prevalence of anemia in pregnant women is higher than 40 percent, supplementation should also continue for three months after delivery.

Folic acid is included in the supplement because it helps to prevent anemia and reduces the risk of obstetric complications and neural tube defects. Pregnant women should reduce workload during pregnancy to decrease energy expenditure and optimize energy balance. Women of reproductive age, if underweight, should increase food intake to protect their own health and establish reserves for pregnancy and lactation. Women who enter pregnancy underweight and continue to engage in heavy physical labor may not be able to gain the weight necessary to ensure adequate fetal growth and favorable birth outcomes. Increased energy intake by underweight women between reproductive cycles can improve birth weight and maternal health.

Micronutrient deficiencies contribute to women's under nutrition. In order to improve quality and micronutrient intake, women of reproductive age should diversify their diets by increasing their daily consumption of fruits and vegetables, consuming animal products when feasible, and using fortified foods such as vitamin A-fortified sugar, iron-fortified flour, other micronutrient enriched staples when available, and iodized salt. When micronutrient requirements cannot be met through available food sources (fortified or not), women of reproductive age need to take micronutrient supplements containing iron, folic acid, vitamin A, zinc, and other micronutrients to build stores and improve their nutritional status. Deficiencies of some micronutrients (such as folic acid and iodine) cause congenital defects very early in pregnancy so fetal development depends on adequate nutrition before the pregnancy is detected. Addressing multiple deficiencies prior to pregnancy and lactation would improve women's current health, establish reserves for pregnancy and lactation, and protect fetal and infant health.

#### ***Dietary Modification to Improve Women's Micronutrient Status***

Dietary modification aims to improve women's food consumption habits and increase:

- Micronutrient intake and/or
- Bioavailability of micronutrient intake
- Where prevalence of anemia is greater than 40%, periodic iron and folic acid supplementation (60mg of iron and 400µg folic acid for 3 months) should be considered for: prepubertal and adolescent girls and for all women of childbearing age.
  - During pregnancy, iron and folic acid supplements should be given daily, starting as early as possible but preferably by the fourth month of pregnancy and continuing for six months. Pregnant women should take a daily supplement of iron+folic acid (60 mg of iron and 400 ug folic acid) for six months of pregnancy. In regions where the prevalence of anemia in pregnant women is higher than 40 percent, supplementation should continue for three months after delivery. Distribution channels include antenatal care services, community pharmacies, and community health workers.

To increase women's demand and compliance, the supplement delivery system should: develop and implement a communications component to educate the community and promote micronutrient supplementation by increasing community awareness about the extent of micronutrient deficiencies among women, their consequences, and the benefits of micronutrient supplementation for women. Providing adequate information to women on side effects and how to minimize them. Provide good quality supplements.

Source: The Linkages Project Academy for Educational Development

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## **Impact of Malnutrition and poor academic performance of children**

**Dr.C.A.Jyothirmayee,**

### **Abstract**

*Malnutrition is generally defined as a chronic condition which is a consequence of over- or under-consumption of any or several essential macro- or micronutrients relative to the individual's physiological and pathological requirements. Knowing more about what nutritional deficiencies can lead to, in terms of learning, will help families to feed their children adequately to succeed in class. This shows that nutrition is of paramount importance in the academic performance of children and their holistic development. It is against this background that this study explores the psychosocial effects of malnutrition on the scholastic performance of children. There is a higher incidence of such conditions as asthma, respiratory infections, headaches, stomach pains, stress related ailments, poor vision, rickets, coughs, diarrhea, ear infections and hearing loss among children from poverty stricken households who are malnourished. Health problems among learners lead to high levels of stress and anxiety, headaches, insomnia, a low self-esteem, low I.Q, mental instability, psychosocial distress as well as underachieving in their academic work. Finally, Good nutrition is fundamental for individuals to realize both their physical, cognitive, and economic potential. It is the basis for individual and family well-being and human capital formation and, as such, key to economic and social development in the current generation and, even more so, for future generations*

**Keywords:** *Malnutrition and Learning, Poor academic Performance, Poor Nutrition, Nutrients, Food Insecurity, Poverty.*

### **Introduction:**

#### **Malnutrition:**

Malnutrition is also a dangerous condition that develops when your body does not get enough nutrients to function properly. Poor nutrition can be caused by a lack of food or an unbalanced diet that's missing or insufficient in one or more nutrients Children who do not consume adequate amounts of key nutrients, including calcium, potassium and vitamin C may be unable to work to their full potential at school A study by Connell (2010:127) revealed that 34 percent of low birth weight children were either repeating grades or placed in special education classrooms while only 14 percent of normal birth-weight children experienced the same outcomes. Knowing more about what nutritional deficiencies can lead to, in terms of learning, will help families to feed their children adequately to succeed in class. This shows that nutrition is of paramount importance in the academic performance of children Shrestha & Pathak (2012) as well as Brauw et al. (2012) concur that underfeeding in childhood was thought to hinder mental development solely by producing permanent structural damage to the brain. A child's brain during the first three years of life is rapidly developing through generation of neurons, synaptogenesis, axonal and dendric growth, and synaptic pruning each of which build upon each other. Any interruption in this process, such as trauma, stress, under nutrition, or lack of nutrients can have long-term effects on the brain's structure and on the child's socio-emotional development and academic performance. Thus, research has established that poor nutrition in early life can limit long term intellectual development. Implicit to the above, children should not be exposed to malnutrition even at an early age for it has detrimental effects to their academic performance and their holistic development.

#### **Malnutrition and the academic performance:**

Thus protein energy malnutrition, iron deficiency, anaemia, Vitamin A deficiency, these poverty related conditions decrease resistance to disease in general. Malnutrition therefore causes illness, brain damage, delayed physical growth, delayed development of motor skills and delayed intellectual development. Evidently, good nutrition early in life can help counteract the destructive effects of poverty on intellectual development.

An indication that poor nutrition in infancy can subsequently undermine the benefits of schooling. There is therefore ample evidence to support the view that early nutrition when children are already at school have strong beneficial effects on their ability to learn and conversely, poorly fed children find it

difficult to concentrate at school, which provides strong support for school feeding schemes in poor countries and communities. Observations made by the teachers and this researcher confirmed that children from low socio-economic background who have poor nutrition end up cheating, lying and stealing, especially food from the peers or money to buy food so as to meet the basic needs. Since this behaviour is regarded by society as socially unacceptable they end up being isolated by significant others and they may develop a low self-esteem. This researcher also found out that pupils with low self-esteem are inactive, suffer from headaches and insomnia, have very high/low levels of anxiety, stress, low I.Q, mental instability, psychosocial distress as well as underachieving in their academic work. It was also observed in this study that the children who were affected by poor nutrition for a long time were more psychologically unstable than those who experienced poor nutrition within a short period of time.

#### **Health challenges caused by Malnutrition:**

There is a higher incidence of such conditions as asthma, respiratory infections, headaches, stomach pains, stress related ailments, poor vision, marasmus, rickets, kwashiorkor, coughs, diarrhoea, ear infections and hearing loss among children from poverty stricken households who are malnourished.

A teacher, Mr. Chuma said that: ...health problems among learners lead to high levels of stress and anxiety, headaches, insomnia, a low self-esteem, low I.Q, mental instability, psychosocial distress as well as underachieving in their academic work.

Teachers and headmasters also observed that some children's attendance to school was erratic because of the various illnesses observed thus negatively affecting their academic performance. In an interview, one headmaster emphasized that a healthy student is a productive student. This has turned into a mere lip service as most of them are failing to maintain a healthy state due, among other factors, to poor diet. Health is fast becoming a luxury which only those who afford to pay the doctors, medical bills and drugs can get. The question most people are asking now is, "Is the health and education for all by the year 2015 slogan going to become a reality or remain a distant dream" (United Nations 2012).

#### **Conclusion**

On the basis of the findings of this study, recommendations were made.

- It is recommended that all people and stakeholders should work hard to minimize the root causes of poor nutrition (socio-economic instability, political unrest, land problem and the issue of international sanctions).
- Nutrition support programs, such as food support programs for pregnant women, children in schools, have gone a long way in alleviating developmental problems in children due to poor nutrition.
- The teachers need to be warm, supportive and nurturing towards learners who are psychologically unstable due to poor nutrition so as to raise their self-confidence, self-direction, self-esteem and self-image.
- Teachers should approach their students with love, acceptance and respect and empathize with their fears, expectations and disappointments as this boosts a positive self-concept.

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**Qualitative Assessment of how Parents Perceive Eating Patterns, Growth, and Nutritional Status in their Children with Sickle Cell Diseases and Barriers to Participation in a Nutrition Intervention Program**

**\*Mrs. Y. Neeraja,**

**\*\*Sr. P. Sunila Rani.**

**Abstract**

***"If something happens in life, nobody is going to take care of you better than yourself."***

*Sickle cell disease (SCD) is a genetic disorder that causes severe hemolytic anemia and is most common in people of African ancestry. Most prevalent in India especially in Orissa tribes working in Assam Tea Garden, Veddian tribes of South, Garasia tribal's Of Rajasthan. Although the gene does not affect growth, approximately one third of children with SCD are below the 5th percentile for height or weight. with 17% below the 5th percentile for both measures. Growth deficits are apparent in children with SCD as early as 6 months of age . By 9 years of age, height and weight deficits approach one standard deviation below reference patterns, and become more pronounced as children mature. Furthermore, some children with SCD have nutrient deficiencies in zinc, Folate, and vitamin B6.*

**Key Words:** *cystic fibrosis, insulin-dependent diabetes mellitus, hypercholesterolemia, phenylketonuria*

**Introduction**

Maintaining adequate nutritional status has been hypothesized to reduce long-term morbidity and mortality in patients with SCD. Preliminary studies have suggested that vitamin, mineral, and behavioral nutrition interventions may improve growth in children with SCD. However, there has been little mention of psychosocial considerations. Despite the fact that nutritional and growth deficits are well documented, few studies have assessed parent perspectives of eating behaviors. Despite literature documenting the severity of nutritional and growth deficits in children with SCD, routine nutritional counseling is not a standard of care as it is in other pediatric chronic illnesses, such as cystic fibrosis and diabetes mellitus. It is unclear what impact early nutritional and behavioral education might have on shaping parent perspectives about their child's eating behaviors and physical development. However, before nutrition strategies can be developed, we need to understand what challenges patients and parents face in managing nutritional issues. Understanding parental viewpoints is especially critical for health care providers so that nutritional intervention programs can be developed that are culturally relevant and anticipate potential barriers to participation and adherence. Appropriate cultural adaptation and implementation is important given that eating behaviors, mealtime routines, body image, and parenting practices are commonly influenced by cultural and family factors.

**1) Low weight status :**

Low Weight Status Parents acknowledged that their child with SCD was often smaller and thinner than his/her siblings and peers; however, they generally accepted thinness as a feature of SCD. Parents perceived low weight to be a consequence of pain episodes, hospitalizations, and/or generally reduced appetite, even in the absence of pain. Parents were more likely to be concerned about delayed puberty, poor eating, and general health issues than they were about their child's thinness

**2) Emphasis on hydration:**

Emphasis on Hydration Parents discussed efforts to keep their children well hydrated, particularly during periods of pain or poor appetite. The importance of hydration in the management of SCD is highly reinforced by health providers. Parents encouraged their children with SCD to drink plenty of fluids, often as a compromise for not eating meals, particularly when they were ill. Parents viewed getting children to drink as important to shortening pain episodes (minimizing splenic complications) and as a strategy for encouraging appetite. Children were more likely to drink water or caffeinated beverages than milk or juice

**(3) Importance of child responsibility for disease management:**

Meal time Challenges and Parenting Strategies Common challenges included reduced and variable appetite, picky eating, and aversion to meat. Parents attempted to manage eating problems using a range of

strategies, including adding dietary supplements, setting limits, rationalizing the problem, and compromising or negotiating with children.

**Discussion**

The current study provides qualitative information on how parents of children with SCD perceive their child’s nutritional status, dietary intake, and mealtime behaviors. Although many parents reported concerns about their child’s low weight status and delayed pubertal onset, there was greater consensus that eating and mealtime challenges were prevalent in children with SCD. In particular, children with SCD are often picky eaters and have variable appetites. Some of this variability was perceived to be related to SCD (pain, hospitalization) and some was attributable to de grounded in families’ cultural and ethnic identities. One salient example was parents’ expectations that their child needed to be independent in self-care, including preparing and eating meals.. Parents also mentioned that during the school year, their child ate one to two meals outside of the home, which must also be considered.

While parents in this study were not well informed on the nutritional risks associated with SCD, they were interested in learning more about nutritional aspects of the disease and how they could improve their child’s eating behaviors and nutritional health. “health focused,” rather than “weight focused.” Furthermore, an intervention plan would need to balance health education with parental support so as to educate, but not alarm, parents. Parents also suggested strategies for publicizing the groups, making the groups creative, and allowing for make-up sessions. Providing incentives for children with SCD and siblings and ensuring that programs balance the needs of the child with SCD with the nutritional and dietary needs of other members of the family is also important.

**Conclusion**

Achieving balance may be accomplished, in part, by providing information for other family members on relevant health topics (e.g., obesity, high blood pressure and diabetes). In summary, parents were generally aware of their child’s poor appetite and appreciated that growth deficits may have implications for their child’s general health. While they expressed concern about eating and weight, they reported little success in the strategies they had been implementing to deal with food refusal. Parents confront these challenges with minimal or no input from health providers. These data provide information that may aid in the design of a nutrition intervention program for children with SCD and their parents. Behavioral nutrition programs have been successfully implemented with children across a number of pediatric chronic conditions, such as cystic fibrosis, insulin-dependent diabetes mellitus, hypercholesterolemia, phenylketonuria, and encopresis and hold promise for children with SCD. Interventions for children with SCD will need to be sensitive to the concerns of parents and will need to consider ways in which parenting and eating practices are culturally influenced, as highlighted in the current study.

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## **Child Labour in Unorganized Sector: A Case Study of Krishna and Prakasam Districts of Andhra Pradesh**

**V. Ranjith Kumar**

### **Abstract**

*The problem of child labour is very vast and beyond the scope of any individual or an organization to deal with all the aspects related to child labour. Today millions of children worldwide are engaged in labour that is hindering their education, development and future livelihoods: many of them are involved in the worst forms of child labour that cause irreversible physical or psychological damage, or that even threaten their lives. Thus, children are the most vulnerable group in any population and in need of greatest social care on account of their vulnerability and dependence. They can be exploited, ill treated and directed into undesirable channels by unscrupulous elements in the community. Increasing inter – linkages of economies and societies across the world have resulted in reaching an emergent consensus that child labour poses a serious threat to real and meaningful social development, while in turn perpetuating poverty and compromising with the objectives of attaining economic growth along with social justice.*

**Key words:** *Hindering, vulnerable, exploited, unscrupulous, consensus, perpetuate*

### **Introduction**

The problem of child labour is very vast and beyond the scope of any individual or an organization to deal with all the aspects related to child labour. Today millions of children worldwide are engaged in labour that is hindering their education, development and future livelihoods; many of them are involved in the worst forms of child labour that cause irreversible physical or psychological damage, or that even threaten their lives. Thus, Children are the most vulnerable group in any population and in need of greatest social care on account of their vulnerability and dependence. They can be exploited, ill treated and directed into undesirable channels by unscrupulous elements in the community. Increasing inter-linkages of economies and societies across the world have resulted in reaching an emergent consensus that child labour poses a serious threat to real and meaningful social development, while in turn perpetuating poverty and compromising with the objectives of attaining economic growth along with social justice. Article 32 of UN convention on the rights of child states that “state parties recognize the right of child to be protected from exploitation and from performing any work that is likely to be hazardous (or) to interfere with child’s education (or) to be harmful to child’s health ,physical, mental, spiritual, moral or social development. Convention 182 of International Labour organization (ILO) has main aim, “to eliminate the worst form of child labour”. Even with other constitutional and legal legislations the child labour is still exists. Kofi Annan U.N. Former Secretary General has commented on child labour as “child labour as serious consequences that stay with the individual and with society for far longer than the years of childhood. Young workers not only face dangers of working conditions, but they also face long term physical, intellectual and emotional stress. They face an adulthood-un employment and illiteracy.

### **Reasons for child labour**

In various studies it is proved that both supply and demand factors are responsible for the prevalence of child labour and the supply and demand of child labourers is certainly determined by the socio-economic status of parents. The global distribution of child labour is similarly a reflection of the country’s economic status, the poorer the country the higher the prevalence of child labour. The problem of child labour is more pathetic in India, children in the poor families are sent to work to supplement the family income and since the poor do not have resources to send them to schools so they send them to work instead of keeping them idle. Actually, the supply of child labour is not their own but that of their parents’ decision, yet the loss in the long term is not only private but social as well. The working children are deprived of education and a fair chance to move out of the poverty trap in which they are born. Socially, if we take the human capability or human capital perspective, then incidence of child labour in any society leads to lower human capital and human capability which means enormous loss to the economy. Thus we can say, child labour not only

prevents from acquiring the skills and education they need for a better future, but it also perpetuate poverty that affects economy negatively through loss of competitiveness, productivity, and potential income. Incidence of child labour is not only influenced by supply side determinants but also from demand side determinants.

On demand side, child labour is considered as a product of the market economy. Demand for child labour by some industries is often justified on the ground that children are most suitable for certain jobs, for instance, there is 'Nimble Finger' argument in carpet industry. However, the 'substitution' axioms of the child labour theory essentially refute this argument and propound that subject to some 'adult equivalence corrections' adults are equally substitutable for any kind of works. It is now well documented that employers –whether in farms, households or industries, employ children because of, both, pecuniary and non-pecuniary reasons. It is a common phenomenon that child workers are invariably underpaid as compared to current market wages; they are exposed to long working hours; denied compensation for overtime; and are deprived of social security. Further, employer prefers to use child labour because it is cheap and easy to manage. They can be coaxed, admonished, pulled up and punished for defaults without jeopardizing relations.

Moreover, children are not organized on lines of trade unions which fight for their rights. Even on average, children are paid half the salary of adults, and they are much less troublesome. On the other hand, increased competitiveness and use of modern technology in today's globalised scenario is sending a signal that employing children is no longer an economically viable stopping the use of child labour. Hence, many large industries may be interested in setting adequate labour standard by stopping the use of child labour. The concept of 'social labeling' as designed and pursued by some big industries' associations around the world has been one typical example of this. Despite these efforts, the industries which carry out manufacturing on cottage, tiny and small-scale basis, where a major part of the work is outsourced, the reliance is still on traditional, simple, manual appliances and labour intensive and primitive processes where in addition to the family labour hired child labour is used. So, there is no wonder that we still find million of children working around the world.

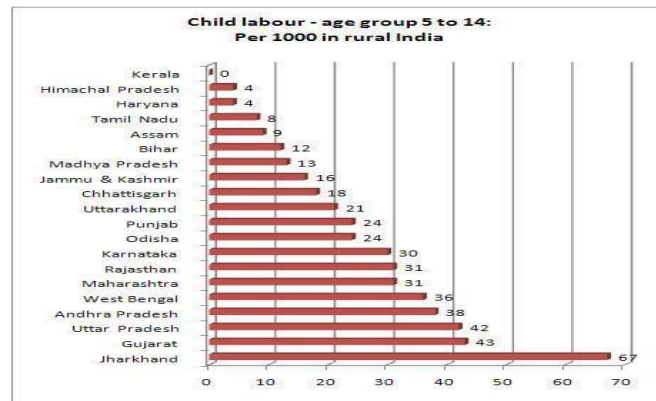
### ***Child Labour at Global Level***

Children continue to form a sizable section of labour force in several fields of employment around the world. While in the less developed countries, the incidence of children's participation in labour force is considerably high. It is not totally absent in the more developed nations too. In many of the third world countries, the problem of child labour is accepted either as a harsh reality or as an inescapable necessity. The International Labour Organization (ILO) reports proves that Asia-pacific showed a massive decline in the number of economically active children by 25.9 million (from 122.3 million in 2004 to 96.4 million in 2008). Similarly, Latin America and the Caribbean also showed a significant decline in children's work. The regional activity rate also fell significantly in case of Asia-Pacific and Latin America and the Caribbean but the picture in Sub-Saharan Africa is more mixed. While the number of child workers increased constantly from 2000-2004 and 2004-2008 but the incidence of work dropped by 2 per cent in 2000-2004 and again increased by the same percentage in next four-year period. As per ILO (1996a) child labour also remains a problem in many developed countries and is emerging in many central and eastern European as well as Asian countries which are moving towards a market economy and this will lead to high demand of child labour.

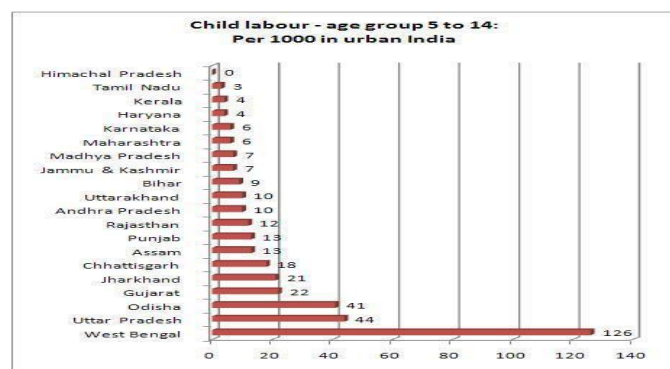
### ***Child Labour at India and Andhra Pradesh***

The latest National Sample Survey (NSS) data, put out in January 2014, have revealed a stark reality: The proportion of child labour in Gujarat in both urban and rural areas is one of the highest in India. Calculated on the basis of usual status of employment, taking principal and subsidiary activities together, the NSS has found that, in urban Gujarat 2.2 per cent of children in the age-group 5-14 are in the workforce, which is higher than most Indian states, except West Bengal (12.6 per cent) and Uttar Pradesh (4.4 per cent). Things are worse in rural areas, where Gujarat's 4.3 per cent of children in the age-group 5-14 are the workforce, which is again higher than all major Indian states, except Jharkhand (6.7 per cent).

An analysis of the NSS data suggest that there was a fall in child labour in Gujarat, from 3.6 per cent of the child population, as found in the NSSO’s report of 2006 on the basis of the survey carried out the top Government of India statistical body carried out in 2004-05, to 2.2 per cent in the latest report, which is based on the NSSO’s survey of 2011-12. A similar fall in the percentage of child workers can in seen in the rural areas – from 5.6 per cent in 2004-06 to 4.3 per cent in 2011-12. However, as the “Reference Note” on child labour, published by the Lok Sabha secretariat in 2013 and meant for use to members of parliament, admits, fall in the percentage of child labour is an all-India phenomenon.



The “Reference Note” specifically says, “Evidence drawn from the National Sample Survey data suggest that India’s child workforce during 2004-05 was estimated at little over 90.7 lakh as against 215.5 lakh in 1983. During this period, the number of child employment declined sharply by 124.8 lakh. There is considerably higher fall in child workforce among boys than girls. The corresponding fall in boys and girls workforce during 1983 to 2004- 05 is observed to have decreased from 120.6 to 47.6 lakh, and 94.9 to 43.1 lakh, respectively.” As for 2009-10, it points out, “As per NSSO survey 2009-10, the working children are estimated at 49.84 lakh which shows a declining trend.” Quoting a Rajya Sabha unstirred question, the “Reference Note” says that in 2009-10, Gujarat had 3,90,687 child workers – 3,58,460 rural and 32,224 urban. This was significantly, the highest among all Indian states.



While no quantification of child workers in Gujarat has been made in the latest NSS report put out in January 2014, it can safely be assumed that things should have not changed. As against Gujarat’s 3.5 lakh child labourers found in 2009-10, Bihar had 2.7 lakh, Maharashtra 2.6 lakh, Karnataka 2.2 lakh, and so on. The lowest number of child workers was in Kerala, merely 2,765, next lowest being Himachal Pradesh (7,391).

These facts have come to light at a time when a new bill is pending before the national Parliament which wants to include ban child labour up for those who reach 18 years of age. While NSS does not have separate figures for children between 15 and 18, it has found that in the age-group 15-19, i.e. those who should potentially be in high school and beyond up to the college, again, Gujarat has one of the highest

percentage of workers. In rural areas, 33.4 per cent of children work, which is higher than all the Indian states. In urban areas, too, 21.3 per cent of the age group 15-19 work, which is again higher than all Indian states. In the Unified State of Andhra Pradesh it was observed that there occurred more number of child labour in Guntur district (Coastal Andhra region), Kurnool district (Rayalaseema region) and Mahabubnagar district (Telangana Region). However, the present purposively selected two districts Krishna and Prakasam districts for the present study. The detailed figures at district level will be collected in later stages of thesis writing.

### ***Objectives of the Study:-***

In the light above facts, the present study aims at the following objectives.

1. To examine the nature and trends of child labour in India.
2. To study the socio-economic conditions of child labour of sample child labour in Krishna and Prakasam Districts.
3. To analyze various governmental programmes for curbing the problem of child labour.
4. To examine the causes and consequences of sample child labour in the Study area.
5. To analyze economic position and share of child labor's income to the Families of child labour in the study area.
6. To examine the migratory features of child labour in the study area.
7. To suggest an alternative approach to overcome for the problem of child labour

### ***Conclusion:***

Threatening trade restrictions based on labor standards is not justified. The problem with such a stance is that (i) not all forms of child labor are exploitive or cruel; (ii) the age deemed "child" labor is not clear; (iii) poor countries cannot necessarily afford such measures; (iv) levels poverty would increase; and (v) school attendance would decline. Furthermore, free trade is probably part of the solution to eradicating child labor. This is because a free trade regime promotes development worldwide. And as countries develop, the incidence of child labor decreases substantially.

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## Urban Poverty and Alleviation Programs in India

P. Bharathi Devi

### Abstract

The Government of India aimed to achieve 'inclusive growth', but its failure to ensure that the benefits of growth have 'trickled down' to the poor is well established. When adjusted for variations in the cost of living, 32.7 per cent of India's population live below the international poverty line of \$ 1.25 per day. India is a home to a 'Third of the World's poor, a third of the World's slave population. Poverty in India is widespread and a variety of methodologies have been proposed to measure it. Before 2005, it was based on food security and it was defined from per capita expenditure for a person to annum. Since 2005, Indian government adopted the Tendulkar methodology which moved away from calorie anchor to a basket of goods and used rural, urban and regional minimum expenditure per capita necessary to survive. The World Bank has simultaneously revised its definition to measure poverty since 1990, with \$ 1.25 per day income on Purchasing Power Parity basis as the definition in use from 2005 to 2013. Poverty in India is a historical reality. From late 19<sup>th</sup> century to through early 20<sup>th</sup> century, under British Colonial rule poverty in India intensified, peaking in 1920s. Famines and diseases killed millions each time. After independence in 1947, mass deaths from famines were prevented, but poverty increased. India's official poverty line in 2014, was Rs.972 (US\$ 15) a month in rural areas or Rs.1407 (US\$ 22) a month in cities. Puduchery had its higher poverty line of Rs.1301 (US\$ 20) a month in rural and Rs.1309 (US\$ 21) a month in urban areas, while Odisha had the lower poverty threshold of Rs. 695 (\$11) a month for rural and Rs. 861 (\$14) a month for its urban areas. According to the Reserve Bank of India's report Goa having the least poverty of 5.09 per cent what national average stands of 21.92 per cent.

**Key Words :** Urbanization, globalization, developing countries, development, economic growth

### Introduction:

Urbanization is happening much faster in developing countries, cities in the developing world are increasing and becoming 'global cities', Globalization is presently new economic markets for developing countries to promote themselves as location for investment and development and growing urban centers are a major force in economic development and innovations. There are considerable benefits to living in or near in urban areas. They can provide engines for economic growth. At the same time, it increases urban inequality and new forms of urban insecurity. Urban population has grown rapidly over the last centuries from 25 million in 1901 to 377 millions in 2011 which constitute 31.2 per cent of the total population in the country, but the urban areas have failed to meet the demands of the increasing population pressure results the gap in provisions of basic amenities of housing, drinking, water, sewage, transportation etc., Deprivation of such services has resulted in burgeoning of slums with conditions unfit for human habitation. Most of the urban poor are involved in informal sector activities where there is removal, confiscation of goods and almost non-existence of social security covers. At present 17.7 per cent of urban population comprising 65 million people lives in slums (2011 census). The pace of urbanization is likely to accelerate over time and it is estimated that by 2030, another 250 million people would be added to the Indian cities.

### Characteristics of Urban Poverty:

- High dependency on cash income
- Access to housing and fear of eviction
- Specific health risks
- Crime and personal safety
- Weaker social ties
- Inequality and stigma
- Political participation and specific governance challenges.

**Causes for Urban Poverty:** The widening gap in income levels in urban areas is the product of a number of factors.

- Poverty in India has become urbanized at the national level, rural poverty remains higher than urban poverty, but the gap is closing by 2030, urbanization in India is projected to reach 50 percent.

- Migration towards urban centres has increased. Poverty has higher among rural to urban migrates, while the most successful migrates are those who move from one urban to another.
- A contracting industrial sector and a growing under-skilled labor force.
- The country's shrinking manufacturing sector has not been able to absorb this migrant labor force exacerbating the problems of urban unemployment, slum expansion and widening income inequality.
- Urban poverty poses different problems – housing, water, sanitation, health, education, social security, livelihood and special vulnerable groups such as women, children and aging.
- Slum population are increasing
- Slum dwellers lack access to basic services they face a constant threat of eviction, removal, confiscation of goods and have virtually no social security cover.

**Studies about the measuring the Poverty:** The Government of India appointed several Expert groups like Working Group (1962), Task Force (1972) Alagh Expert Group (1993), The Expert Group of Lakdawala (1997), Suresh D. Tendulkar Expert Group in 2005 Dr. C. Rangarajan Expert Group to measure the poverty in India. The Planning Commission released estimates of poverty for 1993-94 and 2004-05 derived from the Experts Group (Tendulkar) method in January 2011, subsequently, based on the same methodology, the poverty ratio for 2009-10 and 2011-12 were derived by the Planning Commission in March 2012-13 respectively. The estimates of poverty ratio at the national level are given in the table below:

**Percentage of Poor estimated from expert Group (Tendulkar Methodology)**

S. No.	Year	Rural poverty %	Urban poverty%	Total %
1.	1993-94	50.1	31.8	45.3
2.	2004-05	41.8	25.7	37.2
3.	2009-10	33.8	20.9	29.8
4.	2011-12	25.7	13.7	21.9

The table shows that the rate of decline in poverty ratios during different periods.

The Expert Group under the Chairmanship of Suresh D.Tendulkar was constituted by the Planning Commission in 2005 and it did not construct a poverty line. It adopted the officially measured urban poverty line of 2004-05 based on Expert Group (Lakadwala) methodology and converted this poverty line (which is URP- consumption based) in MRP-Consumption. (URP Consumption data are collected from the households using 30 day recall period for all the items) MRP-consumption data for five non-food items viz, clothing footwear, durable goods, education, institutional medical expenses are collected using 365 day recall period and 30-day recall period for the remaining items. The Expert Group estimated the percentage of population below the poverty line by states during 2011-12 (Tendulkar methodology) Some of the state which have high ratio of poverty are given in the table.

S. No.	State	Rural poverty in%	Urban Poverty in%	Total in %
1.	Arunachal Pradesh	38.9	20.3	34.7
2.	Assam	33.9	20.5	32.0
3.	Bihar	34.1	31.2	33.7
4.	Chattisghar	44.6	24.8	39.9
5.	Jarkhand	40.8	24.8	37.0
6.	Madhya Pradesh	35.7	21.0	31.6
7.	Manipur	38.8	32.6	36.9
8.	Orissa	35.7	17.3	32.6
9.	Uttar Pradesh	30.4	26.1	29.4
10.	Dadra & Nagarhaveli	62.6	15.4	39.3

Public expenditure on social services in the seven year period 2004-05 to 2011-12, the public expenditure on education and health per capita at constant 2004-05 price have nearly doubled. There is a variation in the share of different commodity groups in Poverty line in 2011-12.

**The percentage of expenditure on food and non food items in rural and urban areas.**

Sl.NO.	Items groups	Rural areas In percentage	Urban areas In percentage
1.	Cereals and substitutes	14.6	10.3

2	Pulses	3.5	3.0
3.	Milk and milk products	6.3	6.4
4.	Salt and sugar	2.0	1.7
5.	Edible oils	4.5	3.8
6.	Eggs, fish etc.	4.8	4.0
7.	Vegetables	8.4	6.0
8.	Fruits	1.7	2.1
9.	Spices	3.9	3.3
10.	Other food items	7.2	6.1
	<b>Total of food items</b>	<b>57.0</b>	<b>46.7</b>
11.	Pan, tobacco etc	2.9	2.1
12.	Fuel	9.7	7.9
13.	Medical	4.5	3.4
14.	Conveyance	3.6	7.3
15.	Rent	0.1	5.3
16.	Clothing & bedding	7.8	8.3
17.	Footwear	1.0	0.9
18.	Education	3.0	8.1
19.	Durable goods	1.9	1.5
20	Other non food items	8.5	8.6
	<b>Total of non food items</b>	<b>43</b>	<b>53.3</b>

It is observed that the expenditure spent on food and non food items in rural areas is more than in urban areas.

**The expert Group under the Chairmanship of Dr. C. Rangarajan** to review the methodology for measuring of poverty in the country constituted by Planning Commission in 2012 has submitted its report in June 2014. The main points of the report are

- The Rangarajan Expert Group stated that a monthly per household expenditure of 4860/- in rural areas and Rs.7035 for urban areas for a family of 5 member in each case.
- The poverty line should be based on certain normative levels of adequate nourishment, clothing, house rent, conveyance, education and non food items.
- It computed the average requirement of calories, proteins and fats based on ICMR norms, differentiated by age, gender and activity for all India rural and urban regions – 2,155 Kcal per person per day in rural areas and 2,090 Kcal per person per day in urban areas.
- Protein and fat requirements have been estimated that 48 grams and 28 grams per capita per day in rural areas and 50 grams and 26 grams per capita per day in urban areas.
- The median fractile (45-50%) value of clothing expenses, rent, conveyance and education etc., - this works out to 141/- per capita per month in rural areas and Rs.407 in urban areas.
- Monthly per capita consumption expenditure Rs.972 in rural areas and Rs. 1,407 in urban areas (2011-12) for a family.

The expert group (Ranga Rajan) estimated that the 30.9 per cent of the rural population and 26.4 per cent of the urban population was below the poverty line in 2011-12. Poverty line ratio has decline from 39.6 percent in 2009-10 to 30.9 per cent in 2011-12 in rural India and from 35.1 per cent to 26.4 per cent in urban India.

**Government intervention for urban Poor:** Urban Poverty alleviation Programs: The poverty alleviation programs of the Government were completely rural centric earlier. It was only after 7<sup>th</sup> Five Year Plan that urban poverty was considered as a separate issue by the policy makers. The following are some of the programs have been implementing by the government to alleviate urban poverty.

- The Ministry of Housing and Urban Poverty Alleviation (MOHUPA) is the nodal agency at the level of union Government responsible for the development of urban poor. Urban poverty being multi-dimensional, various vulnerabilities faced by the poor in cities and towns.
- Nehru Rozgar Yojana – 1989 a centrally sponsored program for providing employment to the urban unemployed and underemployed poor

- Urban Basic Services for the poor (UBSP) – a centrally sponsored scheme for the achievement of the social sector goals – community, organization, mobilization and empowerment.
- Prime Minister Integrated Urban poverty Eradication Program (PMIUPEP) started in 1995.
- The Swarna Jayanthi Shahari Rozgar Yojana (SJSRY) – a centrally sponsored scheme started in 1997 for providing gainful employment to the urban unemployed poor by encouraging the setting up of self employment ventures.
- The Urban Self Employment Program (USEP) to assist the individual urban poor, the sub-scheme may be called the “The scheme for Development of Women and Children in the Urban Areas (DWCUA)
- The Urban Wage Employment Program (UWEP) to provide wage employment to the beneficiaries.
- Rajiv Awas Yojana (RAY) – scheme for slum-free city planning (SFCP) is implementing since 2011.

