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Address :
PREPARE
4, Sathalwar Street, Mogappair West
Madras - 600 058. India
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District	Name	Assistance
Nellore	Mr T Appa Rao	Community mobilization
	Mr Deen Dayal Raju	Fieldwork coordination
	Smt B Ammulu	Community Health Worker
	Smt G Prameela	Community Health Worker

District	Name	Assistance
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	Mr P Raja	Fieldwork coordination
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Chalapati Rao
Principal Investigator

Chapter 1 :

Introduction

Child labour is a social phenomenon in both rural and urban areas of India. Children work in various sectors of industry, mostly out of economic necessity and sometimes due to lack of educational facilities. Most studies on the child labour phenomenon in India have been restricted to the collection of sectoral data ,description of the nature and prevalence of child labour, and a search for reasons and explanations for the persistence of this phenomenon. This study is an attempt to understand the relationships between child labour and health and education of children. The expansion of the acquaculture sector during recent times has resulted in a growth in the child labour force in population residing in villages in areas where shrimp culture has developed. Hence this study has been undertaken on children from such villages in Nellore and Srikakulam districts of Andhra Pradesh where acquaculture units have been established. The study was conducted between October 1999 and August 2000. Villages in Allur mandal of Nellore district and Gara and Etcherla mandal of Srikakulam district were selected for the study.

Background

The acquaculture industry in Andhra Pradesh and other coastal states of India has come to limelight for its economic potential and of late for its adverse impact on the environmental and socio-cultural milieu of its operations. The advent of this industry in the nine coastal districts of the state has seen the gradual conversion of agricultural land in parts of the coastal belt into saline land masses. In addition, there has been destruction of mangroves which has upset the ecological balance in this region. The search for shrimp seeds results in the collection and destruction of seeds of other acquatic species which has affected the existing food chain and has decreased the availability of fish within the local maritime fishing zones for the resident traditional fishing community, already weakened by the stiff competition with mechanized trawlers. It has been alleged that pumping of sea water into the inland acquaculture ponds and use of synthetic feeds, pesticides, antibiotics and steroids in these ponds has contaminated the local drinking water sources. This economic deprivation and environmental change has led to a change in the livelihood pattern of the locals resulting in their seeking alternate sources of income and food. The search for and collection of shrimp seed has proved to be an alternate (though insufficient) source of income, which is readily

available for 4-6 months in a year. This and other tasks related to the acquaculture industry serve to perpetuate the causes of the change in their livelihood. It has also been alleged that children, including girls have been inducted into this shrimp seed collection, and other forms of work for wages to support family income, and this has an impact on their health and education.
In view of this scenario, it was planned to undertake a study to assess the impact of work in acquaculture on children in Nellore and other North-Coastal districts of Andhra Pradesh. The industry has been in existence for the past fifteen years in Nellore district and has recently spread to Srikakulam where acquaculture is a growing industry since the past five years.

Review of Literature

Literature was reviewed on four important aspects of the problem which could shed some light on the issue of growth of the child labour force and its impact on health and education of the children. By carrying out the literature review the data gaps were noted and the study was designed towards collection of such data which would fill these gaps in the understanding of the impact of child labour.

Impact of Acquaculture

The acquaculture industry took its roots in India around 1985. This occurred at a time of global expansion of marine shrimp farming that was generated by market demand, short term gain and government support on account of export earnings . The industry serves to produce shrimp on large scale purely for the purpose of export to industrialised countries. The extensive coastline of India with suitable environmental conditions favourable to acquaculture were the attractions which led to the development of this industry. In addition, relatively low investments in the form of raw materials and labor with high income yields also served as promotional features. Initial funding for establishment of acquaculture sites was provided through World Bank loans. The Indian Government has constituted the Marine Products Export Development Authority to act as a facilitatory and regulatory agency for this sector. Land for setting up units was acquired by industrialists in the coastal areas by offering attractive one time sums to the coastal people, predominantly the traditional fishing community , who were already under economic strain due to the advent of mechanised fishing and population growth. In some areas, land was acquired on long term lease. The industry has developed extensively along the Eastern coast and has involved/affected communities according to the following distribution.

Table 1: Distribution of fishing community population residing in villages located near acquaculture industries[1]

State	District	No of Villages	Approx total Population
AP	Nellore	58	98,200
	Prakasam	49	67,550
	Guntur	22	30,110
	Krishna	16	17,160
	West Godavari	34	40,600
	East Godavari	21	26,125
	Visakhapatnam	24	19,800
	Vizianagaram	4	5,070
	Srikakulam	9	9,800
Total AP	9 districts	237	314,415
Orissa	4 districts	110	163,000
Tamil Nadu	6 districts	208	220,000
Total All States	19 districts	555	697, 415

Source : PREPARE Annual Survey Reports 1995-1997.

A number of reports (eg. People 98) and newspaper articles (Science Express, 01 May 2000) are available on the environmental and economic outcomes that have resulted from the development and spread of acquaculture as well as the related legal issues. In November 1998, an International Conference against Industrial Shrimp and Trade was organised in New Delhi and was attended by politicians, senior pressmen and social activists apart from representatives of the affected community, whose needs were the central theme of the conference. The Science Express article clearly states that acquaculture destroys mangroves thereby a) upsetting the eco system and b) increasing the hazards due to cyclones which are frequent in the Bay of Bengal, by removing the protective screen provided by mangroves. The Supreme Court in 1991 had passed an act termed the Coastal Regulatory Zone Act which contained articles pertaining to restrictions and regulations on acquaculture units. However, it is alleged that this Act is not being enforced, including a Chennai High Court ruling to this effect in 1996. In addition, in some of the reports, mention has been made of child labour and this needs quantification and analysis in view of the future expansion and development of this industrial sector. An announcement from the MPEDA on the seafood export trade during 1999 -2000 (Deccan Chronicle, 30 April 2000) stated that the growth rate of seafood exports in dollar terms was seven percent, and as marketing was not a problem, production of high value species such as shrimp had to be increased. Frozen shrimp, though accounted for only 32

percent of total exported quantity, contributed 71 percent of total exports by value. In the light of the documented environmental and socio economic impact of this industry, this announcement does not augur too well, if the interests of the local community are not taken into account.

Child Labour in India

Child labour in a broad sense, can be defined as children's work carried out to improve the economic level of households, either in the form of work for wages or help in household enterprises or of household chores in order to free adult household members for economic activity elsewhere (Mehra, Keppleman, 1996). According to the section 66 of the Factories Act, 1948, no individual who has not completed fourteenth year of life should be employed in any establishment. In addition, adolescents aged 15 - 18 years are protected at the workplace by certain provisions as per Sections 67 - 77 of Factories Act, 1948. While it is difficult to establish approximate estimates in terms of children who work for wages due to various employer/ household/individual information revealing bias, it would be even more difficult to establish estimates of child labour in its other two forms in which an opportunity cost for adults is involved. Data from the UNICEF in the Human Rights Watch report,1996 cites figures ranging from seventy five to ninety million child laborers under the age of fourteen in India. Other reports based on extrapolations from census data or Labour ministry surveys cite lower numbers of child laborers, such as the NSS 1983 figure of 17.4 million and the Labour Ministry report of 44 million . The proportion of children participating in labour is higher in India, as can be inferred from a report from the International Labour Organization (ILO 1995, 113) which cites that the Child Economic Activity Rate for 1980 - 1991 in India was 13 .5 % for males and 10.3 % for females. These figures are higher than those of other countries in the region e.g. Sri Lanka 5.3 % males, 4.6 % females, Malaysia 8.8 % males, 6.5 % females etc. Children from India participate in labour from ages as young as five to six years. A large proportion of these very young labour force participants are involved only as marginal workers, predominantly in the cultivation and agricultural sectors, and as part of the family or household enterprises. Income from such labour accrues directly to the household pool. Elder children participate in labour forces which include work in the same as well as other sectors.

Data from 1991 Census gives the distribution of the child work force in the various sectors of work as shown in Table 2. As can be seen, majority of the child labour force (≅ 80 % of working children) operates in the cultivation and agricultural sectors, with an additional number of children

working in the sector pertaining to livestock, forestry, fishing etc which also is a form of labour with a similar socio cultural background. This means that such labour is a family oriented

Table 2: Distribution of child labour force in various occupational sectors as per 1991 Census

S No	Sector	Child labour force	
		Males	Females
I	Cultivation	38 %	31.2 %
II	Agricultural Labour	40 %	52 %
III	Livestock, Forestry, Fishing, Plantations etc.	4.5 %	2.7 %
IV	Mining and quarrying	0.3 %	0.3 %
Va	Manufacturing, processing, repairs in household industry	2.2 %	4.7 %
Vb	Manu,processing,repairs in other than household industry	6.2 %	4.8 %
VI	Construction	1 %	0.4 %
VII	Trade and Commerce	3.9 %	0.6 %
VIII	Transport, Storage and Communication	0.5 %	0.1 %
IX	Other services	3.4 %	3.2 %
Total	All sectors	100 %	100 %

form of livelihood or labour participation, as compared to labour in other sectors which is oriented towards working in semi organized / organized establishments. Of the remaining sectors, some industries in sector V carry out processes that have been included in the list of hazardous processes in the First Schedule, Section 2 (cb) , Factories Act, 1948. Additionally, in some of these sectors, bonded labour - a phenomenon of children working in servitude in order to pay off a debt - exists. Estimates place the number of bonded child laborers in India to be close to one million. (ILO 1992, 15)

Data from various studies has nurtured the popular perception that income from child labor is a necessary source of support for some families in India. In one study, income from child labor was found to have accounted for 34 - 37 % of the total household income. However, an important fact brought out in another study (Grootaert & Janbur, 1995) was that children's earnings are consistently lower than those of adults, even where the two groups are engaged in the same tasks. Two main determinants of prevalence of child labor are poverty and lack of educational facilities. Studies have revealed a strong positive correlation between poverty (and its underlying determinant - caste) and prevalence of child labor (Mehra 1996). The combination of poverty and lack of social security network for the poor (bank/ governmental loans or other credit sources) forms the basis for the more grave type of bonded child labor. A bonded child laborer can be released only after the

parents make a lump sum payment[7] (HRW, 1996, 17) which is extremely difficult. Even if bonded child laborers are released, the same conditions of poverty can cause people to slip back into bondage (ILO, 1993, 12)

Lack of adequate educational facilities / expenses of schooling leaves some children with little else to do but work. In addition, parental attitudes that children should work to develop skills useful in the job market rather than take advantage of a formal education also contribute to child labor.

Child labour and education

The 1989 UN Convention on the Rights of the Child in articles 28, 29 and 32 guarantees children the right to be protected from economic exploitation and the right to compulsory free primary education that extends to skills beyond basic numeracy and literacy such as development of personality, individual talents, mental and physical abilities among others. Education has been determined as an enabling right that contributes to opening the space for the fulfillment of other rights - to health, nutrition, leisure, participation in society etc. and assists children in becoming self sufficient, responsible and contributing members of the society. In addition, education empowers children with a knowledge of their rights and the capacity to actively resist exploitation.

Lack of adequate educational facilities (infrastructure, teachers etc.) and parental attitudes regarding utility of formal education facilitate the perpetuation of child labor. However, the values and skills children learn from work cannot be ignored as education, although some of the lessons may be negative or the costs in terms of physical or mental detriments may be too high. There is evidence that moderate work, by boosting self esteem, inculcating responsibility, time management etc. can itself be a positive educational experience (Glasnovich 1991, Ennew 1995). Ideally, full-time primary school, combined with time for play, leisure and learning social responsibility should be available for every child. For some, however, there is no other option than work, and as an interim measure, a combination of work and school is better than no school at all. In a broad context, school is considered a key deterrent or preventive intervention to eliminate hazardous child work. Completion of school has been linked to increased earning power while early entry into labor has been shown to contribute to continuing poverty.

Children who combine work with school carry a double burden. Many kinds of work such as those involving long hours, direct health hazards, physical strain etc. can be detrimental to school performance. This can manifest in the form of tendency to drop out, repeat grades and perform poorly (Salazar and Glasnovich, 1996). Learning can also be a great problem for many working

children (Schifelbein, 1997). In many cases, number of years in school was in inverse proportion to the degree of learning.

If working children's perspectives are taken into account, it was found that while some children were willing to attend school full-time, many were not willing to give up work and would go great lengths to combine education and work (Glasnovich 1991, Ennew 1995).

As can be seen from the above, the linkages between education and child work are complex and deep-rooted. Education systems have the potential to contribute to elimination of harmful child work by teaching them about their rights and responsibilities. Existing education systems need to be strengthened so that they are responsive to children who are also working and appear a more attractive option to hazardous work. Teachers and others connected to the learning environment should monitor both work and education and take action to ensure that education and any work experiences have a positive effect on children's growth and development. Therefore, approaches that can lead to both elimination of child labour and universal primary education must be multifaceted and multidimensional.

For meaningful and sustainable educational strategies, there needs to be accurate and probing qualitative and quantitative data about the nature and extent of children's work and its relationship to education. In particular, there needs to be more gender disagregated and age disagregated data which would allow for a deeper understanding of why children are not in school and what keeps them away. Addressing child labour issues especially requires taking into consideration local realities such as availability of economic support, household food security, work timings, nature of work etc. as well as availability of educational infrastructure. Such an approach will help develop strategies which would take into account all these issues and provide feasible solutions towards child development.

Child labour and health

As had been mentioned above, the majority of the child labour force in India is employed in the agricultural sector. This employment may either be in the form of tilling family land or working for wages as part of labour force or as bonded labour. Reasonably accurate estimates of the proportions of these categories are difficult to arrive at. Some of the potential health hazards of agricultural labour include chronic energy deficiency, exposure to damp moist environments predisposing to respiratory morbidity, injuries while using implements, and exposure to pesticides

and other organic and inorganic substances used for augmenting agricultural produce. A large percentage of agricultural tasks by labour involve physical exertion. Children participating as labour are driven to do so by poverty which is also strongly associated with malnutrition. Thus physical exertion is superimposed on malnourished children which further perpetuates chronic energy deficiency. Well designed epidemiological studies will provide accurate data that will prove/disprove these theories as well as quantify the actual hazards of pesticide exposure etc. Children are also engaged in various other sectors of work. Sectors such as mining and construction are ridden with hazards of accidents and injuries as well as the risk of respiratory morbidity due to inhalation of dusts. The manufacturing and processing sector includes several industrial processes that come under the category of hazardous processes listed in the First Schedule of the Factories Act, 1948. Needless to say, children employed in all the above sectors also face similar prospects of developing chronic energy deficiency in its various manifestations. Careful search and weeding out of children employed in hazardous processes should be a priority task for reducing the burden due to child labour on the society.

Taking into consideration all of the above, that is, the projected expansion of the acquaculture industry, the reported child labour involvement in the industry and the known impact of child labour on health and educational development of children , the objectives of the current study were framed as follows :

Objectives of Study

1. To assess the impact of work in acquaculture on children's health and educational development.
2. To study the morbidity pattern and prevalence of nutritional deficiencies, respiratory tract infections and skin disorders among working and non working children in the coastal districts.
3. To assess the school enrollment pattern, school attendance and academic performance of these children
4. To study the economic and social relationships that govern child employment in acquaculture and their implications for child development.
5. To arrive at strategies to be adopted by local communities and policy makers in overcoming these hurdles in the overall development of the child.

Research Questions

1. What is the prevalence of child labour in the acquaculture industry ?

2. What is the health profile of children living in villages where acquaculture is practiced ?

3. Does work in acquaculture or in other forms of labour by children in villages where acquaculture is practiced affect their health ?

4. Does work in acquaculture or in other forms of labour by children in villages where acquaculture is practiced affect their education ?

5. What are the socio-economic factors that result in children in these villages undertaking income generating tasks ?

Chapter 2 :

Methodology

Study design

A descriptive epidemiology study was planned using various methods of data collection described below. A cross sectional survey was conducted on children of school going age (5-15 yrs) from villages in affected areas to gather information simultaneously on exposure (work) status and outcome (prevalence of health and education indicators) that would help in assessing impact of child labor.

Health output indicators to be estimated were decided as prevalences of (a) malnutrition

(b) resp tract infections

(c) skin disorders

Education impact assessment was to be done by (a) evaluating school attendance of the children

(b) performance in annual examinations.

Sample size calculations(EpiInfo Version 6 was used for sample size calculations)

Data from the National Nutrition Monitoring Bureau revealed that the prevalence moderate to severe malnutrition among children aged 6 - 17 years in Coastal Andhra region was about 55 %. Assuming that the prevalence of moderate to severe malnutrition in working children aged 5 - 15 yrs is 65 %, the 95 % CI sample size obtained was 87 children to be selected by random sampling from the affected villages. In descriptive epidemiological studies, cluster sampling is preferred as geographical clustering makes the study easier and cheaper to perform with reference to availability of subjects. This ' Design Effect' was integrated in the sample size calculation by augmenting the random sample number 87 by 1.5 times. In addition, non responses in the population were anticipated to be 20 % therefore the sample number was further augmented by 1.25.

Final sample size for working children = 87 X 1.5 X 1.25 = 164 children

Similarly, using an expected prevalence of malnutrition in non working children as 55 %, and applying the same factors for design effect and non responders in the survey, the sample size for non working children is 95 X 1.5 X 1.25 = 179 children.

Therefore, from each of the two districts, it was planned to survey a population which had at least 164 and 179 working and non working children respectively. It was found that about 20 - 25 % of any population in Andhra Pradesh consists of children in age group 5 - 15 years. From general enquiry it had been estimated that approximately 50 % of children in villages where acquaculture is practiced were engaged for the work. Based on these assumptions, it was calculated that the total population that needed to be covered in each district would have to include about 400 - 500 target age group children to cover the requirements of sampling. Therefore the total sample population would be in the vicinity of approximately 2000. Random selection of villages was made to meet the required sample population, with each of the selected villages serving as a cluster for the cross sectional survey. The following methods were used to collect data from the selected study population.

Household Survey and Questionnaire

Household survey schedule was administered to collect general information on habitation population census, target age group population, primary and secondary sources of income in families, ownership of houses, possession of ration cards, and access to medical care.

This was followed during the actual survey by a questionnaire consisting mostly of closed questions with occasional open ended questions to collect data from target group children on the following :

1. Occupational history : The questionnaire was designed such that information could be collected on nature of tasks performed and time spent at work with duration in terms of work hours per day, days per week and so on. Working children were also asked about the reasons for working, parental attitudes towards work, daily earnings and usage of earnings were also inquired into.
2. Educational history : Self-reported school attendance was the starting point of the educational history section. This led to reasons for non enrollment or dropping out and stage at which dropped out. Lastly, a direct query regarding interest in schooling was added for the children who had never enrolled/ dropped out.
3. Medical history : The medical history consisted of questions regarding symptoms of upper respiratory tract infections and fever using a recall period of one month. Presence of skin irritation/ infections was asked as were occurrence of ocular strain and other generalized symptoms such as chronic fatigue etc.. Questions pertaining to recognition of occurrence of symptoms in association with work hours/ workdays were also included.

Work site inspection to observe nature of tasks and work environment

In addition to the questionnaire, independent observation of work environment was carried out in each of the survey habitations. This was done to get a true picture of the nature of tasks performed and the work environment. During the off season, children also work in other occupations such as agricultural labour, salt crushing, construction and masonry work and familial traditional fishing. Some of these tasks were also observed and described

Clinical examination

Each child was made to undergo clinical examination which included the following components.

1. Nutritional Anthropometry
2. General examination
3. Examination of upper / lower respiratory tracts, skin, and other systems - CVS/ CNS/ Abd

The clinical examination consisted mainly of anthropometric measurements, general examination, examination of upper and lower respiratory tracts and skin. Auscultation of heart was also carried out in all children and CNS disorders such as paralytic poliomyelitis were recorded. Recording of age was carried out using existing birth records/school records/local calendar of events/comparative age assessment using details of birth before or after children with known ages within the

family/relatives/ neighbors. Weight and height of individual children were recorded according to prescribed standards (Rao and Vijayaraghavan, 1993) For weight measurement, children wearing daily clothing minus footwear were made to stand on a platform scale having a lever actuated device that gave weight measurements with accuracy to 100g. The balance was calibrated daily using a standard 10 kg weight. Heights were recorded with the children standing against a graded scale on a wall with heels, buttocks and shoulders touching the wall and external auditory meatus in the same plane as the infra orbital margin. Readings were taken in expiration.

Anthropometric measurements were followed by the history and clinical examination. This was conducted in a separate room with adequate privacy, for each child individually, in the presence of the community health worker and the parent/guardian if present. Routine protocol for clinical examination such as examination in good day light, use of properly cleaned tongue depressors/aural speculae etc. for each child was followed. Facility for examination in recumbent position was provided for, and used for examination of abdominal complaints or for detailed evaluation of the cardio vascular system in some children.

Laboratory investigations

The following two investigations were carried out on the children.

a) Hemoglobin estimation - cyanometh colorimetric method

b) Stool sample analysis for helminthiasis - salt solution floatation concentration method and Stoll's egg counting technique for estimating worm burden

Education data collection

Approximately 50 % of the children who were recruited for the survey were attending the local schools. General information about these schools such as distance from the habitations, total number of students, teachers, classrooms etc. was collected. For each of the children who were attending school, attendance and scholastic performance details for the academic year 1999 - 2000 were retrieved from the school records for the purpose of analysing their relationship with the working status of the children.

Focus group discussions

Separate focus group discussions were organised among groups of mothers of working children,

community leaders and working children to derive information on forces that govern the issue of child labour in these villages. The discussions were conducted according to the prescribed guidelines (Scrimshaw, 1987) and were held at the local school. Each group discussion lasted one hour. A facilitator introduced the topics and moderated the discussion while a recorder maintained field notes. Audio recordings of the discussions were later transcribed.

Chapter 3 :

Descriptive Results

Coverage

As had been described earlier, the sample size calculations were such that population that yielded 164 working and 179 non working children in the age groups 5 - 15 years was to be covered in the cross sectional survey. Three villages in Nellore district and two villages in Srikakulam district were selected from the study by the sampling methodology described earlier, and all children aged between 5 and 15 years from these villages were targeted for the survey. Table 3 shows the coverage achieved during this survey.

Table 3: Population and coverage figures achieved in selected habitations

District	Village	HHolds	Vill Pop	Tgt age pop	Achieved	Coverage
Nellore	Kothakurru	201	1,012	233	180	77 %
	CB Nagar	140	752	194	165	85 %
	Labbipalem	48	276	70	66	95 %
Srikakulam	Balrampuram	236	1,186	326	237	73 %
	D Matchilesam	320	1,427	391	289	74 %
Total		945	4,653	1,214	937	77 %

Household wise target age group population listing was done in each of the selected habitations one month prior to the actual survey at which time the dates of the survey were also informed to the population. As can be seen in Table 3, coverage ranged from 73 - 95 % of the sample population.

While coverage in Nellore habitations was as per expectations, the coverage in Srikakulam was slightly lower. It was noticed during the survey that in Srikakulam district, very few girls aged above 10 years were recruited for the survey. On investigating, it was found that about 150- 200 people from each of the villages temporarily migrate to Gujarat each year from

October to March-April to perform agricultural labour. Girls ages above 12 years are included in this labour force and this resulted in them not being available for the survey. Income from agricultural labour in Gujarat is much higher than that in Andhra and forms a significant source of income for the community. Some families stay on after the agricultural season and take up construction work etc. for sustenance owing to there being no assured source of income back in their home village. In addition, in Srikakulam, school enrollment starts at 6 years of age, so a number of 5 year old children were also missed out.

Other reasons for non attendance in the survey by children were non availability in the village on account of religious pilgrimages, outstation visits to relatives, and small percentages (< 5 %) refusal to participate in the survey.

It may be noted that almost all children who were enrolled in the local schools were recruited for the survey. Therefore it can be safely assumed that majority of those who did not participate in the survey were non school going children.

Household Characteristics

The survey was conducted among villages from the fishing community (notified backward caste) therefore fishing was the primary source of income for the head of household in almost all cases. Population from all the villages except Labbipalem (Muslims - Dudekula caste) belong to Pattapu Kapu community which has been notified as Backward Class (A) community. In a few cases, the head of household was female and the primary source of income was agricultural labour. During the monsoons and other times when the catch is not good, agricultural labour forms a secondary source of income. Very few families in the village also possess land which is tilled on a regular basis. Since the past 4-5 years, families from the survey villages in Srikakulam district have been undertaking temporary migration to Gujarat for agricultural and other labour. This is purely because of lack of assured and adequate source of income in the village. As mentioned earlier, income from migrant labour forms an important revenue source for the village. All the families reside in self owned houses

and possess the below poverty line white ration cards issued by the government. All villages had perennial community wells for drinking water. In addition, some households also had individual hand pumps. Sanitary latrines do not exist in any of the habitations. All the habitations are covered under the Public Distribution System and receive subsidised rations including rice, sugar and kerosene. Very few adults in these villages had received any formal education in their childhood. Direct access to governmental medical care was not available in any of the villages. Each of the habitations had a nurse from the local NGO who had received certificate training in midwifery and community nursing. This nurse was assisted by traditional birth attendants in the discharge of primary health care including health education, antenatal services, deliveries, immunizations and treatment of common ailments. Cost of medicines and other expendables are charged from the patients. Early detection of complicated illness is also one of the responsibilities and patients are referred to the nearby Govt. Health Sub centers/ PHCs and District Hospitals. At Nellore the Government Primary Health center was located at a distance of 2. to 3.5 Km from the habitations while at Srikakulam the Primary health Centres were located about 10-20 km away.

Nature of tasks performed by children

Assessment of nature of child labour was made by
a) Work site observations

b) Occupational history including details described in the methodology

During the preliminary visit, discussions were held with village community health workers, school teachers, members from the panchayat etc. about the nature of the tasks that the children were involved in. It was found that children in these villages, in addition to performing acquaculture related tasks during its season, also performed tasks related to salt processing and packing, agricultural labour, construction and masonry work as well as participating in fishing, the primary occupation of the community depending on their age and sex. At the time of the survey, work sites were visited and observations were made on the actual nature of tasks, working environments and possible health hazards. In addition, during the survey, the occupational history of each child was gathered. It was found that the nature of the work was similar in both the districts with some differences, specially pertaining to income for each task. Data derived from both methods has been pooled and described for each task in the two districts.