The existing programmes to modernize urban infrastructure were discontinued and a new plan was introduced by **Narendra Modi Government**. The JNNURM (Jawaharlal Nehru National Urban Renewal Mission) was introduced by the previous UPA government in 2005 to improve civic infrastructure and services. The first phase of the programme ended in 2012 but was extended by two years. Some of the **Top Public Welfare Schemes** that NDA government has launched in 2015 are...

- Smart city Mission
- One Rank One pension (OROP)
- Skill in India – war against poverty
- Atal Pension Yojana
- Deena Dayal Upadhya Gram Jyothi – 24/7 power supply to all homes in rural India
- Digital India Programme – empowering the nation digitally.
- Pradhana Mantri Suraksha Bima Yojana
- Atal Mission for Rejuvenation and Urban Transformation (AMRUT) for urban development.
- Pradhana Mantri Jeevan Jyothi Bima Yojana – Life insurance
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## **Business Sector Women Entrepreneurship Poverty Alleviation in India**

**P. Bhargavi**

### **Abstract**

*The main purpose of this paper is to corroborate the relationship between entrepreneurship development and poverty alleviation. In this study, we conducted general search to accumulate empirical literatures by the name of entrepreneurship development and poverty alleviation in different We found innovation, entrepreneurship training & education, family background, government support program, social entrepreneurship, women participation, individual entrepreneurial characteristics, participation of micro, small & medium enterprises, youth empowerment, collaboration of government-university-industry is the key tool for entrepreneurship development which is stimulating employment are eventually alleviating poverty. At present, women involvement in economic activities is marked by a low work participation rate, excessive concentration in the unorganized sector and employment in less skilled jobs. Women entrepreneurship development is an essential part of human resource development. The development of women entrepreneurship is very low in India, especially in the rural areas. Entrepreneurship amongst women has been a recent concern. Women have become aware of their existence their rights and their work situation. However, women of middle class are not too eager to alter their role in fear of social backlash. The progress is more visible among upper class families in urban cities. Any strategy aimed at economic development will be lop-sided without involving women who constitute half of the world population. Evidence has unequivocally established that entrepreneurial spirit is not a male prerogative. Women entrepreneurship has gained momentum in the last three decades with the increase in the number of women enterprises and their substantive contribution to economic growth. The industrial performance of Asia-Pacific region propelled by Foreign Direct Investment (FDI), technological innovations and manufactured exports has brought a wide range of economic and social opportunities to women entrepreneurs. In this dynamic world, women entrepreneurs are an important part of the global quest for sustained economic development and social progress.*

**Keywords:** *Business sector, women entrepreneurs, economic liberalization globalization and privatization, Foreign Direct Investment (FDI).*

### **Introduction:**

As the end of the 20th century approached, greater focus was concentrated in the international arena on issues which could impact on eradicating poverty, or at least alleviating it, among others those of women's empowerment and micro, small and medium enterprise development, (MSMEs). Discussion on these issues culminated in the adoption of the Millennium Development Goals, with poverty eradication high on the list.

However, the Secretary-General's recent Report on the Implementation of the First United Nations Decade for the Eradication of Poverty merely emphasizes that addressing the root causes of world poverty still remains an ongoing urgent international concern. All authorities recognize the importance of raising the standard of living in the community by job creation. Yet is increased employment the absolute answer? Most of the poor in developing countries are not unemployed, but it is estimated that in 2006, 1.4 billion did not earn enough to lift themselves and their families above the poverty threshold. Seventy per cent of these people are women and the feminization of poverty is recognized today as a global phenomenon. As stated by the UN Secretary General in his Report, the objective should be creating decent and productive employment.

Promotion of Micro, Small and Medium Enterprises (MSME's) could be one step in the direction of eradicating poverty through enterprise. In India, though women have played a key role in the society, their entrepreneurial ability has not been properly tapped due to the lower status of women in the society. It is only from the Fifth Five Year Plan (1974-78) onwards that their role has been explicitly recognized with a marked shift in the approach from women welfare to women development and empowerment. The development of women entrepreneurship has become an important aspect of our plan priorities. Several policies and programmes are being implemented for the development of women entrepreneurship in India. When a woman is empowered it does not mean that another individual becomes powerless or is having less power.

On the contrary, if a woman is empowered her competencies towards decision-making will surely influence her family's behavior. In advanced countries, there is a phenomenon of increase in the number of self-employed women after the World War II. In USA, women own 25% of all business, even though their sales on an average are less than two-fifths of those of other small business. In Canada, women own one-third of small business and in France it is one fifth. Women Entrepreneurs may be defined as the women or a group of women who initiate, organize and operate a business enterprise. The Government of India has defined women entrepreneurs as an enterprise owned and controlled by women having a minimum financial interest of 51 per cent of the capital and giving at least 51 per cent of the employment generated in the enterprise to women. Women entrepreneurs engaged in business due to push and pull factors which encourage women to have an independent occupation and stand on their own legs. A sense towards independent decision-making on their life and career is the motivational factor behind this urge. Saddled with household chores and domestic responsibilities women want to get independence. Under the influence of these factors the women entrepreneurs choose a profession as a challenge and as an urge to do something new. Such a situation is described as pull factors. While in push factors women engaged in business activities due to family compulsion and the responsibility is thrust upon them.

**Objectives of the Study:**

1. To discuss the development of women entrepreneurs through enterprises.
2. To highlight the factors influencing the women entrepreneurs.
3. To study the major constraints faced by the women entrepreneurs and poverty alleviation.

**Concept of Entrepreneur:** An entrepreneur is a person who combines capital and labor for production.

According to Cantillion “entrepreneur is the agent who buys means of production at certain prices, in order to sell at prices that are certain at the moment at which he commits himself to his cost”. According to P.F Drucker “he is one who always (1) searches for change (2) responds to it (3) exploits it as an opportunity.”

**Concept of Women Entrepreneur:** A woman entrepreneur is a woman who starts and owns an enterprise by investing at least 51% in an enterprise.

**Top Ten Women Entrepreneurs:** Worldwide, businessmen, economists and politicians today assent that, ‘Women owned businesses boost the economy’. Presenting here names who pioneer ‘women entrepreneurship’ and epitomize the female power globally. 1. Madame C.J. Walker (1867–1919), 2. Gabrielle Bonheur ‘Coco’ Chanel (1883-1971), 3. Estée Lauder (1908 -2004), 4. Mary Kay Ash (1918 - 2001), 5. Lillian Vernon (1929), 6. Martha Stewart (1941), 7. Anita Roddick (1943 - 2007), 8. Vera Wang (1949), 9. Oprah Winfrey (1954), 10. Debbi Fields (1956).

**Successful Women Entrepreneurs in India of 21<sup>st</sup> Century**

- Akhila srinivasan, Managing Director, Shriram Investments ltd.
- Chanda Kocchar, Executive Director, ICICI Bank
- Ekta Kapoor, Creative Director, Balaji Telefilms Ltd.
- Jyoti Naik, President, Lijjat Papad.
- Kiran Mazumdar Shaw, Chairman & Managing director, Biocon Ltd.
- Lalita D.Gupte, JMD, ICICI Bank.
- Naina Lal Kidwar, Deputy CEO, HBSE.
- Preetha Reddy, Managing Director, Apollo hospitals.
- Priya Paul, Chairman, Apeejay Park Hotels.
- Rajshree Pathy, Chairman, Rajshree Sugars & Chemicals ltd.
- Ranjana Kumar, Chairman, NABARD.

**SWOT Analysis:** A parameter to examine the growth and performance of women entrepreneurs’ development in India.

**Policies and Schemes for Women Entrepreneurs in India**

In India, the Micro, Small & Medium Enterprises development organizations, various State Small Industries Development Corporations, the nationalized banks and even NGOs are conducting various programmes including Entrepreneurship Development Programmes (EDPs) to cater to the needs of potential women entrepreneurs, who may not have adequate educational background and skills. The Office of DC (MSME) has also opened a Women Cell to provide coordination and assistance to women entrepreneurs

facing specific problems. There are also several other schemes of the government at central and state level, which provide assistance for setting up training cum- income generating activities for needy women to make them economically independent. Small Industries Development Bank of India (SIDBI) has also been implementing special schemes for women entrepreneurs. In addition to the special schemes for women entrepreneurs, various government schemes for MSMEs also provide certain special incentives and concessions for women entrepreneurs. For instance, under Prime Minister's Rozgar Yojana (PMRY), preference is given to women beneficiaries. The government has also made several relaxations for women to facilitate the participation of women beneficiaries in this scheme. Similarly, under the MSE Cluster Development Programme by Ministry of MSME, the contribution from the Ministry of MSME varies between 30-80% of the total project in case of hard intervention, but in the case of clusters owned and managed by women entrepreneurs, contribution of the M/o MSME could be upto 90% of the project cost. Similarly, under the Credit Guarantee Fund Scheme for Micro and Small Enterprises, the guarantee cover is generally available up to 75% of the loans extended; however the extent of guarantee cover is 80% for MSEs operated and or owned by women.

### ***Alleviating Poverty through Micro, Small & Medium Enterprises***

Micro, Small & Medium Enterprises has been played a importance role for development of the economic growth of a country as well as alleviating poverty through new jobs creation and provide income for the people. MS&MEs not only help during the period of economic growth but also in economic recession. The strong turbulence in the world economy in 1970s had made many large firms in developed countries lay off their employees then MS&MEs were regarded as the problem solver to these structural changes. The strategic importance of micro, small and medium-sized enterprises in national economic development is widely recognized by many countries, developed and developing countries alike. Simultaneously, there have been reports and evidence of contributions that MS&MEs make in the process of industrial development. It was noted that MS&MEs consist of 91-93% of the total industrial establishments in countries such as Singapore, Taiwan, Thailand and South Korea. In these countries, contributions of MS&MEs to employment ranged from 35 to nearly 61% with the contribution to value added ranging between 22 and 40%. In Malaysia, MS&MEs accounted for about 84% of manufacturing establishments, while their contribution to total value added and employment was about 28 and 38%, respectively. Moreover, there have been evidence that MS&MEs link themselves with large and multinational companies as has been the case in Japan, the United States, the United Kingdom, Canada, Germany etc. MS&MEs remain a vital force in the manufacturing sector and their importance has increased rather than diminished in many countries. An ILO study in 2003 examined firms with fewer than 10 workers found that they generated 58% of total employment in Paraguay, 54% in Mexico, and 53% in Bolivia, on the other hand, its contribute approximately 31% of overall GDP in the Dominican Republic, 13% in Kenya, and 11% in Pakistan.

**“Alleviating Poverty through Social Entrepreneurship** Social entrepreneurship 'is now creating new business model. It also bridges an important gap between business and social action. Social entrepreneurship, commonly defined as “entrepreneurial activity with an embedded social purpose”. Social entrepreneurship is perceived to be about applying the expertise, talents and resources of entrepreneurs to the variety of problems developing countries face, such as education, health, personal safety and security, poverty alleviation, social advancement, environmental sustainability, and so forth. Social entrepreneurship has developed a global phenomenon that influences the society by using innovative approaches to elucidate social problems. Therefore, Duke University's Fuqua School of Business, the Center for the Advancement of Social Entrepreneurship (CASE) writes, Social entrepreneurship is the process of recognizing and resourcefully pursuing opportunities to create social value with the innovative method. Social entrepreneurs are innovative, resourceful, and result-oriented, who draw upon the best thinking in both the business and nonprofit worlds to develop strategies that maximize social impact. These entrepreneurial leaders operate in all kinds of organizations: large and small; new and old; religious and secular; non-profit, for-profit, and hybrid. The term “social entrepreneurship” is used to refer to the rapidly growing number of organizations that have created models for efficiently catering to basic human needs that existing markets and institutions

have failed to satisfy. Social entrepreneurship combines the resourcefulness of traditional entrepreneurship with a mission to change society.

Social entrepreneurship offers insights that may stimulate ideas for more socially acceptable and sustainable business strategies and organizational forms, because, it contributes directly to internationally recognized sustainable development goals, social entrepreneurship may also encourage established corporations to take on greater social responsibility. Finally, Social entrepreneurship paves the way to a future that may allow coming generations to satisfy their needs better than we are able to satisfy even the basic needs of today's population. Social entrepreneurship is thus having profound implications in the economic system: creating new industries, validating new business models, and re-directing resources to neglected societal problems. The World Bank brings social entrepreneurs with poverty-fighting ideas into contact with partners that have the resources to help them implement their vision.

**Alleviating Poverty through Women Entrepreneurship** is today considered to be a relevant vehicle for economic development and women contribute to it significantly worldwide: indeed, in 2010, 187 million women were involved in creating and operating enterprises, meaning that almost 42% of entrepreneurs in the world were women. On the other hand, however, women have a number of parental duties and inflexible household obligations which they try to effectively combine to maintain a balance between running a business and running a home. Moreover, women to date represents an important engine of economic growth for developing countries as it has a leading role in generating productive work, achieving gender equality and reducing poverty. Global Entrepreneurship Monitor (GEM) in 2004 showed that women perform 66% of work globally and produce more than 50% of food globally and these women turn locally available raw materials into processed and finished goods for sale, therefore making them innovators in business.

Women entrepreneurship is relatively new area of research which originated in the mid-1980s. Three stages can be illustrious in the research into women entrepreneurship. The first stage, before the 1970s, was a move from the gender-neutral position to the male-specific position. The second stage, from the 1970s to the beginning of the 1990s, was conventional in nature, indicating how women are perceived in relation to men. Finally, the third, postmodernist, stage began to study the otherness of women entrepreneurship. The postmodernist context makes it possible to ask questions about how women perceive being entrepreneurs and business owners. Female entrepreneurship can be divided into two categories: the traditional generation of entrepreneurial women, concentrated around businesses involving household services, which require reduced skills and experience; on the other hand, the modern generation, more actively involved in businesses more oriented towards profit and creating new markets. Women entrepreneurship is becoming gradually popular across the globe. The participation of women is progressively being observed as one of the major contributors in economic growth. Regardless of their involvement in small or medium scale enterprises or in the informal or formal sectors, their contribution to output and value addition is considerable. Women entrepreneurship is not only necessary for their economic survival but also for strengthening the social system.

#### ***Industrial Sectors Where Indian Women Have Entered into...***

Indian women have considerably entered into both traditional and non-traditional industries. Traditional industries include handicrafts, readymade garments, toy-making, nurseries, hotels and restaurants, crèches, dairy and poultry, education, canning, insurance, retail trade. Nontraditional industries include textile designing, fabrics and jewelers, engineering and electronics, printing, transport and repair services, leather and plastics products, chemicals, drugs and pharmacy, ceramics and many more.

#### ***Problems of Women Entrepreneurs in India***

Entrepreneurs in India face many problems to get ahead their life in business. The major problems faced by women entrepreneurs can be classified under social, financial, organizational, production, marketing and psychological etc. Social barriers to women entrepreneur include unjust social, economical and cultural system prevailing in the Indian society, discriminating treatment, lack of social acceptance, resistance and inhibition, inadequate encouragement and motivation, responsibility towards family,



contribution remain unaccounted i.e., lack of recognition and traditional Indian culture or social attitudes do not appreciate independence for women particularly in rural areas etc. The other problems faced by women entrepreneurs include compliance of formalities, delay in getting power connection, delay in machinery supply, delay in getting loan amount, lack of adequate finance where large investments are required, discrimination against women in granting loans, lack of access to external funds because of lack of confidence shown by banks, suppliers and clients, biased assessment about their ability to repay loans, lower credit approvals having a question on the capabilities whether women can run the enterprise or not shortage of working capital shortage of funds for expansion repayment of loan, no availability of raw materials, shortage of skilled man power, power shortage, labour unrest or strikes, marketing problems, lack of demand for the product, warehousing problems, transport problems, shortage of technology and management problems etc.

### ***TIPS & Suggestions for Women Entrepreneurs***

1. Start a business that works for you and your personal life
2. Research the product/ service
3. Assess the market
4. Start business with adequate funds
5. Do networking.
6. Consult with professionals.

Here are some suggestive measures, to solve the problems confronted by them and for running their enterprise smoothly.

- Proper technical education to the women and opening of women development cells.
- Improvement of identification mechanism of new enterprise.
- Assistance in project formulation and follow up of training programmes.
- Credit facilities, financial incentive and subsidies.
- Adequate follow-up and support to the women enterprises.
- Women Enterprises research and application from time to time have to be documented.

### ***Conclusion:***

India is a developing country and having mixed economy, male dominated society and women are assumed to be economically as well as socially dependent on male members. Women entrepreneurs are having basic indigenous knowledge, skill, potential and resources to establish and manage enterprise, but simultaneously women entrepreneurs faced lots of problems like lack of education, social barriers, legal formalities, high cost of production, male dominated society, limited managerial ability, lack of self confidence, harassment and not fulfillment of rules and regulation etc. Various factors like positive reinforcement and negative reinforcement influencing women entrepreneurs. Successful leading business women in India are ideal role model for our country. Government takes various steps for the upliftment of women entrepreneurs in 7th five year plan, 8th five year plan and in 9th five year plan. Women entrepreneur networks are major source of knowledge about women's entrepreneurship and are increasingly recognized as a valuable tool for its development and promotion. The impact of culture is considerable matter for entrepreneurship development.

The training in entrepreneurship and provision of other facilities could give poor owners of micro and small enterprises opportunities to grow their businesses and get themselves and other out of poverty.. Finally, we found that innovation, family background, government support program, social entrepreneurship, women participation, entrepreneurship training & education, individual entrepreneurial characteristics, participation of micro, small & medium enterprises, youth empowerment, collaboration of government-university-industry is the key tool for entrepreneurship development which is stimulating employment are

eventually alleviating poverty. This network helps to deliver lectures, printed material imparting first hand technical knowledge in production, processing, procurement, management and marketing among the other rural women. The role of Women entrepreneur in economic development is also being recognized and steps are being taken to promote women entrepreneurship.

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11. THE HINDU PAPER

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## **The Socio-Economic Status of Tribal women in Guntur district of Andhra Pradesh**

**A.Salemraju\***

### **Abstract**

*After bifurcation of Andhra Pradesh, now it has 13 districts only, and these districts have 4, 93, 86, 799 of population in this state, according to 2011 census. Most of the tribal population located in the districts of Srikakulam, Vizianagaram, Visakhapatnam, East Godavari, West Godavari. Caste based stratification of our society unfavourable affected and equal opportunities to the disadvantage of tribal groups and it is also need to examine the defect of caste attached to the present Scheduled Tribes Women in particular. They are facing the problem of discrimination by their family members, gender and forward castes, unemployment under employment, seasonal unemployment and poverty, lack of nutritional food, educational and health facilities and minimum needs facilities. Though, Tribal Women is found to lower than Scheduled Caste and general women the same. There is need to study to improve their welfare and empowerment. The tribal woman plays multifarious roles as a kind and compassionate mother, loyal wife, affectionate sister and is an economic asset. The women attend her daily life in child feeding, housekeeping, cooking; washing cloth, fetching water etc are attended exclusively by the women folk. The Tribal economy around the gathering of forest products like herbs, hunting, podu, and settled cultivation, The gathering of edible roots, forest fruits and other miner products. The tribal women participate in the work digging the Earth, filling the basket with tuber. Tribal women are paid less labour to men, because of social tradition and inefficiency of women. The main objectives of the study are to look into their spatial distribution pattern and growth of tribal women population in the state of Andhra Pradesh. To look into the tribal women literacy and educational attainment and occupational structure in relation to their economy and health status of tribal women in the state of Andhra Pradesh. This study mainly based on primary and secondary data. The primary data will be collected through prepared schedules and 71 samples in the study area. The secondary data will be collected from tribal related books, reputed journals and articles.*

**Keywords:** *Bifurcation, Socio-Economic Status of Tribal women, Empowering, population, welfare and empowerment, unemployment and poverty.*

### **Introduction:**

*Empowering women is a prerequisite for creating a good nation, when they are empowered, society with stability is assured empowerment of women is essential as their value systems lead to the development of a good systems leads to the development of a good family, good society and ultimately good nation." -*

**A.P.J. Abdul Kalam**

*"You can tell the condition of the state looking at the status of women." - Jawaharlal Nehru*

*"Educate a man and you educate an individual. Educate a women and you educate a family"*

**- A. Cripp**

In 21<sup>st</sup> century the equality, unfortunately has not yet been achieved in developing countries like India. This is one of the main reasons why such countries behind in socio-economic, socio-cultural fields and failed to achieve development of the women. In this connection all the countries much take care about the equality of male, female must be achieved. Women, who are one of the basic constituent of the society should have given the same status of women in health education, business, home life, production, consumption, literacy rate, participating in the administration and the general equality should be achieved.

After bifurcation of Andhra Pradesh state, now it has 13 districts only, and these districts, according to 2011 censuses have 4,93,78,776 of population in Andhra Pradesh state. In 1991 censuses, the tribal female population and it constituted just 3.09 percent. Whereas it was 24,75,809 of tribal population in 2001 censuses and it reckons only 3.24 percent of the total population. Most of the tribal population located in the districts of Srikakulam, Vijayanagaram, Visakhapatnam, East Godavari, West Godavari. As per 2001 census, the tribal female population is 24, 75, 809 of the total population and it constituted just 3.24 Percent, whereas, it was 21, 60,873 of tribal female population in 2011 census and it reckons only 4.37 Percent of the total population. Scheduled Tribes have own customs and traditions and those are living under having variety conditions in plains, thick jungles, hill ranges and river valleys. It is so long to village environment and no relation with the society. Tribal people have own social ceremonies, festivals, dress, decoration, music and dance vary from region to region and from tribes to tribes. The woman respected as the main leap of the tribal society and plays multifarious roles as a kind and compassionate mother, loyal wife, affectionate

sister and is an economic asset. The women attend her daily life in child feeding, housekeeping, cooking; washing clothes, fetching water etc are attended exclusively by the women folk. The Tribal economy around the gathering of forest products like herbs, hunting, podu, and settled cultivation, The gathering of edible roots, forest fruits and other miner products. The tribal women participate in the work dig the Earth, fill the basket with tuber. Tribal women are paid less labor to men, because of social tradition and inefficiency of women.

**Women Empowerment In India**

The women empowerment is the central issues in the process of development of countries all over the world. Andhra Pradesh has a glorious tradition of recognizing the importance of empowering women over several centuries. Self-reliance as well as speeding the women selection among themselves, at the core of the concept empowerment is the idea of power the possibility of empowerment depends upon two things. First, the empowerment requires that power can change. Second one is the concept of empowerment depends upon the idea that power can expand. As a general definition, however, one can suggest that empowerment is a multi dimensional social process that helps people gain, control over their lives. It is process that fosters power in people for use in their own lives, their communities, and in their society, by acting on issues that they define as important. In economic empowerment of women, the government provides the employment facilities and implemented the poverty eradication programs, and micro credit facilities are provided by the banks.

Social concept of gender created by a society which defines the values, roles behaviors and similar characteristics of female and male is reflected in masculine and female characteristics of attributed of women and men due to their status in the society and are also reflected in their work lives in manner of doing works in business life education health in many other fields. Therefore the women role in both society and family constitutes the boarder of women labor in business life. The structural, economical and social factors relating to this matter support each other and disorders in the system puts women in a advantageous position UN report “world women 2000 two thirds of the total literates and 70% of the severally poor population consist of women. In fact this time has come when women empowerment in world should be considered more then something more than the usual activities involve with the providing small scale project loans to women or which supports small scale business activities to help women earn money and imagined power of money.

**Status of Women:**

Before the coming of the British people to India the life of Indian women was rather constant position in social oppression. The women completely depend upon the male members in pre-colonial period of India. Some social customs like sati, child marriage, polygamy, lack of proper education were existed in that period. In the British period, Raja Rama Mohan Roy paid much attention and prohibited same social customs like Sati, female infanticide, polygamy, child marriage, purdah system, devadasis system. So there is major change of socio-logical customs of women in India.

**Objectives of the Study**

1. To look into their spatial distribution pattern and growth of tribal women population in the state of Andhra Pradesh
2. To look into the tribal women literacy and educational attainment and occupational structure in relation to their economy and health status of tribal women in the state of Andhra Pradesh. and
3. To give suitable suggestion for proper implementation of policy measures.

**TABLE-1Population of Tribal Women in Andhra Pradesh- 2011**

Population District	Female Population (2011 )	Female Population(2001)	Growth Rate
Srikakulam	84, 736	75,965	11 %
Vizianagaram	1,20,869	1,08,760	11 %

Visakhapatnam	3,15,595	2,79,173	13 %
East Godavari	1,08,773	96,327	12 %
West Godavari	55,705	48,772	14 %
Krishna	65,730	52,410	25 %
Guntur	1,21,984	1,02,056	19 %
Prakasam	74,468	57,571	29 %
Nellore	1,40,829	1,18,703	18 %
Chittoor	79,409	63,037	25 %
Ysr Kadapa	37,315	29,728	25 %
Anantapur	75,554	61,439	22 %
Kurnool	40,779	33,538	21 %
Andhra Pradesh	13,21,746	11,27,479	17.23 %

**Source:** Statistical Abstract of Andhra Pradesh-2013

Above the table shows the demographic features of the tribal women in Andhra Pradesh. According to 2001 and 2011 population, the Visakhapatnam, Vijayanagaram, Guntur and Nellore has highest population and YSR Kadapa, Kurnool, West Godavari, Krishna and Prakasam have lowest population in Andhra Pradesh. In growth rate, the Prakasam, Krishna, YSR Kadapa and Chittoor have highest growth rate and Srikakulam, Vijayanagaram, East Godavari, Visakhapatnam have lowest growth rate in-between 2001 to 2011. Higher population districts have lowest population growth and lowest population districts have highest growth rate in-between 2001 to 2011 in Andhra Pradesh.

**Table-2: Growth Rates of Tribal Women in Andhra Pradesh**

S.NO	Year	Tribal Female Population	Growth Rate
1	1971	8,17,635	71 %
2	1981	15,57,312	90.46 %
3	1991	20,56,664	32.06 %
4	2001	24,75,809	20.37 %
5	2011	13,21,746	17.23 %

**Source:** Statistical Abstract of Andhra Pradesh-1961-2013

Above the table shows the growth rates of tribal women in Andhra Pradesh. In 1971 tribal women population was 8, 17,635 that has 71 percent of growth rate, in 1981 it has 90 percent. This is the highest growth rate the period from 1971 to 2011. After 1981 the growth rate was decreased. The growth rate was 32.06 percent in 1991, 20.37 percent in 2001 and 17.23 percent in 2011. 2011 growth rate is very low compare to the previous years.

**Table-3: Educational status of tribal women**

Category	Numbers	Percentage
Illiterate	56	78.87
Primary level	7	9.85
High school level	6	8.45
Intermediate	2	2.81
Higher education	-	-
<b>Total</b>	71	100

**Source:** Primary data

Above the table shows clear picture about the educational status of tribal women in the study area. The large number of tribal women are illiterate that is 78.87 percent. After the primary level and upper primary level of tribal women are only 9.85 and 8.45 percent, in the intermediate level only 2.81 percent. There is no any member in higher education. The main reason for backwardness of tribal women is lack of literacy rate. It leads to poverty and unemployment of tribal women.

**Table - 4: Income levels of tribal women**

Category	Numbers	Percentage
Below 10,000	51	71.83
10, 000 -30,000-	15	21.12
30,000-50 ,000	5	7.04
Above 50,000	nil	-
<b>Total</b>	71	100

**Source:** Primary data

Above table gives the information about the income levels of tribal women in the study area. In large number of tribal women below 10,000 per one year that is 71.83 percent of the total percentage. 21.12 percent of tribal women earned 10,000- 30,000 per year and very least percentage of women earned 30,000-50,000 per year. Above 50,000 of income group, there is nil because of there all depend upon the agriculture sector, and particularly podu cultivation and cheating of mediators and market mechanism.

**Table - 5: Occupational distribution of tribal women**

Category	Numbers	Percentage
Agriculture	65	91.54
Industry	5	7.04
Territory	1	1.40
<b>Total</b>	71	100

**Source:** Primary data

Above table shows the clear picture about the occupational distribution of tribal in the study area. Most of the tribal women are working in agriculture sector. Particularly they are agriculture labor because of they have no land holdings mainly tribal women have no awareness of any other employment opportunities in the society because of they are live in so far to society. Particularly in hilly areas, in the secondary sector only 7.04 percent of women are working. This is the main reason for low percentage of women working in industrial sector. They are almost illiterates and have no any technical skills. In modern employment generation, tertiary sector only 1.40 percent, that is least percentage in occupational distribution of tribal women.

**Table - 6: Land holdings of tribal women**

Category	Numbers	Percentage
No lands	68	95.77
Marginal (below one hector)	3	4.22
Small (2-5 hector)	Nil	-
Semi medium	Nil	-
Medium	Nil	-
Large	Nil	-
<b>Total</b>	71	100

**Source:** Primary data

Above table shows clear picture about the land holdings in the study area.95.77 percent people have no lands. And those who have lands are 4.22 percent. Marginal formers those who do not have land, they are becoming agricultural labors. A few who have lands, are not able to farm/cultivate the land due to the hilly terrain. Due to in equal distribution of land most of the ST people are becoming victims in getting income.

**Table - 7: Types of houses of tribal women.**

Category	Numbers	Percentage
Thatched	36	50.70
Semi pucca	15	21.12
Pucca	19	26.76
<b>Total</b>	71	100

**Source:** Primary data

## Findings and suggestions

The literacy rate of ST women is very low in the study area so the government should take care of this. As they are dependents of agriculture their income is falling under below poverty line. So the government should educate them to work in factories, and it should teach technical skills. All of these people are indebted due to in equal land distribution. So there is need to provide appropriate land for their welfare. Most of the women are dwelling in thatched houses. Government should also deep into their health problems. Most of the people are getting ill and not able to get rid of it due to lack of medical facilities for them. So government should provide eminent educational, housing and sanitation, employment and medical facilities.

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## **Socio-Economic Status of Women Labour in Informal Sector**

**G. Saritha**

### **Abstract**

*The widespread informal sector in the country is a major contributor to its development but at the same time It is plagued by several problems such as no proper services rules, no wage rules and no possibilities of career advancement. Another notable fact is that as many as 94% of total population of women workers work in the informal sector in India but they have to face gender discrimination which is almost inexistent in formal sector. Besides, their contribution in terms of income generation turns out to be less than their male counter parts, which means almost half of the population, contribute to less than half of the national income. The empowerment of women is one of the central issues in the process of development of countries all over world. The 'New age Women' and the 'Women of Substance' in true terms are just words in books. India is primary an agricultural country. The importance of agriculture in Indian economy is evident. Agriculture is largest and the most important 'industry' in India. Nearly 75 per cent of the people in India depend on agriculture either directly or indirectly for their living. Women labour is being obtained less wage comparatively that of male labour. In the urban areas, women workers are primarily employed in the unorganized sectors. The women employees are dominated by the male in their society. Women are always at a disadvantage in every field. India women employees are getting less pay for the same work than men. The economic and socio factors also influence the rural female work participation rate.*

**Key Words:** Status, Informal Sector, Income Generation, Agriculture Wages.

### **Introduction:**

The Indian economy can well be studied in two district sector, organized (formal) and unorganized (informal). The widespread informal sector in the country is a major contributor to its development but at the same time it is plagued by several problems such as no proper service rules, no wage rules and no possibilities of career advancement. Another notable fact is that as many as 94% of total women workers work in the informal sector in India but they have to face gender discrimination which is almost inexistent in formal sector. Besides, their contribution in terms of income generation turns out to be less than their male counter parts, which means almost half of the population, contribution to less than half to the national income. The empowerment of women is one of the central issues in the process of development of countries all over the world. The international 'Women's Day' celebrated on 8th March every year has become a day of demonstration for equal opportunity and solidarity. But the question arises how relevant is celebration of women's day in view of the fact that their position in the society has changed much. They are still treated as the 'weaker sex' who needs to be protected entire life be it her father, husband or son. The 'New Age Women' and the 'Women of Substance' in true are just words in books. Women constitute about half of the total population of country but they suffer many disadvantages as compared to men in terms. Of literacy rates, labour participation rates earnings.

Social economic and political empowerment is the need of the day, as it is one only the way of making women 'equal partners in development'. The process women empowerment is conceptualized in terms of personal assertions, self-esteem, and confidence, ability to protect themselves as women attaining socio-political participation and economic independence, ownership of productive assets and provide leadership in women. Agriculture is the main occupation of the people and 70 per cent of the people are depending on agriculture and allied activities in rural areas in India. In India, females work participation rate has changed in general and the rural female work participation rate has increased. As per National sample Survey (68th Round), the worker population ratio for females in rural sector was 24.8 in 2011-12, while that for males was 54.3. in Andhra Pradesh, the rural areas females total workers are increasing than the male total workers, indicating an increase in women work force participation rate in agricultural activates.

### **Objectives**

- To study the rural female work participation in India.
- To find the rural women labour problems.
- To suggest the remedial measures for the women labour.

### **Rural female work participation in India**



In India female work participation rate has changed in general and the rural female work participation rate has increased. As per the national sample survey (68th Round), the worker population ratio for females in rural sector was 24.8 in 2011-12 while that for males was 14.7 for female and 54.6 for males. During the period 2004-05 to 2009-10 women's labour force participation declined from 33.3 per cent to 26.5 per cent in rural areas and from 17.8 per cent to 14.6 per cent in urban areas. (NSSO 2011). 2013 report India is placed at 120th of 131 countries in women's labour force participation. As per census 2011, the workforce participation rate for females at the national levels stands at 25.51 per cent compared with 53.26 per cent for males. In the rural sector, females have a workforce participation rate of 30.02 per cent compared with 53.03 per cent for males

**Table-1: Labour force participation rates by age group in rural India 1999-2012**

Age	1999-2000		2001-02		2011-12	
	Female	Male	Female	Male	Female	Male
15-29	31.06	75.09	32.05	76.33	18.03	63.01
30-44	44.05	98.04	46.04	98.74	33.04	98.09
45-59	40.07	95.04	40.38	96.19	34	96.06
60 & above	17.04	62.04	15.08	69.06	Nil	Nil
Total	23.05	53.03	24.06	53.08	18.01	54.04

Source: National Sample Survey Office

Analysis: workforce participation rate in India from 2000-2001 to 2011-12 is presented in table-1. It is observed from the table that there are slight variations from year to year in the female workforce participation rate both in rural India and urban India. The female workforce participation rate, which is 31.06 per cent in rural India during 200-2001 has declined to 75.09 per cent by 2011-12. In urban India, it is found that female workforce participation rate female workforce participation rate Age clarification of female labour participation rates from 2000-01 to 2011-02 in rural India are presented in table-I. It is evident from these tables that women are actively working in the age groups ranging from 15-60. There is a sharp decline in 60 and above years. Most of the women are participating in the labour force during the productive age, i.e. 30-44.

**Table-2: Labour force participation rates by age group in urban India 1999-2012**

Age	1999-2000		2001-02		2011-12	
	Female	Male	Female	Male	Female	Male
15-29	14.09	65.09	12.07	69.12	15.09	59.09
30-44	22.09	98.01	21.08	98.53	23.03	98.08
45-59	22.0	92.03	19.26	92.95	19.02	94.01
60 & above	08.02	38.06	8.0	39	Nil	Nil
Total	12.06	53.09	11.05	57.01	13.04	56.0

Source: National Survey Office

In this table –II shows that portraits the situation in urban India it is evident from these tables that women are actively working in the age group ranging from 15 to 59. There is a sharp decline in 60 and above years. Most of the women are participating in the labour force during the productive age, i.e., 30-44.