Nellore

Acquaculture related tasks

Prawn seed collection is carried out during the season which extends from June to December. In this district, seed collection is done from the backwater creeks and mangrove areas which are located about 2 km away from the villages. Tidal inflow of sea water into the backwaters brings in the prawn seeds into small pools within the mangrove areas. The elder male children (aged 11yrs and above) and a few adults wade chest deep into the water and fill pails with the sea water containing the seeds. Repeated wading into the creeks to collect the seeds results in semi-submersion and exposes the child to contracting upper respiratory tract and skin infections. The filled pails of sea water are emptied into small artificial pools created with plastic sheets in holes dug in the sand along the shore. The younger children (< 10 years) then collect water containing the seeds from these ponds in small white plastic containers. The prawn seeds (about 1-2 cm long, slender, thread like larvae) are separated from those of other species of fish which are discarded. The segregated prawn seeds are then counted. Each filling of the container with the counted prawn seeds is then emptied into the final collection bin. Each collection bin is filled till they contain 500 - 1000 prawn seeds depending on the day's catch and capacity and these are then sold to the purchaser from the acquaculture farms. The younger children are faced with tasks of sorting and counting which are monotonous and require prolonged concentration and accurate counting ability which can cause mental fatigue. The collection of seeds from the backwaters is performed once every hour and the shore pools are filled up for sorting and counting. Generally the work is started early morning at 5: 30 am and carries on throughout the day, with some children participating in the work in the early hours before school and others joining the work in the afternoons after school closure. Payment for the seeds is variable depending on the market demand and availability of seed. In the current year the price paid was about Rs 15/- per 100 seeds. During previous years the price paid had even been as high as Rs 30/ per 100 seeds. Usually a full days work ensures a catch of 500 - 600 seeds sometimes even as high as 1500 seeds. The children are paid a share depending on the earnings and this ranges from Rs 5/- to 10/- for sorting and counting seeds to Rs 10/- to Rs 20/- for carrying out the heavier tasks. It has been reported by the villagers that the catch is generally higher on four days each around the new moon and full moon periods.

Other acquaculture related tasks include daily transportation of work material (nets, pails, containers etc.) to work site and back, and carriage of food etc. for other working family members. All these tasks are usually carried out by children and other members of the family and are therefore not accounted for in terms of payments.

Salt Processing and Packaging

During other months, January to April, children are commonly employed in salt crushing and packing processes in the local salt pans. Heaps of rock salt are covered with gunny bags that are then constantly trampled on by the workers till the salt is completely powdered. These salt heaps are then packed in plastic bags. The children usually accompany the elder women family members to work in the salt pans. Work in salt pans usually starts at about 5: am and lasts till about 11 : 30 am. The children then return home and after a meal attend afternoon school. Working for a full shift earns Rs 16/-. Younger children aged < 9yrs are paid Rs 8/- for a full shift.

Agricultural labour

Almost all the elder non school going girl children perform agricultural labour during the sowing, transplantation and harvest season in paddy fields located in a radius of 2 - 3 km from the village. Work hours are mostly in two shifts, mornings 5:00 AM to 9: AM and afternoons 3: 00 PM to 6:30 PM. A full day of labour fetches Rs 50/- and half day Rs 25/-.

Fishing

Elder non school going male children accompany fathers and other elder family male members in fishing. The fishing boats are launched at about 3 : 00 pm and return around 9 : 00 am the next day. Tasks related to boat handling as well as casting nets and recovering catch are shared by all members in the boat.

A number of the children perform tasks in all sectors namely acquaculture, agriculture and salt processing, depending on season, demand for work force and ability to perform tasks. This underlines the lack of economic support and lack of household food security that drives these children to participate in labour.

Srikakulam

Acquaculture related tasks

In this district, two villages from two separate mandals were selected for the survey. In one of the villages, seed collection, sorting and counting is carried out from a backwater creek situated 1.5 km away from the village. The work tasks, environment , timings and payments are similar to that which are prevailing in Nellore. In the other village, the tasks are carried out directly on the seashore located just 100 m from the village. The coastline here is rocky and seed collection is carried out

from small rock pools. These pools get filled with water containing the seed during tidal flows. Here too the elder children and male adults wade into these pools to collect the water and the rest of the process is similar to the other areas. The season in Srikakulam is longer and lasts from about June to March in each year. The acquaculture industry has recently expanded into this district about 4 - 5 yrs ago.

Additional forms of child labour

As in Nellore, during agricultural seasons, the elder non school going girl children are engaged in agricultural labour but the distances from village to paddy fields are more and can be about 5 km in some instances. The children form a team and move out to perform agricultural labour wherever there is a demand. Earnings from agricultural labour are lower and range from Rs 20/- to Rs 30/- per day.

Construction labour

Some of these girl children also carry out labour in rural house construction and earnings range from Rs 15/- to Rs 20/- per day.

Fishing : same as in Nellore.

Reasons for working and parental attitudes towards work

Out of 459 working children, 423 children said that they were working to earn for the family while 36 said that they were working to have an independent source of income. Wherever the children were accompanying parents to work, payment for the child was also handed over to the parent directly. Some children said that part of their earnings were used by parents to purchase books, pens, clothes etc. for the children while food etc. was provided for the family out of the parental earnings. The other children who attended work independently also said they handed over the earnings to their parents. In response to another question, only 343 children said that they had been specifically instructed by their parents to undertake the work, while the rest went to work to accompany their siblings / friends. These children too handed over their earnings to their parents.

Prevalence of child labour

In the above section, the nature of tasks carried out by children have been described. A quantification of child labour has been done for each of the districts.

Table 4: Distribution of surveyed children from Nellore based on age, sex and working status

Age	Working Males	Nonworking Males	Working Females	Nonworking Females	Total Children
5	8	13	1	16	38
6	6	17	4	18	45
7	13	8	15	14	51
8	11	11	13	3	39
9	11	2	8	4	25
10	20	4	20	2	47
11	8	3	14	1	25
12	19	2	19	2	42
13	14	2	24	0	40
14	8	1	18	1	26
15	13	1	19	0	33
Totals	131	64	155	61	411

As can be seen from table 4, the overall prevalence of child labour in the habitations in Nellore where the survey was conducted was 67 % for males and 71 % for females respectively. It can also be see that from the age of 10 years onward, almost all the children irrespective of gender were involved in work for wages. The number of work days each week for working children had also been collected and is shown in table 5.

Table 5: Weekly work pattern for children from Nellore as per age and sex groups

WorkDays/Week	5 - 10 yrs Males	11 - 15 yrs Males	5 - 10 yrs females	11 - 15 females
>6	18	29	23	71
3-5	9	12	13	14
<2	42	21	25	9
Total	69	62	61	94

It can be seen that below the age of 10 years the proportion of males who work for 1-2 days only is 61 % while that for females is 41 %. In addition, across all ages, 35.8 % males work on all days of the week while 67 % of females do so. Therefore, although the overall prevalence of work in both sexes is almost the same, the weekly working pattern shows that female children perform more work than male children. It should also be noted that female children are also involved in various household chores ranging from cooking and washing to taking care of younger siblings in addition to work tasks.

A similar age and sex distribution of surveyed children from Srikakulam is show in Table 6.

Table 6: Distribution of surveyed children from Srikakulam based on age, sex and work status

Age	Working Males	Nonworking Males	Working Females	Nonworking Females	Total Children
5	0	5	0	8	13
6	0	22	0	33	55
7	2	36	0	32	70
8	12	30	2	37	81
9	13	13	2	26	54
10	19	19	10	32	80
11	19	12	2	11	44
12	30	5	8	11	54
13	12	5	5	2	24
14	11	4	7	11	33
15	6	1	6	4	17
Totals	124	152	42	207	525

It had been described earlier that the age and sex structure of the survey population in Srikakulam habitations was affected by the annual temporary migration to Gujarat for agricultural labour, in which force elder girl children were included. However, out of the children present who were included in the survey, it was found that the prevalence of work for wages among males was 45.8 % while for females it was 16.6 %. While there were 107 males > 11 who were included in the survey, only 67 females > 11 who were surveyed, which causes the lower percentage of working females. On analysing the data further, it was found that 21 out of 39 females > 11 years listed as non working were also not attending school and were staying back to provide domestic help.

Table 7: Weekly work pattern for children from Srikakulam as per age and sex groups

WorkDays/Week	5 - 10 yrs Males	11 - 15 yrs Males	5 - 10 yrs females	11 - 15 yrs females
>6	11	27	5	22
3-5	2	7	2	2
<2	33	44	7	4
Total	46	78	14	28

It can be seen from table 7 that across all ages, about 25 % males work on most days of the week while 65 % of female children do so. It should be remembered that the coverage of target age group children in the study population was 77 %, and almost all the children who were not included in the survey were most probably working in some sector, therefore the actual prevalence of child labour

is definitely higher than that arrived at in this survey. Further analysis of the gender differences in prevalence of child labour is dealt with in the analytical section of the report.

Child Health

Prior to the start of the study, verbal consent for carrying out the clinical examination and investigations of the children was taken from the panchayat committee, some parents, and other key village personnel such as community health workers, anganwadi workers, school teachers etc. Questionnaire administration, medical examination and investigations were carried out in the local school premises within the selected villages. The children were gathered from the classrooms/ village sectors in groups of 20 and brought for the survey. The school teachers assisted in verification of child identity and age of the child by referring to the school records. Of course, this was possible only for those children who were enrolled in the school. Those who had attended school earlier were also aware of their age which was corroborated by the community health worker and traditional birth attendants of the village. For the rest, as mentioned earlier, age assessment was done using calendar of local events etc. In very few cases, parents (mostly mothers/grandmothers) accompanied the children. For all the children, clinical examination was done in the presence of the community health worker and traditional birth attendant of the village.

Health status was evaluated using

1. Symptom questionnaire
2. Nutritional assessment by clinical examination, anthropometry, hemoglobin estimation and evaluation of stools for evidence of intestinal helminthic infestations
3. Clinical examination of respiratory system, ENT, skin and other systems.

Symptoms

The symptom questionnaire included questions pertaining to history of symptoms of upper respiratory tract infections, fever, skin irritation, headache, fatigue, general malaise etc. in the preceding one month.. Very few of the children were accompanied by parents / guardians at the time of the survey so much reliability could not be placed on the responses. However, the symptom questionnaire was administered to all the children as a preliminary familiarization strategy preceding the clinical examination.

Table 8: Prevalence of symptoms among surveyed children

Symptom	Percentage (n= 938)
No symptoms	31.3 %
Fever	55.8 %
Cough/Cold	56.2 %
Skin irritation	12.7 %
Boils/skin infection	10 %
Headache	8.8 %
Fatigue/General malaise	4.4 %

Although the history of symptoms could not be wholly relied upon, as in other clinical settings, they served as a guideline for the possible disorders that could be expected on clinical examination. The symptom of ear discharge had not been included in the questionnaire but was commonly complained of , especially in Srikakulam. Both mothers and children also gave history of passage of worms in stools.

Nutritional assessment

Malnutrition occurs as a result of one of or an interaction between the following factors : poor dietary intake, defective intestinal absorption due to infestation, or increased energy expenditure. Nutritional assessment of the children was done using three parameters

1. Anthropometry
2. Haemoglobin estimation
3. Stool analysis for helminthiasis

Anthropometry enables accurate quantification and classification of nutritional status vis a vis energy / protein intake and utilization. Haemoglobin estimation informs about micronutrient deficiency, and stool analysis identifies children with intestinal helminthiasis and possible defective intestinal absorption. Assessment of these parameters are required to attempt to identify the proximal cause of under nutrition in individual cases. Information regarding dietary intake was gathered during the focus group discussions with mothers and the children. The discussions revealed that the principal morning breakfast food was plain rice. No beverages were taken in any form. During the rest of the day, rice and fish formed the staple diet. Quantities were not specified but apparently there was no state of

chronic hunger/starvation. Occasionally the diet also included eggs, green gram and leafy vegetables. Consumption of other pulses / other forms of non vegetarian food was very rare and dairy product too were very rarely consumed by the children. Thus we get a picture of a diet which may be sufficient in carbohydrate content but does not appear to be sufficient in the other proximate principles i.e. proteins or fats as well as in the essential micronutrients such as iron, calcium, vitamins, etc. In the next section of the report, the prevalence of intestinal helminthic infestation in the surveyed children is described as well as its association with their nutritional status and its possible role in the causation of malnutrition, albeit in conjunction with the effects of the other two parameters. The effect of increased energy expenditure on the nutritional status of children on account of participation in child labour will be described in the section titled child labour and health.

Anthropometry

Anthropometric measurements of height and weight were made according to the standards described in the methodology. National Centre for Health Statistics (NCHS) reference standards were used for comparison of data derived from the study as recommended by the WHO. Weight for age was the chosen indicator of nutritional status. These reference standards are expressed in terms of both percentiles as well as mean and standard deviations.