**Table ;3 Decade wise female work participation Rates in India.**

Decade/Year	Female Work Participation Rates in India
1961	31.39
1971	13.36
1981	23.18
1991	26.67
2001	31.0
2011	31.0

Source: Census of India 2011

Analysis –III this table shows that, rural female work participation rates in India and Andhra Pradesh from 1961 to 2011. In India, the rural female work participation rate was 31.39 per cent in 1961 and it 1971. It shows that the rural female work participation rate is decreasing but in 1981 it has suddenly changed and the rural female. Work participation rate has increased to 23.18 per cent. It is evident from the table that rural female workforce participation rate in India in 2011 is 30.02 per cent.

**Table-4 Workforce participation rate in India 2011**

	Gender	Workforce Participation Rate
Rural	Female	30.02
	Male	30.02
	Total	41.83
Urban	Female	15.44
	Male	53.76
	Total	35.31
Combined	Female	25.31
	Male	53.26
	Total	39.79

Source: Census 2011, Office of the Registrar General, India

Analysis: as per census 2011, the workforce participation rate for female at the national level stands at 39.79 per cent compared with 53.76 per cent for males. In the rural sector, female have a workforce participation rate 30.02 per cent compared with 53.03 per cent for males. In the urban sector, it is 15.44 per cent for females and 53.76 per cent for males. As per census, 2011, 41.01 per cent of female main and marginal workers are agricultural labourers.

#### **Suggestions**

- First of all the society must change their views towards the women that they are weak and less efficient than the men.
- Still the preference is given to male child but it is the time to change the attitude towards female.
- Minimum wage act should be implemented strictly in the female laborers and government must keep eyes on its implementation.
- Women laborers are paid lower wage than the men.
- Women should be educated through formal and non-formal channels.
- Women should be educated through formal and non-formal channels.

#### **Conclusion**

To improve the socio-economic conditions of women labourers, reasonable enhancement of minimum wages and identifications of nonfarm employment are necessary. As per the census of 2011, the workforce participation rate females at the national level stand at 25.51 per cent compared with 53.26 per cent for males. In the rural sector, females have a workforce participation rate of 30.32 percent compared with 53.03 per cent for males. In the urban sector, it is 15.44 per cent for females and 53.76 per cent for males

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## Post Harvest Utilization and Value Addition to Aquaculture Products for Sustainable Development

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### Abstract

The fisheries sector of India contributes to nearly 4.4% of the global fish production, 1.1% of the GDP and 4.7% of the agricultural GDP. The total fish production of 6.57 million metric tons presently has nearly 55% contribution from the inland sector and nearly the same from culture fisheries. Indian marine exports witnessed impressive growth from 37,175 tons in 1970 to 9,83,756 MT in 2013-14. In terms of value the increase was from Rs. 35.54 crores in 1970 to Rs. 30,213.26 crores in 2013-14. These exports have generated valuable foreign exchange which increased from US \$ 47.38 million (1970) to US \$ 5,007.70 million (2013-14). The growth of inland fishery sector has been phenomenal over the years. The share of marine fish in total fish production has been declining in the recent years but simultaneously there was a positive trend in inland fish production. Experience in Andhra Pradesh of aqua farmers vis-à-vis recently introduced fish species viz., pangasius (*Pangasianodon hypophthalmus*), pacu (*Piaractus brachyomus*) and milkfish (*Chanos chanos*) and the shellfish species white shrimp (*Litopenaeus vannamei*) suggest that species diversification has positive impact on production. These emerging species have already made their mark in Indian fisheries and are designed to reach further heights in the near future. However, the sustainable development of the same depends on, 1. Quarantine systems for imported SPF brood stocks needs to be strengthened to prevent possible entry of pathogens.;2 Implementation of scientific farming and GMP in aquaculture;3.Strict measures to control residue/microbial contaminants in hatcheries, feed mills, and aqua-farms and at fish and shrimp processing units;4. Concerted efforts for utilization of unutilized brackish water and saline lands for culture of fin fish/shell fishes and 5.Value addition of fish and shellfish targeting domestic and export markets needs to be encouraged. With diversification in the product and process management, appropriate and scientific knowledge is a basic requisite for increased understanding and for alleviation measures for new emerging pathogens as well as the chemical contaminants and additives that go in to the production line in order to protect the health of the consumer across the world and for sustainable development of aquaculture.

**Key Words:** Aquaculture, fish production, sustainable development, alleviation, diversification, residue, microbial contaminants.

### Introduction

Fisheries are one of the fastest growing sectors in India. The freshwater aquaculture and brackish water aquaculture are two main practices in India. Freshwater aquaculture involves the breeding of freshwater fish mainly carp, catla, rohu, magur, freshwater prawn, freshwater pearl culture and ornamental fish farming. Catla is grown in tanks and reservoirs in Uttar Pradesh and Rajasthan. Brackish water aquaculture involves breeding of fish viz., sea bass, grey mullet, tiger shrimp and mud crabs and is practiced in States of West Bengal, Andhra Pradesh, Kerala and Goa. General practice of fish farmers is use a mixture of oil cakes, rice bran, locally available snail, clam or mussel meat and buffalo meat to feed the fish. This mixture may be blended with tapioca paste to form small balls that are then placed in pottery bowls at marked feeding sites. The water in which fish are farmed is important for the development of a good harvest. The monitoring of the water quality for hardness, acidity/ alkalinity, contaminants, industrial chemicals and pesticides is essential for good aquaculture practice. At the same time it is equally important to ensure sufficient dissolved oxygen in the water for the survival and better health of aquatic life. These factors influence sustainable development of aquaculture albeit, what is equally important how the Aquatic Fish Produce (AFH) is utilized properly minimizing post harvest losses and develop value addition both for intra country and inter country (international) consumption and commercial purpose especially to manage glut produce and sustain market fluctuations and prevention of market crises.

### Indian Fisheries

Indian fisheries and aquaculture is an important sector of food production, providing nutritional security to the food basket, contributing to the agricultural exports and engaging about fourteen million people in different activities. With diverse resources ranging from deep seas to lakes in the mountains and more than 10% of the global biodiversity in terms of fish and shellfish species, the country has shown

continuous and sustained increments in fish production since independence. Constituting about 4.4% of the global fish production, the sector contributes to 1.1% of the GDP and 4.7% of the agricultural GDP. The total fish production of 6.57 million metric tons presently has nearly 55% contribution from the inland sector and nearly the same from culture fisheries. Paradigm shifts in terms of increasing contributions from inland sector and further from aquaculture are significations over the years.

The country has 429 Fish Farmers Development Agencies (FFDAs) and 39 brackish water Fish Farms Development Agencies (BFDAs) for promoting freshwater and coastal aquaculture. The annual carp seed production is to the tune of 20 billion and that of shrimp about 8 billion, with increasing diversification in the recent past. Along with food fish culture, ornamental fish culture and high value fish farming are gaining importance in the recent years. With over 2.4 lakh fishing crafts operating in the coast, six major fishing harbours, 40 minor fishing harbours and 151 landing centres are functioning to cater to the needs of over 3.5 million fisher folk (Table1). Fish and fish products have presently emerged as the largest group in agricultural exports of India account for around 3% of the total exports of the country and nearly 20% of the agricultural exports. More than 50 different types of fish and shellfish products are exported to 75 countries around the world.

**Table 1: Indian Fisheries, Resources, production and potential from different resources**

<b>Indian Fisheries</b>	
Global position	3rd in Fisheries 2nd in Aquaculture
Contribution of Fisheries to GDP (%)	1.07
Contribution to Agri. GDP (%)	4.7
Per capita fish availability (Kg.)	9.0
Annual Export earnings (Rs. in Crore)	30,213
Exports (quantity in MT)	9,83,756
Employment in sector (million)	14.0
<b>Resources</b>	
Coastline	8129 km
Exclusive Economic Zone	2.02 million sq. km
Continental Shelf	0.506 million sq. km
Rivers and Canals	1,97,024 km
Reservoirs	3.15 million ha
Ponds and Tanks	2.35 million ha
Oxbow lakes and derelict waters	1.3 million ha
Brackish waters	1.24 million ha
Estuaries	0.29 million ha
<b>Production and potential from different sources</b>	
Present fish Production	6.4 mmt
Inland	3.4 mmt
Marine	3.0 mmt
Potential fish production	8.4 mmt
Fish seed production	21,000 million fry
Hatcheries	1,070
FFDA	422
BFDA	39

### **Aquaculture**

Aquaculture is playing very important role in the economic and social wellbeing of nations across the world. Besides contributing to a major occupation of a large section of the population, it is feeding a significant part of the world's population a low cost but highly nutritious food. Over a period of time this simple business of small timers has evolved into a most lucrative and trade-oriented industry, providing employment to millions of people around the world. This traditional livelihood business has transformed into a sector, contributing to the food and nutritional security of the country, besides contributing to the economy and providing employment opportunity. The world per capita consumption of fish has increased from 9.9kg in 1960s to over 19kg in 2014. The increase in population and concomitant pressure to increase the production lead to enhanced production in aquaculture especially during last half decade. The stagnation

in fish production from marine sector augmented the aquaculture production to satisfy the requirements in a large way.

### **Production, Exports and its impact**

Indian marine exports witnessed impressive growth from 37,175 tons in 1970 to 9,83,756 MT in 2013-14. In terms of value the increase was from Rs. 35.54 crores in 1970 to Rs. 30,213.26 crores in 2013-14. These exports have generated valuable foreign exchange which increased from US \$ 47.38 million (1970) to US \$ 5,007.70 million (2013-14). The growth of inland fishery sector has been phenomenal over the years. The share of marine fish in total fish production has been declining in the recent years but simultaneously there was a positive trend in inland fish production (Tables 2&3). Of the 8,000,000 tons of fish produced in the India in 2009-10, nearly 62% was contributed by inland fisheries (DAHD, 2013).

**Table 2: Marine and inland fish production ('000 tons) in India**

Year	Marine	Inland	Share of inland fish in total production (%)
1950-1951	534	218	29
1960-1961	880	280	24.1
1970-1971	1086	670	38.3
1980-1981	1555	887	36.3
1990-1991	2300	1536	40
2000-2001	2811	2845	50.3%
2007-2008	2920	4207	59
2008-2009	2978	4659	62.77
2009-2010	3070	4930	61.63
2010-2011	3250	4981	60.52
2011-2012	3375	5295	61.08
2012-2013	3430	5632	62.15

Adopted from: Fisheries Profile of India, [www.dahd.nic.in](http://www.dahd.nic.in)

**Table 3: Fish production in last seven years**

Year	Inland Fish Production		Marine Production		Fish Growth rate (%)	Total Fish Production (lakh tons)	Total Fish Growth rate (%)	Fish seeds Produced In million fry
	Inland (lakh tons)	Growth rate (%)	Marine (lakh tons)	Growth rate (%)				
2004-05	35.26	1.96	27.79	-5.53	63.05	-1.48	20790.64	
2005-06	37.56	6.52	28.16	1.33	65.72	4.23	21988.30	
2006-07	38.45	2.37	30.24	7.39	68.69	4.52	23647.95	
2007-08	42.07	9.41	29.20	-3.44	71.27	3.76	24143.57	
2008-09	46.38	10.24	29.78	1.99	76.16	6.87	32177.21	
2009-10	48.94	5.52	31.04	4.23	79.98	5.02	29313.17	
2010-11	49.81	1.78	32.50	4.70	82.31	2.91	34110.83	
2011-12	52.94	6.28	33.72	3.75	86.66	5.28	36566.43	
2012-13	57.19	8.03	33.20	-1.51	90.40	4.32	34922.00	
2013-14	61.36	7.28	34.43	3.68	95.79	5.96	41450.00	

Source: Fisheries Profile of India, [www.dahd.nic.in](http://www.dahd.nic.in)

The fishing industry in India is traditionally export-oriented but of late, increase in price realization is seen in the domestic market. However, quality of the product sold in the domestic market is a concern and in this context much is need to be addressed. Another important factor is the shift in the consumer acceptance from traditional chilled/frozen products to value-added products. Even minor value addition as ready to cook product fetches appreciable demand from the domestic consumers. A perusal of export of marine products in India during the financial year 2013-14 shows that it has reached an all-time high of US \$ 5007.70 million. Marine product exports, crossed all previous records in quantity, rupee value and US \$ terms. Compared to the previous year, seafood exports recorded a growth of 5.98 % in quantity, 60.23% in rupee and 42.6 % growth in US \$ earnings respectively. The unit value realization also reached to record

high from USD/Kg 3.78 during 2012-13 to USD/Kg 5.09 during 2013-14 and recorded growth of 34.55% (Tables 4 & 5). The increased production of *L. Vannamei* shrimp has helped to achieve higher exports.

**Table 4: Exports during 2013-14 compared to 2012-13**

Export details	2012-13	2013-14	Growth %
Quantity Tons	928215	983756	5.98
Value Rs. Crore	18856.26	30213.26	60.23
Value US \$ Million	3511.67	5007.70	42.60
Unit value (US\$/Kg)	3.78	5.09	34.55

**Table 5: Export of total Shrimp and Aquaculture last 2 years**

Item		Apr-2012 - Mar-2013	Apr-2011 - Mar-2012	Apr-2010- Mar-2011
<b>Total Frozen Shrimp</b>	<b>Q:</b>	228620	189125	151465
	<b>V:</b>	9706.36	8175.26	5718.13
	<b>\$:</b>	1803.26	1741.20	1261.82
<b>Total Cultured Shrimp</b>	<b>Q:</b>	154938	119192	84245
	<b>V:</b>	6879.39	5729.20	3793.11
	<b>\$:</b>	1277.12	1225.10	836.77
<b>Black Tiger</b>	<b>Q:</b>	61177	74097	69034
	<b>V:</b>	2808.63	3683.96	3155.56
	<b>\$:</b>	521.33	791.00	695.65
<b>Scampi</b>	<b>Q:</b>	2061	2723	2069
	<b>V:</b>	112.12	154.63	113.26
	<b>\$:</b>	20.87	33.17	24.93
<b>Vannamei</b>	<b>Q:</b>	91171	40787	12047
	<b>V:</b>	3937.48	1819.71	480.96
	<b>\$:</b>	731.01	385.95	106.71
<b>White Shrimp</b>	<b>Q:</b>	529	1585	1095
	<b>V:</b>	21.16	70.90	43.34
	<b>\$:</b>	3.91	14.98	9.48
<b>Wild Shrimp</b>	<b>Q:</b>	73682	69933	67220
	<b>V:</b>	2826.97	2446.06	1925.02
	<b>\$:</b>	526.14	516.10	425.05

Q: Quantity in Tons, V: Value in Rs. crores, \$: USD Million

#### **Most important items of export**

Frozen shrimp continued to be the major export value item accounting for 64.12% of the total US \$ earnings. Shrimp exports during the period increased by 31.85%, 99.54% and 78.06% in quantity, rupee value and US \$ value respectively. There was all time high growth in unit value realization of frozen shrimp at 35.05%. The overall export of shrimp during 2013-14 was to the tune of 3,01,435 MT worth US \$ 3210.94 million. USA is the largest market (95,927MT) for frozen shrimps exports in quantity terms followed by European Union (73,487 MT), South East Asia (52,533MT) and Japan (28,719 MT). The contribution of cultured shrimp to the total shrimp export is 73.31% in terms of US \$. The export of cultured shrimp has shown tremendous growth of 36.71% in quantity and 92.29% in dollar terms. The export of Vannamei has shown fabulous growth to 1,75,071 MT from 91,171 MT and US \$ 1,994.27 million from 731.01 million compared to 2012-13. The export of Vannamei recorded a growth of 92.03% in quantity and 172.81% in dollar terms. 44.59 % of total Vannamei shrimp was exported to USA followed by 17.07% to EU, 16.54% to South East Asian countries and 4.01 % to Japan in terms US \$. Export of Black Tiger shrimp reduced from US \$521.33 million to 435.79 million and 61,177 MT to 34,133 MT compared to last year (MPEDA, 2014). Fish, has retained its position as the principal export item in quantity terms and the second largest export item in value terms, accounting for a share of about 32.97% in quantity and 14.15% in US \$ earnings. The unit value realization of fish also increased by 21.65%.

#### **Important export markets**

South East Asia continued to be the largest buyer of Indian marine products with a share of 26.38% in terms of US \$ value realization. USA is the second largest market with a share of 25.68% followed by European Union (EU) (20.24%), Japan (8.21%), other countries (8.20%), China (5.85%) and Middle East

(5.45%). The exports to South East Asian Countries have shown positive growth by 11.47%, 84.67% and 62.72% in terms of Quantity, Rupee value and US dollar terms respectively. Export to Middle East countries has shown good growth of 40.13%, 43.65% and 30.29% in terms of Quantity, Value and Dollar terms respectively. Marine products and AFH were exported through 26 sea/air/land ports. Exports improved from Vizag, Chennai, Krishnapatnam, Tuticorin and Mangalore compared to the corresponding period during the last year. Pipavav is the major port in terms of quantity (25.27%) and Vizag is the major port in terms of dollar value (22.59%). The envisaged target for the year 2014-15 is USD 6.0 Billion. This is attributed to increased production of *L. Vannamei* shrimp, Quality control measures and increase in infrastructure facilities for production of value added items.

### **Andhra Pradesh**

Andhra Pradesh ranks first in coastal aquaculture and freshwater aquaculture. It ranks second in freshwater fish production and overall value of fish/prawn production. Andhra Pradesh contributes nearly 40 per cent of the total marine exports of the country. Inland resources in Andhra Pradesh (un-divided) comprise 102 reservoirs of which 7 are large, 26 are medium and 69 are small reservoirs. There are two lakes-Kolleru Lake, a freshwater lake and Pulicat lake - a brackish water lake. 74,000 perennial, seasonal and long seasonal tanks, fishponds and freshwater prawn ponds for aquaculture are also located in Andhra Pradesh. Brackish water resources comprise 78000 hectares for shrimp culture, a coastline of 974 km and 508 fishing villages. The contribution of the fisheries sector to the economy of Andhra Pradesh has been very substantial. The rate of increase in culture area and production from aquaculture in Andhra Pradesh has been much higher than that of rest of the country. This can be attributed, largely to the positive attitude of the aqua farmers towards innovative technologies and entrepreneurial capabilities of the fish processors to explore and establish marketing channels both for internal trade and for exports (Murthy *et al*, 2014).

Similar to other areas in India, the Indian Major carps (*Labeo rohita*, *Catla catla*, *Cirrhinus mrigala*) formed the major component of fish culture in Andhra Pradesh and till recently the black tiger shrimp (*Penaeus monodon*) dominated the shrimp culture in Andhra Pradesh. The aqua-farmers of Andhra Pradesh were the first to realize the potential for species diversification both in fish and shellfish. This led to the introduction of new and commercially important fish and shellfishes into the aquaculture scene of Andhra Pradesh. The recently introduced fish species are pangasius (*Pangasianodon hypophthalmus*), pacu (*Piaractus brachypomus*) and milk fish (*Chanos chanos*) while the emerging shellfish species is white shrimp (*Litopenaeus vannamei*). These emerging species have already made their mark in Indian fisheries and are destined to reach further heights in the near future. Part of the discussion centers on these emerging fish and shellfish species based on the information collected from primary and secondary sources so that it would sensitize prospective and progressive aqua farmers in other parts of the country towards species diversification and sustainable development.

#### **Important cultured fish and shrimp species for value addition:**

**1. White shrimp (*Litopenaeus vannamei*):** Shrimps are rich source of amino acids, peptides, protein and other soluble non-nitrogenous substances, which partly contribute to the desirable, delicate sweet taste of shrimp. Shrimp has remained as a major export earner in case of Indian seafood industry. Exports to US had registered a tremendous growth of 19.94% in quantity and 72.06% in US\$ realization and is mainly attributed to the export of Frozen Shrimp which showed a growth of about 34.81% in volume and 92.40% in US\$ terms. Exports of Vannamei shrimp showed a tremendous increase in US market by 59.63 % in quantity and 135.71% in US \$ realization. Export to Japan registered increase in terms of US \$ by 10.30%. Export of Frozen Shrimp increased by 7.38% in quantity terms and 28.23 % in dollar terms ([www.mpeda.com](http://www.mpeda.com)). Frozen shrimp accounted for 51.35 per cent of total seafood export earnings of the country during 2012-13 Shrimp production through aquaculture contributed to 68% of the total shrimp exports 2012-13: 68%. Recent data shows a huge increase in production of *L. vannamei*, in India and more so in Andhra Pradesh. During 2012-13, the total shrimp production in India through aquaculture was 2,74,151 MT from a culture area of 1,18,744 ha. The contribution of vannamei in the total shrimp production was 53.8% and formed 59% of the farmed shrimp export from a culture area of 19%. The

contribution of vannamei is all the more striking in the case of Andhra Pradesh. The total shrimp production in Andhra Pradesh through aquaculture was 1,59,257 Mt from a culture area of 36,403 ha. Vannamei contributes 83.6% of the total farmed shrimp production and 78.6% of the farmed shrimp exported from Andhra Pradesh. At present 55.5% of the shrimp culture area in Andhra Pradesh is under vannamei.

The giant leap in production and productivity of *L.vannamei* has resulted in wider adoption of the species by aqua farmers and an increased raw material flow to the processing. It is likely that this shellfish species would get wider patronage by the shrimp farmers. Andhra Pradesh has 55 seafood processing firms out of which 51 are European Union (EU) approved plants. Total installed capacity of the firms is 2,236.6 MT. In addition to the processing plants, there are five independent cold storages with a total capacity of 5,459 MT capacity. Dominant changes have been observed in cultured shrimp processing scenario of Andhra Pradesh after introduction of new shrimp species *L.vannamei*. As the shrimp export industry is the backbone of Indian seafood industry the current changes after introduction of *L.vannamei* in the seafood processing sector need to be sustained further. In Andhra Pradesh coast more than 150 registered hatcheries located in different coastal districts and an average production of seeds is in the tune of 100 million per hatchery and out of that 80% Vannamei and 20% black tiger production hatcheries. Hatchery operators and shrimp farmers are cautioned that *L.vannamei* being an exotic species should be bred and cultured only by the authorized persons. Culture of this species by unauthorized farms without proper bio-security facilities would result in introduction of pathogens into the system and would result in the collapse of the shrimp farming activities in the country.

**Farm prices of Vannamei (Grade wise) in 2013 and International Market:** Over the past two years Early Mortality Syndrome (EMS) or Acute Hepatopancreatic Necrosis Syndrome (AHPNS) has caused large-scale mortalities of farmed shrimp in several countries in Asia. The EMS affected countries include China, Malaysia, Thailand and Viet Nam. Short fall of vannamei production in these countries has lead to an increase demand for vannamei in the International markets thus benefitting India, indirectly. A steep increase in the raw material price of vannamei of different grades (Table 6) is a clear indication of the demand for vannamei by the shrimp processors. It is of paramount importance that necessary precautions have to be taken to prevent the entry and spread of EMS in India for sustainable development.

**Table 6: Comparison of the raw material price of different grades of Vannamei during Oct 2012 and Oct 2013 in Andhra Pradesh**

Vannamei Grade	Price in Oct. 2012	Price in Oct, 2013	Increase (%)
20-40	303.33	650.00	116.48
50-70	186.67	420.00	123.98
80-100	123.33	260.00	110.82

## 2. Pacu (*Piaractus brachypomus*):

Out of the total inland fish production of over 3.6 million metric tons, more than 60% is contributed by fish culture in ponds and reservoirs. The average productivity from ponds on the national level is nearly 2,500 kg/ha/y, though in Andhra Pradesh and Haryana it is more than 5,000 kg/ha/y. The Indian Major Carps are the widely cultured freshwater fish species in Andhra Pradesh. Pacu (*P.brachypomus*), a native fish of South America has been introduced into India recently as an alien species via Bangladesh. Pacu were probably introduced in India in 2003 or 2004, and leading hatchery owners soon started culture in captivity to raise brood stock for commercial breeding programmes.

Pacu was introduced into the farming sector of Andhra Pradesh no more than five years ago. At present Pacu is cultured in nearly 20-25 thousand hectares in West Godavari, East Godavari and Prakasam districts of Andhra Pradesh. It grows 600-700g in 4-5 months, fetches Rs. 60-70/kg at farm level and transported to Assam, Siligiri and Nepal with 1:1 icing in thermocoal boxes @ 200 trucks daily. Pacu is normally filter feeders and is recommended as new member for commercial aquaculture practice. Pacu can tolerate temperature ranging from 23 to 28<sup>0</sup> C and pH level of 4.8-7.5 under grow-out conditions. Although carnivorous, farmers are culturing pacu in polyculture with carps. Pacu is frequently grown in polyculture



with Indian major carps at a ratio of 1 pacu: 3 carps and attain maturity at 3+ years in age with a stocking density of 2,000-2,500 individual /ha. Polyculture with striped cat fish *Pangasianodon hypophthalmus* has also been reported from Andhra Pradesh. At fingerling stage, the fish possess an alluring shining color with a tint of blood red around the ventro-anterior region of the trunk. At maturity, the color becomes more subdued with some round spots appearing throughout the body. The overall color is dark in nature with a shape similar to that of marine fish, pomfret (*Pampus spp.*).

Pacu has a characteristic pomfret-like shape and is often referred to as red pomfret or freshwater pomfret. The characteristic pomfret-like shape of pacu is considered an attractive quality amongst fish consumers. Market name of Pacu in Telugu is 'Suryudu chandhuva' which is similar to the Telugu name of pomfret i.e. tella Sandhuva (silver pomfret) and *nalla chandhuva* (black pomfret). Pacu fish Culture Practices in Andhra Pradesh with IMC, Polyculture. Pacu have already established a place in the farming sector of Bengal and a good number of freshwater hatcheries are likely to be converted into Pacu hatcheries in the near future.

**3. Pangasius fish (*Pangasianodon hypophthalmus*):** An exotic catfish that is endemic to the waters of Mekong basin in south-east Asia, belongs to the family *Pangasiidae* and commonly known as river or silver striped cat fish, sutchi catfish and iridescent shark. Total pangasius production in India during 2009-10 was 3, 01,066 tons. The annual production of pangasius cultured in Andhra Pradesh increased phenomenally and reached 3, 00,000 tons from a culture area of 15,000 ha in 2009-10 (MPEDA, 2010). Pangasius is being cultured, mainly in the Krishna, West Godavari, East Godavari, Guntur and Nellore districts of Andhra Pradesh. Pangasius farming in Andhra Pradesh represents and fastest growth of single species farming recorded so far in the aquaculture sector of India. Pangasius meat has high nutritive qualities and excellent sensory properties. The fish can be filleted easily due to the absence of intra-muscular pin bones. Tender flesh, sweet taste; absence of fishy odour and spines, delicate flavor and firm texture when cooked are the attributes that favour consumer preference for pangasius. Frozen catfish fillets popularly known as 'bass' forms the mainstay of export of fishery products from Vietnam to US and Europe. There is a great potential for development of convenience products such as fish fillets, fish fingers, fish cutlets, fish balls, fish wafers, fish pickles, smoked fish, canned fish and fish curry in retort pouches from Pangasius (Rao *et al.*, 2013).

**4. Milkfish (*Chanos chanos*):** This brackish water fish is suitable as indigenous candidate aquaculture species in India. World aquaculture production of milkfish was about 6.5 lakh metric tons during 2009 (FAO FishStat, 2011) and it takes second only to Atlantic Salmon in terms of aquaculture production of marine/brackish water species. Locally it is called a *hu meenu* (Kannada), *poomeen* (Malayalam), *thullu* (Tamil) and *pala bontha* (Telugu) ([www.fishbase.org](http://www.fishbase.org)). It is popular food fish in South-East Asian countries such as the Philippines, Indonesia, Taiwan and Pacific Ocean island countries (Fiji, Solomon islands) where it is sourced from brackish water farms and open sea cages. Milkfish culture can be traced back about 700 years in Indonesia, and at least 400 years in Taiwan and Philippines. Historically in India, milkfish was famous fish during Tippu Sultan's Mysore Kingdom and the Imperial Gazetteer of India (1908) mentions that "on the sand-pit to the west of Kundpura town lies a small reservoir containing a variety of fish locally known as the mu-mi-nu (flower fish) running up to three feet in length, which were especially reserved for Tippu's table during Mysore rule".

#### **Milk Fish *Chanos chanos***

**Scope for milkfish aquaculture:** Indian domestic market for marine finfish in recent years is facing a serious trend of diminishing catches and escalating prices. This has opened new vistas for affordable, acceptable, perennial accessible and sustainably farmed marine finfish. Milkfish can be candidate species to meet the Indian domestic market needs as it is a euryhaline (tolerates wide range of salinity from 0-45 ppt), omnivore species (eats vegetable based food and low in food chain) and hatchery and farm production technology already exists in South-East Asian Countries. It can tolerate wide ranges of salinity and temperature fluctuations. Over last 5-6 decades, several commendable attempts have been made to farm milkfish by National Fisheries Research Institutes and fish farmers across India. Milkfish can be used as

efficient live bait for export oriented tuna fisheries in Asia-Pacific countries. Marketing of milk fish of below 500g size was unsuccessful as consumers did not prefer these fish due to bones and tender meat. Milkfish farmed in freshwater carp farms had poor market response, mainly due to muddy flavor.

In general, aqua farmers believe that it is a non-marketable fish in India. Need of the hour is systematic value-chain oriented effort to comprehend the entire techno-economic and market feasibility of milkfish farming and marketing in India or its potential as bait fish to cater the needs of tuna fishery. Brackish water farming areas fallen idle along the Indian coastline can be revived by low risk milkfish farming. The estimated milkfish wild fry availability in Peninsular India is about 200-250 million. Challenges in the form of hatchery seed availability and marketing need to be addressed on a priority basis. Sustainable milkfish farming can be achieved through polyculture with shrimps, rotation of milk fish and shrimp crops, open cage culture and by establishing robust hatchery technology. Milkfish can be cultured in brackish water pond (2ha, 10-30 ppt). At present wild milkfish fry was sourced from Krishna and Godavari estuarine areas in Andhra Pradesh.

Hatchery technology for milkfish fry production already exists and widely used in Southeast Asian countries. India needs to adopt them to local conditions and it needs a strong national level brood bank development program. There is ample scope for milk fish farming and marketing of above one kg size in domestic markets. Presently idle brackish water farming areas along the Indian coastline can be effectively utilized for low risk milkfish farming. To realize this, there is a need to establish vigorous hatchery technology for continuous seed availability, create awareness among fish farmers by field demonstrations and arrange for continuous supply of big size milkfish to the domestic markets to meet consumer demand.

#### ***Post Harvest Utilization***

***Advanced technologies in fish processing:*** Aquatic Food Harvest (AFH) are highly perishable and needs to be processed into products which can be stored or processed subsequently or consumed at a later stage. Though AFH undergo post mortem changes due to chemical processes or due to microbial action during storage, the existing technologies can take care of spoilage to a large extent. Chilling is one the earliest technologies for the preservation of AFH. The increase in shelf life of the AFH from initial stage to spoilage determines its commercial value. In view of changes in consumer's preference, technologies as well as different products have come into the market to cater the consumer requirement. The consumer is aware of the finer attributes of quality such as texture, flavor, colour etc., and therefore the responsibility for the processor rests on the creation of suitable characteristics in the products in order to increase its acceptability for the business. There are a number of emerging technologies which have been tried at different levels across the world or are at different levels of research and development and are waiting for adoption in the sector. Some of the technologies which received the attention of food manufacturers include high pressure processing, pulse electric field, microwave processing, radio frequency, microwave, irradiation etc.

**High pressure processing** is a technique for extending the shelf life of products with minimal or no heat treatment but is effective in protecting the attributes of the AFH. The technology, first commercialized in 1992 in Japan, has been tried for a variety of food products. In this process, the pressure is uniformly transmitted throughout the product which affects the covalent bonds of food, while retaining the other attributes. The possibility of extending shelf life of the product for longer periods without compromising the freshness and quality of the food is the main advantage of the process. Studies reveal the use of high pressure processing for destruction of micro-organisms, to alter functional properties of fish-based products such as surimi and for the formation of heat induced gels from fish. Pressure shift freezing and pressure assisted thawing are the two other applications of high pressure techniques.

**Pulse light** is another non-thermal technology finding application in food processing. The technique, approved by the USFDA under 21 CFR 179.41, employs pulses of light i.e., high peak pulses of broad spectrum white light in short bursts, which inactivate micro-organisms on food surfaces as well as food contact surfaces and packaging materials by the action of the ultra-violet light of the spectrum. Reduction in the load of species of Listeria, salmonella, pseudomonas, staphylococcus, etc. and has contributed to extension of shelf life of fish and shellfish. It was reported that shrimp treated with pulse light demonstrated

a higher shelf life of 7 days in edible condition in chilled storage compared to the of simply chilled shrimp. The green technology which uses minimum energy is a quick process in controlling microbial growth and is considered as a safe technology for food applications. However, low penetration of light in fish meat products and the effect of light on lipids are some of the intriguing problems associated with pulse light technology.

**Pulse Electric Field (PEF):** In high intensity pulse electric field, food is placed between 2 electrodes where pulses of high voltage are applied. The treatment is conducted either at ambient, or sub or above ambient temperatures for a short period of time (less than 1 sec). This is a non thermal technology where heating of food is least and is reported to be superior to traditional heat applications as the detrimental changes in physical and sensor attributes of the food is avoided (Ziang *et al.*, 1995).

**Microwave Energy:** Microwaves are used at domestic levels for cooking of food but their application for commercial purposes for preservation of food such as cooking, drying, pasteurization and preservation of food materials is an important area of the future. The importance of microwaves is due to its ability to reach high heating rates, uniform heating and safe handling, besides easy operation and low maintenance. The possibility of changes of flavor or sensory attributes of food is also reported to be minimum compared to conventional cooking process (Vadivambal & Jaya, 2010). Microwaves are type of electromagnetic waves with frequency in the range 300MHz to 300GHz. Domestic microwave appliances operate generally at a frequency of 2.45 GHz, while industrial microwave systems operate at frequencies of 915 MHz and 2.45 GHz (Datta & Anantheswaran, 2000). Microwave heating of food materials is caused by the dipolar and ionic mechanisms, in which the food materials absorb the microwaves and convert to heat. The presence of water results in dielectric heating due to the dipolar nature of water. The major problem however is the non-uniform distribution of heat leading to uneven distribution of temperature resulting in the partial control of microbes (Vadivambal & Jayas, 2010). But in selected food applications such as bacon cooking as well as sausage cooking, microwaves have shown their useful application.

**Radio Frequency Heating (RFH):** The RFH like microwaves is a dielectric heating has a potential for fast heating solid or semi-solid food. According to electromagnetic compatibility regulations, the industrial, scientific and medical bands of radio frequency are limited to 13.56, 27.12, and 40.68 MHz. The deeper depths of RF energy penetration in foods and the simple uniform field patterns, compared to the complex non-uniform standing wave patterns in a microwave oven, make RF heating more suitable for processing of large food trays (Zhao and others 2000; Wang and other 2003). This is being extensively used for thawing of frozen fish products which takes lesser time compared to conventional thawing. The irradiation process has been approved by the Food and Agriculture Organization (FAO), the World Health Organization (WHO), the International Atomic Energy Agency (IAEA) and the *Codex Alimentarius Commission*. In India, about 20 commodities have been approved for processing by this method. Irradiation processing of food involves the controlled application of energy from ionizing radiations such as gamma rays, electrons, and X-rays for food preservation.

It works by disrupting the biological processes that lead to decay. Control of insect infestation, reducing the numbers of pathogenic or spoilage micro-organisms and delay or elimination of natural biological processes such as ripening, germination, or sprouting in fresh food are some of the characteristics of radiation that find application in food industry. Like all preservation methods, irradiation should supplement rather than replace good food hygiene, handling, and preparation practices. Irradiation, though it causes alterations in the case of microorganisms, does not cause change in nutritional parameters. Gamma irradiation has been considered as an interesting method of preservation to extend the shelf life of fish and also to reduce qualitatively and quantitatively the microbial population in fish and fish products. Irradiation doses of 2-7kGy can reduce important food pathogens such as Salmonella, Listeria, and Vibrio spp., as well as many fish-specific spoilers Pseudomonadaceae and Enterobacteriaceae that can be significantly decreased. Studies have shown that frozen tuna loins (*Thunnus obesus*) packed in polyethylene PE bags and irradiated by an X-ray machine at a dose of 2.2 kGy, showed higher keeping quality than un-irradiated samples.

### **Central Institute of Fisheries Technology (CIFT) Contributions:**

The Central Institute of Fisheries Technology has made considerable advances on the utilization of many varieties of fish and shellfish. Pioneering work on the harvest and post-harvest front was initiated by CIFT in the country during 1960s, which paved way for the future developments in both the harvest and post-harvest areas. The Institute, in the past 55 years of its existence, has provided the much needed impetus for the fisheries development in the country.

**I. Pacu (*Piaractus brachypomus*):** In CIFT Visakhapatnam Research Centre Cultured Pacu was collected from fish market in Andhra Pradesh and subjected to nutritional and biochemical analyses. The proximate composition constituents' viz., moisture, protein, fat and ash were 75.17%, 18.56%, 4.95%, 1.29%, respectively. The mineral compositions were 1177mg% (K), 163.5mg% (Na), 66.18mg% (Ca), 104ppm (Fe), 1046.4mg% (P) had a total lipid content of 1.3% with a fatty acid profile of 37% SFA, 34% MUFA and 21%. The sensory and organoleptic evaluations revealed that Pacu was excellent in all attributes on 10 point hedonic scale methods in which product scoring 8-10 is excellent; 6 to 8 is very good; 4 to 6 is good; 2 to 4 is average and scoring below 2 is unacceptable. The Pacu fish was subjected to production of breaded and battered products preparation. The results of nutritional composition indicate that Pacu is excellent candidate species of food fish.

**II. 1 Pangasius fish (*Pangasianodon hypophthalmus*):** The major crisis in Pangasius farming is the decrease of market price. One of the avenues for addressing this problem is to increase the consumption of the fish by way of promoting value added products in the domestic markets. However, the marketing of value added products requires infrastructure in the form of cold chain from the point of manufacture to the point where the product is consumed. In the Pangasius Fish Festival organized by CIFT at Eleru on 24 March 2012 different value added products made with Pangasius were demonstrated.

**II.2 Pangasius fillet problem for export and domestic market:** Pangasius fillet have demand in the International market. However, the fillet prepared from cultured pangasius has the problem of yellow discoloration. White or pinkish coloured fillets are preferred in the international market. At CIFT, Visakhapatnam Research Centre the colour ( $L^*$ ,  $a^*$  and  $b^*$  values) of pangasius fish fillets procured from local market were measured using a Hunter's colorimeter (ColorFlex EZ, Hunter Lab).  $L^*$  is the luminance or lightness component, which ranges from 0 to 100, and parameters  $a^*$  (redness/greenness (+/-)) and  $b^*$  (yellowness/blueness (+/-)) are the two chromatic components, which range from -120 to +120. Three types of fillets were commonly observed namely, white fillets, pink fillets and yellow fillets. Mean  $L^*$ ,  $a^*$  and  $b^*$  values of whitish fillets was 60.07, 6.73 and 17.75 respectively. Yellow coloured pangasius fillets had mean  $L^*$ ,  $a^*$  and  $b^*$  values of 54.96, 12.34 and 27.28, respectively. A processing plant has been established in Andhra Pradesh for processing pangasius fish. The plant is equipped with filleting machine exclusively for Pangasius fish.

**III. High pressure processing:** The research at CIFT, Cochin, clearly indicates increased shelf life of shell fish when high pressure processing method was employed. The 'Studies on high pressure processing on high value perishable commodities' clearly demonstrated the extension of chilled stored shelf life of pressure treated shrimps (*L.vannamei*) up to 30 days.

**IV. Pulse light:** The studies at CIFT have shown extended shelf life of the product of *Etroplus suratensis*. A decrease in counts of *E. coli* 0157 H7 from 3 to 0.7 log cycles was observed in masmin made up of tuna upon treatment with Pulse Light.

**V. Pulse Electric Field (PEF):** There are reports indicating the application of PEF for extending the shelf life of bread, mild, fruit juices et. This could be an important future technology for preserving AFH based liquid food such as soups with minimum loss of characteristics such as flavor, nutritional value etc.

**VI. Microwave Energy:** There is a growing demand for the use of microwaves in the applications for ready-to-eat products packed in microwaveable packaging materials. Glut production of cultured fish as Pangasius can be used for sausage production (Anon, 2013, 2014). When large quantities of sausages are under preparation microwave preservation will be highly effective.

**VII. Radio Frequency Heating (RFH):** BARC, Mumbai has carried pioneering works in the irradiation of fish. Consumers have their own understanding on the consumption of irradiated products, and consumer sensitization programmes have not been extensively taken up by the industry till date.

#### ***Quality Assurance and Trade***

The fish and fishery products mainly AFH is an important commodity for trade and India exports that aggregated to 983,756 MT valued at Rs. 30,213.26 crores and US \$ 5,007.70 million in 2013-14. Since the demand of these products is on increasing trend world over and as it is one of the highly traded commodities across the world, concerns are raised by the consumers on safety for its consumption. Sanitary and Phytosanitary agreement signed in Marrakesh on 15 April 1994 and the General Agreement on Tariffs and Trade (GATT 1994) along with the establishment of World Trade Organization on 1 January 1995 sets out the basic rules for food safety and animal and plant health standards.

The production of good quality AFH depends on the water ecosystem, and the environmental and pollution issues associated with the water bodies have direct impact on the quality of the AFH with special reference to hazard aspect. A hazard is a biological, chemical or physical agent that is reasonably likely to cause illness or injury in the absence of its control. The hazards associated with alarms on AFH is increasing in both number and level due to the awareness of consumers on the health impact of hazards and therefore has become a major concern of trade.

The key issues for ensuring AFH quality are fish health and environmental monitoring, whether it is sourced from aquaculture or from other aquatic bodies. As far as aquaculture is concerned control and sensible management of environment and fish health programme should be made available in line with the scientific development to the farmers. Periodic assessment of the AFH quality based on chemical residues is essential to protect the consumers and to provide reassurance and competitive advantage to the export market. Traceability is the much talked about method in the food industry which requires every food operator to have system and procedure for tracking all the inputs entering the food system.

A chain of potential risks follows from the aquaculture ponds to the processing facility as well as from the processing facility to the retailers or consumers directly. Product handling in the process causes concerns to consumers as well as to the authorities. The chemical hazards in AFH possibly include heavy metal residues, pesticide residues, antibiotic residues and a few other persistent organic pollutants such as PCBs and Dioxins. The levels of these hazards keep on decreasing and few of them, particularly antibiotic residues, have been banned in the edible portion meant for human consumption. The microbial hazards include certain viruses such as norovirus and bacteria such as *Vibrio parahaemolyticus*. Incidences of pathogens such as *Vibrio* in shell fishes, as well as metals like mercury in fish, cadmium in cephalopods and additives beyond limits as well as adulterants in feed and other contamination related to industrial pollution lay pressure on the consumers. In addition, additives which are banned for use in fish, wild or farmed, cause major concern in the trade. Presence of residues of formaldehyde in fish as well as presence of residue levels of dyes such as malachite green is major problems in fish in other countries. This calls for a closer look into the quality system so that such banned items do not enter the food system.

#### ***Challenges for export from India: Rising above Rejections***

The major importing countries, namely the EU and USA, have stringent quality requirements on imports. The Operational and Administrative System for Import Support System (OASIS) of USA and the Rapid Alert System for Food and Feed (RASFF) of EU control the import in respective countries. On an average there are about 380 rejections of fish and fishery products by EU during the period from 2002 to 2008. India's rejection figure from EU was about 37 for the period from 2002 to 2008, almost one tenth of the total rejections. For the same period the average rejections from USA is about 1850, almost six times higher. The analysis of the cause of rejection from EU showed that maximum rejection from third world countries were noticed for the presence of banned veterinary drug residues (28%) followed by microbiological contaminants, heavy metals and other reasons. Rejections on the grounds of organoleptic reasons indicated limitations in the quality control in the exporting countries. For USA, filth or unsanitary

conditions contributed to over 49% of the rejection, followed by Microbiological reasons, labeling issues etc. The pattern of rejections definitely showed concern on the quality control system in the exporting countries.

### **Quality Alleviation Practices**

Good manufacturing and good hygiene are important practices for all the states in India and other countries and are in immediate need to develop a good hygienic environment for production and processing of AFH. According to FAO, quality Assurance refers to “all those planned and systematic actions necessary to provide adequate confidence that a product or service will satisfy given requirements for quality”. Preventive strategies based on thorough analysis of prevailing conditions are much more likely to provide assurance of fish quality. Implementation of Hazard Analysis Critical Control Point (HACCP) along with GMP and GHP provide safe guards against the potential hazards which are likely to interfere with the production system leading to safe fish for human consumption. Post-harvest handling must therefore be optimized, and quality assurance systems are a way to reduce post-harvest losses and maximize the value aquatic food produce.

### **Conclusions:**

Experience in Andhra Pradesh of aquafarmers vis-à-vis recently introduced fish species viz., pangasius (*Pangasianodon hypophthalmus*), pacu (*Piaractus brachyomus*) and milkfish (*Chanos chanos*) and the shellfish species white shrimp (*Litopenaeus vannamei*) suggest that species diversification both in fish and shellfish has positive impact on fish production. These emerging species have already made their mark in Indian fisheries and are designed to reach further heights in the near future. However, the sustainable development of the same depends on,

- Quarantine systems for imported SPF brood stocks needs to be strengthened to prevent possible entry of pathogens.
- Implementation of scientific farming and GMP in aquaculture.
- Strict measures to control residue/microbial contaminants in hatcheries, feed mills, and aqua-farms and at fish and shrimp processing units.
- Concerted efforts for utilization of unutilized brackish water and saline lands for culture of fin fish/shell fishes.
- Value addition of fish and shellfish targeting domestic and export markets needs to be encouraged.

With diversification in the product and process regime, proper and scientific knowledge is a basic requirement for increased understanding and for alleviation measures for new emerging pathogens as well as the chemical contaminants and additives that go in to the production line in order to protect the health of the consumer across the world and for sustainable development of aquaculture.

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## Role of Immunex Ds as immunostimulant on the biochemical response in *Labeo rohita* (Hamilton) during aeromoniasis.

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### Abstract

Various diseases were recognized as a hurdle to sustainable farming of carp culture in India. Due to negative result of chemotherapeutics for treating diseases, there is need to use of eco-friendly disease preventive measures to be taken to reduce the risk of diseases and for economic growth of carp culture. Fish can be protected strongly by sensitizing their immune system with immunostimulants. The immune stimulants increase resistance by enhancing the non specific immune system. The modulation of immune response by using Immunex Ds as a possible therapeutic measure has become a subject of active scientific investigation. These have no or little side effects and also do not cause any pollution hazards; therefore the present study has been undertaken to study the effect of Immunex Ds on disease resistance. Two experiments were performed. Three groups were employed Group A, fed with Immunex Ds supplemental diet (40mg/100gm of feed), Group B received *A. liquefaciens* ( $10^5$  CFU/fish) and Group C (uninfected and untreated). The tissue samples of gill, intestine, brain and thymus from groups A, B and C were analyzed for carbohydrate, protein, DNA and RNA in 1, 2, 3, 4 and 5 of experimental period following standard methods. The level of carbohydrates, protein, DNA and RNA were increased in Group A and decreased in Group B throughout the experiment in comparison with control group.

**Keywords:** Immunostimulant, Immunex Ds, *Aeromonas liquefaciens*, *Labeo rohita*

### Introduction:

Fish are susceptible to a wide variety of bacterial pathogens. These bacteria became pathogens when fish are fed with physiologically unbalanced, nutritionally different diet, or exposed to stress i.e. poor water quality, overstocking etc. Aeromoniasis is one of the most common bacterial diseases of fresh water fish. This disease has been associated with several members of the genus *Aeromonas*, including *A. liquefaciens* and *A. hydrophila*. *A. liquefaciens* is ubiquitous in nature and is even found in the intestinal tract of the fish. In natural situation, infection of fish with *Aeromonas* is probably a minor problem. However in intensive fish farming systems, like outdoor ponds, aquaria tanks, some abnormal factors other than pathogen play a role in the onset of disease. *A. hydrophila* causes disease in fish known as Motile Aeromonas Septicemia (MAS), haemorrhagic septicemia, Ulcer disease or Red sore disease. The clinical symptoms include swimming abnormalities, pale gills, bloated appearance and also ulcerations other organs commonly, affected with aeromoniasis include, gill, kidney, liver, spleen, pancreas and skeletal muscle. Antibiotics and chemotherapeutics are extensively used in aqua ponds to control these fish pathogens, but they create so many problems to the fish as well as to the environment. In order to reduce these hazards, recently use of immunostimulants came into existence to improve disease, act as resistance and stress agents to the cultivable fish and eco-friendly for the sustainable environment Castro et. al (2003) examined the development of immune system and use of immunostimulants in *Sanegalese sole* (*solea senegalensis*) during the early life stages and until day 121 after hatching. Rohu fed with aqueous root extract of *Achyranthus aspera* showed increased serum antiproteases when compared with those fed with control diet (Rao and Chakrabarti, 2004). Ivan and Roy (2005) studied the effect of immunostimulants in fish larval aquaculture.

The immunostimulants, as dietary supplements can stimulate natural immunity in fish. The present study has undertaken to evaluate the effect of Immunex Ds in Immunity of *L. rohita* during aeromoniasis. Immunex Ds contains L. lysine, DL methionine, Fatty acids, Levamisole, hydrochloride, vitamins A, D<sub>3</sub>, E, C, B<sub>12</sub>, minerals and probiotics etc. Fish, *Oreochromis niloticus* fed on diet supplemented with levamisole HCl (225mg/kg diet) and Immunoton (a mixture of vitamin E, 150 mg/kg diet) for two weeks showed enhanced level of total leucocytes and phagocytosis (Abdelkhalek et.al, 2008). Fish can be protected against diseases and/or their growth may be enhanced with the use of immunostimulants (Siwicki and Korwin, 1988; Anderson, 1992; Raa, 1996; Sakai, 1999; Sahoo and Mukherjee, 2001, 2002 and 2003; Kumari et.al, 2003).



### **Material and Methods:**

**Experimental Fish:** Experiments were performed on the common fresh water carp, *Labeo rohita* (Indian Major carp) which is extensively cultured in India and is valued as an important food fish.

**Procurement and Maintenance of fish:** Healthy fish with an average weight of 50-60 gm. were obtained from Jalipudi fish farm, Jalipudi Mandal, West Godavari District, Andhra Pradesh and kept in the laboratory for acclimatization for about 4-5 days before they were used for experimentation. Dechlorinated ground water was used during acclimation and experimental period. The water in acclimation tanks were frequently oxygenated with electrical aerators.

**Bacterial strain and cultivation:** *Aeromonas liquefaciens* strain, MTCC 2654 (virulent strain) was obtained from MTCC, Chandigarh, India. From this parent culture, sub cultures of *A. liquefaciens* were prepared and doses were made under aseptic condition.

**Antigen dose:** Various doses like  $10^{-1}$ ,  $10^{-2}$ ,  $10^{-3}$ ,  $10^{-4}$ ,  $10^{-5}$ ,  $10^{-6}$ ,  $10^{-7}$ ,  $10^{-8}$  and  $10^{-9}$  CFU/fish were injected to the fish to include aeromoniasis and determined  $10^{-4}$  dose as LD<sub>50</sub>. So  $10^{-5}$  CFU/fish was selected for experimentation as optimum dose.

**Route of infection :** *A. liquefaciens* bacterial suspension was injected to the fish, *L. rohita* intramuscularly near the anal region.

**Immunostimulants :** Immunex Ds and H-Treat were used in the present investigations (manufactured from PVS laboratories Ltd., Vijayawada, Krishna District, A.P, India). Test does of H-Treat was selected as per the recommended dosage given by PVS lab i.e. 5g.per kg. of pellets).

### **Culture method of Aeromonas liquefaciens :**

Culture of *A. liquefaciens* was done following the method of pelczar et. al (1993). Healthy fishes were divided into six groups and maintained in separate tanks each with twenty fish as derailed below.

- Group A (fed with Immunex Ds @ 40mg/100g. of feed)
- Group B (infected with *A. liquefaciens* @  $10^{-5}$  CFU/fish)
- Group C (Untreated and uninfected controls)

The fish from experimental and control groups were necropsied on day 1, 2, 3, 4 and 5 and studied for carbohydrates, proteins, DNA and RNA of gill, intestine brain and thymus.

### **Discussion:**

In India, major carps are the dominant fish fauna in fresh water ecosystem. Rohu is of considerable economic importance and an understanding of carp immune system is of great interest in fisheries. In recent year the concern about the growth and/or bacterial resistance to antibiotics in culture fisheries has led to the use of immunostimulants. The dietary administration of immunostimulants/herbal immunizers in aquaculture became popular to enhance the non specific mechanism and increase disease resistance (Raa, 1996). In the present investigation, the infected fish (group B) showed significant decrease of protein carbohydrate, DNA and RNA in gill, intestine, brain and thymus. This shows that the infectious bacteria caused the decrease in the content of protein, carbohydrates, DNA and RNA. Fish treated with Immunex Ds (group A) showed marked increase of protein, carbohydrates, DNA and RNA in all the test organs compared to group A and control. This shows that Immunex Ds supplemented diet improved the content of protein, carbohydrates, DNA and RNA on the test organs like gill, intestine, brain and thymus. Proteins are the nutrient energy source. Addition of energy to a diet not only increase energy up take but also lowers protein energy, total energy efficiency (Page and Andrews,1973) feeding fish with IDS and/or addition energetic nutrients might have enhanced the level of biochemical composition in different organs in groups A as observed in the present findings. Fish (group B) which are experienced stern due to infection showed lowered DNA/RNA level.

The decreased level of DNA/RNA in various fishes confirms the observations of Iqbal et. al (2005) who also found a gradual decrease in DNA/RNA ratio in *cirrhinus mrigala* during starvation /stress condition. Also, these results indicate that the Immunex Ds used in the diet (after infection and before antibiotic treatment) might have elevated the level of bio chemical constituents in IDS treated fish. The infected fish (group B) experience stress due to infection, they may require more energy and the efficiency of physiological mechanisms may decreased. Thus there may be decreased level of the biochemical composition in the all the

tested organs. The overall decreased in the biochemical composition in infected fish might be due to the utilization of protein under infection stress condition. These results were similar to Anil kumar et. al (2010), who found decrease

Days of		Experimental groups	Control group
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in protein in tissues like liver, brain, muscles, gill and kidney of *channa punctatus* exposed to thiamethoxan indicate the toxic stress conditions.

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Table – 1: Protein and Carbohydrate content (mg/ml) in the gill, intestine, brain and thymus of control (group C, untreated and uninfected), treated (group A, treated with Immunex DS 40mg/100gm of feed) and infected (group B, infected with *A. liquefaciens* 10<sup>5</sup> CFU/fish) fish,

*L. rohita* at different days of experiment. Values are expressed in mean derived from five observations.

		Treated with Immunex Ds (group A)				Infected with <i>A. liquefaciens</i> @ 10 <sup>-5</sup> CFU/fish (group B)				Uninfected and untreated (group C)			
		Gill	Intestine	Brain	Thymus	Gill	Intestine	Brain	Thymus	Gill	Intestine	Brain	Thymus
<b>1</b>	DNA:	260	285	360	250	85	60	75	90	140	200	210	180
		285	310	375	275	60	45	65	75	140	200	210	180
		295	315	390	290	50	30	40	60	141	200	210	181
		310	330	405	315	45	20	35	50	141	200	209	181
		325	345	420	335	30	15	20	45	140	201	210	180
<b>1</b>	RNA :	230	260	200	150	155	122	125	90	232	125	130	135
		230	265	210	150	150	110	120	80	232	125	130	136
		235	265	250	175	150	100	110	50	232	125	131	135
		240	275	275	210	140	90	100	60	231	126	131	135
		250	275	280	260	90	80	100	75	231	125	131	135

Days of Necropsy		Experimental groups								Control group			
		Treated with Immunex Ds (group A)				Infected with <i>A. liquefaciens</i> @ 10 <sup>-5</sup> CFU/fish (group B)				Uninfected and untreated (group C)			
		Gill	Intestine	Brain	Thymus	Gill	Intestine	Brain	Thymus	Gill	Intestine	Brain	Thymus
<b>1</b>	Proteins:	0.460	0.450	0.440	0.450	0.200	0.180	0.190	0.150	0.450	0.440	0.390	0.450
		0.480	0.460	0.460	0.490	0.190	0.150	0.110	0.090	0.450	0.420	0.360	0.450
		0.575	0.600	0.490	0.500	0.190	0.140	0.100	0.080	0.440	0.410	0.350	0.440
		0.880	0.950	0.550	0.630	0.150	0.100	0.080	0.060	0.450	0.430	0.360	0.440
		1.180	1.520	0.700	0.750	0.100	0.090	0.060	0.050	0.440	0.430	0.390	0.450
<b>1</b>	Carbohydrates:	0.100	0.930	0.058	0.120	0.031	0.312	0.015	0.019	0.054	0.470	0.036	0.038
		0.116	0.945	0.188	0.136	0.023	0.210	0.011	0.012	0.054	0.472	0.035	0.038
		0.124	1.030	0.195	0.140	0.018	0.190	0.008	0.009	0.055	0.472	0.034	0.036
		0.259	1.596	0.226	0.219	0.011	0.108	0.005	0.006	0.054	0.471	0.035	0.036
		0.340	1.665	0.420	0.439	0.005	0.008	0.004	0.003	0.054	0.470	0.035	0.038

Table – 2: DNA and RNA content ( $\mu\text{g/ml}$ ) in the gill, intestine, brain and thymus of control (group C, untreated and uninfected), treated (group A, treated with Immunex DS 40mg/100gm of feed) and infected (group B, infected with *A. liquefaciens* 10<sup>-5</sup> CFU/fish) fish, *L. rohita* at different days of experiment. Values are expressed in mean derived from five observations.

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## **Socio – Economic Conditions of Fishermen in Guntur, Prakasam Districts, Andhra Pradesh**

**M. Luke Steeven Babu**

### **Abstract:**

*The socio-economic conditions of the fishermen and their attitude towards development schemes will serve as back ground information which is vital for implementing new technologies and policies. With this view in focus. There exists a great deal of direct and indirect employment potential associated with inland wetlands of our country. However this can be implemented only when these are well organized and managed through effective participation of relevant primary and secondary stakeholders. Fishery is the oldest and most important livelihood option for the inhabitants of the coastal line of the country since time immemorial. This natural resource along with the marine environment has been the custodian of livelihood security of the coastal populace. The web of life of the community is woven around it, be it festivals, weddings or even death. The community is intricately related to the natural marine resource. The recent technological innovations in marine fishing have not shown much impact on living conditions of fishermen. They are socially; economically backward most of the fishermen their socio-economic status falls below poverty line, therefore the levels of education are low and awareness towards living, personal hygiene. General health is also low. The regulatory mechanisms like "fishing ban" imposed by the state also affect the livelihood security of fish workers in mechanized sector and conflicts among the fish folk.*

**Key Words:** *Fisherme,; socio-economic condition, sustainability, exodus*

### **Introduction**

Fishery is the oldest and most important livelihood option for the inhabitants of the coastal line of the country since time immemorial. It is estimated that 12 million people are directly engaged in fishing. Six million people are directly employed in fisheries and reaming six million people are marine resources potential of about 3.9 million tunnel per year. The total population depends upon fisheries approximately about 1% of the total population in India. The potential source can be bracketed two categories 1. Oceanic fishery 2. Coastal fishery . The Indian fishers can be broadly classified as 1.inland fishers 2. Marine fishers 3.Fish Farmers. The Important marine fish Disposition in India are the Shark, Tuna, Catfish, Prawn, Silver Belly, Octopus etc. Besides this, there arises tremendous possibilities for expansion of related tertiary sector employment including preservation, processing, Transporting and marketing of fish-products and ancillary sector like fish feed, soil fertilizer producing industries which can make provision of huge additional employment potential. There special feature involved in the intensity of their night time efforts in catching fish, their acquired knowledge about the conditions of the river/ponds in which they operate and their relative scarcity in the context of the Inland sector, highly makes it imperative that their Socio-Economic conditions be upgraded overtime. In India development of fishermen is often restricted to the traditional fishing communities near the coastal areas in maritime states while the interest of those associated with inland fisheries is relatively neglected.

### **Fishing at Global Level**

FISHING plays a Important role in supporting livelihood worldwide and also forms an important source of diet for over one billion people. In Cambodia, about 60% of total human consumption of animal protein is obtained from Tonal sap fishery alone. Similarly in Africa, Inland fisheries in Malawi provide about 70-75 % of total animal protein Consumption of both Urban and rural low-Income families (FAO 1996) WITH 40 % of fish catch being sold internationally. Fish has become the most heavily traded commodity in international market with net value of \$ 18 billion a year nearly 75 % of goes to developing countries in Asia Especially Inland fisheries are of particular Importance to the rural poor and has accounted for at least 15 % of total global employment in capture fisheries and aquaculture producing 8 million tones of fish in 1998. The distribution pattern of world population Indicates that 84% fishers and aqua culturists in 1990 were in Asia, the majority of them in china.

### **Fishing in India**

Fisheries sector plays an important role in Indian economy by contributing to the national income, employment and foreign exchange It has a vast potential for fish resources both from Inland and marine

environment. India has about 1.6 million hectares of fresh water lakes, ponds and swamps; and nearly 64,000 KM of river and streams. The economic Liberalization policy initiated in 1991 opened up new opportunity for the growth of this sector. The Indian fisheries sector production has increased from 0.6 million tones, of fish five decades ago to nearly 6.0 million tones, out of which Inland Fisheries contributed % total fish production. Inland production including farming is catching up with the production from Marine sector and is expected to overtake marine fishing in the coming millennium. The Implementation of two programs i.e. establishing “ fish Farmers development agencies “ and the “ National programme of fish seed Development “ had led to encouragingly increased production. In India, Bengal occupies the top most position in contribution to inland fish production and for this purpose the state has been offered the national productivity award for inland fishery, several fisheries co-operative/ groups are beset with on towards socio- cultural and economic features.

### ***Fishing in Andhra Pradesh.***

In India Andhra Pradesh is one of the major centers of fish farming in the country, surpassing traditional states in fish production and ranks “second in inland fisheries “in the country. Andhra Pradesh with 80931 lakh Fishermen population contributes 2.30 % to Gross state Domestic product and quantity of fish producing during 2005-06 was 8.91 lakh tones. Valued at 6,287 crores. It earned exports 2,500 crores (India’s exports) Fishery sector provide employment to 14 lakh people. The coverage under group accident insurance scheme increased from 1.30 Lakh to 2.00 Lakh fishermen. Construction of 15 Fish landing centers was taken up at a cost of INR 12.15 crores.

### ***Objectives***

1. To study the overall socio- economic status of fishermen in two districts; namely Guntur and Prakasam districts of A.P.
2. To examine earnings and expenditure patterns of the surveyed workers.
3. To identify the problems of fishermen, with special emphasis on health.
4. To analyze the Government schemes and natural calamities relief fund. Etc.
5. To analyze the performance of fishing Exports.
6. Suggest appropriate strategies for improvement of their conditions

### ***Problems***

Fishing is used to be the primary and adequate source of livelihood for the fishing community. But these have been substantial changes since the mid 1990’s. New aquaculture farms, in which prawns were bred primarily for export, it leads, not only to ecological degradation of the area but also induced many from the fishing community become Wage Workers on these farms. With the subsequent bar on aquaculture, the farms lie deserted but the ecological degradation of the land and the pollution of the coastal belt have led to decline in fish stocks. In addition the new regulations initiated by the government to help regenerate the marine fish resources prohibit fishing, during the fish breeding season of April and May. With several other months being a lean period the fishing community is able to fish successfully for only two months. As a result, they are compelled to migrate to other fishing areas or to seek employment in other regions. The declining in fishing as a source of livelihood is also leading to a diversification in the occupational and work patterns of the fishing community. While many men are forced to take up wage work as coolies in the towns or an Agricultural laborer, the women and children are integrated in to the agricultural labor force in the region. Many women now hire themselves out as workers especially in the sowing and harvesting seasons. The recent technological innovations in marine fishing have not shown much Impact on living Conditions of fishermen. They are socially, economically backward. Most of the fishermen their socio-economic status falls below and awareness towards living, personal hygiene, general Health is also low So many illiterate people in the fishermen. They are not having minimum education to survive in the society even thou they are not having knowledge about government schemes. There is no improvement in road transport. So they are not get much price in the market for their fish folks.

### ***Suggestions***

1. More attention should be paid to enhance the literacy level of coastal population since the literacy rate, in general, is low.

2. In case of development of any innovation in marine fisheries, traditional fishermen be ensured of its benefits in terms of employment and income generation.
3. Besides providing loan to procure means of production, the fishermen may be provided operational loan so that they may not depend on private money lenders and fish merchants for meeting day to day operational expenses.
4. Improvement in road transport system in coastal regions will provide better price for catch to the fisher folk.
5. Since motorization of country crafts has increased employment opportunities in certain regions, it should be encouraged in other coastal regions also.

### **Conclusion**

The differing location specific features some broad aspects can still be identified in almost all the sample ponds, which need to be highlighted. For instance the fishermen associated with FCS/FPG are in general rather poor, semi literate/ illiterate and hardly have any other alternative job opportunity to switch over. The little amount that they could possibly save get drained away for buying medicine or for servicing of the nets which for most part of the year remain idle. For fuel and water, the two important ingredients of household maintenance, most of them have still to depend on outdoor collection. The aforesaid conditions are manifest mostly in rural areas compared to urban sector. In addition to this, studies explaining the reasons for the existing conditions i.e., analytical socio-economic studies may be conducted in future. Periodical monitoring of the socio-economic conditions of the marine fishermen at macro level in different maritime states may be undertaken which will help greatly in estimating the success and feasibility of and development programme / scheme drafted for them.

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## **Role of Aquaculture Development Issues and Challenges**

**Y. Surya Sowjanya**

### **Abstract:**

*Indian fisheries and aquaculture is an important sector of food production, providing nutritional security to the food basket, contributing to the agricultural exports and engaging about fourteen million people in different activities. With diverse resources ranging from deep seas to lakes in the mountains and more than 10% of the global biodiversity in terms of fish and shellfish species, the country has shown continuous and sustained increments in fish production since independence. Constituting about 6.3% of the global fish production, the sector contributes to 1.1% of the GDP (Gross Domestic Product) and 5.15% of the agricultural GDP. The total fish production of 10.07 million metric tonnes presently has nearly 65% contribution from the inland sector and nearly the same from culture fisheries. Paradigm shifts in terms of increasing contributions from inland sector and further from aquaculture are significations over the years. With high growth rates, the different facets of marine fisheries, coastal aquaculture, inland fisheries, freshwater aquaculture, coldwater fisheries to food, health, economy, exports, employment and tourism of the country. Presently, production from inland aquaculture is estimated at about 5.4 million tonnes. During the last two decades, flexibility in operation of area and scale of intensity as also compatibility of freshwater aquaculture practices with other farming systems have made freshwater aquaculture a fast growing farming activity in the country. Aquaculture and agriculture are not strictly parallel developments in food production, even though food gathering, hunting and fishing might have started at about the same time in human history. The complexity of aquaculture as a multi-disciplinary activity, even more complex than Agriculture, is perhaps one of the reasons for the late start of modern aquaculture. China still dominates the world scene by accounting for over 65% global aquaculture production. Though India is second only to China, it accounts for only 7% of global aquaculture production. The major problems faced by the Aquaculture farmers were disease (90%), price fluctuation, electricity, poaching declining production, and management problems. Diseases and electricity were the first and second ranked problems of the farmers.*

**Keywords:** Sustainable, Aquaculture Development, food production, economy, employment, Production, Exports, Price fluctuation, Government, technology.

### **Introduction:**

The fisheries sector has been recognized as a powerful income and employment Generator as it stimulates growth of a number of subsidiary industries and is a source of cheap and nutritious food, at the same time it is an instrument of livelihood for a large section of economically backward population of the country. More than 6 million fishers in the country depend on fisheries and aquaculture for their livelihood. Indian fisheries are an important component of the global fisheries, with India being the third largest producer of fish in the world and second in inland fish production. India's share in the world production of fish has increased from 3.2% in 1981 to 4.5% at present. Fishery sector occupies an important place in the socio economic development of the country. The future development of aquaculture depends on adoption of new and innovative production technologies, management and utilization of less utilized water resources and proper market tie-ups. A reservoir fishery offers a major opportunity to enhance fish production in the country. In the marine sector, while the coastal fisheries have been fully exploited, deep-sea fisheries resources are yet to be harnessed. Diversification and high value produce will add new dimensions to this sector. Proper post-harvest handling, reduction of losses and hygienic primary processing are important to realize full potentials of the sector. Simultaneously, effective marketing arrangements are to be made to ensure adequate returns to the fishers and the farmers and also make available of good quality fish at affordable prices to the consumers. With these in view, an end-to-end approach from ensuring proper input availability to efficient marketing is contemplated, for a 'win-win' situation for both the fish producer and the consumer. Set in this background, the National Fisheries Development Board (NFDB) would seek to realize the full potentials of Indian fisheries through coordination of different agencies and public-private partnerships.

### **Objectives of Aquaculture**

1. Production of protein rich, nutritive, palatable and easily digestible human food benefiting the whole society through plentiful food supplies at low or reasonable cost.

2. Increase income and diversify revenue sources to improve the living conditions of poor households in rural environments
3. To examine earnings and expenditure patterns of aquaculture.
4. To identify fish farmers Aqua farming, such as production, markets.
5. To analyze the performance of fishing exports.

Fish farming is the raising of specific species of fish in enclosures or special tanks. The fish raised on farms are primarily for food, though the objectives of this aspect of aquaculture include more than increasing the seafood supply. There are employment and economic advantages, as well as the possibility of sustaining species that might be over-fished if not for the controlled environments of fish farms.

***Meeting Global Demand:***

- The Environmental Defence Fund notes that the global demand for seafood has jump dramatically since the 1980s. An aging population will increase demand on seafood supplies, since older adults tend to eat more seafood than any other group. The EDF acknowledges that fish farming is the only reasonable way to meet the surging demand for fish around the world. The demand is especially high, which trails only Japan and China in per capital consumption of seafood.

***Protecting Species:***

- The fish most commonly raised on fish farms include cod, salmon, carp, tilapia, and catfish and European sea bass. Given the increasingly effective means of fishing available to the average angler and commercial fisherman, these fish might be at risk of being over-fished if not for the protected environments of fish farms. Aquaculture experts are always on the lookout for fish species that can be helped by fish farming and spared the risk of extinction.

***Providing Economic Boost:***

- When fishing restrictions have become law in states with thriving fish industries, a number of state governments have sought to cushion the blow by providing training programs for commercial fishermen to learn aquaculture. Coastal areas in particular may benefit from having fish farm operations in their communities, because of the jobs associated with the construction and operation of a fish farm.