Different scales for classification of nutritional status use the standards as follows :

1. The Indian Academy of Pediatrics (IAP) Classification using five grades for classification based on percentage deviation of observed weight for age from reference median weight for age. These grades are 80 % of median, 70 - 80%, 60 - 70 %, 50 - 60%, and < 50 %. The IAP classification is used by the Integrated Child Development Scheme for selecting beneficiaries

   and growth monitoring in preschool children, and while it is useful for individual children , it has too many categories for comparing populations.
2. The WHO Classification - classification according to standard deviations below the reference median weight for age, ie within -1 SD, within -2 SD, and outside - 2 SD. Although it is advised to use the -2SD level as the cut off mark for severe malnutrition, the WHO mean and standard deviation classification may not be appropriate for classifying children into different grades of nutritional status, as human body weight does not follow Gaussian distribution (Rao and Vijayaraghavan, 1991).

3. The Gomez Classification using four grades for classification based on the same principle as the IAP classification with different cut off levels for the categories as shown in table 9. Of the three classifications available, the Gomez classification was based on functional outcomes, and was developed as a predictor of survival among preschool children. For school age children, however, no specific classification has been fixed. The Gomez classification enables descriptive comparisons of nutritional status of populations of school age children, and also facilitates collapsing of the four stage classification into a two stage classification for analytical purposes, as is done later. This classification also has descriptive labels for each stratum of the classification, as compared to the IAP classification which has only an ordinal ranking of malnutrition without any descriptive labels, or the SD classification which also does not have descriptive labels.

Classification : Gomez

Indicator : Weight for age

Table 9: Gomez Nutritional Grading Classification

Cut of level as % of NCHS median weight for specific age	Nutritional grade
> 90	Normal
76 - 90	Mild malnutrition
60 - 75	Moderate Malnutrition
< 60	Severe Malnutrition

Based on the above grading system, data from the survey was used to classify the children from both the districts and the results are shown in table 10. Similar evaluation of nutritional status by anthropometric measurements is carried out at regular intervals by the National Nutritional Monitoring Bureau (NNMB) which has recently reported the Gomez nutritional grading data for children aged 6 to 17 years in 1997, but this data has been pooled for all the eight states. The subset of data used in this report from East Godavari district in Coastal Andhra has been used for comparison with the results of this study (personal communication from Mr Mallikarjun Rao, Research Officer, NIN, Hyderabad) . The resultant proportions of nutritional grades are shown in the table alongside the values obtained from the present study.

Table 10: Results of Nutritional Grading

Nutritional status	Prevalence of nutritional grades			
	Nellore (n = 411)	Srikakulam (n = 525)	Both districts (n = 936)	NNMB Survey in Coastal Andhra (n = 317)
Normal	8	15.4	12.2	5.7
Mild malnutrition	36.3	37.6	37.0	39.4
Moderate malnutrition	44.0	39.7	41.6	45.4
Severe malnutrition	11.7	7	9.20	9.50
Total	100	100	100.0	100.0

It can be seen that the percentages of moderate and severe malnutrition in the present study are similar to that of the NNMB study. In addition, it is seen that the prevalence of malnutrition in any form is 92 % for surveyed population in Nellore district while it is 85 % for surveyed population in Srikakulam district. However, this difference is not statistically significant at the 95 % confidence levels.

In the sampled population from each district, one further level of disagregation of nutritional grade data was done according to the sex of the children to look for any gender differences in nutritional status and the results are shown in table 11. This table shows the prevalence of the various grades of nutritional status among the children from each sex in the two districts. The prevalence of moderate to severe malnutrition appears almost identical among male and female children from the sampled villages in Nellore district.

Table 11: Gender wise nutritional grading of surveyed children from the two districts

Nutritional Grade	Nellore		Srikakulam	
	Males (n = 196)	Females (n = 215)	Males (n = 276)	Females (n = 249)
Normal	6.6	9.3	14.4	16.4
Mild malnutrition	37.2	35.3	36.5	39
Moderate malnutrition	44.5	43.8	39.7	39.8
Severe malnutrition	11.7	11.6	9.4	4.8
Total	100	100	100	100

Although in Srikakulam the males appear to have a slightly higher prevalence of severe malnutrition, the difference is not statistically significant. There are various factors apart from gender which can

influence the prevalence of malnutrition such as dietary intake, age, intestinal infection or energy expenditure that need to be evaluated before any conclusions can be made.

The nutritional status of children was also studied to look for differences in nutritional status among children from different age and sex groups, in order to identify any particular age sex group which was more malnourished than the others. The children were classified into males and females aged 5-9 years and 10- 14 years respectively with children aged 15 years considered separately and the results are shown in table 12.

Table 12: Nutritional grading of surveyed children from both districts according to age and sex groups

Nutritional grade	M5-9 (n=238)	F5-9 (n=236)	M10-14 (n=218)	F10-14 (n=198)	M15 (n=17)	F15 (n=29)
Normal	13.4	16	9.6	10.6	0	6.9
Mild malnutrition	45.0	40.5	28.9	32.8	23.5	41.4
Moderate malnutrition	37	39.7	45.4	42.9	58.8	48.3
Severe malnutrition	4.6	3.8	15.6	13.6	17.6	3.4
Total	100	100	100	100	100	100

From the results shown, it appears that children from both sexes aged 10 years and above have higher prevalence of moderate to severe malnutrition than those aged 5 to 9 years. In addition, male children in the higher age group appear to be slightly more malnourished than female children, but none of these observed differences were statistically significant. However, this finding is important as it suggests that the nutritional requirements of children in the vital age of growth ie the teens does not appear to be sufficient which could have significant consequences by increasing their vulnerability / susceptibility during the forthcoming adolescent growing phase. The NNMB survey also showed similar increased proportion of malnourished children in the higher ages.

Haemoglobin estimation

In addition to anthropometry, haemoglobin estimation was carried out in the children to get an alternate picture on the nutritional status of the children. Haemoglobin estimation was carried out using cyanmethaemoglobin method taking 0.02 ml of blood and adding to 4ml of Drabkin's cyanide - ferricyanide solution. Colorimetric estimation with electric photometer was carried out on two

batches of specimens daily. Photometer readings were converted into haemoglobin readings daily. Haemoglobin estimation was carried out on 889 out of the 936 survey children. Mean values for two age groups viz 5 - 9 years and 10 - 14 years and for 15 years were computed for each sex and the results are as shown in table 13.

Table 13: Mean values of haemoglobin in age - sex groups of surveyed children

Age Group	Sex	Srikakulam		Nellore		Overall	
		n	μ ± sd	n	m ± sd	n	m ± sd
5 - 9 yrs	M	122	8.69 ± 1.61	98	9.36 ± 1.34	220	8.98 ± 1.53
	F	126	8.58 ± 1.64	94	8.86 ± 1.39	220	8.70 ± 1.55
10 - 14 yrs	M	132	9.23 ± 1.67	79	9.8 ± 0.98	211	9.45 ± 1.47
	F	91	8.56 ± 1.64	98	9.65 ± 1.04	189	9.12 ± 1.47
15 years	M	6	10.46 ± 1.03	11	11 ± 1.15	17	10.84 ± 1.14
	F	10	8.55 ± 0.97	19	9.84 ± 1.04	29	9.39 ± 1.19

Gender differences in mean Haemoglobin levels

It can be observed that the mean values of haemoglobin for males in all age groups from both districts were higher than those of female children with the gender difference appearing to be more at ages above 10 years. However, on carrying out the t test for significance of differences in mean haemoglobin between male and female children from each age group in each the two districts, it was found that there was no significant difference in means at 95 % confidence levels.

Inter district comparisons

It is also observed that for all age sex groups, the mean Hb levels are higher in children from Nellore than those of children from Srikakulam. On comparing means between same age sex groups in the two districts, it was found that female children aged above 10 years from Nellore had higher significantly higher mean haemoglobin levels at 99 % confidence levels than their counterparts from Srikakulam. From this it could be inferred that nutritional anaemia is more of a problem in Srikakulam than in Nellore, and significantly so for female children aged above 10 years.

Discrete categorization

Since comparison of mean values alone does not give the complete picture of the haemoglobin status, the data was categorised into discrete groups of levels characterising normal status and variuos grades of anaemia. The WHO has prescribed same reference levels for male and female children aged 6 - 14 years, with the cut off level for anaemia being 12 gm %, and prescribed a five category classification ie upto 4 gm %, 4 - 7 gm%, 7 - 10 gm%, 10 - 12 gm % and above 12 gm %. However, for India, the ICMR Task Force study to evaluate the National Nutritional Anaemia Prophylaxis Programme in 1989 used a level of 11 gm % to delineate normal and anaemic status and prescribed a four category classification with cut off levels are as follows :

Normal : Hb > 11.0 gm %

Mild anaemia : Hb 9 - 11 gm %

Moderate anaemia : Hb 7 - 9 gm %

Severe anaemia : Hb < 7 gm %

Data from this study was classified according to the ICMR recommendations, and proportionate findings of haemoglobin estimation according to these categories in the age and sex groups in both districts are shown in table 15. Using the Hb level of 9 gm % as the delineating mark, the overall prevalence of moderate to severe anaemia ranges from 42 - 47 % in male children and 46 - 60 % in female children.

Table 15: Percentage distribution of grades of anaemia among surveyed children from age - sex groups in the study population from both districts

Haemoglobin Status	5 - 9 years		10 - 14 years		15 years	
	M (n=220)	F (n=220)	M (n=211)	F (n=189)	M (n=17)	F (n=29)
Normal	6.6	4.9	23.1	6.8	8.8	6.8
Mild Anaemia	51.4	49	29.9	33.1	91.2	58.6
Moderate Anaemia	32.1	32	37.6	50	0	27.8
Severe Anaemia	9.9	14.1	9.4	10.2	0	6.8
Total	100	100	100	100	100	100

Gender and inter district differences in prevelance of moderate to severe anaemia were analysed by comparing proportions of children from each sex and age interval at district level. Significance tests of differences in proportions were carried out and it was found that female children in Srikakulam aged greater than 10 years had significantly higher proportions of Hb less than 9 gm% (ie moderate to severe anaemia) at 99 % confidence levels than both male children of the same age group from

the same district and female children of same age group from Nellore. Even in the lower age group ie 5 to 9 years, female children had higher proportion of moderate to severe anaemia than male children of the same age group in both districts, although the difference was not significant. Therefore it may be concluded that female children have higher prevalence of moderate to severe anaemia than male children at ages 5 to 15 years, and this difference assumes significance at 99 % confidence levels for female children from Srikakulam aged greater than 10 years. This could be attributed to onset of puberty and menstrual blood loss in the female child occurring in a setting of pre existing iron deficiency which adds to the daily iron requirement. This loss needs to be compensated for by increasing the dietary intake of iron. Probably the adolescent girl child also needs to be catered for in the National Anaemia Control Program and it could help in correcting the anaemia as well as in building up the iron reserves for the inevitable iron demands of future pregnancy.

Intestinal Infection and Nutritional Status

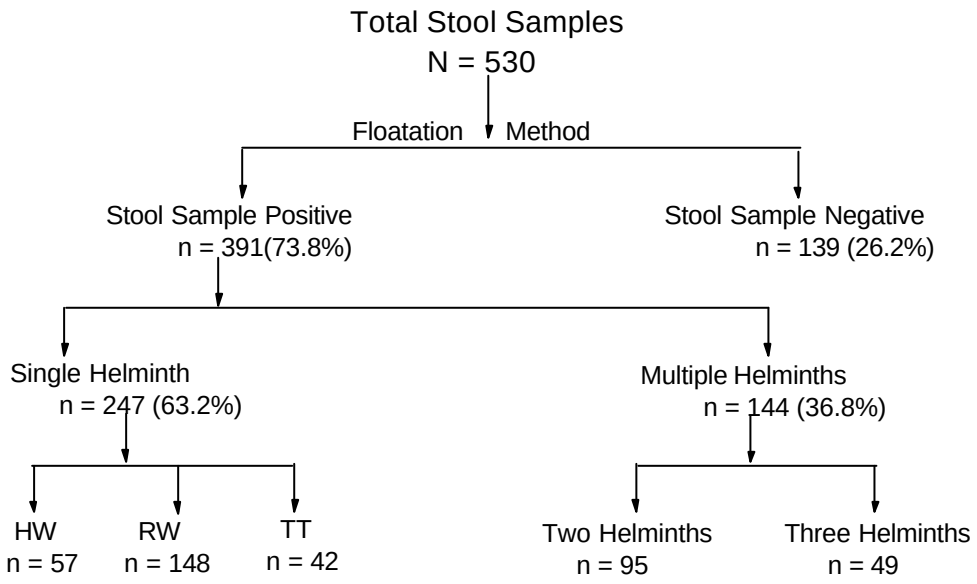
Intestinal helminthiasis has been found to be the leading cause of morbidity in children of school going age according to the World Development Report, 1993. Worm infestation, widely prevalent in children of school going age, directly or indirectly causes under nutrition, growth retardation, anaemia and impaired mental cognition. Many of these effects can be reversed with treatment. Important intestinal parasites causing health problems in the developing world include *Ascaris Lumbricoides* (roundworm), *Ancylostoma Duodenale* and *Necator Americanus* (hookworms) and *Trichuris Trichura* (Whipworm) among others. Helminthic infestations are acquired by ingestion of helminthic eggs through food, drink and soiled hands or by penetration of infective larvae through the skin.