***Improving Quality:***

- Though ongoing tweaks in aquaculture can help improve filtration, feeding, reproduction, net harvest and other aspects of fish farming, the safety and quality of the seafood can also be improved as the fish are studied in the controlled environment of fish farms. Researchers can check to see if the fish are healthy and are eating and reproducing at optimal levels. Though there remain questions about possible pollution effects in areas surrounding fish farms, scientists and engineers are seeking ways to minimize harmful impact.

***Employment, production and trade:***

While data on fisheries in developing countries are often patchy<sup>1</sup>, it is nevertheless possible to identify trends in the importance of fisheries and aquaculture for developing countries, particularly in the areas of employment, consumption, and trade. Employment in fishing and aquaculture has grown rapidly over the past few decades, increasing more than threefold from 13 million people in 1970 to over 41 million in 2004. Employment in the fisheries sector has grown more rapidly than both world population and employment in agriculture. Most of this growth is in Asia, where over 85 percent of the world's fisher folk live, and is largely due to the expansion of aquaculture in this period.

***Contribution of aquaculture to rural development***

Aquaculture comprises diverse systems of farming plants and animals in inland and coastal areas and often complements other food production systems. In the context of the rural poor, aquaculture often complements catches from traditional fisheries. Often, the capture or culture of aquatic species forms the basis of food security, enabling the use of livestock or cultured fish as a source of income generation. Aquaculture becomes an attractive and important component of rural livelihoods in situations where increasing population pressures, environmental degradation or loss of access limit catches from wild fisheries.



### ***Aquaculture production intensity, risks, and benefits:***

Specific examples of aquaculture activities that have positive impacts on the rural poor include: fry nursing and the development indirect benefits include an increased availability of fish in local rural and urban markets and concomitant reduction in household expenditure through sparing consumption of other income generating farm products. Aquaculture can also offer benefits from the utilization of common resources, particularly for the landless, through cage culture, culture of molluscs and seaweeds, and enhanced fisheries in communal water bodies.

“Aquaculture contributes to poverty alleviation as it provides employment to millions of people, both in the sector itself as well as in support services.” Aquaculture’s potential for contributing to global food production is far from being fully realized. The decision to establish the Sub-Committee on Aquaculture under the Food and Agriculture Organization’s (FAO) Committee on Fisheries (COFI), during 2001, reflects the importance that FAO Member Governments attach to aquaculture as a tool for national development. Many recent international gatherings recognized the role that aquaculture can play in national economic development, global food supply and achievement of food security, and declared that the sector has the potential to continue to contribute even more to peoples’ livelihoods. There is a huge institutional network in the country to support fisheries sector. This includes Indian Council of Agricultural Research (ICAR); Ministries of Agriculture, Commerce and food processing industries; CSIR; State agricultural universities etc.

Further, the government established National Fisheries Development Board (NFDB) in 2006 with its headquarter at Hyderabad to realize the untapped potential of fisheries sector, fish culture, processing & marketing of fish, application of modern tools of research & development for optimizing production and productivity in fisheries. It is executing various programmes to enhance the national fish production and to augment the fish processing and marketing infrastructure in the country. There is also a statutory body called Coastal Aquaculture Authority, established by Coastal Aquaculture Authority Act, 2005. Its main work is to regulate coastal aquaculture activities in order to endure sustainable development without causing damage to the coastal environment. The Authority is empowered to make regulations for the construction and operation of aquaculture farms in coastal areas, inspection of farms to ascertain their environmental impact, registration of aquaculture farms, fixing standards for inputs and effluents, removal or demolition of coastal aquaculture farms, which cause pollution etc. The Government of India launched National Fisheries Development Board in 2006. Its headquarters are in Hyderabad, located in a fish shaped building. Its activity focus areas are Intensive Aquaculture in Ponds and Tanks.

- Fisheries Development in Reservoirs.
- Coastal Aquaculture
- Mari culture
- Seaweed Cultivation
- Infrastructure: Fishing Harbours and Landing Centres
- Fish Dressing Centres and Solar Drying of Fish
- Domestic Marketing
- Technology Up gradation

The implementation of two programs for inland fisheries establishing fish farmers' development agencies and has led to encouragingly increased production, which reached 1.5 million tons during FY 1990, up from 0.9 million tons in FY 1984. A network of 313 fish farmers' development agencies was functioning in 1992. Under the National Programme of Fish Seed Development, forty fish-seed hatcheries were commissioned. Fish-seed production doubled from 5 billion fry in FY 1983 to 10 billion fry in FY 1989. A new program using organic waste for aquaculture was started in FY 1986. Inland fish production as a percent of total fish production increased from 36 percent in FY 1980 to 40 percent by FY 1990.

**1. National Cooperative Development Corporation (NCDC) :** NCDC started promoting and developing fishery cooperatives after its Act was amended in 1974 to cover fisheries within its purview. In order to discharge these functions effectively, NCDC has formulated specific schemes and pattern of assistance for

enabling the fishery cooperatives to take up activities relating to production, processing, storage, marketing etc.

Assistance to fishery cooperatives is provided by the NCDC for the following purposes:

- (i) Purchase of operational inputs such as fishing boats, nets and engines.
- (ii) Creation of infrastructure facilities for marketing (transport, cold-storages, retail outlets etc.
- (iii) Establishment of processing units including ice plants, cold storages etc.
- (iv) Development of inland fisheries, seed farms, hatcheries etc.
- (v) Preparation of feasibility reports.
- (vi) Integrated fisheries projects (marine, inland and brackish water)

## **2. National Federation of Fishermen Cooperatives Limited (FISHCOPFED)**

National Federation of Fishermen Cooperatives Limited (FISHCOPFED) is the apex organization of fishermen cooperatives in India. It came into being in 1980 and started its activities in 1982. Its goal is to facilitate the fishing industry in India through Cooperatives. During this period, FISHCOPFED entered a number of activities which can be classified in three categories viz. (i) promotional; (ii) welfare; and (iii) business.

3. The Marine Products Export Development Authority (MPEDA),

4. Ministry of Commerce A number of ongoing subsidy assistance scheme are being implemented by the MPEDA. The schemes are: Export Production – Capture Fisheries, Export Production – Culture Fisheries, Introduction of new technology, modernization of processing facilities and development of infrastructure facilities, Market Promotion

### **Welfare programmes for Aquaculture farmers:**

Welfare Programmes for Aquaculture farmers the Scheme has 3 components.

#### **(a) Development of Fishermen Villages (DFV) :**

The objective of this component is to provide basic civic amenities such as housing, drinking water and construction of community halls for fishermen villages. In each village with 10 to 100 housing units, up to 5 tube wells and one 22 community hall can be constructed. One tube well is provided where the number of houses in a village is more than 10. A community hall is provided only in those villages where the number of houses is not less than 75. The scheme was revised during the Ninth plan and the cost of houses constructed under the scheme is now Rs. 40,000, cost of tube wells is Rs. 30,000 outside the North Eastern region and Rs. 35,000 North Eastern states and the approved cost of community hall is Rs. 1.75 lakhs. During the first four years of the Ninth plan, constructions of 2250 houses have been completed.

#### **(b) Group Accident Insurance (GAI) Scheme for active aqua farmers:**

The objective of GAI is to provide insurance cover to fishermen actively engaged in fishing. Active fishermen in the age bracket of 18-65 years only are covered under the programme. The scheme has been revised and the fishermen are now insured for Rs. 50,000 against death or permanent disability and Rs. 25,000 against partial disability. Premium amount of Rs. 14 per beneficiary per annum is shared equally on 50:50 basis by the Central Government and the State Government. In case of Union Territories 100% premium is borne by the Government of India. A single policy has been taken in respect of all those states/UTs who are participating through National Federation of Fishermen Cooperatives Limited (FISHCOPFED). During the first four years of the ninth plan, under the scheme, about 38.50 lakh fishermen have been insured at the rate of about 9.62 lakh per annum. The number is likely to increase further in the terminal year of the plan period.

#### **(c) Saving-cum-Relief (SCR) for fishermen:**

The objective of SCR is to provide financial assistance to the fishermen during the lean fishing period. Till 1999-2000, this facility was available to marine fishermen only. The scope of the programme has been further extended to the inland fishermen from the current year 2000-01. The rate of contribution by the fisher folk is Rs. 75 per month for eight months for marine fishermen while it is 23 Rs. 50 per month for nine months for inland fishermen. This contribution is matched by a contribution shared equally between the centre and the state governments and the accumulated amount is distributed back to fishermen in four and

three equal installments for marine and inland fishermen respectively at the rate of Rs. 300 per month. About 3.25 lakh beneficiaries were covered under the scheme in 2000-01. Against an outlay of Rs. 100.36 crores, an expenditure of Rs. 69.39 crores has been incurred in the first four years of the Ninth plan.

***Challenges:***

1. "Aquaculture accounts for an increasing proportion of global fish supplies, but access and availability is for many species focused on high-income markets despite the fact that there are many environmental and also good economic reasons to focus more on low-income markets
2. Maintaining the contribution made by fisheries and aquaculture to food security, employment, national economic development, and recreation. Depending on geography, access to markets and affordable technology, the contribution of fish to food security comes not only from fish produced for direct local food consumption, but also from aquatic products of all types which can be sold domestically or exported for funds, as well as those which generate income through recreation, tourism, and employment. Access to all potential contributions is not automatic and specific interventions are required to achieve full access;
3. The crisis demonstrated the importance of environmental and health variables for good performance, maintenance and growth of the activity, thus a first challenge will be to implement the mechanisms of the new law and its regulations, which must ensure the health and environmental heritage of country to maintain the conditions of competitiveness. The potential for further growth of aquaculture in the region is promising. Such growth could be realized through improvements in technologies and resource use, intensification, integration of aquaculture with other farming activities, and development of additional areas for aquaculture. However, aquaculture will face significant challenges including:

- meeting growing demands for seed, feed and fertilizers, in terms of quantities and quality;
- reducing production losses through improvement in fish health management;
- increasingly severe competition with other resource (land/water/feed) users;
- deteriorating quality of water supplies resulting from aquatic pollution;
- successful integration of aquaculture with other farming activities, and promotion of small-scale low-cost aquaculture in support of rural development;
- improvements in environmental management including reduction of environmental impacts and avoidance of risks to biodiversity through better site selection, appropriate use of technologies, including biotechnologies, and more efficient resource use and farm management; and
- Assurance of food safety and quality of products.

***Aquaculture farmer's problems:***

1. **Water Pollution:** Fish wastes, excess food, fish escapes, antibiotics, and various chemicals from fish farms can all result in water pollution and harm surrounding habitats by poisoning wildlife and causing other disturbances.
2. **Trade problems:** fish farming is unlikely to solve our import problem. Currently, we export about 70 percent of the fish we catch and grow here in the India. and import cheaper, often lower quality, sea food products. Fish grown in offshore aquaculture cages would likely follow the current export pattern, and the small quantity of newly farmed fish likely to be kept in this country would not offset the vast amount of fish imported.
3. Especially increasing cost of production
4. Mainly due to rising cost of fertilizers and supplementary feed; and weather related fish mass mortality.
5. The main problem is the fall in dissolved oxygen (DO) in the rainy season in particular but also during cloudy weather in general and during cool season fog.
6. Water quality problems also occur during the hot season from April to June when there is limited water availability, especially with high density culture which may cause disease.
7. The farmers also recognized the need for change, especially to farm new species for domestic and possibly export markets.
8. Poor organizational capacity among rural famers due to pre existing personal disputes and lack of capable community leaders.
9. Rural farmers lack infra structure ponds material inputs credit facilities etc. for carrying out fish culture.

### **Suggestions:**

1. Government to provide fertilizers in low cost pricing
2. Rural farmers to cultivated co-operative aqua farming
3. To developed education level in aqua farmers and conducting seminars on aqua farming.
4. Introduced new mechanism in aqua farming.
5. Government to develop aqua labs and aqua culture new products.

### **Possible changes by 2030**

The current decade and the next are likely to see major changes in economies, markets, resources and social conduct. Climate change impacts will bring about increasing uncertainty in many food sectors, including capture fisheries, and climate adaptation approaches will need to be well integrated with the processes of improving fisheries governance. The size of the shift in balance towards sustainable fisheries will also depend in part on how it will be defined; whether, for example, by conduct (the fishing sector agreeing to specific actions or signing commitments of varying force) or by outcome (where significant measures or indicators are put in place to confirm the consequences of good practice).

### **Conclusion:**

In many developing countries in the region, there is significant there is significant scope for enhancing contributions of inland fisheries and aquaculture to food supplies and poverty alleviation. However, most fishers and fish farmers continue to be unable to access to adequate technical information required to improve their practices to increase production. Increased fish production can be achieved through expansion, intensification, diversification, and better integration of fish production into existing land and water use schemes, but fish producers, as most rural people, often do not have access to credit. Capacity building through provision of training, extension, and advanced education to fish producers continues to be crucial for successful development. Both aquaculture and inland fisheries suffer from insufficient institutional support and legal and political recognition as legitimate users of resources. Many policy makers are not aware of the benefits and needs of these sectors. A major future task is therefore to increase participation of producers and relevant public authorities in the allocation and management of aquatic resources and land uses. Management of river or lake basins and of coastal areas must take account of fisheries and aquaculture.

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**Eco friendly Nuclear power**

**Dr. K.Sree latha**

**Abstract**

*The nuclear power is known to be eco friendly since it causes no pollution to the environment. One of the peaceful uses of nuclear energy is to produce the nuclear power. India has an ambitious programme in the field of nuclear power generation. Ever since the industrial revolution, the energy requirements of the human population was continuously increasing and now fast reaching its peak. The global power production data indicate that 80 – 90 % of the power is by fossil fuels. Burning of these fuels lead to production of green house gases, due to which the entire globe is going to become warmer and may get a drastic reduction of land due to the melting of the glaciers and hence rise of the sea level. The total power production in India is approximately 152 GWt. Most of the energy requirements are met by the fossil fuels (64.6% of total production) and hydro electricity (24.7% of total production) in India. About 2.9% of the electricity is generated by nuclear and 7.7% is generated by renewable energy sources in India. As per the estimates, fossil fuels are going to exhaust within the next 30 – 40 years if the same growth of power demand exists. Therefore searching for an alternate energy source to meet our demands after 30 years is a great challenge to the scientific community. There will be limited options left at that time to meet the energy demand. Most prominent of them will be nuclear energy, solar energy, wind energy and hydra energy. The option of nuclear energy for the future generation and its safety features are discussed in this paper.*

**Key words:** pollution, nuclear energy, fossil fuels, glaciers, renewable energy.

**Introduction:**

The nuclear fuel cycle involves mining, fabrication, power production, reprocessing and waste disposal. India has an ambitious programme in the field of nuclear power generation. Towards the attainment of and in support of this objective India has also established full fledged nuclear fuel cycle facilities which span the entire gamut of nuclear fuel cycle operations to satisfy the requirements of its 3 phase nuclear power programme which is described here.

**Front end fuel cycle:**

This involves mining and milling where higher concentration of uranium occur in certain geological formations. Currently mined ore grades range 0.04% to about 0.3%. The solid waste produced is used for backfilling the abandoned mines and the liquid waste generated is sent to a tailings pond in the same area treatment and monitoring for radioactivity. The raw mineral is converted into magnesium diuranate (yellow cake) form and sent to fabrication unit.

**Fabrication unit:**

In the fabrication unit, the fuel is converted to uranium oxide and fabricated in zircolloy tubes. The radioactive waste produced here is negligible as the entire amount of uranium is fully utilized. Solid wastes of raffinate cake containing uranium are sent to the uranium mill for recovery.

**Nuclear Power:**

The nuclear power programme in India is planned and developed in 3 phases. In the first phase natural uranium oxide as the fuel and Heavy water as the moderator and coolant are used to produce power in PHWRs. These reactors will also produce a byproduct plutonium-239 which will be separated and used in a fast breeder reactor for production of power and conversion of  $\text{Th}^{232}$  to  $\text{U}^{233}$  in the second phase. In the third, the reactor is fuelled with  $\text{U}^{233}$ , moderated with Heavy water and cooled with light water produces. India has abundant resources of  $\text{Th}^{232}$  in the form of monazite in Kerala beach sands.

**Fuel reprocessing:**

Fuel reprocessing is at the back end of the nuclear fuel cycle which produces high level liquid and solid waste. Separation of useful isotopes from the spent nuclear fuel is carried out here. These are as said above plutonium and uranium isotopes and some other isotopes like Cs-137 with high specific activity which can be used in industrial and medical applications.

**Radiation protection in nuclear installation:** It can be stated that absolutely no conventional pollutants are in any of the processes involving nuclear fuel cycle. But a little amount of radioactive substances may be released to the environment in gaseous form and liquid form. There are stringent regulations to be adhered before releasing any radioactivity to public domain. To substantiate these regulations, environmental monitoring is carried out up to 30 Km radius around the installation by environmental survey laboratory

(ESL) which is established well before the plant is commissioned and carryout preoperational monitoring of the environment. Samples from various environmental matrices like air, soil, water, food items, agricultural products, fish, meat, milk, grass, plant leaves etc... are monitored here for any traces of radioactivity.

The annual dose limit for an occupational worker is  $3E03$  mRem (mRem is the unit of radiation dose we receive) and life time dose limit is  $1E05$  mRem. The dose limit for members of public in the vicinity due to the installation is 100 mRem. The natural radiation background averaged over the globe is 240 mRem/year. The causative factors for this dose are radiations emanating from the terrestrial (85%, due to Uranium and Thorium series) and cosmic region (15%).

The workers with in the facility are well qualified and extensively trained in their respective areas. The work area is monitored for radiological conditions on continuous basis by using various radiation detectors and also the dose of all the workers is monitored by personnel radiation dose monitoring devices. The individual doses are minimized by making physical barriers to radiation areas, by incorporating administrative controls like the duration of the work, keeping away from high active source, allowing the source to decay and fabricating shielded material around the source or keeping the source inside a shielded containment and extensive use of personal protective equipment. Remote operations and mockup drills are a routine part of the day to day works. All these monitoring programmes are assessed and audited by the national regulatory authority AERB (an autonomous organization under government of India).

***Radioactive waste management:***

Nuclear waste requires sophisticated treatment and management in order to successfully isolate it from interacting with the biosphere. This usually necessitates treatment, followed by long-term management strategy involving storage, disposal or transformation of the waste in to a non toxic form. Some of the management techniques used for gaseous wastes are filtration by combined (HEPA and activated charcoal) filters, storing in gas bottles, use of demisters, chemical scrubbers, passing through sand beds and finally confining within the containment if required. The liquid wastes are concentrated by chemical co-precipitation, ion exchange, evaporation and reverse osmosis. High active liquid wastes are converted to in dispersible form by cementation, bituminization and vitrification. Solid waste volume is reduced by baling and incineration. Finally the very low active gaseous and liquid wastes are dispersed to environment after dilution with inactive medium in such a way that if these are directly mixing in the food chain, there should be no harm to the living organism. Long lived and high active wastes are converted to solid (in dispersible) form as mentioned above and disposed within the installation or stored in retrievable storage system so that they never interfere with the biosphere outside the boundary. Regular monitoring of ground water around disposal site is carried out to ensure this. However, theoretically the most accepted permanent disposal method for the high active and long lived radioisotopes is deep geological repository disposal though very few countries (USA and Germany) have made this facility and others are yet to follow.

***Emergency planning and preparedness:***

Emergency plans are prepared for an 'in-plant' emergency, an 'on-site' emergency as well as an 'off-site' emergency. Irrespective of the extremely small probabilities, it is considered prudent to have a basic off-site emergency plan worked out in advance, so that actions required to be taken are known and understood by all those will have a role to play in limiting the consequences of the accident. In brief, a number of 'probability-limiting' and 'consequence-limiting' features are incorporated in the over-all safety philosophy and emergency preparedness is to be seen as one element of the consequence-limiting package of safety measures. There are various agencies containing departmental and state government officials involved in the mitigation of different levels of emergencies. To meet with any such unwanted situation, a number of countermeasures are available. These are i. Sheltering, ii. Prophylaxis, iii. Respiratory protection, iv. Evacuation, v. Personal decontamination, vi. Relocation, vii. Control of access, viii. Control of food stuff and ix. Decontamination of affected areas. These countermeasures can be implemented based on the merits and demerits of the situation while considering the social and economic factors.

***Conclusion:***

The nuclear power is known to be eco friendly since it causes no pollution to the environment. The other advantages are like no production of fly ash or oxides of carbon and sulphur like thermal power stations, ease in transportation of fuel since the quantity of fuel used in the reactor is negligible in comparison to coal (1 kg of uranium nearly produces the equivalent energy of 3000 tons of coal), once the reactor is fuelled no need to refuel it up about an year, no fear of exhausting the fuel in the near future like fossil fuels since the available resources can serve hundreds of years for the entire globe, no inundation of precious natural flora and fauna like hydal dams and does not depend on the rains to produce power, no noise pollution like wind mills etc.....The controlled fusion reactor and hydrogen fuel cells are major areas of research in reaching the demands of the sustainable power for every citizen.

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## Green Chemistry – Challenges and Opportunities

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### Abstract

The roots of the current Green Chemistry and Sustainability can be traced back to the environmental movement of the 1960s and 1970s. The publication of Rachel Carson's *Silent Spring* and Barry Commoner's *The Closing Circle* focused public attention on the negative side effect of a multitude of chemical products on our natural environment. The Oil Crisis of 1973 highlighted the vulnerability of an energy and chemicals industry that is based largely on a single fossil fuel. This is underline by the turn of phrase which we heard: "engineering a better world without chemistry". But the solution is clearly "NOT NO CHEMISTRY" but NEW and BETTER CHEMISTRY that is cleaner, greener chemistry. One could say that environmental movement defined the problem and the sustainability movement has defined our common goal. The latter has been further delineated by Thomas Graedel as (i) using natural resources at rates that do not unacceptably deplete supplies over the long term, and (ii) generating and dissipating residues at rates no higher than can be assimilated by the natural environment. We need technical solutions, the underlying science and engineering of sustainable development. That's where green chemistry enters the scene.

**Key words:** Sustainability, vulnerability, Green Chemistry, delineated, assimilated.

### Introduction

#### Definition

Green chemistry can be succinctly defined as follows: 'Green chemistry efficiently utilizes (preferably renewable) raw materials, eliminates waste and avoids the use of toxic and/or hazardous reagents and solvents in the manufacture and application of chemical products'.

#### The 12 Principles of Green Chemistry

1. Prevention	2. Atom Economy
3. Atom Economy	4. Less Hazardous chemical synthesis
5. Designing safer chemicals	6. Safer solvents and auxiliaries
7. Design of energy efficiency	8. Use of renewable feedstock
9. Catalysis, catalytic reagents	10. Design of degradation
11. Real time analysis for pollution prevention	12. Inherently safer chemistry for accident prevention

Green chemistry embodies two components a) efficient utilization of raw materials and the elimination of waste, and b) health, safety and environmental aspects of chemicals and their manufacturing processes. Green chemistry is pollution prevention not end-of-pipe solutions. Green chemistry is sustainable chemistry. It should be economical, efficient usage of materials and reducing the waste.

#### Challenges and Opportunities – Commandments.

The achievement of sustainability will require adherence to some important principles. These can be condensed into Ten Commandments of sustainability, which are listed below:

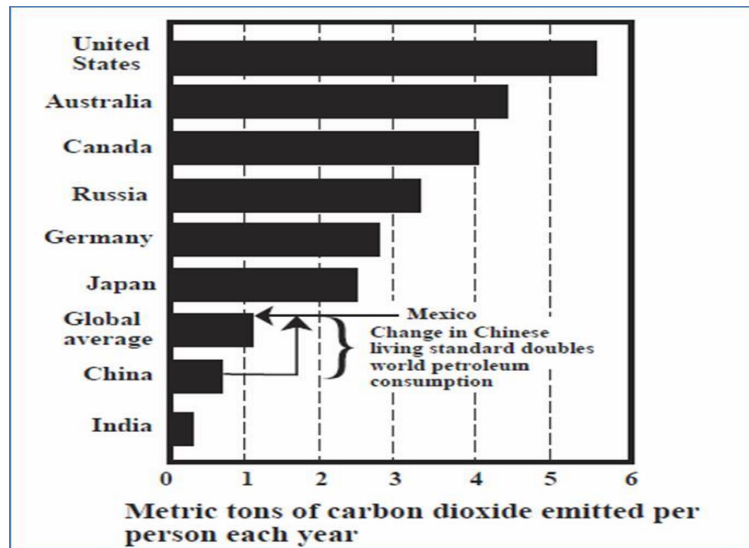
- i. Human welfare must be measured in terms of quality of life
- ii. Burden on Earth = (number of people x demand per person)
- iii. Given that even at the risk of global catastrophe, *technology will be used* in attempts to meet human needs, it is essential to acknowledge the anthrosphere as one of the five basic spheres of the environment and to design and operate it with a goal of zero environmental impact and maximum sustainability.
- iv. Given that energy is a key to sustainability, the development of efficiently used, abundant sources of energy that have little or no environmental impact is essential.
- v. Climate conducive to life on Earth must be maintained and acceptable means must be found to deal with climate changes that inevitably occur.
- vi. Earth's capacity for biological and food productivity must be maintained and enhanced, considering all five environmental spheres.



- vii. Material demand must be drastically reduced; materials must come from renewable sources, be recyclable and, if discarded to the environment, be degradable
- viii. The production and use of toxic, dangerous, persistent substances should be minimized and such substances should not be released to the environment; any wastes disposed to disposal sites should be converted to nonhazardous forms.
- ix. It must be acknowledged that there are risks in taking no risks.
- x. Education in sustainability is essential; it must extend to all ages and strata of society, it must be promulgated through all media, and it is the responsibility of all who have expertise in sustainability.

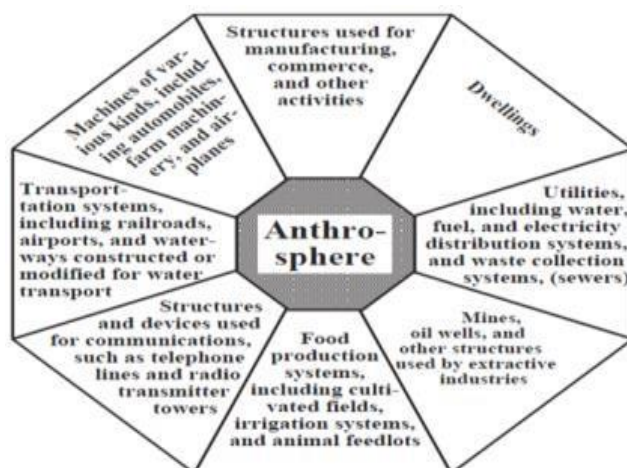
**1. Discussion**

Happiness and wellbeing of societies can be possible with much less consumption of materials and energy. Economic measures can be used to reduce pollution and demand on resources. Carbon and energy taxes can be imposed to reduce emissions of greenhouse gas carbon. Pollution trading is an effective pollution control measure. The achievement of sustainability will require an unprecedented commitment from all individuals, institutions, organizations, private and government bodies. The burden placed upon Earth’s support systems can be expressed by the equation  $Burden = (Number\ of\ people) / (Demand\ per\ person)$



A reasonable indicator of demand is reflected in the amount of carbon emitted per person each year, which reflects fossil fuel consumption as shown for several major countries as shown in the above figure. Two countries with the largest populations, China and India, have much lower carbon emissions per person. Obviously, ways must be found to meet the basic resource demands per person in both developed and under developed countries.

Misuse of Technology could result in catastrophe. So a challenge for modern humankind is to use technology in ways that do not irreparably damage the environment and deplete Earth’s resources. Industrial ecology principles are to be used to accomplish our goals. Energy and materials must come from renewable sources.



The anthrosphere can be designed and operated in a positive way to improve and enhance the other environmental spheres.

- Restoration of topsoil, construction of wetlands to restore wastewater
- Terracing land to prevent water erosion of soil.
- Pumping water underground to restore depleted aquifers.
- Construction and operation of reverse osmosis plants to remove excess salt from irrigation waters
- Construction of electrified railroads to replace inefficient, resource intensive, environmentally damaging truck transport

With enough energy almost anything is possible. Toxic organic matter in hazardous waste substances can be totally destroyed and any remaining elements can be reclaimed or put into a form in which they cannot pose any hazards. Wastewater from sewage can be purified to a form in which it can be reused as drinking water. Pollutants can be removed from stack gas. Essential infrastructure can be constructed. The accomplishment of Green chemistry/sustainability is impossible without the development of efficient, sustainable, nonpolluting sources of energy. Nuclear energy is a source of continuous power that does not contribute to greenhouse warming.

Release of carbon dioxide into the atmosphere from fossil fuel combustion is the major cause of global warming. Destruction of forests and the decay of biomass residues from forests releases additional carbon dioxide to the atmosphere. Methane is also a greenhouse gas. It is released to the atmosphere by flatulent emissions of ruminant animals (cows, sheep, moose), from the digestive tracts of termites attacking wood, and from anoxic bacteria growing in flooded rice paddies. Minimizing the greenhouse gas emissions and burning of fossil fuels will go towards sustainability.

A number of human activities have been tending to adversely affect biological productivity. This is due to usage of excess fertilizers, producing hybrid crops and widespread irrigation. This results in the following,

- Loss of topsoil through destructive agricultural practices
- Urbanization of land and paving of large amounts of land area
- Desertification in which once productive land is degraded to desert
- Deforestation
- Air pollution that adversely affects plant growth

Reduced material demand particularly that from nonrenewable sources, is essential to sustainability. Recycling of materials is necessary to reduce the materials wastage.

The most fundamental tenet of green chemistry is to avoid the production and use of toxic, dangerous, persistent substances and to prevent their release to the environment. Any wastes that are disposed should first be converted to nonhazardous forms.

Burning large amounts of greenhouse-gas-generating fossil fuels, with the climate changes that almost certainly will result, or of severely curtailing energy use, with the poverty and other ill effects that would almost certainly ensue, indicates that the nuclear option is the best approach.

Education is essential and a key to achieving sustainability. Education in sustainability must begin early with children in primary school and should be integrated into curriculum from kindergarten through graduate school. By providing containers for recyclables in grade schools, there is some small benefit from the waste paper, plastics, and aluminum cans collected, but a much greater benefit in the lessons of sustainability that those containers illustrate.

### **Conclusions**

A particular challenge is that of informing the general public of the principles of sustainability/Green Chemistry and of its importance. The general public has more choice in its sources of information than does the captive audience of a student body, so the challenge of informing them about sustainability is greater. In this respect the media and the internet have key roles to play. Digital Media should allocate reasonable air time for Green chemistry/sustainability to enlighten the public.

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## **Waste-to-Energy: A way from Renewable Energy Sources to Sustainable Development.**

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**\*\*Dr. M. Rama**

### **Abstract**

*Nowadays, energy is key consideration in discussions of sustainable development. So, sustainable development requires a sustainable supply of clean and affordable renewable energy sources that do not cause negative societal impacts. Wastes and biomass fuels are usually viewed as sustainable energy sources. Wastes are convertible to useful energy forms like hydrogen (biohydrogen), biogas, bioalcohol, etc., through waste-to-energy technologies. In the recent years, utilization of agriculture waste and residues for energy generation has received a lot of attention since biomass does not threaten food supply and is therefore not the source of "food or fuel" controversy. Among the biomass resources, rice husk and rice straw are the key residues from rice crop, which is one of the world's most important staple foods. Ample availability of rice husk and straw, coupled with the continuous development of biomass energy conversion technologies have turned rice biomasses into vital sources of renewable energy. This paper provides the key aspects of the utilization of rice husk and rice straw as important sources of renewable energy.*

*Keywords: Biomass, agriculture waste, agriculture residues, rice husk ,rice*

### **Introduction:**

Renewable energy is one of the most efficient ways to achieve sustainable development. Increasing its share in the world matrix will help prolong the existence of fossil fuel reserves, address the threats posed by climate change, and enable better security of the energy supply on a global scale. In order to ensure that our energy system remains clean even with large increases in population and economic activity in the long run, we consider only those technologies that have essentially zero emissions of greenhouse gases and air pollutants per unit of output over the whole "lifecycle" of the system. Similarly, we consider only those technologies that have low impacts on wildlife, water pollution, and land, do not have significant waste-disposal or terrorism risks associated with them, and are based on primary resources that are indefinitely renewable or recyclable.

### **Biofuels an answer to a sustainable fuel:**

Biofuels are referred to liquid, gas and solid fuels predominantly produced from biomass. A variety of fuels can be produced from biomass such as ethanol, methanol, biodiesel, Fischer -Tropsch diesel, hydrogen and methane [1]. Biofuels have emerged as one of the most strategically important sustainable fuel sources and are considered an important way of progress for limiting greenhouse gas emissions, improving air quality and finding new energetic resources [2]. Furthermore, biofuels technology is relevant to both developing and industrialized countries. For these reasons, the share of biofuels in the automotive fuel market is expected to grow rapidly over the next decade. Biofuels could be peaceful energy carriers for all countries.

Advantages of biofuels are (a) biofuels are easily available from common biomass sources, (b) they are represent a carbon dioxide-cycle in combustion, (c) biofuels have a considerable environmentally friendly potential, (d) there are many benefits the environment, economy and consumers in using biofuels and (e) they are biodegradable and contribute to sustainability. The benefits include reduced carbon dioxide emissions, which will contribute to domestic and international targets, the diversification of the fuel sector, biodegradability, sustainability, and an additional market for agricultural products.

Biofuels are broadly classified as primary and secondary biofuels. The primary biofuels are used in an unprocessed form, primarily for heating, cooking or electricity production such as fuel wood, wood chips and pellets, etc. The secondary biofuels are produced by processing of biomass e.g. ethanol, biodiesel, DME, etc. that can be used in vehicles and various industrial processes.

### ***Rice biomass and its utilization:***

In general, agricultural wastes are biomass residues that can be divided into two categories namely the crop residues and the agro-industrial residues [3]. Crop residues refer to plant residues that remain on the field after the collection of crops. The agro-industrial residues on the other hand are the by-products of the post-harvest processes that maybe generated from the process of cleaning, sieving, and milling.

In rice industry, biomass residues that are commonly utilised for energy generation are rice straw and rice husk, which are crop residue and agro-industrial residue, respectively. Rice straw is the stalk of the rice plant that is left over as waste products on the field upon harvesting of the rice grain (i.e. the seeds of rice). Rice husk is the outer layer of a rice seed. Rice husk is removed from the rice seed as a by-product during the milling process.

### ***Pre-treatment of rice biomass:***

Rice straw and rice husk must be pre-treated carefully upon collection from fields and prior to conversion process. This is in order to minimise the transportation costs of the raw materials and the handling costs to produce the end products. The typical pre-treatment technologies include sizing, leaching (commonly known as washing), and palletisation. From the physical perspective, the high volatility and low density of rice husk and rice straw can cause challenges in handling and transportation. However, it has been proven that these challenges can be overcome by densification of the biomass fuels. Densified biomass can minimise the cost of handling, storage and transportation.

Sizing refers to the process of reducing the size of rice straw and rice husk, with the aim to improve boiler efficiencies. In general, biomass fuel with small-sized particles provides higher burning rates as well as ignition front speeds, leading to better combustion efficiency [4]. In biochemical conversion, pretreatment of lignocelluloses biomass is an essential step that emphasizes on the removal of lignin network. Pretreatment contributes towards a huge portion of the cost throughout the process of converting lignocelluloses biomass into fermentable sugar [5].

### ***Technologies to convert rice biomass into energy***

In general, biomass can be converted into energy products via two processes: (a) Thermo-chemical process. (b) Bio-chemical process.

#### ***Thermo-chemical process***

Thermo-chemical processes can be divided into two categories. The first category involves direct utilisation of biomass as fuel for combustion, and subsequently for heat and electricity generation. The second category involves converting biomass into other useful forms of energy products prior to its utilisation as a source of energy.

#### ***Bio-chemical process***

The bio-chemical process routes for biomass conversion into value-added products include the production of ethanol, hydrogen as well as methane. During anaerobic digestion process, microorganisms convert biomass into biogas, a mixture of methane and carbon dioxide, in the absence of oxygen. The biogas products is subsequently utilised as fuel to generate heat and energy.

#### ***Ethanol production from fermentation***

Generally, bio-ethanol production from lignocelluloses biomass consists of three major steps, namely: (i) pretreatment, (ii) enzymatic hydrolysis and (iii) fermentation. The enzymatic hydrolysis involves conversion of cellulose into glucose, and hemicelluloses into several pentose's and hexoses [6]. The glucose is finally fermented into ethanol by selected microorganism.

### ***Conclusion***

Rice straw and rice husk are the main agricultural wastes (or biomasses) from rice. China, India, Indonesia, and other rice producing countries can enjoy the environmental and economic benefits from utilisation of rice straw and rice husk as sources of renewable energy. Heat and electricity from cogeneration systems could be used to meet the energy demands of local rice mills.

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## Studies on Satellite and Ground based measurements of SUV, UVA, and Aerosol Optical Depth over Hyderabad

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### Abstract

Great emphasis has been placed on the surface reaching particularly ultra-violet-B (UV-B) radiation. The shorter wavelengths that comprise UV-B are most dangerous portion of UV radiation at surface. Exposure to UV-B radiation has adverse effects on human and other organisms. Ozone acts as a regulator of UV-B due to strong absorption characteristics over the ultraviolet region. The majority of ozone absorption occurs in stratospheric ozone layer. The intensity of UV radiation received at ground is largely determined by the atmospheric aerosols. Examination of the record of solar ultraviolet measurements showed substantial reduction of UV-B radiation on days with high level of air pollution, which are associated with high concentration of particulate matter. Tropospheric aerosol is the most important UV-B attenuating factor.

Daily SUV and UVA variation during 2001-2006 were studied over **Hyderabad**. Comparison of day to day variation of AOD, SUV and UVA in Fig.4.1 suggests that different levels of aerosol loading in the boundary layer results in significant modulation of solar UV radiation reaching the ground, especially during the days of high aerosol loading. The aerosol loading is observed to be high during 2002, and low SUV observed during 2002 also supports the impact of aerosols on the reduction of ground reaching SUV, especially during summer season. The observations in the present study are in conformity with other studies reported in literature (Kylling et al., 1998) and (Krzyscin J W et al., 1998). The SUV varies markedly through the year and is more intense during summer season. Seasonal and diurnal cycles of solar radiation are responsible for observed variations in the SUV intensities.

### Introduction

Solar ultra violet radiation reaching the earth's surface has been largely discussed owing to its biological and photochemical activity. The UV radiation is often sub-divided into three bands UV-C (100 – 280 nm) UV-B radiation (280-315 nm) and UV-A radiation (315-400 nm). UV radiation can be measured as irradiance. The diffusion of UV – B irradiance increases with the increasing solar zenith angle and turbidity. Absorption and scattering characteristics are influenced by the variability of tropospheric pollutants and these characteristics are associated with the chemical composition of the aerosols.

The global scale daily erythemal UV radiation data at the earth's surface are available from the Total Ozone Mapping Spectrometer (TOMS) employed by the NASA, Goddard Space Flight Centre. Ground based measurements show that sun measured UV irradiances in the Southern Hemisphere exceed those at comparable latitudes in Northern Hemisphere by up to 40% where as the corresponding satellite based estimation show only 10-15% differences (Madronich et al., 1998). The ground based UV radiation measurements at more sites reduce these discrepancies, obviously caused by the atmospheric pollution and aerosols.

As the short-term variation in aerosols is the source of uncertainties for deriving surface UV radiation from satellite data, the simultaneous measurement of aerosol and UV radiation are of great importance. Changes in atmospheric aerosol loading strongly affect radiative properties of aerosol & spectral characteristics of UV radiation reaching the earth's surface.

### Methodology

Aerosol Optical depth (AOD) was measured at wavelengths 380, 440, 500, 675, 870 and 1020nm using MICROTOPS-II sun photometer having measurement accuracy of  $\pm 2\%$ . The detector consists of a silicon photodiode mounted behind a set of continuous variable interference filters. The field of view of the instrument is  $1.8^\circ$ . The AOD,  $\tau_A(\lambda)$ , was retrieved from the measuring data by accounting for Rayleigh scattering  $\tau_R(\lambda)$ , and the contribution of gas absorbers is as follows:

$$\tau_A(\lambda) = \tau(\lambda) - \tau_R(\lambda) - \tau_{O_3}(\lambda) - \tau_{H_2O}(\lambda)$$

where  $\tau_{O_3}(\lambda)$  is the ozone optical depth and  $\tau_{H_2O}(\lambda)$  is the water vapour optical depth. The Rayleigh scattering has been calculated by the formula  $\tau_R(\lambda) = (P/P_0) \times 0.008735 \times \lambda^{-4.08}$ . In this formula P is

the actual air pressure in hPa and  $P_0 = 1013.25$  hPa. During 2004 – 2006, a total of above 800 independent measurements of aerosol optical depth and  $UV_{ery}$  measurements have been carried out. Total columnar ozone has been measured using MICROTOPS – II ozonometer. UV radiometer from Solar Light Co has been used to measure SUV in 280 – 315 nm. The cosine response of the instrument is  $\pm 5\%$  with a resolution of 0.01 minimum erythemal dose per hour (MED/hr). The MED/hr is a measure of sun burning effect of solar radiation.

Global distribution of the UV intensity was evaluated with archived data of the Earth Probe (EP)/Total Ozone Mapping Spectrometer (TOMS). TOMS instrument is the second-generation backscatter ultraviolet ozone sounder. TOMS measures the total column density of ozone under all daytime observing and geophysical conditions by observing both incoming solar energy and backscattered UV radiation at six wavelengths. Backscattered radiation is solar radiation that has penetrated to the Earth's lower atmosphere and is then scattered by air molecules and clouds back through the stratosphere to the satellite sensors. Along that path, a fraction of the UV is absorbed by ozone.

### ***Results and Discussion.***

#### ***Diurnal and seasonal variation of AOD, SUV, UVA:***

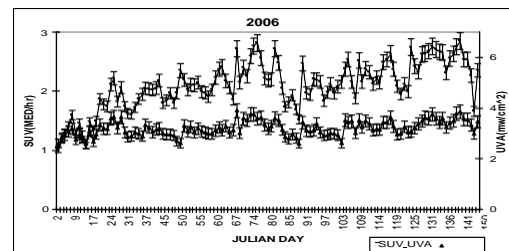
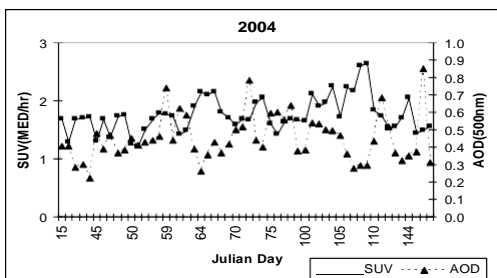
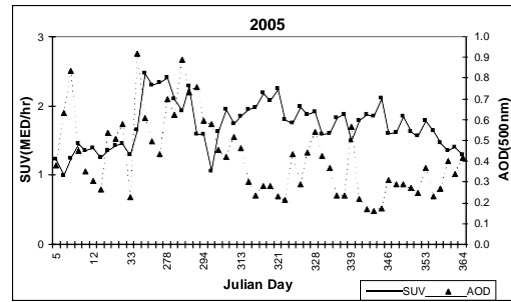
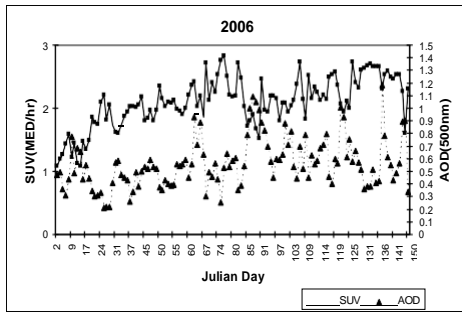
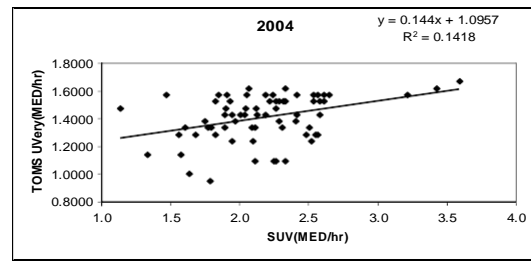
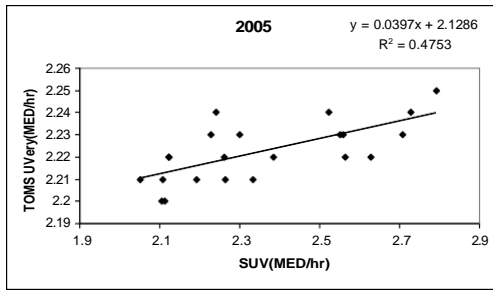
Aerosol optical depth (AOD) at 500nm was measured using sun photometer on each experimental day. The diurnal and seasonal variations of AOD, SUV, and UVA on all the days during the period 2001 to 2005, and from January to May during 2006 were studied. The winter season of December-February shows slightly increased AOD values compared to monsoon season of June-October in all the years. This indicates slow addition of aerosols into the atmosphere after wet removal processes during monsoon season. Maximum AOD during summer season (March-May) is due to experiences of high aerosol loading with abundance of coarse-mode particles of soil-dust origin due to the occurrence of dust storm, strong convection and windblown dust. The minimum AOD values observed during monsoon season suggests decrease in tropospheric aerosol loading due to wet removal processes like washout and cloud scavenging. The observed minimum AODs during post monsoon could be due to weak production and strong wet removal processes that remove most of the aerosols from the atmosphere. High AOD during winter period has been attributed to lower wind speed and relative humidity, which offers the best condition for gas to particle conversion processes. Seasonal patterns of AOD during 2001-2006 remained same and are in agreement with other studies over Indian region (Devara P C S, Pandithurai et al., 1996) and (Niranjan et al., 1995).

Daily SUV and UVA variation during 2001-2006 at the study site is studied. The seasonal variation of SUV and UVA at noon time shows relatively low values during December and January (around (SUV = 1MED/hr and UVA = 2MED/hr) except for the year 2003. The values are high during 2003 compared to other years (SUV=2.6MED/hr, UVA=3.8MED/hr). The values reached maximum during summer period i.e from March to May (>3MED/hr). Comparison of day to day variation of AOD, SUV and UVA in suggests that different levels of aerosol loading in the boundary layer results in significant modulation of solar UV radiation reaching the ground, especially during the days of high aerosol loading. The aerosol loading is observed to be high during 2002, and low SUV observed during 2002 also supports the impact of aerosols on the reduction of ground reaching SUV, especially during summer season. The observations in the present study are in conformity with other studies reported in literature (Kylling et al., 1998) and (Krzyscin J W et al., 1998). The SUV varies markedly through the year and is more intense during summer season. Seasonal and diurnal cycles of solar radiation are responsible for observed variations in the SUV intensities.

#### ***Relation between satellite and ground based measurements of SUV and TOMS $UV_{ery}$***

The measured surface erythemal UV irradiances for the years 2004 and 2005 were compared with TOMS UV erythemal radiation using scatter plots. Ground measured SUV showed a positive correlation with TOMS  $UV_{ery}$  during the period with the corresponding slopes of 0.144 and 0.04 with values of  $r^2 = 0.14$  and 0.48 respectively.





Day to day variations of SUV,UVA & AOD(500nm) during 2004, 2005 & 2006

### Summary and Conclusions

Results of the study suggested that tropospheric aerosol loading has significant impact on variations in the ground reaching  $UV_{ery}$  radiation in tropical urban environment at 500nm. Synchronous measurements suggested that SUV showed decrease at the rate of nearly 0.1 MED/hr per unit increase in aerosol optical depth. In addition to this, synchronous observations on AOD and ground reaching SUV radiation during normal day and the day after rainfall event suggested ~45% attenuation of ground reaching UV-B radiation during normal high aerosol loading days.

The seasonal variation of SUV and UVA at noontime show relatively low values during December and January, around (SUV = 1MED/hr and UVA = 2mW/cm<sup>2</sup>) except for the year 2003. The values are high in 2003 compared to other years (SUV = 2.6MED/hr, UVA = 3.8 mW/cm<sup>2</sup>). The values reached maximum during March and May (>3MED/hr). Comparison of day to day variation of AOD, SUV and UVA suggested that different levels of aerosol loading in the boundary layer results in significant modulation of solar UV radiation reaching the ground. The aerosol loading is observed to be high during 2002, where as low SUV observed during 2002 also supports the impact of aerosols on the reduction of ground reaching SUV, especially during summer season.

Ground measured SUV showed negative correlation with columnar ozone ground measurements. Both satellite and ground based measurements suggest high atmospheric aerosol loading during summer

season (March-May) and low during winter season (Dec-March). The presence of high aerosol loading during summer season has been considered as main reason for the observed low correlation between TOMS ozone and ground measured total columnar ozone. TOMS columnar ozone during 2005 and 2006 suggested a clear gaussian pattern of minimum concentration during winter and maximum during summer.

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## Mathematical modeling on Detection of diabetics

M. Padma devi

### Abstract

*Diabetes mellitus is a metabolic disorder in which the body is unable to respond properly to the consumption of carbohydrates, sugars, and starches, leading to increased levels of glucose in the blood and urine. This fact is used to diagnose diabetes in the context of a glucose tolerance test. In a glucose tolerance test (GTT), a patient fasts overnight and is then given a large dose of glucose. The concentration of glucose in the body is then monitored for the next three to five hours, and an abnormal response may indicate diabetes. This project will present a mathematical model that can be used to diagnose diabetes based on the data collected during the GTT.*

*Key words: metabolic disorder, consumption, tolerance test, diabetes,*

### Introduction of diabetes:

Diabetes is a disease of the metabolism where the body cannot adequately respond to the ingestion of any type of carbohydrate. This is the result of the inability of the body to adequately produce the hormone insulin, which allows cells to absorb glucose from the blood. The source of this inadequacy varies between the type of diabetes. In type 1 diabetes, the cells of the pancreas responsible for producing insulin (the islets of Langerhans) are destroyed by the body's own immune system and the production of insulin is therefore completely absent. In type 2 diabetes, insulin is still produced by the body, but the body is very resistant to its effects. The result in both cases is the same: high levels of glucose in the blood, also known as hyperglycemia. Because this is much more drastic and therefore more obvious and easier to diagnose in type 1 diabetes, this model will be constrained to the detection and diagnosis of type 2 diabetes

### Important terms of diabetes:

To construct a mathematical model it is necessary to follow the following well known facts from the elementary biology.

**(a) Glucose is a source of energy** for all tissues and organs, and has an important role in the metabolism of any vertebrate. The blood glucose concentration has an optimal level for each individual, and any excessive departure from this optimal concentration causes severe pathological conditions, that may eventually result into death, the departure leads to Diabetes.

**(b) The blood glucose levels** tend to be auto-regulatory but they are also susceptible to a wide variety of hormones and some hormones e.g. Insulin decrease the blood glucose concentration. Some hormones have been mentioned in view of their importance in Blood glucose respiratory system.

**(c) Insulin:** The hormone insulin is made in the beta cells of the pancreas and is secreted when the body presents high blood sugar levels. When only 10-20% of beta cells are working properly then the signs of diabetes tend to show. Insulin causes most of the body's cells to take up glucose from the blood (including liver, muscle, and fat tissue cells), storing it as glycogen in the liver and muscle, and stops use of fat as an energy source. When insulin is absent (or low), glucose is not taken up by most body cells and the body begins to use fat as an energy source (ie, transfer of lipids from adipose tissue to the liver for mobilization as an energy source). When sugar levels are high in the body then the insulin hormone is segregated. When control of insulin levels fail, diabetes mellitus results. On the other hand, an excess of insulin results in hypoglycemia.

**(d) Glucagon** is an important hormone involved in carbohydrate metabolism. Produced by the alpha cells in the pancreas, it is released when the glucose level in the blood is low (hypoglycemia), causing the liver to convert stored glycogen into glucose and release it into the bloodstream. The action of glucagon is thus opposite to that of insulin, which instructs the body's cells to take in glucose from the blood in times of satiation. In this action if there is no sufficient glucose in blood the glucagon takes the reserves of glucose stored in the liver.

(e) **Gluconeogenesis** is a metabolic pathway that results in the generation of glucose from non-carbohydrate carbon. The vast majority of Gluconeogenesis takes place in the liver and, to a smaller extent, in the cortex of kidneys. This process occurs during periods of fasting, starvation, or intense exercise and is highly energetic. Gluconeogenesis is often associated with ketosis. Gluconeogenesis is also a target of therapy for type II diabetes, such as metformin, which inhibit glucose formation and stimulate glucose uptake by cells.

(f) **Growth Hormone:** The growth hormone or somatotropin is secreted by the delta cells in the pancreas. It intervenes directly on the regulation of glycemic and the secretion depends on the high levels of glucose, amino acids and glucagon. In addition to increasing height in children and adolescents, growth hormone has many other effects on the body. This is to reduce liver uptake of glucose and promote Gluconeogenesis in the liver, therefore it increases the glucose levels in blood. It is important to note when the growth hormone is secreted it increases blood sugar levels. It is believed that the growth hormone decreases the sensitivity of muscle and adipose membrane to insulin, thereby reducing the effectiveness of insulin in promoting glucose uptake.

**What is Mathematical modeling?**

A **mathematical model** is a description of a system using **mathematical** concepts and language. The process of developing a **mathematical model** is termed **mathematical modeling**.

**Formation of Mathematical Model**

The model proposed serves to interpret the results of the Glucose Tolerance Test (GTT) on either normal or diabetes patients. We know that glucose plays an important role on our performance which depends on the metabolism system. Glucose provides energy to tissue and organisms but the levels provided depend on various hormones such as: insulin, growth hormone, glucagon, epinephrine best known as adrenaline, glucocorticoids and thyroxine. To analyze GTT results a fixed criterion does not exist. The model proposed in this paper will be classified in three groups depending on the hormones that influence glucose levels in blood. In this way we can group the hormones that elevate glucose levels in blood separated from those that lower them.

It is a simple one, requiring only a limited number of blood sample The during a GTT ,and it centres on two concentrations

- (a) G(Glucose in the blood)
- (b) H(Net hormonal concentration)

The latter represents the cumulative effect of all the important hormones.

**Building the model**

The objective of this model is to be able to accurately identify normal and abnormal results to the glucose tolerance test. As such, it seems appropriate to define two different concentrations. G is defined as the concentration of glucose in the blood. H is a concentration describing the net effects of the various hormones in the blood. Hormones such as insulin that decrease blood glucose concentrations are considered to increase H, while hormones such as glucagon or thyroxin that increase blood glucose concentrations are considered to decrease H. Because the effects of insulin tend to dominate all other effects, and the blood glucose regulatory system as a whole relies more on the synergy of the hormones rather than their specific concentrations, the lumped sum of these hormonal effects still an accurate way to measure the relevant concentrations.

This being said, rate of change functions can now be defined for these two concentrations:

$$\frac{dg}{dt} = F(G, H) + J(t) \text{ --- (1)}$$

$$\frac{dh}{dt} = F(G, H) \text{ --- (2)}$$

Where J(t) represents the external supply rate of glucose. Note that a similar function K(t) could be included in the second equation, but in practice, fasting for the GTT would also bar a patient from externally supplying any of the hormones listed above, so K(t) can be disregarded. Because both F<sub>1</sub> and F<sub>2</sub> are

dependent on both G and H, a change in either G or H will have its own effect on G and H. In other words, this is an ideal beginning of a differential equation. It seems safe to make the assumption that G and H both reach optimal values  $G_0$  and  $H_0$  as the patient fasts. With this assumption in mind,  $F_1(G_0;H_0) = 0$  and  $F_2(G_0;H_0) = 0$ . Since the focus of this model is on deviations of G and H, it seems prudent to make the following substitutions:

$$g = G - G_0$$

$$h = H - H_0$$

After making this substitution, it follows that

$$\frac{dg}{dt} = F_1(G_0 + g, H_0 + h) + J(t) \quad (3)$$

$$\frac{dh}{dt} = F_2(G_0 + g, H_0 + h) \quad (4)$$

When these functions are expanded,

$$F_1(G_0 + g, H_0 + h) = F_1(G_0, H_0) + \frac{\delta F_1(G_0, H_0)}{\delta G} g + \frac{\delta F_1(G_0, H_0)}{\delta H} h + e_1 \quad (5)$$

$$F_2(G_0 + g, H_0 + h) = F_2(G_0, H_0) + \frac{\delta F_2(G_0, H_0)}{\delta G} g + \frac{\delta F_2(G_0, H_0)}{\delta H} h + e_2 \quad (6)$$

Where  $e_1$  and  $e_2$  are error functions that are infinitesimal compared to  $g$  and  $h$ . Therefore it can be assumed that G and H deviate only slightly from  $G_0$  and  $H_0$  and  $e_1$  and  $e_2$  can be ignored. Also, because  $G_0$  and  $H_0$  are both constants,  $F_1(G_0;H_0)$  and  $F_2(G_0;H_0)$  are both derivatives of constants and therefore zero. Employing this information,

$$\frac{dg}{dt} = \frac{\delta F_1(G_0, H_0)}{\delta G} g + \frac{\delta F_1(G_0, H_0)}{\delta H} h + J(t) \quad (7)$$

$$\frac{dh}{dt} = \frac{\delta F_2(G_0, H_0)}{\delta G} g + \frac{\delta F_2(G_0, H_0)}{\delta H} h \quad (8)$$

Now, while it is not currently possible to determine the exact values of

$$\frac{\delta F_1(G_0, H_0)}{\delta G}, \frac{\delta F_1(G_0, H_0)}{\delta H}, \frac{\delta F_2(G_0, H_0)}{\delta G} \text{ and } \frac{\delta F_2(G_0, H_0)}{\delta H}$$

it is possible to determine their signs by examining physiological mechanisms.

Examining  $\frac{dg}{dt}$ , if  $h = 0$ ,  $\frac{dg}{dt}$  is negative due to tissue absorption of glucose and the storage of glucose (converted to glycogen) in the liver.

Therefore  $\frac{\delta F_1(G_0, H_0)}{\delta G}$  must be negative. If instead of  $g=0$ ,  $\frac{dh}{dt}$  is negative because positive  $h$  decreases blood glucose by definition. Therefore  $\frac{\delta F_1(G_0, H_0)}{\delta H}$  must also be negative.

Examining  $\frac{dh}{dt}$ , if  $h=0$ ,  $\frac{dh}{dt}$  is positive because high values of  $g$  tend to cause secretion of hormones that increase H.

Therefore  $\frac{\delta F_2(G_0, H_0)}{\delta G}$  must be positive. When  $g = 0$ , H decreases due to hormone metabolism, so

$$\frac{\delta F_2(G_0, H_0)}{\delta H} \text{ must be negative.}$$

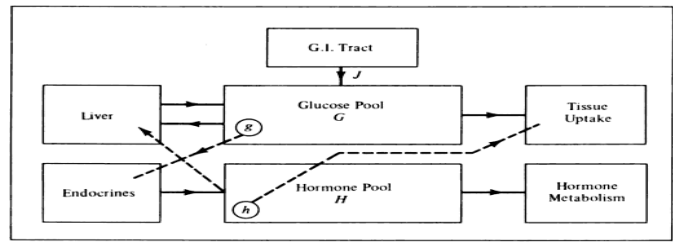


Figure 1: Glucose and hormone absorption

With these revelations, the previous equations can be rewritten:

$$\frac{dg}{dt} = -ag - bh + J(t) \quad \text{--- (9)}$$

$$\frac{dh}{dt} = cg - dh \quad \text{--- (10)}$$

Where a, b, c, and d are all positive constants. This forms a first order differential equation. However, the only variable being examined in the GTT is g, so it would be beneficial to rewrite equation 9 in terms of only g. To do this, it is first necessary to differentiate the equation with respect to:

$$\frac{d^2 g}{dt^2} = a \frac{dg}{dt} - b \frac{dh}{dt} + \frac{dJ}{dt}$$

Substitute for  $\frac{dh}{dt}$  from equation 10, then equation becomes

$$\frac{d^2 g}{dt^2} = a \frac{dg}{dt} - bcg + bdh + \frac{dJ}{dt} \quad \text{--- (11)}$$

Now, equation (9) can be rearranged to show that  $bh = -\frac{dg}{dt} - ag + J(t)$  Using this

to substitute, equation (11) can become a second order linear differential equation:

$$\frac{d^2 g}{dt^2} + (a + d) \frac{dg}{dt} + (ad + bc)g = \frac{dJ}{dt} + dJ$$

After making a few substitutions, this equation can be written as

$$\frac{d^2 g}{dt^2} + 2A \frac{dg}{dt} + w_0^2 g = R(t) \quad \text{--- (12)}$$

Where  $A = \frac{a+d}{2}$ ,  $w_0^2 = ad + bc$  &  $R(t) = \frac{dJ}{dt} + dJ$  Note that R(t) = 0 for all t other than when the

glucose is being ingested at the start of the GTT. Therefore, equation (12) can be made homogenous by setting t0 to be the time that the glucose has been completely ingested.

$$\frac{d^2 g}{dt^2} + 2A \frac{dg}{dt} + w_0^2 g = 0 \quad \text{--- (13)}$$

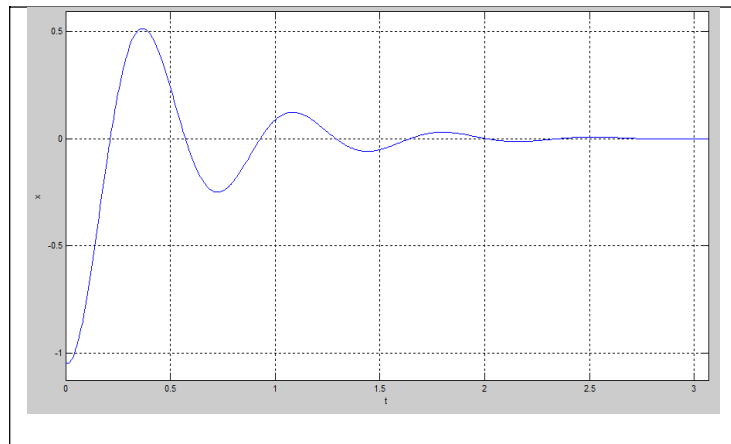
Equation (13) is the equation for damped harmonic motion, and therefore eventually approaches zero as  $t \rightarrow \infty$ . This proves that the model is effective, as the physical implication of this fact is that the blood glucose approaches an optimal level, which does indeed happen.

With any harmonic motion, there are three cases: the over damped case  $A^2 - w_0^2 > 0$

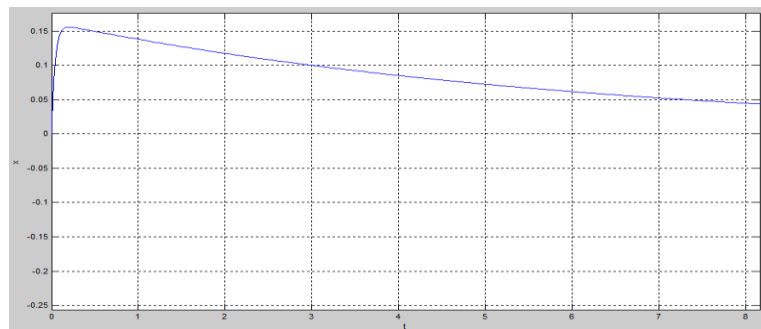
the under damped case where  $A^2 - w_0^2 < 0$  and the critically damped case, where  $A^2 - w_0^2 = 0$ .

If the physical reality of diabetes is considered, it becomes that the under damped case is appropriate. Typically a diabetic experiences fluctuating blood glucose levels that rise above and fall below the optimal level. In other words, the sign of g changes many times before equilibrium is reached. In the over damped

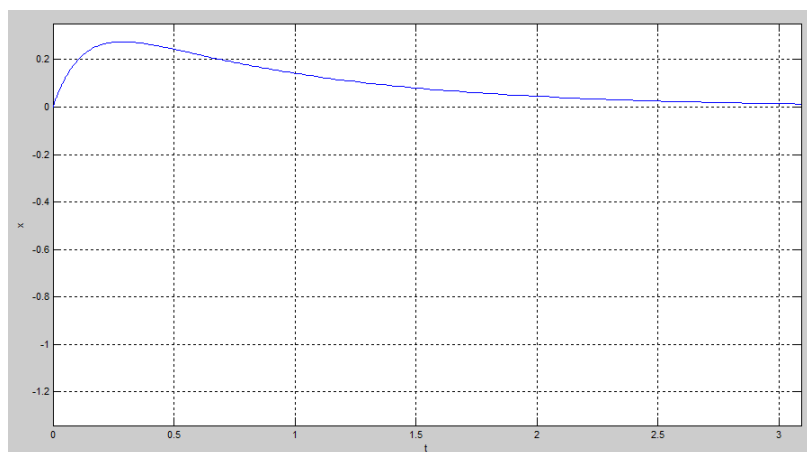
and critically damped cases, the sign of  $g$  can change once at most. This physical implication is not in accordance with reality, where rising and falling blood glucose levels are typical. For examples of under damped, over damped harmonic motion and critically damped , respectively.



An Under damped spring



An over damped spring



A Critically damped spring

When  $A^2 - w_0^2 < 0$ , the characteristic polynomial of equation (13) has complex roots and the solution of equation (13) is always of the form

$$g(t) = A_1 e^{-At} \cos(\omega t - \delta) \dots (14)$$

Where  $w = \omega_0^2 - A^2$  When changing coordinates back to G, or the actual blood glucose concentration, this equation becomes

$$G = G_0 + A e^{-\alpha t} \cos(\omega_0 t - \delta) \quad (15)$$

There are 5 unknowns in equation (15);  $G_0$ ,  $A$ ,  $\alpha$ ,  $\omega_0$  and  $\delta$ . While it would be Possible to measure  $G_0$  when the patient first arrived, before he/she ingested the glucose, and then measure G at four more different times, this approach would not yield a good overall fit for the data. Instead, a more accurate way to determine the five unknowns is to take n measurements  $G_1, G_2, \dots, G_n$  throughout the test at times  $t_1; t_2, \dots, t_n$ . Usually six or seven measurements are sufficient.

These measurements are then used to find values of  $G_0$ ,  $A$ ,  $\alpha$ ,  $\omega_0$  and  $\delta$  that minimize the following square error formula:

$$E = \sum_{j=1}^n [G_j - G_0 - A e^{-\alpha t_j} [\cos(\omega_0 t_j - \delta)]]^2$$

This function is best solved using computer software, but is much more accurate than using a system of equations.

Experimentally, it has been determined that even a slight error in the measurement of G can result in significant error in the value of  $\alpha$ . Therefore  $\alpha$  is not a reliable indicator when diagnosing diabetes. However,  $\omega_0$ , which is the natural frequency of the system, was not significantly influenced by error in G. This means that  $\omega_0$  is an ideal indicator as to the interpretation of the GTT results. When interpreting the physical meaning of this value, it is easier to understand when discussing the implications of the corresponding

natural period,  $T_0 = \frac{2\pi}{\omega_0}$  which essentially describes the amount of time it takes the body to return to the optimal glucose concentration  $G_0$ . It was found that a value of  $T_0$  less than four hours was typically found in no diabetic subjects, whereas a value of  $T_0$  greater than four hours indicated diabetes.

**Conclusion:**

This model proved to be effective in the diagnosis of mild to moderate type 2 diabetes mellitus using the results of the glucose tolerance test. It was found that the body's blood glucose regulation mechanisms could be likened to a hormonal spring, where too low a blood glucose led to pressure in the upward direction, and too high a blood glucose led to pressure in the downward direction. The model struggles to diagnose severe type 2 diabetes, especially in the time period three to five hours after glucose is ingested. The model is also completely ineffective in the diagnosis of type 1 diabetes, but the symptoms of type 1 diabetes usually become prominent to the point where they are impossible to ignore. The implications made by this model as to the correlation between the natural amount of time it takes to reach equilibrium in blood glucose concentration and the timing of meals in American culture are fascinating, and more research should be done in other cultures to provide better understanding.

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### **Applications of Differential Equations: Newton's Law of Cooling**

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**Abstract:**

*This paper studies one of the application of Differential equations which is "Newton's law of cooling". It gives the derivation of this and explains its role in the engineering connection. It solves some problems by using this.*

**Key words:** *Differential equation, Newton's law of cooling, heat, application.*

**I Introduction:**

One physical system in which many important phenomena occur is that where an initial uneven temperature distribution causes heat to flow. Of course as heat flow the temperature distribution changes, which in turn modifies the heat flow. That is to say: Heat flow from hot places to cold ones, and as this happens, the temperature of cold places rises and the temperature of hot places decreases. There are two rough mathematical rules governing the relationship between heat flow and temperature change: Heat flow is proportional to spatial rates of change in temperature distribution. The time rate of temperature change at any point is proportional to the rate of heat flow into that point.

Students come to see the exponential trend demonstrated through the changing temperatures measured while heating and cooling a beaker of water. This task is accomplished by first appealing to students' real-life heating and cooling experiences, and by showing an example exponential curve. After reviewing the basic principles of heat transfer, students make predictions about the heating and cooling curves of a beaker of tepid water in different environments. During a simple teacher demonstration/experiment, students gather temperature data while a beaker of tepid water cools in an ice water bath, and while it heats up in a hot water bath. They plot the data to create heating and cooling curves, which are recognized as having exponential trends, verifying Newton's result that the change in a sample's temperature is proportional to the difference between the sample's temperature and the temperature of the environment around it. Students apply and explore how their new knowledge may be applied to real-world engineering applications.

**II Newton's law of cooling** states that the rate of change of temperature of a body is proportional to the difference between the temperature of the body and its surroundings

$$\frac{dT}{dt} \propto (T_t - T_s)$$

The Newton's law of cooling is given by

$$\frac{dT}{dt} = k(T_t - T_s)$$

Where  $T_t$  is the temperature at time  $t$  and  $T_s$  is the temperature of the surrounding,  $k$  is a constant.

**The Newton s Law of Cooling Formula** is given by

$$T(t) = T_s + (T_0 - T_s)e^{-kt}$$

Where  $t$  is the time taken,  $T(t)$  is the temperature of the given body at time  $t$ ,  $T_s$  is the surrounding temperature,  $T_0$  is the initial temperature of the body,  $k$  is the constant.

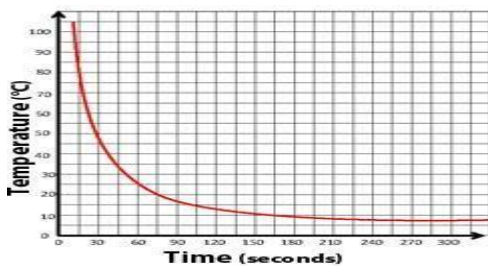
**NOTE:**

The greater the difference in temperature between the system and surrounding, more quickly the body temperature changes.

**III Engineering Connection:**

Heat transfer is a broad topic used in many branches of engineering. For example, mechanical engineers who design engines—from steam locomotives to modern internal combustion engines—rely on a detailed understanding of how heat moves through all types of matter. Industrial engineers use heat transfer concepts to design climate control systems for manufacturing facilities, such as foundries or refrigerated food production facilities, which integrate temperature-sensitive human workers with extreme temperature processes. Moreover, heat transfer is so critical to biological engineering that it has spawned the specialty of "bioheat" transfer, which is the study of normal functioning of the cardiovascular system as well as inherently heated treatments such as cryo-surgery and laser-based therapies.