During the current study, children were asked to collect stool samples in labelled plastic containers provided to them for this purpose. Out of 936 children surveyed, 530 children complied with the instructions and their stool samples were analysed for presence of helminthic eggs using the salt floatation method for concentration. Samples were labelled to be negative for helminths or positive for a number and type of helminths as is shown in the following flow chart.

Fig 1. Flow chart showing results of stool sample analysis for presence of helminths

HW = hookworm
RW = roundworm
TT = trichuris

HW + RW = 24
HW + TT = 43
RW + TT = 28



It was found that about 74 % of the tested children harboured helminths in their intestines, and of them, 36 % harboured more than one type of helminth. The percentage prevalences of the three helminths in the sampled children are shown in table 16. The last column shows the percentage prevalence for the same helminths from a study carried out in school children from Andhra Pradesh in 1993.

Table 15: Percentage prevalence of helminth infestation in the study population

Helminth type	Male (n=281)	Female (n=249)	Overall (n=530)	Overall prevalence 1993
Ascaris lumbricoides (roundworm)	48.8	42.4	46.3	91.3
Ancylostoma duodenale (hookworm)	32.5	31.2	31.8	45
Trichuris trichura (whipworm)	31.2	29.7	30.5	70.8

As had been mentioned earlier, intestinal helminthiasis is one of the aetiological factors in the pathogenesis of malnutrition. Nematodal infestations, although not usually fatal, are associated with malnutrition and diminished work capacity. In the absence of other adverse factors, roundworm infestation is not causally associated with under nutrition at lower levels of prevalence but the morbidity increases once prevalence rates cross 60 %. In addition, worm masses are known to cause pediatric intestinal obstruction, either mechanically or by producing intestinal spasm. Hookworm infestation causes anaemia with all its clinical consequences due to intestinal blood loss as well as hypoproteinaemia due to intestinal albumin loss. Whipworm infestation can produce chronic colitis and proctitis with resultant protracted diarrhoea that can result in growth retardation and stunting. In addition, whipworms are also known to cause anaemia by blood loss. Results of stool sample analysis showed that while some children had no helminthic infestation, others had either single worm or multiple worm infestation. An analysis was carried out to see the relationship between degree of intestinal helminth infestation and nutritional status of the children, according to the same Gomez classification of nutritional status and the results are shown in table 16. The last column in this shows the percentage distribution of the various nutritional grades in these children whether or not they harboured intestinal helminths.

Table 16: Percentage distribution of children with various grades of malnutrition and degree of helminth infestation

Nutritional Grade	No helminth infestation (n=139)	Single worm infestation (n=247)	Multiple worm Infestation (n=144)	Any worm infestation (n=391)	Irrespective of worm infestation (n=530)
Normal	15.1	10.5	7.7	9.5	10.9
Mild malnutrition	34.5	36.4	35	36.1	35.7
Moderate malnutrition	39.6	41.7	47.6	43.7	42.6

Severe malnutrition	10.8	11.3	9.8	10.7	10.8

As can be seen from the table, increasing degree of intestinal helminth infestation results in small increases in proportions of children with moderate to severe malnutrition - from 50.4 % for children without helminth infestation to 53 % with single helminth infestation and 57.4 % for children with multiple helminth infestation. This observation will be made use of in the analysis of individual effect of various factors on prevalence of malnutrition .

An attempt was also made at quantification of worm load in each child whose stools tested positive for helminths by employing the Stoll's egg counting technique. The results of worm load are shown in table 17.

Table 17: Mean values and ranges of worm load among children from the two districts

Parasite	Worm load	District					
		Nellore			Srikakulam		
		n	Mean	Range	n	Mean	Range
Round worm	Low	44	77	12 - 150	68	30	12 - 40
	High	44	647	150 -2376	67	50	40 -108
Hook worm	Low	64	25	6 - 51	12	14	12 - 48
	High	64	186	51 - 789	12	76	48 - 128
Trichuris	Low	47	18	3 - 42	16	22	15 - 28
	High	46	172	42 - 828	16	38	28 - 72

In the two districts, we had taken the services of local pathologists to undertake this component of the study. We found some variation in the results from the two districts. It was found that pathological laboratories were not familiar with the Stoll's egg counting technique for estimating worm burden and this exercise was used to understand the methodology and to practice the technique. The worm load is reported for each of the three helminths ie hookworm, roundworm and whipworm from the two districts. It was generally found that the worm loads for all the three helminths was higher in the reports from the laboratory in Nellore as compared to those from the

laboratory in Srikakulam. Further studies in these two districts would help in determining whether this phenomenon is true or is a type of inter observer variation.

Other Clinical Abnormalities

Apart from nutritional assessment, clinical examination of the children formed the second component for detection of disease. As had been mentioned earlier, each child was submitted to a general examination followed by a search for disorders of the ear, nose, throat , respiratory system and the skin.

The results from the survey of prevalence of the abnormalities detected on clinical examination are shown in table 18.

Table 18: Prevalence of clinical abnormalities in the study population

Abnormality	Males (n=473)	Females (n=464)	Overall (n=937)
Angular stomatitis	32.3	26.2	29.6
Dental caries	10.4	14.1	12.2
Rhinitis	11.4	9.3	10.4
Pharyngitis	9.7	8.6	18.5
Tonsillitis	7.4	7.8	7.6
Otitis media	8.7	7.9	8.3
Wax	15.2	12.3	13.8
Scabies	13.3	4.9	9.2
Multiple folliculitis	8.2	2.8	5.5
Tinea	1.9	1.5	1.7

A brief discussion of the diagnostic criteria and results of the findings is discussed below.

General examination

The most frequently observed abnormality on general examination was angular stomatitis, seen in 29.6 % of the children examined. Both male and female children exhibited this sign, and it was seen in all the habitations. Angular stomatitis is essentially a clinical feature of both iron as well as riboflavin deficiency. In rural India, especially among children, such micronutrient deficiency seldom appears in isolation and is almost invariably associated with some grade of protein energy

malnutrition, or the macronutrient deficiency. Table 19 shows the distribution of angular stomatitis in children with various grades of such malnutrition, as per the Gomez classification.

Table 19: Percentage distribution of angular stomatitis in children with various nutritional grades

Nutritional grade	Angular stomatitis	
	Present (n=277)	Absent (n= 659)
Normal	11 %	12 %
Mild malnutrition	39 %	36 %
Moderate malnutrition	40 %	42 %
Severe malnutrition	10 %	10 %

From the figures, it was calculated that the sensitivity of angular stomatitis in indicating malnutrition is 29.9%, while the specificity is 72.8 %. In addition, the positive predictive value of angular stomatitis of any grade of malnutrition is 89 %. Considering that the overall study population has a prevalence of any grade of malnutrition of 88 %, and the fact that angular stomatitis is a prominent, easily detectable sign of nutritional deficiency, its prevalence on detection by community health worker could be a useful predictor of prevalence of malnutrition in a population.

Dental caries was observed in 10 - 14 % of the children, more commonly in female children. The general examination also included examination of the eye and tests for visual acuity. No child had Bitot's spots or any of the other features of xerophthalmia. Impaired visual acuity (6/9 or worse vision) was detected in only 15 children. This low prevalence of features of vitamin A deficiency can be attributed to the fact that the staple diet for this community includes fish which is a rich source of retinol.

Examination of the respiratory tract and ear

As had been mentioned in the earlier sections, upper respiratory tract infections and fevers form some of the hazards of work exposure for children in the acquaculture industry. Therefore a detailed clinical examination of the nasal cavity, oro pharynx and external ear was carried out. A brief description of the clinical diagnostic criteria (first ± additional criteria) used for each of the three main clinical disorders detected during the examination is as follows :

1. Rhinitis : Congested, inflamed nasal mucosa / turbinates
   Thin watery/ mucoid / mucopurulent secretions

Purulent crusts in the nasal cavity

2. Pharyngitis : Congestion of posterior pharyngeal wall

Presence of lymphoid follicles on posterior pharyngeal wall

3. Tonsillitis: Inflammation of tonsils, protrusion towards midline

Associated pharyngeal congestion, particularly anterior faucial pillar

Presence of pustules on tonsillar surface

4. Otitis Media: Chronic mucopurulent discharge in external auditory canal

Congestion and perforation of tympanic membrane

Also, ear wax sufficient to obliterate view of tympanic membrane was detected in 14 % children apart from those with suppurative otitis media. As the general impression goes, excess wax in the ear can lead to impaired hearing which can affect learning.

It was found that more than one of these respiratory tract and ear abnormalities were co existent in the surveyed children as is the expected case in all children.

On examination of the lower respiratory tract, only one child was found to have acute bronchitis. There were no cases of bronchial asthma / bronchopneumonia / respiratory tuberculosis detected by auscultation.

Skin findings

Dermatological diseases were the other main health hazard for the children having work exposure inthe acquaculture industry. The three main skin disorders that were detected include scabies, tinea and multiple folliculitis. The prevalence of these disorders among the children is shown in table l8. Male children were found to have much higher prevalence of scabies and folliculitis than girl children, and need for skin hygiene needs to be stressed on for them during health education programs.

Diagnostic critieria for scabies :

- presence of burrow marks at common sites ie interdigital web spaces, trunk etc
- history of characteristic nocturnal itching

Diagnostic criteria for multiple boils / folliculitis

- > 3 lesions on any single extremity / gluteal region
- at least 2 lesions each on two different extremities/ body parts

All lesions were in stage of current inflammation ie healed /healing lesions were not taken into account.

Other systems

As part of the clinical examination, auscultation of the cardiovascular system was carried out in conjunction with that of the respiratory system. In 46 children, on auscultation there were cardiac murmurs that need to be evaluated further by examination of these children by paediatrician/ cardiologist. The murmurs could be either the haemic murmurs produced by hyperdynamic circulation of anaemia or could be due to rheumatic heart disease. Similarly, the gait of the children was observed while the children were entering into the room for examination and eight children were found to be having lameness due to poliomyelitis.

Chapter 4 :

Analytical Results

Gender Differences in Child Labour

In both the districts, the true prevalence of child labour as well as gender differences in child labour could not be established with precision on account of non participation in the survey owing to various reasons described earlier. On eyeballing the data, in Nellore district the prevalence in both

sexes is almost equal ie 67 % and 71 % respectively for males and females. However in Srikakulam , the prevalence among male children was 46% while that among females was 16 %. Tables 6 and 7 show the weekly working pattern for each age and sex group in the two districts. From these tables, it appeared that working female children work on more days in a week than working male children. The following analysis was carried out to see whether the average number of days worked per week by male and female children were different. For each work days per week stratum an average figure was used as follows :

Work days per week	Avge wkdays / week
≥ 6 days	6
3 - 5 days	4
≤ 2 days	2

Using these factors, the total child work days (CWD) in a week put in by working male and female children called Total CWD was calculated by multiplying the number of working children in each stratum by the average work days per week for that stratum and summing them up separately for the two sexes. On dividing the Total CWD by the total children, we get the average working days per week for each of the two sexes from the two districts. The results of this analysis are shown in Table 19. It is seen from the data that in both the districts, female working children, on an average work over one extra day per week than their male counterparts

eg in Nellore, males on average work on 3.75 days/week while females work on 4.77 days / week.

Table 19. Average working days per week for male and female children in the two districts

Districts	Males			Females		
	Total CWD	Total Children	Wkgdays/ Week	Total CWD	Total Children	Wkgdays/Week
Nellore	492	131	3.75	740	155	4.77
Srikakulam	418	124	3.37	200	42	4.76
Both districts	910	255	3.56	940	197	4.77

Female children perform household chores too, and this lessens their chances to pursue education which will equip them with skills for improving their lot.

Child Labour and Health

One of the objectives of the study was to look for relationships between working for wages and impaired health status among children residing in villages in Andhra Pradesh where acquaculture is practised. In the above two sections, the prevalence of children working for wages and the prevalence of various forms of health impairment have been described. Strictly speaking, data from descriptive cross sectional surveys such as this one is helpful to understand the patterns of disease within the various sub groups and to formulate causal hypotheses which can be evaluated through cohort studies. To assess impact of child labour on health, we need to measure and define health. A single measure of individual health status is difficult. Instead, few specific indicators of health status were chosen as a proxy. These are : (a) nutritional status including assessment of worm infestations and anaemia, (b) prevalence of respiratory tract disorders, and (c) prevalence of skin diseases. While these are partial measures of children's health, an advantage of choosing few specific health related measures is that they allow for quantitiative comparison of health status between different groups. Hence, to understand the relationships and to establish a working model for designing analytical studies, the following analyses is presented. The prevalence of the health indicators viz malnutrition, respiratory tract disorders and dermatologic diseases among working and non working children were examined for significance in differences, but owing to the limitation that these indicators of health are only partial measurements, the conclusions should be interpreted with caution.

Labour force participation and nutritional status

Children aged 5 to 15 years from each gender experience different physiological changes and growth patterns during this time period. After the age of 10, anticipated spurts in growth in the study population may occur at different times from those accounted for in the reference standards, thereby making comparisons difficult to rely upon. Superimposed upon these intrinsic differences in growth are the extrinsic influences on growth, namely individual dietary intake, intestinal absorption and energy expenditure and other socio economic factors which may be associated with place of residence. Keeping these factors in mind, the Gomez grading of nutritional status of the working and non working children in the study population was used for detecting any association between work for wages and odds of having malnutrition. By collapsing the four stage grading into two stages, ie clubbing normal and mild malnutrition together and moderate and severe malnutrition

together, the intrinsic individual differences in growth pattern can be largely controlled. In addition, mild malnutrition is a minor public health problem while both moderate and severe malnutrition are to be tackled with equal priority. Thus we can aggregate the data into two grades of nutritional status viz average and poor. Place of residence, gender and presence of intestinal infestation were evaluated for their effects on the association under study.

1. Place of residence

The data was initially categorized into the original Gomez four nutritional grades for each district for both working and non working children and is shown in table 22.

Table 22: Gomez nutritional grading of working and non working children according to place of residence.

Nutritional Grade	Nellore		Srikakulam		Overall	
	Working	Not working	Working	Not working	Working	Not working
Normal	24	9	37	44	61	53
Mild malnutrition	103	46	66	132	169	178
Moderate malnutrition	122	58	54	155	176	213
Severe malnutrition	35	13	18	19	53	32
Total	284	126	176	350	460	476

This four category data was collapsed into two categories as described above and a stratified analysis for association between work for wages and poor nutritional status was carried out by place of residence and the results are shown in table 23.

Table 23: Data from across-sectional study of working for wages and odds of poor nutritional status, stratified by place of residence

Place of residence	Work Status	Nutritional Status			Odds Ratio	95 % CI
		Poor	Average	Total		
Nellore	Workers	157	127	284	0.96	0.63 - 1.46
	Non Workers	71	55	126		
	Total	228	182	410		
Srikakulam	Workers	72	103	175	0.71	0.49 - 1.02
	Non Workers	174	176	350		
	Total	230	234	525		
Both Districts	Workers	229	230	459	0.94	0.73 - 1.21
	Non Workers	245	231	476		
	Total	474	461	935		

As can be seen from the data, in Srikakulam district, the odds of a working child having poor nutritional status is 0.71 times that of a non working child. However, the 95 % CI for this estimate shows that the results interval straddles the null value of no association, that is , 1, therefore, these results are not statistically significant. The same estimate for children residing in Nellore showed a similar direction in the association but of lesser magnitude.

As the results were uniform, a pooled summary estimate which would show the association between working for wages and odds of having poor nutritional status unconfounded by place of residence was calculated and the results are as follows :

Maentel Haenzel summary risk estimate OR_{MH} = 0.81

95 % confidence interval = 0.42 - 1.54

Chi square $_{MH}$ = 2.36, p = 0.16

The 95 % CI of the pooled estimate shows that there is no statistical significance of association between working for wages and odds of having poor nutritional status. This result also shows that the relationship between working for wages and poor nutritional status is similar in both the districts. However, place of residence is one of several possible confounders, the effect of each needs to be evaluated before drawing final inferences and conclusions from the results.

2. Gender

It had been mentioned earlier that children from each sex may have differences in nutritional grading on account of their respective physiology. In addition, male and female children perform different tasks with different levels of intensity so these to may have an effect on nutritional status. To look for differences, if any, initially the nutritional grading for working and non working children from each sex in the four stage grading was examined, as shown in table 24.

Table 24: Gomez nutritional grading of working and non working children according to gender

Nutritional Grade	Males		Females		Overall	
	Working	Not working	Working	Not working	Working	Not working
Normal	36	17	25	36	61	53
Mildmalnutrition	92	82	77	96	169	178
Moderate malnutrition	99	97	77	116	176	213
Severe malnutrition	35	13	18	19	53	32
Total	263	209	197	267	460	476

In order to observe the true effect of gender on the association between work and prevalence of poor nutritional status, the data was stratified accordingly and stratum specific estimates were calculated.

As can be seen, there is uniformity in the stratum specific estimates of odds ratios. A pooled, summary estimate unconfounded by gender, the Maentel-Haenzel risk estimate was calculated and significance testing of the estimate was carried out.

Maentel Haenzel summary risk estimate OR_{MH} = 0.93

95 % confidence interval = 0.85 - 1.01

Chi square $_{MH}$ = 0.33, p = 0.48

Table 25: Data from a cross sectional study of working for wages and odds of having poor nutritional status, stratified by gender

Gender	Work Status	Nutritional Status			Odds ratio	95 % CI
		Poor	Average	Total		
Male children	Workers	134	128	262	0.94	0.65 - 1.36
	Non Workers	110	99	209		
	Total	244	227	471		
Female children	Workers	95	102	197	0.91	0.63 - 1.32
	Non Workers	135	132	267		
	Total	230	234	464		
Both sexes	Workers	229	230	459	0.94	0.73 - 1.21
	Non Workers	245	231	476		
	Total	474	461	935		

The results imply that there is no significant statistical association for either sex between working for wages and odds of having poor nutritional status at the 95 % confidence levels. In addition, the crude and adjusted summary estimates are almost identical, indicating that gender does not have any confounding effect on the observed association. Also, since the 95 % confidence interval is narrow, it indicates adequacy of sample size and stability (less inherent variability) of the estimate.

3. Intestinal helminth infestation

In order to probe deeper for possibility of association between working for wages and prevalence of poor nutritional status , the individual characteristics of working male children who were severely malnourished were examined. Out of 35 of them, 31 were over 10 years of age, and 21 were working only on holidays, ie 2 days per week. Therefore, increased energy expenditure on account of working for wages was unlikely to be the only determinant in developing poor nutritional status. In addition, 23 of these children had submitted stool samples for analysis and 19 of them tested positive for intestinal helminths. Figures in table 16 suggest that intestinal infestation has an association with poor nutritional status. For evaluating whether intestinal helminth infestation confounds a true association between working for wages and prevalence of malnutrition, a stratified analysis as shown in table 26 was carried out. It can be seen from the stratum specific estimates, that working children with worm infestation have increased odds (OR = 1.19) of having poor nutritional status as compared to non working children with worm infestation., although this association did not achieve statistical significance at 95 % confidence levels.

Table 26: Data from a cross sectional study of working for wages and odds of having poor nutritional status, stratified by presence of intestinal helminthiasis

Helminthiasis	Work Status	Nutritional Status			Odds ratio	95 % CI	P value
		Poor	Avge	Total			
Absent	Workers	25	27	52	0.86	0.43- 1.72	0.68
	Non Workers	45	42	87			
	Total	70	69	139			
Present	Workers	118	90	208	1.19	0.80 - 1.77	0.79
	Non Workers	96	87	183			
	Total	214	177	391			
Total	Workers	143	117	260	1.12	0.79 - 1.57	0.52
	Non Workers	141	129	270			
	Total	284	246	530			

It was seen in table 16 that increasing degree of helminth infestation was associated with increased prevalence of poor nutritional status. An analysis was carried out to see whether there was any significant association between intestinal infestation and prevalence of poor nutritional status when the effect of different levels of work status or energy expenditure was controlled by stratification. Table 27: shows the result of this stratified analysis.

Working Status	Intestinal Helminthiasis	Nutritional Status			Odds Ratio	95 % CI
		Poor	Average	Total		

Non Workers	Present	96	87	183	1.03	0.62 - 1.72
	Absent	45	42	87		
	Total	141	129	270		
Workers	Present	118	90	208	1.42	0.77 - 2.60
	Absent	25	27	52		
	Total	143	117	260		
Overall	Present	214	177	391	1.19	0.81 - 1.76
	Absent	70	69	139		
	Total	284	246	530		

Stratum specific estimates show that children with intestinal helminthiasis have higher odds of having poor nutritional status than children without helminthiasis, more so if they happen to be working children than non working children. However, the width of the 95 % confidence intervals show that the results are not statistically significant and that sample size may not be adequate, particularly in the case of the stratum for working children. There is uniformity in the estimates so a pooled Mantel Haenzel risk estimate was calculated.

Maentel Haenzel summary risk estimate RR_{MH} = 1.17

95 % confidence interval = 0.91 - 1.35

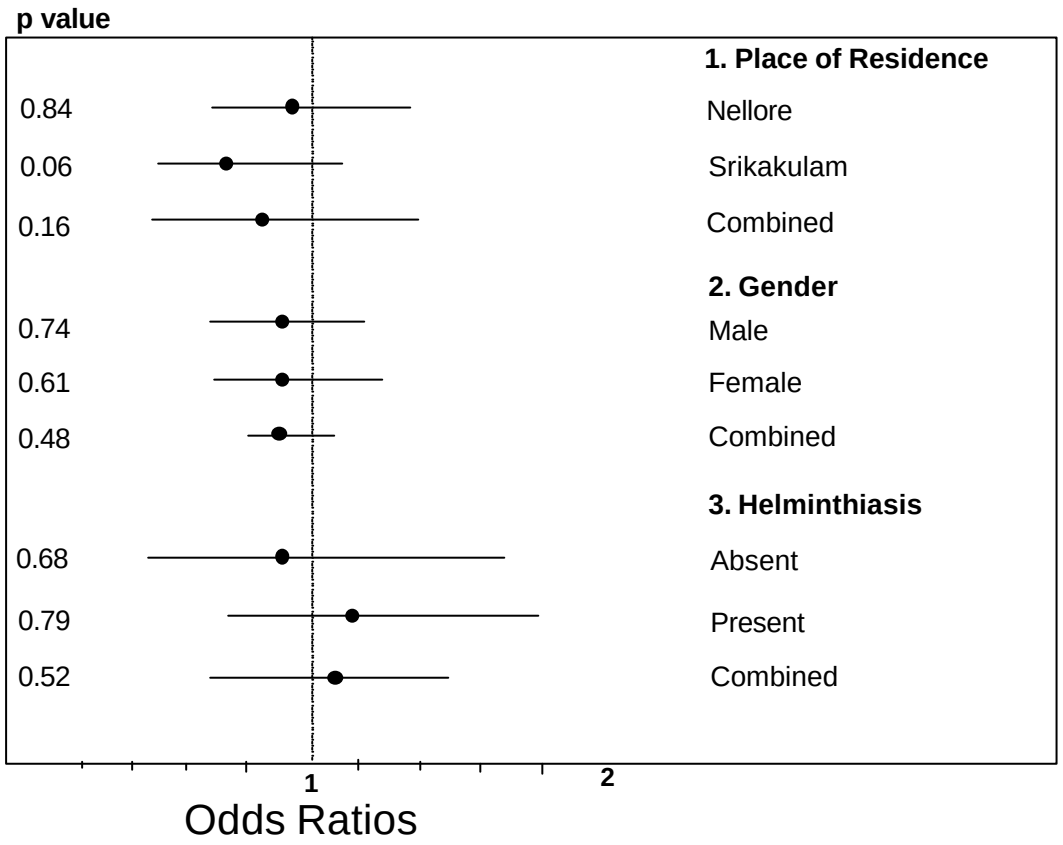
Chi square $_{MH}$ = 0.50, p = 0.48

The pooled estimate shows that children with stool helminth infestation have increased odds (OR=1.17) of having poor nutritional status, irrespective of whether they work or not. This result is in accordance with normal expectation as had been mentioned earlier that intestinal helminthiasis can result in defective intestinal absorption thereby causing malnutrition. Although the results have not achieved statistical significance , the relatively narrow 95 % CI of the adjusted estimate suggests less inherent variability of the estimate. Poor environmental sanitation coupled with the universal practise of open defecation in these villages results in such disease patterns.

The results of all the above stratified analyses are shown together below so that an overall picture of the association between labour force participation and odds of having poor nutritional status could be gauged. The null value of no association is depicted by the vertical line running at the level of odds ratio equal to 1. On the left margin of the figure are the p values determined from each of the analyses, as is known, a p value of less than 0.05 indicates that the results of this analyses could not have been due to chance and are adjudged to be statistically significant. As can be seen from the results, the 95 % confidence intervals for all the analyses straddles the null value of no association

and at the same time, the p values are all above 0.05, therefore the fact that chance could have played a role in the occurrence of these results, or that there is no statistical significance at the 95 % level. From the sampling strategy and the coverage figures, it was found that the sample sizes were adequate for all the analyses, except that the number of non working children in from the sampled villages in Nellore district is lower than that had been targeted.

Figure 2. Odds ratios (with 95% CI) from stratified analyses to study association between labour force participation and poor nutritional status.