For example, If you placed a room-temperature can of soda in the refrigerator and waited for it to cool, how would you expect its temperature to change? What kind of trend do you think the temperature would have over time?



**IV PROBLEMS**

**Problem 01**

A thermometer which has been at the reading of 70°F inside a house is placed outside where the air temperature is 10°F. Three minutes later it is found that the thermometer reading is 25°F. Find the thermometer reading after 6 minutes.

**Solution:**

According to Newton’s Law of cooling, the time rate of change of temperature is proportional to the temperature difference.

$$dT/dt = -k(T-10)$$

$$dT/(T-10) = -k dt$$

$$\ln(T-10) = -kt + \ln C$$

$$\ln(T-10) = \ln e^{-kt} + \ln C$$

$$\ln(T-10) = \ln C e^{-kt}$$

$$T-10 = C e^{-kt}$$

$$T = 10 + C e^{-kt}$$

When  $t = 0$ ,  $T = 70^\circ\text{F}$

$$70 = 10 + C$$

$$C = 60$$

Hence,

$$T = 10 + 60e^{-kt}$$

When  $t = 3$  min,  $T = 25^\circ\text{F}$

$$25 = 10 + 60e^{-3k}$$

$$15 = 60e^{-3k}$$

$$1560 = e^{-3k}$$

$$e^{-k} = (14)^{1/3}$$

Thus,

$$T = 10 + 60(14)^{t/3}$$

After 6 minutes,  $t = 6$

$$T = 10 + 60(14)^2$$

$$T = 13.75^\circ\text{F}$$

2. Example

A cup with water at  $45^\circ\text{C}$  is placed in the cooler held at  $5^\circ\text{C}$ . If after 2 minutes the water temperature is  $25^\circ\text{C}$ , when will the water temperature be  $15^\circ\text{C}$ ?

3.

A hard-boiled egg at temperature  $100^\circ\text{C}$  is placed in  $15^\circ\text{C}$  water to cool. Five minutes later the temperature of the egg is  $55^\circ\text{C}$ . When will the egg be  $25^\circ\text{C}$ ?

Given  $T_0 = 100$ ,  $T_m = 15$ , and  $T(5) = 55$ .

$$T(t) = T_m + (T_0 - T_m)e^{-kt} \quad k = 0.1507\dots$$

$$55 = 15 + 85e^{-5k} \quad \text{Now find } t \text{ when } T(t) = 25.$$

$$40 = 85e^{-5k} \quad 25 = 15 + 85e^{-0.1507t}$$

$$\left(\frac{40}{85}\right) = e^{-5k} \quad 10 = 85e^{-0.1507t}$$

$$\ln\left(\frac{40}{85}\right) = -5k \quad \ln\left(\frac{10}{85}\right) = -0.1507t$$

$$t = 14.2 \text{ min.}$$

### Conclusion:

This paper explains one of the application of Differential equations which is "Newton's law of cooling". It gives the derivation of this and explains its role in the engineering connection. It solves some problems by using this.

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## **Education and Community Services in Developing Leadership Qualities among College Going Students**

**Dr. Sr. Marietta D'Mello**

### ***Abstract***

#### ***Education and Community Development***

*The primary aim of an educational institutions is not to form scholar's who are absolutely self centered, puffed up with the most recent knowledge but quite far removed and alienated from the harsh realities of their less fortunate brothers and sisters. India can no longer afford to impart a purely academic formation without infusing into the students a commitment social and political Transformation. Education is mainly directed at transformation, the transformation of both the individual and the society, education helps the young person to make balanced decisions with regard to social realities, especially culture. The young person becomes a transformer of culture in all its aspects thus contributing to the building up of an awakened society.*

*Education is the major social instrument to foster all around development of the student with integrity and moral and human values. It must stem from the roots and culture of the society, its living conditions, problems, goals and aspirations. Only then can education become relevant to life and contribute the development of the individual and the society. What is lacking in our University education today is that it does not give an opportunity to students and we might add, to staff members also, to make this contact with the people in Indian villages, which is so essential to give inspirations to students in their later life, and to staff members in their teaching and in drafting the university curricula. If there is anything we can learn from the generation of leaders that gave India her independence, it is that no leadership worth name, a leadership with vision and a sense of mission can be trained in India unless it is brought into intimate contact with the concrete life of the Indian village.*

***Key words:*** *alienated, commitment, transformation, social realities, integrity, leadership, awakened, vision, mission*

### ***Introduction***

Youth specially, the students have always responded to National challenges. They are highly responsive to the appeals of new idealism and Methodology. Youth have been in the forefront of the Indian freedom struggle. They always come forward spontaneously to do intensive manual/relief work during disasters such as floods. Experiences with programmes organized for youth through the NCC, NSS, NIS, NSO and others indicate that developmental programmes of the Nation should be linked with the development of the youth. Student lawlessness is one of the most serious problems now facing in the country. All the Nation's gigantic efforts to lift itself by the boot-straps will prove in-fructuous if the university students do not have confidence in the future of the country, selfless commitment to its welfare and a sense of purpose in their work.

Another important point in the same connection is the training of the right type of leadership, which is sadly lacking. A majority of the students are not interested in agitations and even against them, but they are lead like sheep by troublesome and irresponsible elements, many of whom are professional agitators. It is therefore urgent to do what we can create the right type of leadership among students and to train the rank and file to have backbone, so as to stand up for their convictions.

The main purpose of collegiate education is to direct the attention of youth to the problems of the society in which they live, to orient them to the aspirations of their people and the social changes required to meet them and to develop the skills and attitudes necessary to work effectively for national improvement. A large segment of Indian society today is faced with social change. Youth must be taught to understand the character of social change and to know that change is inevitable.

### ***Objectives***

The more specific objectives of NSS/NCC are to arouse social conscience in the student and to provide them with opportunities.

- a) To work with and among the people.
- b) To engage in creative and constructive social action.
- c) To enhance his knowledge of himself and the community through confrontation with reality.
- d) To put his scholarship to practical use in mitigating at least some special problems.
- e) To gain skills in exercise of democratic leadership.

### ***The problem of the Study***

This study comes under survey type research. It deals with present, describes and determines the status of phenomenon. This study is aimed to evaluate how far leadership qualities could be developed among students through Community services in educational institutions. The educational institutions should plan and provide opportunities to bring out all-round development for the students.

### ***Hypothesis***

- 1) There will be a significant relationship between community services and development leadership qualities among the students.
- 2) Boys and girls differ in developing leadership qualities through community services

### ***Population and Sample***

The study was carried out in 10 Degree Colleges in West Godavari District in Andhra Pradesh. The sample of the study constitutes 100 second year Degree students representing boys and girls who involved in National Service Scheme (NSS) and National Cadet Corps (NCC) activities. Random sampling technique was used for selection of the sample.

The rationale for selecting the second year students is that in accordance with University norms that students studying I & II years at graduation level are to be involved in NSS.

In this study the following variables are selected viz.

- a. Sex
- b. Urban/Rural
- c. Socio economic status of the students

The study was conducted in two phases with the duration of six months.

### ***Instrumentation***

General information schedule was developed and used for collecting the family background information and socio-economic status of the students (Rural and Urban). The collection of information of the following given six attributes is based on primary data. Questionnaire is constructed and administered to assess leadership qualities of the students based on six attributes namely, Interpersonal relationship, Intellectual operation, Behavioral and emotional stability, Ethical/moral strength, Adequacy of communication and operation as a citizen

### ***Statistical Techniques***

To analyze and emphasize the impact of community services in developing leadership qualities of Undergraduate students in West Godavari District, Andhra Pradesh, estimated and based on the following selective six attributes of leadership. Namely a) Interpersonal relationship, b) Intellectual operations, c) Behavioural and emotional stability, d) Ethical and moral strength, e) Adequacy of communication and f) Operation as a citizen.

The different statistical tools used in this study to measure the involvement of students both boys and girls of second year Undergraduate course involved in different group activities. Mainly a focus has been made and taken into consideration of NSS and NCC Community services, belonging to different faculties i.e. students of Science group, Arts, Commerce and Vocational. The present study not only focus the different location/area background i.e. Rural/Urban of the students but also their socio-economic status by including the classification of the parents categorizing them based on their educational qualifications and occupations.

To measure the above mentioned six aspects of leadership activities the following statistical methods are used – i) Mean ii) Standard deviation iii) Standard Error in order to estimate the values of descriptive of different activities in this study that helps to analyze the attitude of the students to develop their personality by contributing their services to the community as a part of their regular curricula. And also the hypothesis is tested at 95% confidence interval for mean to estimate the lower Bound and upper Bound values. iv) To estimate the variance between groups and within groups by calculating ‘F’ distribution based on Analysis of Variance (ANOVA) calculating a) Sum of squares, b) Mean squares of all the six sections of leadership attributes of NSS and NCC groups. And another important method is used i.e. Paired sample correlation evaluated by analyzing a comparative study of First Phase and Second Phase and ‘t’ test is applied in order to test the hypothesis.

### **Findings**

1. The study revealed that maximum students from B.Com. that is 50%, 36% from B.A., 12% from B.Sc. and least percent of only 2% of Vocational Course participated in NSS activities. Where as in the case of NCC the maximum of 62% of B.Sc. students, 24% and 14% of B.A. and B.Com. students respectively participated in NCC.
2. It was found out that nearly 72% of students with rural background and 28% from urban background involved in NSS activities. But in the case of NCC 56% of students belong to urban background and 44% belong to rural background. On the whole the maximum students belong to rural background that is 58% and 42% of students belong to urban background.
3. The study also revealed that most of the students who are involved community activities come from rural area whose parents are illiterates with agriculture background and labour category.
4. It was found out that the maximum Educational qualification percentage of parents of NSS students 56% of fathers and 70% mothers qualification is 10<sup>th</sup> and below. Where as in NCC students, it is 26% of fathers and 54% of mothers.
5. The most important finding of this study is out that though the students belong to rural background and socio-economically backward, it did not stop them to carry out their service through NSS activities. The students in the case of NCC most of them had a very good socio-economic status and also come from urban area.
6. Another finding based on information given by the students in the beginning of their experience after joining in NSS and NCC activities expressed that they have given first priority to develop interpersonal relationship than compared to other criteria. The analysis clearly indicated nearly 80% of boys and 92% of girls have given positive participation through their services attaining interpersonal relationships which was the main course for them to take up their mission i.e. NSS/NCC.
7. This study also analyzed that by the end of I phase there was a gradual improvement in the personality of the students as they started giving importance to other criteria like Intellectual operations, Behavioral & emotional stability, Ethical and moral strengths in addition to I criterion.
8. Based on the Estimation of Descriptive analysis and Analysis of Variance of NSS & NCC as well as class wise i.e. B.Sc., B.A., B.Com. and Vocational for I and II phase found out that there is an excellent achievement of the students in develop their personality by imbibing the six given criteria of leadership qualities in this research. And also expressed their mind setting to achieve their goals and success in their life not only through their academic but also by developing their mental strength with good psychological abilities through their community service of NSS & NCC.
9. The major finding of this analytical study is based on ANOVA tables of both Descriptive group wise i.e. NSS and NCC and class wise by the estimation of standard errors given a clear picture regarding the improvements in the attitude of the students from I phase to II phase resulting a continuous decrease in the standard error values ranging between 0.084 to 0.096 almost negligible. And also testing hypothesis of I and II phase by the estimation of calculated “t” distribution values compared in the “t” distribution tabulated value at 5% level of significance and 99 degrees of freedom. The increase in calculated values of “t” distribution from phase I and phase II being greater than the tabulated value analyzed the hypothesis is

rejected in both the case of NSS and NCC group wise as well as class proves that because of significance variations showed that the students succeeded in developing their leadership qualities by the end of the II phase.

10. The students in II phase, succeeded in acquiring and developing their skills by achieving the qualities of all the six criterion to become good leaders in order to carry on their mission of service – has proved in the correlation analysis. Satisfying the condition of value lying between +1. According to this study the result was between 0.56 to 0.99 with (+) ve correlation.
11. Descriptive analysis of NSS & NCC for phase I and Phase II by testing at 95% confidence interval for mean by evaluating the lower bound and upper bound values proved that there is flexibility in increasing and decreasing of bound values showed that though there was no consistency in the active participation of boys and girls in their community service, but by the end of II phase the students have come out with good results by improving their abilities by developing the skill of self awareness and their role in the community services. It was proved that all the six criteria are closely inter dependent on each other.
12. It was clearly noted that the students succeeded in developing leadership qualities by the end of their undergraduate course.

The “t” distribution proved that the students of both boys and girls of NSS and NCC were able to develop their personality based on acquiring the leadership qualities of six selected criteria emphasized in this research study based on a comparative analysis between pre Test (I phase) and post Test (II phase) of paired sample statistics of NSS and NCC, as well as group wise testing the hypothesis based on ANOVA of “F” distribution variations and ‘t’ distribution proved that both boys and girls of NCC and NSS developed positive thinking and balanced behaviour with attaining Ethical and moral strength and their responsibilities towards society basically related to the acquiring of leadership qualities of six selected criteria in this research study.

### **Conclusion**

In this study it is clearly indicates that the students of NSS and NCC used their community services as parameters of their intellectual improvement and usually consider their services as aids of developing individual personality and leadership. Collection of data became a handsome task. Interviewing students would have been more advantageous in order to know their perspective and about their activities in which they are involved. Among the 10 colleges which are selected few of the colleges were either of women or men and few of the colleges were of co-education, therefore the data obtained has few differences. Though 6 months time period was allotted for the study, shortage of time entailed a much more elaborate and intensive study.

### **Scope for further research & Suggestions**

- A study on NCC activities at school level needs to study in a deeper manner.
- This type of study on Intermediate students would prove more useful.
- A study on opinion on programme Officers regarding these two activities would yield good results.
- A comparative study can be conducted between two universities.
- A study can be taken up on NSS and NCC activities at Andhra Pradesh State level.
- It is suggested that every educational institution should provide opportunity to the students to develop their potentialities.
- The curriculum needs to be prepared in such a way that it should enhance the developmental activities in the community. Hence the students are encouraged to apply the subject matter to life situations.

- Lack of moral standards is a burning issue of today's executives and administrators. One of the best rectification measures for these anomalies is learning discipline & selfless service through NSS and NCC.
- Disciplined managers are need of today's nation to enter into the global village system at par with advanced nations. The researcher found that NSS & NCC are inculcating the needed psychological development in the students.
- The students need to be made to participate compulsorily in co-curricular activities in order to develop in their hidden talents.
- The community services offered by the students need to be viewed as practical work to facilitate social change and brotherhood.
- The educational authorities should utilise the Human resources available in community services.
- The community services need to be imparted from the school itself. Hence the students get better motivation and it will enable their personal growth.
- There is a greater need for the staff to be motivated in imparting community services. Hence they in turn can energize and boost the talents of the students. The staff member's involvement as coordinator in community services can be done in rotation.
- By above positive findings the researcher felt that the institutional services organizations like NSS & NCC are to be made compulsory for every student of this nation, because these pupils are going to become the nation's hope.

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## **Quality in Higher Education - A Case Study of Affiliated Degree Colleges in Acharya Nagarjuna University Area**

**B. Prakash Babu,**

### **Abstract**

*Higher education as the production of qualified human resources. In this view, higher education is seen as a process in which the students are counted as "products" absorbed in the labour market. Thus, higher education becomes input to the growth and development of business and industry. Higher education as training for a research career. In this view, higher education is preparation for qualified scientists and researchers who would continuously develop the frontiers of knowledge. Quality within this viewpoint is more about research publications and transmission of the academic rigour to do quality research. Higher education as the efficient management of teaching provision. Many strongly believe that teaching is the core of educational institutions. Thus, higher education institutions focus on efficient management of teaching-learning provisions by improving the quality of teaching, enabling a higher completion rate among the student education as a matter of extending life chances. In this view, higher education is seen as an opportunity to participate in the development process of the individual through a flexible, continuing education mode.*

**Keywords:** *Absorb, Transmission, Rigour, Core, Efficient, Enable, Completion, Flexible*

### **Introduction:**

In a society full of diversity, ideologies and opinions, higher education means different things to different people. The pluralism of views is quite inevitable and some would opine it should be like that only. However, as we intend to discuss and learn more about quality in higher education, we should ask ourselves. There is more to it. In terms of the level, higher education includes college and university teaching-learning towards which students' progress to attain higher educational qualification. Higher education imparts in-depth knowledge and understanding so as to advance the students to new frontiers of knowledge in different walks of life (subject domains). It is about knowing more and more about less and less. It develops the student's ability to question and seek truth and makes him/her competent to critique on contemporary issues. It broadens the intellectual powers of the individual within a narrow specialization, but also gives him/her a wider perspective of the world around.

### **Concepts of Higher Education**

There are four predominant concepts of higher education:

Higher education as the production of qualified human resources In this view, higher education is seen as a process in which the students are counted as "products" absorbed in the labour market. Thus, higher education becomes input to the growth and development of business and industry. Higher education as training for a research career in this view, higher education is preparation for qualified scientists and researchers who would continuously develop the frontiers of knowledge. Quality within this viewpoint is more about research publications and transmission of the academic rigour to do quality research. Higher education as the efficient management of teaching provision, many strongly believe that teaching is the core of educational institutions. Thus, higher education institutions focus on efficient management of teaching-learning provisions by improving the quality of teaching, enabling a higher completion rate among the students. Higher education as a matter of extending life chances, in this view, higher education is seen as an opportunity to participate in the development process of the individual through a flexible, continuing education model. The access and quality of higher education in India is not up to the mark as per the requirements of rapidly growing economy. The biggest challenge of India as its GDP continues on robust growth made in the coming decade will be finding adequately skilled, educated and trained manpower. India's current GDP is S 1.25 trillion and at an annual growth rate of 7.0 per cent, it could double to S 2.5

trillion in 10 years. But what could derail our growth was finding skilled and trained manpower (Pai. 2008). B.K. Jha, 2006, of course at any point of time, weakening of higher education sector would weaken the forces of competitiveness and efficiency in the functioning of different sectors of economy.

As former president of India Dr. A.P.J. Kalam opines. "We should aim at developing a knowledge society" to build a strong and successful India in 21st century It is through "Knowledge Intensive" activities we can reach the growth by investing in the institutions and policy frame works which sustain faster innovation and proper education to equip our youth to meet the challenges of globalization and liberalization.

### ***Role of Higher Education In The Society***

Higher education is generally understood to cover teaching, research and extension. If we critically analyze the different concepts of higher education, we can list the various roles higher education plays in the society. Higher education is the source or feeder system in all walks of life and therefore supplies the much-needed human resources in management, planning, design, teaching and research. Scientific and technological advancement and economic growth of a country are as dependent on the higher education system as they are on the working class. Development of indigenous technology and capabilities in agriculture, food security and other industrial areas are possible because of our world-class higher education infrastructure. Higher education also provides opportunities for lifelong learning, allowing people to upgrade their knowledge and skills from time to time based on the societal need i.e to seek and cultivate new knowledge and to engage vigorously and fearlessly in the pursuit of truth, and to interpret old knowledge and beliefs in the light of new needs and discoveries. To provide the right kind of leadership in all walks of life, to identify gifted youth and help them develop their potential to the full by cultivating physical fitness, developing the powers of the mind and cultivating right interests, attitudes and moral and intellectual values;

To provide the society with competent men and women trained in agriculture, arts, medicine, science and technology and various other professions, who will also be cultivated individuals, imbued with a sense of social purpose;

To strive to promote quality and social justice, and to reduce social and cultural differences through diffusion of education; and

To foster in the teachers and students and through them in the society generally, the attitudes and values needed for developing the 'good life' in individuals and society (GOI, 1966, p. 497-8).

The report of the UNESCO International Commission on Education in the 21st Century titled "Learning: The Treasure Within" emphasized four pillars of education: learning to know, learning to do, learning to live together and learning to be. While, higher education intends to inculcate all these four in individuals and the society, the report highlighted the following specific functions of higher Education:

To prepare students for research and teaching;

- To provide highly specialized training courses adapted to the needs of economic and social life;
- To be open to all, so as to cater to the many aspects of lifelong education in the widest sense; and
- To promote international cooperation through internationalization of research, technology, networking, and free movement of persons and scientific ideas (UNESCO, 1996).

### ***Concepts of 'Quality'***

'Quality' is a much-debated term. To some it is like 'beauty' that lies in the eye of the beholder! Those who believe in this are 'relativists', whereas those who believe quality can be specific attributes that can be identified, they are 'objectivists'. The word quality comes from the Latin word *quails* meaning 'what kind of'. With a variety of meanings and connotations, it has been referred to as a 'slippery concept'. Quality ... you know what it is, yet you don't know what it is. But that's self-contradictory. But some things are better than others, that is, they have more quality. But when you try to say what the quality is, apart from the things that have it, it all goes poof! There's nothing to talk about it. But if you can't say what Quality is, how do you know what it is, or how do you know that it even exists? If no one knows what it is, then for all practical purposes, it doesn't exist at all. But for all practical purposes it really does exist... So round and round you go, spinning mental wheels and nowhere finding anyplace to get traction. What the hell is Quality? What is it? (p. 171). This implies that quality means different things to different people.

## Defining Quality

The British Standard Institution (BSI) defines quality as “the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs” (BSI, 1991). Green and Harvey (1993) identified five different approaches to defining quality:

- in terms of exceptional (exceeding high standards and passing a required standard);
- in terms of consistency (exhibited through “zero defects” and “getting right the first time”, making quality a culture);
- as fitness for purpose (meaning the product or service meets the stated purpose, customer specifications and satisfaction);
- as value for money (through efficiency and effectiveness); and
- as transformative (in term of qualitative change).

These different notions of quality have led Reeves and Bednar (1994) to conclude “...The search for a universal definition of quality and a statement of law like relationship has been unsuccessful”. According to Gummesson (1990) it might be useful to create an insight into the many dimensions that form a fuzzy entity referred to as quality through social consensus rather than defining it. Garvin (1988) classified the various definitions of quality into five major groups:

1. Transcendent definitions. These definitions are subjective and personal. They are eternal but go beyond measurement and logical description. They are related to concepts such as beauty and love.
2. Product-based definitions. Quality is seen as a measurable variable. The basis for measurement is objective attributes of the product.
3. User-based definitions. Quality is a means for customer satisfaction. This makes these definitions individual and partly subjective.
4. Manufacturing-based definitions. Quality is seen as conformance to requirements and specifications.
5. Value-based definitions. These definitions define quality in relation to costs. Quality is seen as providing good value for costs (Largosen et al, 2004).

Quality has a few central ideas around which the whole concept revolves: Quality as absolute, Quality as relative, Quality as a process, and Quality as culture.

### ***Quality Movement in Indian Higher Education***

The University Grants Commission (UGC) with its statutory powers is expected to maintain quality in Indian higher education institutions. Section 12 of the UGC Act of 1956 requires UGC to be responsible for “the determination and maintenance of standards of teaching, examinations and research in universities”. To fulfil this mandate, the UGC has been continuously developing mechanisms to monitor quality in colleges and universities directly or indirectly. In order to improve quality, it has established national research facilities, and Academic Staff Colleges to re-orient teachers and provide refresher courses in subject areas. The UGC also conducts the National Eligibility Test (NET) for setting high standards of teaching.

Various committees and commissions on education over the years have emphasized directly or indirectly the need for improvement and recognition of quality in Indian higher education system. The concept of autonomous colleges as recommended by Kothari Commission (1964-66) has its roots in the concept of quality improvement. Since the adoption of the National Policy on Education (1968), there has been a tremendous expansion of educational opportunities at all levels, particularly in higher education. With the expansion of educational institutions, came the concern for quality. The constitutional amendment in 1976 brought education to the concurrent list making the central government more responsible for quality improvement (Stella and Gnanam, 2003). The New Education Policy (1986) emphasized on the recognition and reward of excellence in performance of institutions and checking of sub-standard institutions. Consequently, the Programme of Action (PoA) in 1986 stated, “As a part of its responsibility for the maintenance and promotion of standards of education, the UGC will, to begin with, take the initiative to establish an Accreditation and Assessment Council as an autonomous body”. After eight years of continuous and serious deliberations, the UGC established NAAC at Bangalore as a registered autonomous body on 16th September 1994 under the Societies Registration Act of 1860. The milestones in the emergence of

NAAC can be identified as follows (Stella, 2000) 1987-1990: UGC constituted a 15-member committee on Accreditation and Assessment Council under the chairmanship of Dr. Vasant Gowariker. Nine regional seminars and a national seminar organized to debate Gowariker.

Committee report.

1990: Dr Sukumaran Nair's project report submitted to UGC that reflected a consensus to have an accreditation agency accountable to UGC.

1992: The revised New Education Policy reiterated all round improvement of educational institutions.

1994: Prof. G. Ram Reddy committee appointed to finalize the memorandum of association and rules and regulation of the accreditation board (July 1994).

1994: National Assessment and Accreditation Council established at Bangalore (September 1994).

- All India Council for Technical Education (AICTE)
- National Council for Teacher Education (NCTE)
- Medical Council of India (MCI)
- Indian Nursing Council (INC)
- Bar Council of India (BCI)
- Rehabilitation Council of India (RCI)
- Distance Education Council (DEC)
- Indian Council for Agricultural Research (ICAR)

The AICTE established the National Board of Accreditation (NBA) in 1994 to accredit programmes offered by technical institutions. The NBA accredits programmes and it is a voluntary process like that of NAAC. Other professional statutory bodies mostly undertake review exercises to recognize or de-recognize the institutions on the basis of their quality audit. Thus, quality issue is on the top of the agenda of Indian higher education.

### **Objectives**

- To examine the level of quality of Higher Education in Acharya Nagarjuna University area.
- To examine the benefits for women and other vulnerable sections in Higher Education.
- To determine extent of Employability of undergraduate Education in this area.
- To measure the Quality of Higher Education in under graduate colleges under Acharya Nagarjuna University area.
- To suggest appropriate measures to improve quality in Acharya Nagarjuna University area.
- To Study the comparison between rural colleges and urban, government and private aided colleges under Acharya Nagarjuna University area.

I of sample colleges personally going around all the regions of the Acharya Nagarjuna University area long with a schedule.

### **Issues And Challenges:**

The major challenges of the Indian higher education have explained here under However the study identified five areas critical to making the Indian Higher education system that financial innovation, innovation use of information and communication technology (ICT), reinvigorating research, thrust on vocational education and training (VET), and regulatory reforms are potential Game changer' for the Indian higher education system The study also found that very low per capital spends on higher education India. Lack of qualified faculty limited funding for hours for research, great budgets and research as well as poor linking The study found that poor quality of graduates – lack skills for employability 10% of graduates and 25% of engineering graduates are directly employable (Infosys, IT giant, last year sorted through 1.3 million applicants only to find that around two percent were qualified for jobs.) It is also found that quality of education delivered in most institutions is very poor. While India has some institutions of global repute delivering quality education, such as (Indian Institute of Management) IIMs and (Indian Institute of Technology) IITs.

It is also fact that Education is become a seller's market and everybody wants to get more profit rather than the quality education. Coming up to the next increasing number of students going abroad for

higher education which is a drain on foreign exchange resources and also on the students and/or their parents' finances. It is also noticed that the number of Ph.D.s produced each year is very low – those required by International Journal of Social Science & Interdisciplinary. In fact, at many institutions fresh graduates are employed to teach, leading to poor quality of classroom instruction. The study also found that the top institutions have demand supply gap not just in terms of number of seats available but more so in terms of seats available in institutions who offer quality education According to the senses 2011 India has birth rate of 20.97 million per year – developed countries have 1/3rd of students going to college. If India were to meet the same standard, it will need 8-9 million graduate seats in college and it has only 4.5 million today. There is huge obsession with capacity creation but emphasis should be much more on quality how is it that we can create quality capacity. The study found that the parents only treat engineering, medicine as only choices for graduation they are unable to appreciate attractiveness of new specialized industry oriented programs that are launched in the country India has a very large number of talented students but many of these feel dejected for not making it to IITs and IIMs due to lack of capacity – they end up going abroad for education.

### **Conclusion:**

A lot of commissions and committees appointed by the government for suggesting reforms have also pinned upon same obstacles in the Indian Higher Education. But there has been sheer dearth of courage and a political will. It is also important that the way attempts have been made to reform secondary level education in schools, higher education needs to be reformed too. It is high time that universities cater to the growing demand of students or else this human resource boon will soon prove to be population bane for the economy. Though these are clearly positive trends, the Indian higher education system continues to demonstrate many structural shortcomings which in turn create challenges in meeting future expectations. Inequity is also pervasive in the system, with the GERs of women and backward castes being much lower than the national average. However, finally achieving India's 30% gross enrollment ratio objective by 2030 plans requires solutions that combine the needs of policy makers, employers and youth Expectations of/from various stakeholders – Students, Industry, Educational Institutions, Parents, Government.

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## **Jainism- Religious Service to Environment**

**<sup>1</sup>S. Soma Sekhar <sup>2</sup>Dr .V. Ramabrahmam <sup>3</sup>Dr.K.S.V.Ranga Rao**

### **Abstract**

*Man basically wants peace, security, liberty and property which are at stake during the time of war. In Indian philosophy, metaphysical and epistemological opinions differ widely, but there is at least an apparent resemblance in ethics. Non-violence in Ancient Indian thought is a brief account of Ahimsa. While expounding the ten kinds of Yamas it mentions non-violence, truthfulness, non-stealing, celibacy, compassion, rectitude, forbearance, fortitude, temperance in food and cleanliness. The rudiments of ahimsa are found in the Vedas and Upanishads. The place of non-violence in the Epics and the Purana, Ramayana and Mahabharata are two great epics of India. They together preserve and reveal the glory of ancient India. Jainism become popular only after the 7<sup>th</sup> century A.D. and held the ground till about the 13<sup>th</sup> century. Jainism was more predominant and it survived for a longer time in the western parts of Andhradesa – Telangana and Rayalaseema than in Coastal regions. The Nadimaha indicated the festival of the river Goddesses. A special example of Nadimaha may be seen in the festival of the river Goddess Ganga, which was known as Ganga-Maha. In the Ramayana and Mahabharata there is frequent mention of the river goddesses. The origin of festivals and the organization of festivals directly or indirectly helped the issues of environment. In this paper the role and significance of festivals made religious service to environment.*

**Keywords:** Jainism- Different festivals -Nadi Maha- Religious service – Environment

### **Introduction**

Man basically wants peace, security, liberty and property which are at stake during the time of war. In Indian philosophy, metaphysical and epistemological opinions differ widely, but there is at least an apparent resemblance in ethics. Non-violence in Ancient Indian thought is a brief account of Ahimsa. The verb hims, means "to injure or to kill". The negative form of that verb is used in several places in the Rig-Veda and in the Atharvaveda.<sup>1</sup> According to Brhदारanyaka Upanishad; one becomes good by good action and bad by bad action. <sup>2</sup> The people of the upanishadic age were of the value of goodness aware virtue and vice. They believed that good deeds had their reward. T. W. Rhya David's is of the view that ahimsa is used for the first time as a substantive in the Chandogya Upanishad, and the date of this document may be the seventh century B.C.<sup>3</sup> The Sandilyopanisad deals with the eight stages of Yoga. While expounding the ten kinds of Yamas it mentions non-violence, truthfulness, non-stealing, celibacy, compassion, rectitude, forbearance, fertitude, temperance in food and cleanliness.<sup>4</sup> The rudiments of ahimsa are found in the Vedas and Upanishads. The place of non-violence in the Epics and the Purana, Ramayana and Mahabharata are two great epics of India. They together preserve and reveal the glory of ancient India.

The most famous statement of Ahimsa, which probably every Indian has heard, is found only here.

"Ahimsa paramo dharmo ahimsa paramam tapah

Ahimsa paramum satyam tate dharmah pravartate."<sup>5</sup>

Here, ahimsa is considered to be the supreme virtue and the spring of all morality. Ahimsa in the Mahabharata is no doubt a cardinal virtue of great importance, but not extended equally towards all creatures. The origin of the influence of Jainism in Andhradesa may be traced back to 6<sup>th</sup> century B.C, <sup>6</sup> during the lifetime of Mahavira himself who seems to have laid its foundations by preaching his doctrine in the region of Kalinga which comprises the northern frontiers of the Andhradesa.<sup>7</sup> Jainism become popular only after the 7<sup>th</sup> century A.D. and held the ground till about the 13<sup>th</sup> century. Jainism was more predominant and it survived for a longer time in the western parts of Andhra Pradesh – Telangana and Rayalaseema than in Coastal regions.<sup>8</sup> Scholars are of opinion that "Jainism is an imported religion for Andhra". The groups of monks diverging from a large centre like Sravana Belagola or accompanying kings in their conquests, are sole carriers of the Jaina tradition as well as Dharma into Andhradesa.<sup>9</sup> This becomes more transparent because the entire corpus of lithic records on Jainism in Andhra is in Kannada language with an exclusion of a few Sanskrit and Telugu records.<sup>10</sup> Girimaha or the festival of the mountain was connected with pastoral life in which the people subsisted mostly on cattle breeding. The Harivamsa gives a relevant explanation of lifting of the Govardhana Mount by Krishna.<sup>11</sup> The Nadimaha indicated the festival of the river Goddesses.

A special example of Nadimaha may be seen in the festival of the river Goddess Ganga, which was known as Ganga-Maha.