From the above analyses, it appears that that there is no significant association between labour force participation and poor nutritional status in the children from the sampled villages, as the null value of no association ie 1 is included in the 95 % intervals for each of the strata. However, at this stage it would be pertinent to note that the working children are contributing towards the household income thereby increasing their chances of food intake similar to (or maybe better than) that of non working children and therefore the resultant lack of association. This effort on the part of working children (and the observed parity in the nutritional status between them and the children who do not work) is being made, as will be seen in the next section, at the cost of attending school and foregoing

educational development. In addition, it may also be noted that in both the districts, and in both sexes, while there is no significance of association, the odds ratios determined in this study suggest that the working children are at a slight advantage with reference to nutritional status and this suggests that there is an overall deficit in household food security that drives children to participate in work for income for food provision. Further studies need to address this issue to determine the reasons why the children who do not work, not work. Is it because of lack of demand for labour, or that only fit children can work, which further marginalises the undernourished. Therefore, it may be concluded that the nutritional status of the children from these villages, whether working or not, is not satisfactory with the overall prevalence of poor nutritional status being 50 -55 %. Efforts need to be made to improve this situation, and the nutritional needs of both working and non working children need to be addressed.

Labour force participation and other disorders

The association between working for wages and odds of having features of recurrent upper respiratory tract infections or skin disorders was also studied. Otitis media and tonsillitis were considered to be suggestive of chronic upper respiratory tract infections. The prevalence of these two disorders either singly or together in working and non working children were subjected to analysis for any association. Similarly, prevalence of all skin disorders in the two groups were analysed and the results are shown in table 28.

Table 28: Data from a cross sectional study on work exposures and odds of having recurrent upper respiratory tract infections or skin disorders

Disorder	Work status	Disorder			Odds Ratio	95 % CI
		Present	Absent	Total		
Chronic URTI	Worker	63	397	460	0.79	0.55 - 1.13
	Non worker	80	396	476		
	Total	143	793	936		
Skin disorders	Present	78	383	461	0.89	0.63 - 1.24
	Absent	89	386	475		
	Total	167	769	936		

The results show that there is no statistically significant association between working for wages and odds of having either chronic upper respiratory tract infections or skin disorders. Stratified analysis of the data was carried out according to place of residence and gender to look for possible

confounding, although such data disaggregation for these disorders would result in smaller sample numbers. It was found that there was no confounding in the observed association between URTI and work, in both districts and in both sexes.

Table 29: Data from a cross sectional study on work exposure and odds of having skin disorders, stratified by place of residence

Place of residence	Work status	Skin Disorder			Odds Ratio	95 % CI
		Present	Absent	Total		
Nellore	Worker	28	256	284	0.79	0.55 - 1.13
	Non worker	15	112	127		
	Total	43	278	411		
Srikakulam	Worker	50	125	175	1.49	0.96 - 2.31
	Non worker	74	276	350		
	Total	124	401	525		
Overall	Worker	78	382	460	0.88	0.63 - 1.26
	Non worker	89	387	476		
	Total	167	769	936		

Working children from Srikakulam were found to have increased odds of having skin disorders, although the association was not statistically significant. The skin disorders detected were predominantly scabies and multiple folliculitis. Some of the children with scabies also had secondary bacterial infection of the lesions, which increases the morbidity on account of the disorder as well as makes it more costly to treat, as antibiotics are required for the treatment.

Chapter 5 :

Child Education

The need for appropriate education of children cannot be overemphasized. As had been mentioned earlier, the right to free, accessible primary education is a fundamental right of every child. In this context, the educational survey collected data from various perspectives to understand the forces that govern the present education level of children residing in the sampled survey population.

Accessibility and Infrastructure

Table 30 shows the schools available for the children in the sampled habitations. This availability of educational infrastructure is discussed in the following perspectives :

Location of schools :

It is apparent that accessibility of educational facilities is a primary attribute for its utilisation by the community. In table 30, for each of the survey habitations, the distance from the centre of the village to the respective educational institution is mentioned.

Table 30: Location and distance of schools from survey habitations

District	Village	Primary/ Middle School	Distance km	High School	Distance km
Nellore	CB Nagar	Balwadi, CB Nagar	0	ZPHS Iskapalle	3
		MPES Iskapalle	2.5		
	Kothakurru	MPES Kothakurru	0		
	Labbipalem	MPES Kothakurru	1		
Srikakulam	Balrampuram	MPES Balrampuram	0	ZPHS Ippili	3
	Matchilesam	MPES D Matchilesam	0	ZPHS School	2

As is seen from the table, primary schools are available in each of the sampled habitations (except CB Nagar) which provide education facilities upto class 5. Children from CB Nagar

study upto class 1 in the local balwadi and then are enrolled in the primary school at Iskapalle. Further education for children from all the habitations entails travel on foot ranging from 2.5 to 4 km to the high school established in some of the bigger habitations by the district authorities. These high schools cater for children from a number of the surrounding habitations, and children face stiff competition for getting admission in them. This itself is responsible for the high dropout rates as will be seen later.

Infrastructure

For each school, the number of classrooms available, the total number of students enrolled and the number of teachers employed are tabulated in table 31.

Table 31: Number of students and availablity of infrastructure and staff in the schools

District	School	Classrooms	Students	Teachers
Nellore	Balwadi, CB Nagar	1	40	1
	MPES Kothakurru	2	121	2
	MPES, Iskapalle	6	331	8
	ZPHS, Iskapalle	6	301	7
Srikakulam	MPES, Balrampuram	4	186	3
	ZPHS Ippili	6	384	6
	MPES D Matchilesam	3	329	4

As can be seen, the schools are running to full capacity, with classroom : students ratio ranging from 1:50 in Isakapalle to 1:110 in D Matchilesam. In all the schools, it was noticed that some classes were also being conducted in the verandah as well as in open air clearings next to the school. Teacher - student ratios are also distributed in the same range as that of classroom student ratios, but there are no substitutes for teachers as there are for classrooms ! While discussing this situation with the teachers in some of the schools, it came to light that there were a number of intermediate level / graduate level educated young persons in the same or neighbouring habitations. It was suggested that some of them, especially women not employed elsewhere, would be willing to assist in teaching, provided some remuneration could be assured to them. If all children studying in the school were made to contribute a small sum, say Rs. 5 /- per head per month, then a school with 200 students could engage one or two additional teachers on a part time basis. In any case, the available classrooms and staff would be inadequate for the needs of all the children in the

habitations, therefore, apart from this immediate ad hoc solution, Government could assist in building up infrastructure of schools and facilitate local recruitment of staff in the long term perspective. Community participation in such decision making would help as this would take into consideration ground realities and use the local data for policy planning and implementation towards enhancing the educational development of these children.

Enrollment pattern

In the light of the location of and infrastructural facilities available in the schools, the age wise percentages of children enrolled in these schools was calculated from the survey data and is shown in table 32.

Table 32: Age and sex wise percentage distribution of school enrollment

Age	Srikakulam		Nellore		Overall	
	Male	Female	Male	Female	Male	Female
5	0	0	90	77	74	56
6	64	79	74	85	69	81
7	82	94	90	83	84	87
8	86	82	78	64	83	75
9	92	77	67	83	81	83
10	84	67	52	43	71	58
11	87	46	54	33	78	40
12	51	26	40	13	47	19
13	58	14	54	0	56	3
14	67	11	33	0	54	6
15	0	0	17	0	10	0
All ages	74.2	61.1	63.6	43.7	69.8	53.1

Denominators for calculating percentages are from age sex distribution of children from each district as shown in tables 4 and 6.
In Srikakulam, school enrollment commences at 6 years age.

As can be seen, female children are enrolled in high proportions at the early ages but this drops off rapidly at the time of transition from primary to middle/high school. In contrast, more boys tend to carry on with high school education, although only 40 to 60 percent of them do so. This point had been made by the children as well as the parents during the focus group discussions that costs of further schooling as well as the distance involved are factors which curtail the continuation of schooling in a significant number of children, and more so for girls.

Non enrollment and dropping out from school

From the above information it is seen that out of a total of 938 surveyed children, the enrollment rate was 61.3 %. At this stage, it must be remembered that the total number of target age group children in the five habitations was 1214, and almost all the children not covered in the survey were not enrolled in school, therefore the actual enrollment rate in this study population is below 50 %. Table 33 shows the distribution of enrollment in each of the habitations along with figures of children who had dropped out of school or had never enrolled.

Table 33: Habitation wise details of children currently not enrolled in school

Village	Total	Enrolled	Not Enrolled	Previous drop out	Current drop out	Never enrolled
CB Nagar	165	76	89	33	25	31
Kothakurru	180	92	88	50	6	31
Labbibalem	66	50	16	3	7	6
Balrampuram	237	177	60	32	14	14
D Matchilesam	290	180	110	23	37	50
Total	938	575	363	141	89	132

From the data, it is observed that 39 % of the children currently enrolled had dropped out from school in years previous to the current academic year, 25 % dropped out in the current academic year, and 36 % of the children had never enrolled at all. Of the children never enrolled, 71 % were female children.

It can be said that with the currently available educational facilities being utilised to more than capacity, some of the children, especially the ones performing poorly, may not be able to cope with the school and are therefore forced to drop out. A recently introduced government policy of providing 3 kgs of rice for each child who attends over 80 % of school days in a month has led to higher enrollment, including female children.

Child Labour and Education

The children had been asked for the reasons for not enrolling or dropping out of school and the most common response was to support family income. Other responses included need to provide domestic help, and high costs and distance involved for pursuing high school education.

Apart from having to attend school, some children also work for wages, while others do not, and still others do neither. Table 34 shows the distribution of the children in these four categories from the two districts according to gender.

Table 34: District wise percentage distribution of children who (n)either work and /(n)or study

Work/ Education status	Nellore		Srikakulam		Overall	
	Males n = 196	Fem n = 215	Males n = 278	Fem n = 249	Males n = 474	Fem n = 464
Only study	25.5 %	22.8 %	41.7 %	57 %	35 %	41.2 %
Work and study	37.8 %	20.9 %	28.8 %	3.2 %	32.5 %	11.4 %
Only work	30.1 %	50.7 %	17.3 %	13.3 %	22.6 %	30.6 %
Neither work nor study	6.6 %	5.6 %	12.2 %	26.5 %	9.9 %	16.8 %

All the female children from the last group even though not working for wages were actively involved in domestic chores, including cleaning, cooking, caring for younger siblings etc. while parents could pursue work for wages. The reason that there are more children from this group in the study population from Srikakulam could be due to the fact that the acquaculture industry in this district is relatively new so there are not that much demand for labour and in addition, there is no room in the schools for these children. It is this group of children who need to be helped first, by putting them through some feasible for of education so that they attain some skills for individual development Secondly those children who only work should also be educated through some alternate schooling which accommodates their working hours.

The academic performance of those children who were only studying and those children who both work and study is shown in table 36. The balwadi school in CB Nagar that has pupils studying in class 1 does not conduct examinations, so the 40 students from that school where excluded from this analysis. From the results, it is seen that children who both work and study have marginally higher pass percentages (marks > 30 %) as well as higher proportions of students with more than 50 % aggregate marks, especially in Srikakulam.

Table 36: Performance of children during annual examination April 2000.

District	Education status	Academic performance (% marks)			
		Not attended exam	< 30 %	30 - 50 %	> 50 %
Nellore	Only study	1	24	32	18
	Work & study	0	34	40	29
Srikakulam	Only study	12	13	150	82
	Work & study	3	3	43	39

Children who attend school and do not work for wages absented themselves from examinations in slightly higher percentages than those from the other group. These observations may explain the theory that children who work feel more responsible and manage their time for studies better than those who do not work.

Chapter 6 :

Focus Group Discussions

Discussions were carried out among groups of mothers of working children, community leaders and working children themselves from one of the selected habitations in Nellore ie Chandrababu Nagar. These discussions were used as an additional source of information and opinions on some of the issues concerning the socio economic relationships involved in the prevalence of child labour as well as the impact of child labour on the health and education of the children. The discussions were held at the local school. This venue was chosen rather than the house of the village sarpanch or that of the health worker so that each of the participants can be comfortable and not be afraid to speak out. For each group, there was a facilitator who introduced the topics and moderated the discussion as well as a recorder who maintained field notes. In addition audio recordings of the discussions were made which were later transcribed. Each discussion lasted for 50 minutes to 1 hour. Details pertaining to group composition and the results are described for each of the groups are described below.

Mothers of working children

The group comprised of 12 mothers of working children and their ages ranged from 28 to 40 yrs. Two main themes for discussion were that of child labour and gender differences. Various aspects discussed included mothers' perceptions regarding determinants of child labour and their opinions on health hazards. In addition, their opinions regarding education of children was also probed. Description of other topics discussed such as dietary practices and availability of health facilities were covered elsewhere in the report.

Reasons for child labour, knowledge of health hazards, attitudes towards child education.

The mothers were categorical in stating the necessity to either send their children for work or to take the children along with them to work for wages. They treated this aspect in a matter of fact manner and were neither offended nor defensive on being asked why was it necessary for children to work for wages. However, a few participants personally did not like the idea of their children working at such young ages, but had to send them out of necessity. Adult male earnings were not sufficient to meet all needs of the family, especially since they were prone to spend part of the earnings on alcohol. Money earned by the wife and the children was essential to provide food and clothing.