In the Ramayana and Mahabharata there is frequent mention of the river goddesses.<sup>12</sup> The worship of the Naga deity is an ancient Indian cult. It was known as Naga-Maha. The Naga worship was accepted in the Brahminical, Jaina, Buddhist religions.<sup>13</sup> In the Indian literature and Art we find numerous references to the tree worship, in which the trees were regarded as deities. The worship of such plants and trees as Tulasi, Pippala, Vata, and Amalaki is still popular amongst all classes of people.<sup>14</sup> It was a festival of the sea or the ocean. We get a literary description of the Samudra-maha of Krishna in the sea of Dwaraka. The fair was celebrated in the following manner according to the Harivamsa.<sup>15</sup> The origin of the Dari-maha (festival of mountain) started with such tribes as the Kiratas and the Kinnaras in the Himalayas, who made use of natural caverns to spend their time for family enjoyment.<sup>16</sup>

The early Jains preferred natural caves and caverns on the tops of the hills, which were difficult of approach, for their stay. This resigned life of Jains did not probably attract rigid practice of nudity made them shun public life and hence people preferred Buddhism to Jainism in the early period.<sup>17</sup> The early Jain monks were mostly highlanders and preferred natural caves, which are in accessible. Hence the caves played an important role in the architectural history of Jainism in Andhra. This shows that the natural mountain environment play a major role.<sup>18</sup> In Andhra Pradesh, the early Jains chose their abode in a natural caves hewn out of living rock by means of pick and polished them with dexterous application of the chisel. In the beginning the Jains stayed in natural rock cut chambers but afterwards these are replaced by a more grandeur and embellished ones, with the result came the embellishment or adorning the living rock, which heralds a new phase in the development of Jain architecture in India.<sup>19</sup>

Andhra with its large expanse studded with high mountains such as Eastern Ghats and fertile river valleys, is littered with innumerable Jaina monuments – both natural and artificial. They broadly fall into two main types, namely Rock-shelters or natural caves and caverns and structural shrines. As said earlier, the early Jains, being mostly forest recluses and wandering ascetics, chose the rock-shelters which served as sojourn or temporary refuges. Moreover, these resorts are generally situated far away from human habitation. Hence, their settlements were mostly modest, unattractive and not only uninhabitable but also inaccessible.<sup>20</sup> This shows that the Jains maintain the environment in an undisturbed manner. For that only jains preferred the natural caves and rock shelters for their residences. The early Jain caves in Andhra, under this category comes the cave scooped on a hillock, at Malkonda near Kandukur in Prakasam district. Malkonda hill contain a natural cave. It is now called as Parvatiguha.<sup>21</sup>

A cave called “Munulagutta” in Kapparaopet village Karimnagar district. It is brought to light by Dr. P.V.P. Sastry.<sup>22</sup> Even now; it is popularly called as “Munulagutta” (i.e. the hill of ascetics). Guntupalli caves are actually found on the hill at Jilakaragudem, near Kamavarapukota in West Godavari district A.P. The discovery of a Mahameghavahana chief of Kalinga (viz.) Sada, at Jilakaragudem cave clearly reveals the Jain nature of these caves.<sup>23</sup> We know that the family of Mahamegavahana Sada to which the great Jain champion Kharavela, the chief of Kalinga, belonged, extended his full support to Jainism. The Jilakaragudem rock-cut monasteries which are popularly known as Guntupalle caves were originally occupied by the Jains and not by the Buddhists as hither to believe. Konakondla the cave in the hill of the village, Konakondla situated near Guntakal in Anantapur district. Its importance lies in the fact that it served as the domicile of the famous saint, Kundakundacharya, lived in the I Century A.D. The famous Kundakundacharya probably lived in the natural caves, which is devoid of any carvings. The Jain antiquities found on the hillock called “Rasasiddhula gutta.” This is the earliest Jain establishment headed by the famous Kundakundacharya in the Rayalaseema area of Andhra Pradesh.<sup>24</sup>

The village Penicalapadu in Muddanur mandal of Kadapa district is a natural rock shelter. One rock shelter named “Sanyasigundu” bears an inscription engraved in early Telugu characters of 7<sup>th</sup> century A.D. It informs that a great teacher, named Vrishabha who was a cloud to the crops, Vrishabha and his expertise in discourses led the scholars to believe that the cave temple because the abode of an illustrious Jain teacher.<sup>25</sup> Next in the same Kadapa district, the hill which contains the rock-shelters is popularly known as “Nemalla

Tippa” (The of Peacocks). These rock- shelters bear mural paintings in ochre colour. Among the paintings, Bison and antelope are clearly identifiable. According to the (Dommara) Nandyal Kaifiyat<sup>26</sup> the Jains arrived at Dommara Nandyal which lay close to Jammalamadugu in Kadapa district.

A Jain vidyalaya is carved on the rock face of a natural cave at Rayadurgam in Anantapur district.<sup>27</sup> In the slope of carvings of the Siddhas. It is a well known Jain centre for the Yapaniyas. This is corroborated by an inscription which mentions the names of Chandrabhuti of Mulasangha and Chandrendra of yapaniya sangha and also the names of carvers of the sculptures. Below the Tirthankara images, is a row of seated pupils and teacher. Among the pupils, ladies are also found. Further, these teachers have Vidyapithas or book rests before them and so there is no mistaking of their intent.<sup>28</sup>In the out skirts of Ramatirtham in vizianagaram district,<sup>29</sup> two hills called Gurubhakta konda and Durgamma konda in which lie two caves or recesses depend just to accommodate few monks. In the Gurubhakta hill, we find only natural caves capable of sheltering single monk. There is another cave which is popularly known as Durgapancha cave or Durgamma konda. It appears that the Jain establishment at Ramatirtham began first on Gurubhaktha hill and spread to the Durgamma konda afterwards. A cave shrine can be seen at Kollivalasa village, 8 kms, away from Amudalavalasa town in Srikakulam district. The hill, which contains a cave-shrine, is popularly known as Sangamayya konda (i.e. the hill of Lord Sangamesvara) i.e. Siva but a Lord Jina. The caves at Ramatirtham and Kollivalasa have been erroneously recorded as Hindu caves instead of as Jain.<sup>30</sup> The hill establishment of Adoni in Kurnool district thrived under the liberal patronage extended by the Rastrakutas to Jainism.<sup>31</sup> There, on the way to the Bara khilla, are noticeable three Tirthankara figures carved in the rock in sitting position. Inside the cave is a Parsvanatha image in standing posture. Below at his feet, are also depicted yakshini and yaksha figures. Finally at Siddulayya kona in Nellore district is a Rock shelter, located about 8 kms, to the north of Saidapuram. It is a Jain Rock shelter located about 3 kms, further west on Podalakur –Saidapuram road. There are six Jain sculptures found there. All around the shelter are few natural springs in the form of water tanks. They might have provided water throughout the year to the Jaina ascetics

#### **Conclusion:**

Jainism is not only a religion but way of life. It is Art of Living. A human being, live with his or her society and preserving environment. Jainism depicts a lot about climate change issues that is to take place in future and suggested to act reasonably for sustainable development. Jainism says that five main elements of nature,

1. Prithvi (Land, Soil, Stones etc.)
2. Jal (Water resource including cloud)
3. Agni (Fire)
4. Vayu (Air)
5. Vanashpati (Vegetables, trees and plants) including are living creature and must be treated as living beings.

For the propagation of Jainism in the Indian Sub-continent, the preaching followed by the Jains selected Natural caves and small hillocks for Jaina establishments in Andhradesa, without spoil the environment, without spoil the flora and fauna, in the form of deforestation. Normally these establishments are far away from human habitations, this shows that Mahavira is not interested to the concept of Urbanization. The simplicity, the non-complexity, mingling with nature, do not harm to creatures, following the Jaina principles, maintaining Discipline are the Jewels of Jainism.

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## **Perspective Education and Economic Development: A Gender**

**L. Kodandaram**

### **Abstract**

*Gandhiji's concept of education stands for the balanced and harmonious development of all the aspects of human personality. Professor Amartya Sen recently emphasized education as an important parameter for any inclusive growth in an economy. The policies have focus on inclusive rather than divisive growth strategies. Education and development are not two different things but merely two sides of the coin. It is observed that education should lead to development should create the motivation for more education as well as provide tools for it. Education influences and in turn is influenced by access to other needs that adequate nutrition, safe drinking water health services and shelter. It prepares and trains skilled workers at all levels to manage capital, technology, services and administration in every sector of the economy. Education can help the society to overcome its ills and problems it has to be made application-cum-life-oriented and has to be taken to the door-steps of the villagers without delay. It should deal with the variety of aspects one deals within life so as to enrich it and to make it useful for one self and for the service of mankind. Such type of education is necessary for development. In this sense it is something wider than mere schooling. Economists have long been aware of importance of education in economic development of a country.*

**Key words:** *inclusive growth, inclusive growth, balanced and harmonious, strategies*

### **Introduction:**

Adam Smith as early as in the 18<sup>th</sup> century stressed the importance of the education in his wealth of nations. Alfred Marshal at the end of the 19<sup>th</sup> century further emphasized the importance of education as a national investment, and in his view "the most valuable of all capital is that invested in human beings."(Marshal, 1920). In the 1960s mounting empirical evidence stimulated the "human investment revolution in economic thought" (Bowman, 1960). The theory of economic growth in modern times emphasized on education, skill and acquisition of knowledge and the 20th century is known as the "age of human capital". Education provides the foundation for economic development and social progress and unequal education tends to have negative impact on per capita income in most of the countries. Education is an important determinant of the status of women in the society. But women's education levels are lower than men in most of the countries of the world. Gender inequality in education directly effects economic growth by lowering the average level of human capital. In addition, growth is indirectly effected through the impact of gender inequality of investment and population growth. That is why the international organizations and researchers in the field of education have emphasized the importance of women's education for the socio-economic development of the third world countries.

### **Social Benefits**

- Improvement of quality of life at home and outside
- Reduces fertility, infant mortality and child mortality rate
- Increases family health and nutritional level
- Development of art, culture and literature

### **Economic Benefits**

- Growth of science and technology
- Promotes entrepreneurship
- Increases labour productivity, level of employment and wages

### **1. Education In The States Of India**

There are two important indicators of education. They are (1) Literacy rate and (2) Gross enrollment of students from primary to tertiary level.

#### **Rate of Literacy**

The position of literacy in the states according to the census of 2011 is presented following table. The state of Kerala is in the top in both male and female literacy rates being 96.0 and 92.0 percent respectively. Bihar is lowest in the ladder of rate of literacy with 73.5 and 53.3 percent for male and female respectively. The growth of male and female literacy rate in India during 1951-2011 is shown

graphically in fig: 1 and literacy rates in India from 1951-2011 are shown in table 2 Women's education suffered due to limited financial resources as the government provided meager funds for women's education. Unlike boys education the girl's education requires higher investment among others due to the following reasons:-

1. Separate schools for girls
2. Hostels have to be provided
3. Escorts have to be appointed to bring the students to school and back, as the girls are not traditionally allowed outdoor for any working those days in some states
4. Women teachers have to be trained and appointed as parents did not allow their daughters in the schools with male teachers
5. Free scholarships have to be provided as incentive to parents so that they would agree to forego earning and labour of their daughters

**Table: 1**

<b>Rate Of Literacy In The States In 2011 Census</b>				
<b>S. No</b>	<b>State</b>	<b>Literacy Rate (2011 Census)</b>	<b>Male Literacy Rate (2011 Census)</b>	<b>Female Literacy Rate (2011 Census)</b>
1	Andaman & Nicobar Islands	86.3%	90.1%	81.8%
2	Andhra Pradesh	67.7%	75.6%	59.7%
3	Arunachal Pradesh	67.0%	73.7%	59.6%
4	Assam	73.2%	78.8%	67.3%
5	Bihar	63.8%	73.5%	53.3%
6	Chandigarh	86.4%	90.5%	81.4%
7	Chattisgarh	71.0%	81.5%	60.6%
8	Dadra & Nagar Haveli	77.7%	86.5%	65.9%
9	Daman & Diu	87.1%	91.5%	79.6%
10	Delhi	86.3%	91.0%	80.9%
11	Goa	87.4%	92.8%	81.8%
12	Gujarat	79.3%	87.2%	70.7%
13	Haryana	76.6%	85.4%	66.8%
14	Himachal Pradesh	83.8%	90.8%	76.6%
15	Jammu and Kashmir	68.7%	78.3%	58.0%
16	Jharkhand	67.6%	78.5%	56.2%
17	Karnataka	75.6%	82.8%	68.1%
18	Kerala	93.9%	96.0%	92.0%
19	Lakshadweep	92.3%	96.1%	88.2%
20	Madhya Pradesh	70.6%	80.5%	60.0%
21	Maharashtra	82.9%	89.8%	75.5%
22	Manipur	79.8%	86.5%	73.2%
23	Meghalaya	75.5%	77.2%	73.8%
24	Mizoram	91.6%	93.7%	89.4%
25	Nagaland	80.1%	83.3%	76.7%
26	Orissa	73.5%	82.4%	64.4%
27	Puducherry	86.5%	92.1%	81.2%

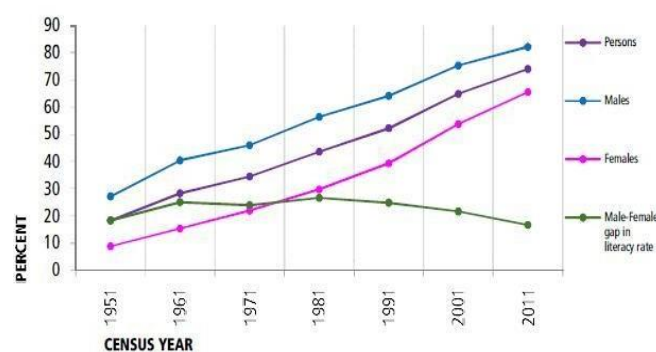
28	Punjab	76.7%	81.5%	71.3%
29	Rajasthan	67.1%	80.5%	52.7%
30	Sikkim	82.2%	87.3%	76.4%
31	Tamil Nadu	80.3%	86.8%	73.9%
32	Tripura	87.8%	92.2%	83.1%
33	Uttar Pradesh	69.7%	79.2%	59.3%
34	Uttarakhand	79.6%	88.3%	70.7%
By In35	West Bengal	77.1%	82.7%	71.2%
-	<b>INDIA</b>	74.04%	82.14%	65.46%

SOURCE:- CENSUS OF INDIA 2011

**Table: 2**  
**Literacy Rates of Male and Female in India: 1951-2011**

Census Year	Persons	Males	Females	Male-Female gap in literacy rate
1	2	3	4	5
1951	18.33	27.16	8.86	18.30
1961	28.3	40.4	15.35	25.05
1971	34.45	45.96	21.97	23.98
1981	43.57	56.38	29.76	26.62
1991	52.21	64.13	39.29	24.84
2001	64.83	75.26	53.67	21.59
2011	74.04	82.14	65.46	16.68

**Fig: 1**  
**Literacy Rates of Male and Female in India:1951-2011**



Primary education is regarded as the foundation for the educational system in an economy, which increases higher education and promotes human resource development. The gross enrollment ratios of boys and girls from the class I-VIII of the 35 states of India are presented in Table: 3. In 2010-11 the total GER I-VIII is highest in Manipur with 155.0 and lowest is Daman and Diu with 78.2 among all 35 Indian states and union territories.

## 2. Education and Income

As mentioned in the beginning, education is one of the important factors of development. No country can achieve sustainable economic development without substantial investment in human capital. Education plays a crucial role in securing economic and social progress improving income distribution. There is a positive feedback from improved education to greater income quality, which in turn is likely to favour higher rates of growth.

Source: For Sl. No. 1-32 -- Directorate of Economics & Statistics of respective State Governments, and for All-India -- CSO. As on August 14, 2012

Table: 4 show the state wise growth of per capita Net State Domestic Product (NSDP) at current prices. The table indicates that the per capita NSDP is highest in Goa followed by Delhi, Chandigarh, Sikkim, Haryana and Maharashtra in first 6 places. Lowest per capita NSDP is in Bihar followed by Uttar Pradesh, Manipur, Assam, Jharkhand and Jammu & Kashmir are in lowest six places, the Indian average of rupees is 60603 per

**Table:4**  
**Per Capita Net State Domestic Product At Current Prices      Rs.**

S. No. (1)	State/UT (2)	2004-2005 (3)	2006-2007 (5)	2007-2008 (6)	2008-09 (7)	2009-10 (8)	2010-11 (9)	2011-12 (10)
1.	Andhra Pradesh	25321	33135	39727	46345	52814	62912	71480
2.	Arunachal Pradesh	26610	30000	34352	39656	48662	55789	62213
3.	Assam	16782	19737	21290	24099	27464	30569	33633
4.	Bihar	7914	9967	11051	13728	15548	18928	23435
5.	Jharkhand	18510	19789	24789	25046	28223	31993	35652
6.	Goa	76968	94882	108708	135966	149164	159244	192652
7.	Gujarat	32021	43395	50016	55068	63549	75115	N.A
8.	Haryana	37972	49261	56916	67388	82024	94464	108859
9.	Himachal Pradesh	33348	40393	43966	49903	58798	68020	74899
10.	Jammu & Kashmir	21734	25059	27448	30212	33648	37593	42220
11.	Karnataka	26882	35981	42419	48084	51386	59975	68374
12.	Kerala	31871	40419	45700	53046	60264	71434	83725
13.	Madhya Pradesh	15442	19028	20935	25278	28712	32253	38669
14.	Chhattisgarh	18559	24800	29385	34360	35121	41167	46573
15.	Maharashtra	36077	49831	57760	62234	71300	87686	101314
16.	Manipur	18640	21419	23093	24773	27332	29684	32284
17.	Meghalaya	24086	30952	34229	40583	43142	47164	52971
18.	Mizoram	24662	28764	32488	38582	42715	48591	N.A
19.	Nagaland	30441	36568	39985	46207	50209	52966	56638
20.	Odisha	17650	22237	27735	31416	34361	40412	46150
21.	Punjab	33103	41883	49380	55315	61894	68998	74606
22.	Rajasthan	18565	24055	26882	31279	34982	42434	47506
23.	Sikkim	26690	32199	36448	46983	90749	104506	121440
24.	Tamil Nadu	30062	42288	47606	54137	64336	75449	84496
25.	Tripura	24394	29081	31111	35587	39949	44965	50750
26.	Uttar Pradesh	12950	16013	17785	20422	23661	26903	30052
27.	Uttarakhand	24726	35111	42619	50657	62885	72093	82193
28.	West Bengal	22649	27823	31567	35487	41045	47738	54830
29.	A & N islands	40921	53778	61430	69177	79396	85741	93075
30.	Chandigarh	74173	97568	102980	108486	117371	130461	140073
31.	Delhi	63877	83275	95241	111756	129746	150653	175812
32.	Puducherry	48302	68673	74201	79306	88158	98719	95759
<b>All-India Per Capita NNI(2004-05 base)</b>		<b>24143</b>	<b>31206</b>	<b>35825</b>	<b>40775</b>	<b>46117</b>	<b>53331</b>	<b>60603</b>

capita NSDP.

**Conclusion**

Education is indispensable to economic development education; mainly female education affects the income considerably and plays an important role in controlling fertility, so steps should be taken to reduce the gender gap in education by appropriate policy measures by the planners.

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## **Recognition of Forest Rights Act, 2006**

(The Scheduled Tribes and Other Traditional Forest Dwellers)

**\*KUBNV. Prasad, \*\*P. Siri Varshini**

### **Abstract**

*India is the home to large number of indigenous people, who are still untouched by the lifestyle of the modern world. . These tribal people also known as the adivasi's are the poorest in the country, which are still dependent on haunting, agriculture and fishing. The term 'tribe' is derived from the Latin word 'tribus'. Earlier Romans used this term to designate the divisions in society. The Indian Constitution has made important provisions for the development and welfare of the tribes. A list of tribes was adopted for this purpose. In 1971, the list contained names of 527 tribes. The people who have been listed in the Constitution have been termed as Scheduled Tribes. The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 is unique in being a legislation that guarantees traditional local communities, the right over forest land on which they have been dependent since ancient times. Since times immemorial, the tribal communities of India have had an integral and close knit relationship with the forests and have been dependent on the forests for livelihoods and existence. While supporting the principles of the law, forest rights supporters are not entirely satisfied with the law as finally passed. The recommendations of a Joint Parliamentary Committee on the law were partly rejected, and supporters of forest rights have claimed that some of the rejected clauses were important.. The Campaign for Survival and Dignity described the final form of the law as "both a victory and a betrayal" in their official statement on the occasion.*

**Key Words:** Tribe, Adivasi, Scheduled Tribes, Forest Dwellers, Conservation, Survival.

### **Introduction**

India is the home to large number of indigenous people, who are still untouched by the lifestyle of the modern world. With more than 84.4 million, India has the largest population of the tribal people in the world. These tribal people also known as the adivasi's are the poorest in the country, which are still dependent on haunting, agriculture and fishing. Some of the major tribal groups in India include Gonds, Santhals, Khasis, Angamis, Bhils, Bhutias and Great Andamanese. All these tribal people have their own culture, tradition, language and lifestyle. Bihar leads all other States as regards the tribal population. It is followed by Maharashtra and Orissa. The term 'tribe' is derived from the Latin word 'tribus'. Earlier Romans used this term to designate the divisions in society. Latter use suggests that it meant poor people. The present popular meaning in English language was acquired during the expansion of colonialism particularly in Asia and Africa. The present popular meaning of 'Tribe' in India refers to a category of people, included in the list of Scheduled Tribes. It has carried different connotations in different countries.

The Indian Constitution has made important provisions for the development and welfare of the tribes. A list of tribes was adopted for this purpose. The list has been modified from time to time. In 1971, the list contained names of 527 tribes. The people who have been listed in the Constitution and mentioned in successive presidential orders are called Scheduled Tribes. This is the administrative concept of tribe. A tribe has been defined in various ways. The Constitution, however, does not provide a definition of a tribe. The people who have been listed in the Constitution have been termed as Scheduled Tribes. The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 is unique in being a legislation that guarantees traditional local communities, the right over forest land on which they have been dependent since ancient times. The notification of Rules for the implementation of the Forest Rights Act, 2006 came on 1st Jan 2008.

### **Significance of the Act**

For the first time Forest Rights Act recognizes and secures-

- Livelihood and occupancy for individuals and communities for ST's and Other Traditional Forest Dwellers. It recognizes the right of ownership and also to use and collect minor forest produce.
- Also, the rights such as rights to water bodies and flora and fauna.
- Settlement and conversion of all forest villages into revenue villages.
- Right to protect, regenerate, or conserve or manage any community forest resource, which they have been traditionally protecting and conserving for sustainable use.

- Intellectual property rights and traditional knowledge related to biodiversity.
- Rehabilitation and settlements rights including the provision to get alternate land in cases of displacements or evictions.

Since times immemorial, the tribal communities of India have had an integral and close knit relationship with the forests and have been dependent on the forests for livelihoods and existence. The relationship was mutually beneficial and not one sided. However, rights were rarely recognized by the authorities and in the absence of real ownership of the land, the already marginalized local dwellers suffered. Even the Forest Conservation Act did not correct it and sought to further dissociate the tribal's from their traditional linkages to their land. The Act was opposed vehemently initially for the reason that it will deteriorate the condition of India's forests. "This is despite the fact that over 60% of the country's forest cover is found in 187 tribal districts where less than 8% of national population lives. This reflects the culture of the tribal's to conserve forest." It can be argued that if the above reasoning holds good, then the forest cover should have shown a significant improvement after independence since the forest bureaucracy has been running it since then and the indigenous people have been kept out. This however, has not been the case.

The Act was necessary because the earlier forest acts are an anachronism in independent India. While the British drafted their acts for the exploitation of forests and not their conservation, even the Forest Act of 1980 perpetuated this injustice by not recognizing people's rights and giving paramount to conservation with utter disregard for the people. "Under the Indian Forest Act, areas were often declared to be "government forests" without recording who lived in these areas, what land they were using, what uses they made of the forest and so on. 82% of Madhya forest blocks and 40% of Orissa's reserved forests were never surveyed; similarly 60% of India's national parks have till today (sometimes after 25 years, as in Sariska) not completed their process of enquiry and settlement of rights."

The most significant and perhaps both positive and negative feature of the Act is the inclusion of 'other traditional forest dwellers.' An Other Traditional Forest Dweller is defined as "...any member or community who has for at least three generations prior to the 13th day of December, 2005 primarily resided in and who depends on the forest or forests land for bonafide livelihood needs. Explanation: For the purpose of this clause, "generation" means a period comprising of twenty five years." This definition does not exclude cases where people may have encroached upon land that may not be rightfully theirs and it does not also include the rightful owners. In the absence of any real written evidence, it would be difficult for the claimants to provide evidence of their 75 years stay which dates back to the pre- independence period.

### **Criticisms**

While supporting the principles of the law, forest rights supporters are not entirely satisfied with the law as finally passed. The recommendations of a Joint Parliamentary Committee on the law were partly rejected, and supporters of forest rights have claimed that some of the rejected clauses were important. In particular, the final form of the law is said to make it easier to exclude some categories of both tribal and non-tribal forest dwellers, to have undermined the democratic nature of the processes in the Act and to have placed additional hindrances and bureaucratic restrictions on people's rights. The Campaign for Survival and Dignity described the final form of the law as "both a victory and a betrayal" in their official statement on the occasion.

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## **Performance of Cement Industry in Krishna and Nalgonda Districts**

**K. Narasimha Swamy**

### **Abstract**

*This paper examines the industrial structure and performance of Andhra Pradesh and Telangana. To analyze the structural changes at all India and selected state level, variables like the number of factories fixed capital, working capital total number of fixed capital formation, total input, total output and depreciation are used. To examine the industrial performance, structural ratios such as worker for factory, fixed capital per factory, gross real output per worker, net real value added per worker and technical coefficients like fixed capital to gross output [capital output ratio] and net value added to gross output are employed. The analysis of structural ratios confirmed that the ratio of real output per worker at national and states level has increased, the ratio of number of workers per factory and the ratio of fixed capital per factory has mildly increased. Finally the technical coefficient viz., the capital output ratio was found to be dropping.*

**Key Words:** capital formation, total input, fixed capital, gross output, national income.

### **Introduction:**

Cement is an essential component of infrastructure development and most important input of construction industry, particularly in the government's infrastructure and housing programs that are necessary for the country's socio-economic growth and development. It is also the second most consumed material on the planet. The Indian cement industry is the second largest producer of cement in the world just after china. It is consented to be a core sector accounting for approximately 1.3% of GDP and employing over 0.14 million people. Also the industry is a significant contributor to the revenue collected by both the central and state governments through excise and sales taxes.

### **Structure of the Cement Industry:**

The characteristics of the Indian cement industry need to be discussed to understand its structure better. Firstly, it is a combination of mini (more than 300 units) and large capacity cement plants, where majority of the production of cement (94%) in the country is by large plants, The conventional method of cement manufacturing used by large plants (Rotary Kiln) needs high capacity, huge deposits of lime stone in its vicinity, high capital investment and long gestation period. Hence mini cement plants based on Vertical Shaft Kiln technology, suiting the small deposits of limestone are becoming popular. Also they create less environmental pollution. The viability of the location plays a major role in the economics of cement manufacturing since cement is a high bulk and low value commodity; competition is also localized because the cost of transportation of cement to distant markets often results in the product being uncompetitive in those markets. Traditionally, cement has been a heavily taxed sector with both the central and the state governments levying the taxes which amount to around 30% of the selling price of cement or around 70% of the ex-factory price. The cement industry is energy intensive and thus power costs form the most critical cost component in cement manufacturing, of about 35% to total cost of production. The issues here is the technology used fuel efficiency and power efficiency.

### **Evolution of the Indian Cement Industry:**

The story of the evolution of the Indian cement industry is rather long, where it has seen many ups and downs. But finally has arrived in its maturity stage as it is beginning to gather the benefits of its decontrol by the government in 1989-90.

### **Invention of Cement:**

Ever since civilizations first started to build, the world has sought a manmade bonding material that would bind stones into a solid, formed mass. During the Paleolithic Age, men used to enjoy adequate shelter provided by nature. The Bronze Age witnessed the use of building materials from a clay based mixture and air hardening lime. The Egyptians advance to the discovery of lime and gypsum mortar as a binding agent for building such structures as the Pyramids.

District	Mandal	Location of Factories
Krishna	Jaggayyapeta	Ramco cement limited( Jaya nthipuram) Hemadri cements ltd.( ved adri) Jaypee cements ltd.( Budhavada) Kakatiya cements ltd.( Agraharam) Kcp( Mu kyala)
Nalgonda	Kodad Mellach aeruvu Ned enjarla Miriyalagudem Nalgoda	Maha cement, Priya cement, Bheema gold cements, Coro mandal cements, Rasi cements, Vishnu cements, An jani cements, Suvarna cements, Monagadu cements, Sagar cements, Lalitha cements etc...

The Greeks made further improvements and finally the Romans developed cement that produced structures of remarkable durability (Cement Association of Canada 2006). The secret of Roman success in making cement was traced to the mixing of slaked lime with Pozzolana, a volcanic ash from Mount Vesuvius. This process produced cement capable of hardening under water. During the middle Ages this art was somehow lost.

#### ***The Beginning of Indian Cement Industry:***

The attempt to produce cement in India dates back to 1889 when a Calcutta firm attempted to produce cement from Argillaceous (kankar). But the first organized effort on mass scale to manufacture Portland cement commenced in Madras (Washermanpet), in 1904, by South India Industries Limited (Cement Manufacturers Association 1964; Gadhok 2000). The factory could not succeed hence it failed. However, it was in 1914 that the first commissioned cement-manufacturing unit in India was set up by India Cement Company Limited as Porbandar, Gujarat, with an installed capacity of 10,000 tones and production of 1000 tones, subsequently two plants.

#### ***Objectives:***

1. To examine emerging trends of the cement industry in Krishna and Nalgonda districts.
2. To evaluate the performance efficiency in terms of capacity utilization, factor Productivity, profit rate and cost effectiveness.
3. To study structural ratios and technical coefficients of cement industry.
4. To illustrate the SWOT analysis of the select cement companies in Krishna and Nalgonda district
5. To suggest remedial measures to overcome existing challenges facing the industry.

For the purpose of collection of data the following structure from each district will be collected.

#### ***Analysis of the Structural Parameters: A Comparison***

In the following section an attempt is made to examine the changes in the industrial structure by analyzing and comparing important structural variables at India and selected states level as mentioned earlier, the analysis is carried out covering a period. To study the structural changes at state level the important variables used for the analysis are the Number of Factories, Number of Factories, Fixed Capital, Working Capital, Total Number of Workers, Net Value Added, Gross Fixed Capital Formation, Total Input, Total Output and Depreciation.

#### ***Number of Factories***

The primary unit of the enumeration in the survey is a factory in the case of manufacturing industries, a workshop in the case of repair services, an undertaking or a licensee in the case of electricity, gas and water supply undertakings and an establishment in the case of bidi and cigar industries (ASI, various issues). As noted earlier, the data collected from the respective industrial units relate to their accounting year

ended on any day between 1<sup>st</sup> April and 31<sup>st</sup> March of the respective fiscal year. This implies that in any particular financial year, if the number of factories are de-registered in comparison to the preceding year, it indicates that there is a decline in the number of factories in that particular year operation under Section 2(m)(i) and 2(m)(ii) of the Factories Act, 1948.

### ***Fixed Capital***

According to ASI, fixed capital represents the depreciated value of fixed assets owned by the factory and those that have a normal productive life of more than one year as on the closing day of the accounting year. Fixed capital includes land including leasehold land, buildings, plant and machinery, furniture and fixtures, transport equipment, water system and road ways and other fixed assets such as hospitals, schools, used for the benefit of the factory personnel

### ***Working Capital***

First, ASI working capital as the sum total of the Physical Working Capital which comprises of total inventories including raw materials and components, fuel and lubricants, spares, stores and others, semi-finished goods and finished goods as on the closing day of the accounting year. Second, working capital also includes the cash deposits in hand and at bank and the net balance receivable over amounts payable at the end of the accounting year. Working capital is required to meet day to day operational needs of a manufacturing unit and the various components of working capital held by a business enterprise helps in stabilizing the production without any interruption.

### ***Total Workers***

Total number of workers defined by ASI includes “all persons employed directly or through any agency whether for wages or not and engages in any manufacturing process or in cleaning any part of the machinery or premise used for manufacturing process or in any other kind of work incidental to or connected with the manufacturing process or the subject of the manufacturing process”.

### ***Total Input***

According to ASI, total input consists of expenditure incurred on total fuels and materials consumed as well as expenditure incurred on overheads like cost of contract and commission work done by others on materials supplied by the factory, cost of materials consumed for repair and maintenance of factory’s fixed assets including cost of factory’s fixed assets, inward freight and transport charges, rates and taxes (excluding income tax), postage telephone and telex expenses, insurance charges, banking charges, cost of printing and stationery and purchase value of goods sold in the same condition as purchased.

### ***Total Output***

Total output represents the value of the all products and by products manufactured by a unit.

### ***Depreciation***

Depreciation is the consumption cost of fixed assets which results due to wear and tear and obsolescence during the working life of the fixed capital. Since depreciation is also a cost of production, a proper mechanism is required by the manufacturing units to see that depreciation costs are not high in any particular year.

### ***Net Value Added***

Net value added of a manufacturing firm is the difference between the value of output and the total value of input cost plus depreciation. The net value added is the actual contribution of factors of production and is also considered as the component which makes up the domestic product of an economy (Pani, 2007). Thus, this measure of variable shows the relative contribution of the industrial sector to the states domestic product.

### ***Gross Fixed Capital Formation (GFCF)***

GFCF is defined as the new additions to the existing fixed capital and generally includes investments in plant and machinery, furniture and fixtures and land and building. Investment in fixed assets is considered as long-term investment which is the earning asset of a manufacturing unit that determines the overall level of output at any particular point of time.

### ***Analysis of the Structural Ratios and Technical Coefficients: A Comparison***

With the help of structural ratios and technical coefficients, one can assess the overall performance of the industrial sector. In the following section an attempt is made to assess the cement industry of performance in particular by comparing structural ratios and technical coefficients. Structural ratios such as, workers per factory, fixed capital per factory, real output per worker and net real value added per worker (both output and value added have been deflated have been used to examine the structural performance of the manufacturing units. To examine the technical coefficients. Ratios like fixed capital to gross output (capital out ratio) and net value added to gross output have been utilized.

#### ***Real Output per Worker***

Real output per worker is one of the partial measures of efficiency and is also known as partial factor productivity. It is known as a measure of partial factor productivity because output is a function of factors of production viz., land, labour, capital and organization whose proportion in the overall production is determine by the concerning technology set. This structural ratio gives information about the production capability of workers alone and thus throws light on their contribution in the overall production process.

#### ***Real Value Added per Worker***

Similarly, the ratio of real value added per worker also depicts the average productivity of labour and is also one of the partial measures of productivity.

#### ***Workers per Factory***

The ratio of number of worker per factory measures not only the size of the manufacturing firm but also reflects the concentration of workers in the factory which ultimately influences the productivity of the factory.

#### ***Fixed Capital per Factory***

This ratio measures the average factory size in relation to the investments in fixed assets of the manufacturing unit.

#### ***Value Added to Output***

As mentioned earlier, net value added is the difference between the value of output and the value of input cost plus depreciation of a manufacturing firm. Thus, the ratio of value added to output is one of the important technical coefficients that depict the cost structure of a manufacturing unit. If a particular manufacturing firm is able to manufacture one or more of its products under its single roof then it can reduce the overall production cost substantially. This not only improves the productivity of the firm but also improves the competitiveness of the firm in the market.

#### ***Capital Output Ratio***

Capital output ratio is the ratio of fixed capital to output which illustrates the relationship between the amount of units of capital required to produce a certain given level of output of a manufacturing unit. If a manufacturing firm has a high capital output ratio, it requires a large amount of capital units to produce a given level of output during any specified period and vice-versa. The capital output ratio has been steadily declining both at all India and at the selected states level suggesting the substitution of labour intensive techniques for capital incentive techniques.

#### ***Problems faced in cement industry***

The Indian cement industry plays a key role in India in the national economy, generating substantial revenue for state and central governments as well as employment. Cement is basic raw material in India and is used extensively in urban housing ,industrial sector and developing infrastructure. But now a day's cement industry facing certain difficulties like operating cost inadequate machines etc. There are a number of constraints and bottlenecks which are hindering the growth of this core sector industry . A few of the major concerns of the industry are discussed below. Excess cement industry; cement industry has been experiencing glut situation as there has been mammoth mismatch between cement demand and its supply Acute storage of coal ; coal is one of the major raw materials needed by the industry both in the manufacturing of cement and also for generating power . The rise in domestic coal prices has resulted in an increase in cost of power and fuel . Prices of raw materials such as lime stone and gypsum have also increased. Cement prices and rising cost; cement prices continued to remain under pressure in the running

years. Though cement manufacturers made few attempts to rise prices during the years, most of the price undertaken by the industry were partially (or) fully reserved. Furthermore , Indian cement producer continue to face rising input costs. Freight cost has significantly increased over the past years, as a result of a rise in freight rates by railways, diesel prices and dependence on expensive road transport.

**Storage:**

Another important requirement and forms 40 percent of the total cost ,along with coal. Power cuts, erratic and inadequate power supply from state electricity boards have created serious problems for cement industry High taxation; the overall rate of taxation on cement is around 30 percent in India compared to 19 percent in china and almost negligible in Thailand.

**Suggestions**

- 1) To liberalize the rules and regulations on Government tax rates.
- 2) To provide transportation facilities
- 3) To provide power facilities like wind energy, solar energy etc..
- 4) To reduce the coal prices.
- 5) To install new sophisticated technology methods.
- 6) To provide subsidies for purchasing machinery.
- 7) To provide electricity facilities on subsidies basis.

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