Some mothers stated that part of the girl child's earnings are saved for their marriage. The girl children were made to perform domestic chores and wood gathering, apart from working in acquaculture, agriculture and salt processing. Boys would work in acquaculture and salt processing but would not have to perform domestic chores. Instead, they had to catch fish for household consumption. The main hazard which mothers feared was of boys drowning while working in acquaculture or fishing, and of snake bite for girls working in fields, but no deaths/ accidents have ever occurred so far. They stated that girls get skin diseases on hands and feet while working in agriculture. They also warn the children about other insect bites such as crabs, centipedes etc. Regarding education, mothers felt that working for wages was the priority over education, and that if schooling was required, then boys were preferentially sent to school. This too, till they attain the age for working. The necessity of income for children's food and clothing was more important. In addition, schooling costs money whereas work earns money, therefore the priority of work over education. Finally, mothers stated that if they were provided Rs 100/- per day, they would be in an position to send that child to school.

Differences in attitudes toward male and female children

Although initially , mothers said that boys and girls are considered equal, further discussions revealed differences. For instance, the attitude that girls are made to wake up much earlier to help with domestic chores prior to leaving for work, not being spared from work even if feeling tired/ill, and that the girls income is taken away totally by the mothers. Boys manage to evade and spend part of their earnings on movies, bidis etc. As one mother stated, " My husband spends all his earnings on liquor, my son gives me only part of his earnings, so if I do not take all my daughter's earnings how am I to run the home ?" Boys are preferentially sent to school. Girls are either not enrolled or are made to drop out earlier than boys so that they can help at home or work outside. Mothers felt that girls would have to work for wages throughout their life. Girls are beaten up severely by mothers if they do not return from work in time, while boys are rarely questioned of their whereabouts. Girls are married off at 13 years, or whenever the parents have sufficient money. Mothers regret this and state that a large number of the girls have to undergo surgeries during childbirth.

Community leaders

This group consisted of 21 participants , 9 of them male and 3 female, ages ranging from 22 to 70 years. The heterogenous composition of this group did not seem to affect the nature of responses. The main themes for discussion were sources of livelihood and the attitudes towards child labour and education.

Sources of livelihood

It was agreed by all that the primary source of income, that is fishing, was nowadays not sufficient to meet all the household needs. The reasons for this was reduced availability of catch due to the stiff competition from mechanised fishing boats. In addition, some of these boats use different kinds of nets which also deplete the sea of eggs of the different species of fish, which decreases the catch. Since the advent of the acquaculture industry, huge motors used to pump sea water inland create sound and vibrations within the sea water and along the seabed which, these people feel, has disturbed the breeding environment and 'scared' away the fish thereby depleting the availability for catch. As fishing is the only trade that they know, they are completely dependent on it. Hence a number of them have given up traditional fishing and nowadays turn out as drivers of mechanised boats for a paltry sum, which cannot be matched with the sum that the fish catch would fetch in the market. This sum was not sufficient to meet the needs of the family. During this discussion, some males also admitted that these earnings were spent by them on liquor, and that they demanded additional money for this purpose from their wives and children. Thus children's income was needed for their food, clothing and medical treatment and other such necessities. The participants all agreed that the community needed better housing, sanitary facilities, agricultural land, cattle and carts. In view of the bleak future of fishing as a source of income, they opined that if they are given training in another profession it would be useful to them.

Attitudes towards child labour

In view of the above, they feel that it is imperative for them to send children to work rather than to school. Some of them said that apart from earning money, children by starting to work early were trained in skills which would help them later, rather than obtaining partial education which will not serve any purpose. They also said that they do not have any reservation for jobs (later proved to be untrue as they belonged to a registered Backward Class, as verified from the Mandal Revenue Office). They did not feel uncomfortable about their children working for wages. Some participants

also stated that the children were happy working, even at their early ages while this was strongly refuted by others. It was also stated that if they were assured a sum equivalent to the child's daily wages as compensation, they would send their children to school. One woman also stated that even if she was assured a sum for the dowry for her daughters, she would rather send them to school.

Working children

This group consisted of 11 working children, 8 female children and 3 male children. The ages ranged from12 to 15years. the parents of the children were standing outside the site of the discussions, out of sight of the children but just within earshot. After some time, the parents drifted away. To create an informality in the proceedings, the children were initially engaged in light conversation about generalities and in group singing. The main themes were nature of tasks and health hazards, and attitudes towards education.

Nature of tasks and health hazards

Girl children wake up at 5 o ‘clock and complete the domestic chores before moving out for work by 7 o clock. They even have to take care of the small children. Girls go for salt processing, agricultural labour and shrimp seed collection, while boys go for salt processing and shrimp seed collection only. The boys also have to catch fish for household consumption, while girls collect / cut firewood. The girls, those who do not attend school, said they enjoy going out for work as they can be with their peer group. According to the children, agricultural labour is the most difficult task for girls while catching fish is the most difficult task for boys. In any of the tasks, the children do not have food breaks during working hours, and are not paid if they leave the work before completion, and employers scold them even for small mistakes. They do not argue for fear of termination. The boys are beaten by their fathers if they do not fish properly.

The children were more descriptive about the health problems they experienced on account of work. For instance, during agricultural labour, they complained of headache and backache due to exposure to long periods of hot sun and prolonged stooping, and of itching in hands and feet due to working in stagnant water. In salt processing, the children complained of burning in the soles. Shrimp seed collection causes injuries to hands and feet from underwater rocks, plants and weeds and other insects, although most of these are only minor injuries. Wages are paid equally to boys and girls, but

girls have to hand over entire earnings while boys spend a part of their earnings. The children hand over the money to their mothers rather than their fathers as the fathers would spend the money on liquor. The children also felt that boys and girls are treated equally at home. At the work place, girls are preferred to boys as they are more disciplined at work while boys tend to play and fight and disrupt the proceedings.

Attitudes towards education

All the children in the group were not attending school in the current academic year. Most of them said that although they are interested in attending school, their parents denied them the opportunity and ordered them to work. According to the children, this was because of lack of money and they felt that only rich people send their children to school, and they too send only their boys.

Finally, the children said that they hoped to have a school in the village with a pucca building, play ground, play things and good teachers. They also hoped to have a doctor in their village, good roads and a bus facility for the village.

Chapter 7 :

Summary and Conclusions

The conclusions of this study are grouped as answers to each of the research questions listed along with the objectives. These conclusions are drawn from data obtained through one or more of the data collection and analytical procedures that have been described.

1. Prevalence of child labour in the acquaculture sector :

a) Labour force participation by children from the sampled villages in each district is as follows :

District	Males	Females	Combined

Nellore	67 %	71 %	69 %
Srikakulam	42 %	16 %	32 %
Both districts	54 %	42 %	48 %

b) The true participation of children in the labour force is higher than that arrived at from this survey as almost all of the 25 % children who were not recruited for the survey were involved in working for wages.

c) Children from both sexes perform tasks pertaining to the acquaculture sector as well as in other sectors such as salt processing, agricultural labour, fishing and construction labour.

d) Among working children, on an average, female working children work on more days each week than their male counterparts.

e) Almost all children above 10 years from both sexes in all the habitations surveyed in this study participate in one or other form of work for wages.

2. Health profile of children in the sampled villages :

a) Prevalence of moderate to severe protein calorie malnutrition ie weight for age less than 75 % of median weight for age from reference standards is as follows :

District	Males	Females	Combined
Nellore	56.2 %	55.4 %	55.7 %
Srikakulam	49.1 %	44.6 %	46.7 %
Both Districts	52.3 %	49.5 %	50.9 %

b) Children from both sexes and at all ages in the two districts suffer from similar prevalances of malnutrition as defined above, with no specific age, sex or regional group being significantly disadvantaged as compared to the others.

c) The percentage prevalence of anaemia using 11 gm % as cut off level in children aged 5 - 15 years is as shown in the table :

District	Percentage prevalence of anaemia (Hb < 11 gm %)		
	Male	Female	Combined
Nellore	90.6 %	97 %	94.1 %
Srikakulam	87.7 %	93.9 %	90.6 %
Both Districts	88.9 %	95.5 %	92.2 %

d) Prevalence of moderate to severe anaemia is significantly higher among female children aged greater than 10 years from sampled population in Srikakulam as compared to all other age sex groups from the two districts.

e) Angular stomatitis was found to have a positive predictive value of 89 % for detecting protein calorie malnutrition.

f) Overall prevalence of ascariasis was 46.3 %, of ancylostomiasis was 31.8 % for and of trichuriasis was 30.5 %.

g) Percentage prevalences of other clinical disorders detected were as follows :

Dental Caries	12.2 %
Tonsillitis	7.6 %
Otitis Media	8.3 %
Scabies	9.2 %

3. Effect of labour force participation on health of children

a) Data from descriptive cross sectional surveys cannot be used to study this effect as health status of children before entering labour force is not known. However, it was found that there was no significant increase or decrease in the odds of working children in having poor nutritional status, upper respiratory tract infections, or skin disorders, as compared to non working children.

b) The overall health profile of the children being dismal, significant differences in health status of working and non working children is unlikely. On the other hand, in some habitations, although the sample sizes were too small, working children appeared to be have better nutritional status than non working children. This could be attributed to their contribution to the family income.

c) A follow up study to assess health status of new entrants in the labour force from those in the study population currently not working will aid in understanding the true effect of labour force participation on health.

4. Education facilities available, school enrollment pattern

a) Primary education facilities are available in all sampled villages but lack infrastructure and staff.

b) Classroom : student ratios range from 1 : 60 to 1: 110, and these classrooms do not have furniture / electrical fittings etc.

c) Teacher : student ratios range from 1 : 45 to 1 : 110, and very few of the teachers reside in the village.

d) Child school enrollment rate in the districts is as shown :

District	Males	Females	Combined
Nellore	63.6 %	43.7 %	53.1 %
Srikakulam	74.2 %	61.1 %	68.0 %
Both districts	69.8 %	53.1 %	61.4 %

e) The true enrollment rates would be much lower, as almost all the 25 % of children from these villages not covered in this survey were not enrolled in school.

f) Female enrollment rates are markedly lower than males in both districts, and the number of girls studying beyond primary school is negligible.

g) Children who work and study have slightly higher examination attendance rates, examination pass percentages as well as higher numbers with aggregate marks above 50 % as compared to children who only study.

h) Children drop out of school to support family income. Some female children are not enrolled in school because they are needed for domestic help, looking after siblings etc.

i) Although data had not been specifically gathered in this regard, it appears that some children are forced to discontinue schooling due to limited availability of high schools.

5. Socio economic factors that result in children participating in the labour force

a) Lack of household food security due to inadequate household income.

The reasons for this could be :

1. Dwindling traditional sources of income for the community in general.
2. Lack of alternate adequate sources of income.
3. Growing population of both children and elderly, thereby increasing the burden on the primary income generators, ie the parents.
4. Wastage of income on habits such as alcoholism.

b) Parental attitudes towards work and school.

1. Parents feel that boys need schooling and girls do not, and should either provide domestic help or accompany the mother to work.
2. According to some mothers, girls need to work to earn sufficient money for their dowry and marriage, therefore they are sent to work.
3. Children would be better equipped if they learnt skills directly related to income generation than school education.
4. Girl children would need to work at home and outside throughout their lives so they should be trained early in performing these tasks.

c) Lack of adequate educational facilities.

Some children, for sheer lack of anything else to do are driven into entering the child labour force. This is because schools do not have capacity to educate all the children, even upto primary level.

Chapter 8 :

Recommendations

Towards improvement in income and household food security

- Promotion of women's self help groups which can market the fish catch directly in the town rather than selling the catch to middlemen at lower prices in the village
- Promotion of horticulture in small plots lying unused within and in the vicinity of the villages so that green vegetables etc are available for domestic consumption as well as for sale
- Promotion of small scale poultry farming ventures which could be of same use as horticulture, especially since eggs have high net protein utilization
- Community counselling regarding wasteful habits such as alcoholism

Towards improving child nutritional status

- Improving community sanitation by providing sanitary latrines and educating community on usage
- Improving personal hygiene of children through health education which will reduce intestinal, skin and other infections that impair growth and development

- Alteration in dietary habits, as rice consumed in combination with fish could reduce absorption of iron due to formation of insoluble phytates.
- All girl children aged above 10 years should be provided with supplemental iron in combination with ascorbic acid which can be tolerated in an oral formulation.

Towards improvement in educational development of children

- Improvement in school infrastructure so that all children can be accommodated for education upto primary level.
- Increase in infrastructure of high school facilities that will increase the number of students completing high school.

- To strengthen the alternative schooling scheme 'Akshara Deepam" which promotes literacy among non enrolled and working children during evening school sessions.

Towards improving income from traditional sources

- Strict implementation of Coastal Regulatory Zone Act so that eco system along the coastline is not altered such that it endangers environment and livelihood of resident communities.
- Improved surveillance systems which will prevent trawlers from operating within the 10 km zone earmarked for fishing by the traditional fishing community.
- Provision of loans / grants for upkeep of boats / fishing nets etc that will improve the catch.

Towards minimizing child participation in labour force

- Improvement in household food security and in educational facilities will result in reduction of child labour force participation
- Community counselling regarding requirement of basic education for all and especially for the girl child.

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