EXAMPLES OF HEALTH POLICY ANALYSIS

SRI LANKA
AN ILLUSTRATION WITH THREE EXAMPLES
IMPACT OF AGRICULTURE POLICIES ON HEALTH
IMPACT OF SETTLEMENT PROGRAMS ON HEALTH: THE MAHAWELE SCHEME
THE HEALTH IMPACT OF POLICIES ON THE URBAN POOR.

METHODOLOGY & ANALYTICAL FRAMEWORK

MARGA INSTITUTE
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This project was directed by Godfrey Gunatilleke.

The individual studies were authored as follows:

Agricultural Policies and their Impact on Health
Eardley Fernando and Godfrey Gunatilleke.

Mahaweli Project. Health Policy Analysis.
Dr. P.D.A. Perera and Godfrey Gunatilleke.

Policies Affecting the Urban Poor. With Special Emphasis on
Health Related Outcomes. The Case of Sri Lanka.
Dr. Nimal Gunatilleke.
AGRICULTURAL POLICIES AND THEIR IMPACT ON HEALTH

SECTION I

THE AGRICULTURAL SECTOR IN SRI LANKA - AN OVERVIEW

1. Introduction

Agricultural Policies and the products and processes of agriculture are an important determinant of the people's health in both developing and developed countries. In developing countries, however, unlike in developed countries, the health status of the majority of the population is closely linked with agriculture for it is on the performance of this sector that their incomes and well-being depend. Nevertheless, it would be true to say that in general, agricultural policy-making does not take into account the health implications of agricultural policies and programmes.

The policies in the agricultural sector will be primarily concerned with sectoral goals which are specific to agriculture. These will normally include agricultural productivity and output of the various crops, diversification, production for import substitution and exports and food self-reliance. The outcomes of these policies have far-reaching consequences for the health and nutritional status of the population through their effects on the income and purchasing power of the agricultural workforce, the availability of food and the movement of prices. Yet, the analysis of the agricultural policies at this level for their possible outcomes on health is seldom undertaken by national and sectoral planning agencies. However, agricultural planners may often collaborate with the health sector to alleviate or mitigate clearly identifiable and visible health risks which impede or retard agricultural growth. The joint effort of these two sectors to combat the spread of malaria in Sri Lanka for the development of the dry zone is a striking example. There is little evidence of similar collaboration to uncover health risks which do not have the same direct impact on agriculture even though they could lead to negative feedback on agricultural productivity and output. The uncontrolled use of pesticides and weedicides in Sri Lanka which has caused serious health hazards to agricultural workers and farming families is an example.


Structure

The agriculture in Sri Lanka including forestry and fishing contributed approximately 26.3% of GDP in 1988. It employs about 45% of the total workforce. The composition of
agricultural output in terms of value added is given below.

<table>
<thead>
<tr>
<th>Sector</th>
<th>1988 Rs (Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agriculture, Forestry and Fishing</td>
<td>...</td>
</tr>
<tr>
<td>1.1. Agriculture</td>
<td>45,557</td>
</tr>
<tr>
<td>1.1.1. Tea</td>
<td>6,478</td>
</tr>
<tr>
<td>1.1.2. Rubber</td>
<td>1,619</td>
</tr>
<tr>
<td>1.1.3. Coconut</td>
<td>5,021</td>
</tr>
<tr>
<td>1.1.4. Paddy</td>
<td>9,420</td>
</tr>
<tr>
<td>1.1.5. Other</td>
<td>23,019</td>
</tr>
<tr>
<td>1.2. Forestry</td>
<td>4,006</td>
</tr>
<tr>
<td>1.3. Fishing</td>
<td>4,037</td>
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</table>


As it would seem from this table the agricultural sector in Sri Lanka contains two components which are more or less clearly distinguishable, with different agro-climatic characteristics and structures of production. The tree crop sector comprises one component. It includes tea, rubber, coconut and other minor export crops such as cloves, cinnamon, cardamoms, which are produced primarily for export and contribute the major share of Sri Lanka's export earnings. This export-oriented agriculture is mainly confined to the wet zone. The major part is organised in relatively large land holdings, employing wage labour. The other component consists of seasonal crops, mostly food crops which are produced for domestic consumption, in small holdings with a large proportion of owner cultivators. The landlord and tenancy arrangements which are a common feature of traditional peasant agriculture in developing countries also form part of the structure of ownership in the paddy sector in Sri Lanka. It is however the smaller part, and is regulated by legislation which has attempted to safeguard the benefits of tenant farmers. The most productive part of peasant small holding agriculture based on seasonal food crops is located in the dry zone and depends on irrigation.

Priorities.

Agriculture continues to be the major commodity producing sector in the economy. The national plans project a growth rate of approximately 4% per annum for agricultural output during the five-year period 1988 to 1992. The specific goals of agriculture
have been identified as follows:

(i) "Optimum production of basic food items - rice, milk, sugar, fish and pulses - in order to achieve a high degree of self-reliance of supply thereby providing greater security and improving the nutritional status of the population;

(ii) Expansion and diversification of agricultural export earnings;

(iii) Increasing income levels and employment opportunities in rural areas."

The total government capital investment in agriculture and the allocation for the various sub-sectures and programmes for the period 1988 to 1992 is given below. Agricultural investments absorb approximately 27% of the total national investment of the government.


<table>
<thead>
<tr>
<th>Ongoing</th>
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<td>Total Government investment</td>
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<tr>
<td>Agriculture</td>
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<tr>
<td>(a) Mahaweli</td>
<td>21,800</td>
</tr>
<tr>
<td>(b) Other Irrigation</td>
<td>4,854</td>
</tr>
<tr>
<td>(c) Forestry</td>
<td>556</td>
</tr>
<tr>
<td>(d) Lands</td>
<td>1,913</td>
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<td>(e) Field and Minor crops</td>
<td>3,433</td>
</tr>
<tr>
<td>(f) Livestock</td>
<td>488</td>
</tr>
<tr>
<td>(g) Fisheries</td>
<td>1,238</td>
</tr>
<tr>
<td>(h) Plantation</td>
<td>3,176</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>New Projects</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Government Investment</td>
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</tr>
<tr>
<td>Agriculture</td>
<td>619</td>
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<tr>
<td>(a) Mahaweli</td>
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<td>(f) Animal husbandry</td>
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<td>(g) Fisheries</td>
<td>236</td>
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</table>

Source: Public Investment - National Planning Division
Some Socio-economic Characteristics.

The agro-climatic as well as socio-economic characteristics of the agricultural sector in Sri Lanka are important for the purpose of identifying the linkages between agriculture and health. Recent socio-economic surveys reveal that nearly a quarter of the households in Sri Lanka live in conditions which can be characterised as absolute poverty below the level at which the minimum basic needs can be satisfied. The major share of this segment is in the rural sector, either obtaining their livelihoods directly from agricultural or agriculture-linked economic activities. In the tree crop sector the casual workers who are dependent on seasonal employment in the plantations suffer from fluctuations of income which lead to periodic shortages of food in their plantations. The health status and levels of literacy of the resident workforce of Indian descent are significantly lower than the national averages. In the tree crop sector which is subject to price fluctuations in the international market, the smallholders such as those cultivating cinnamon have been specially vulnerable.

In the peasant smallholding sector which produces only food crops a large part of the population is exposed to intermittent droughts, consequent crop failures and wide seasonal variations in their income flow. The households in poverty are to be found among the landless labourers, the owners of fragmented holdings and cultivators without access to adequate or regular supply of water. The impact of policies and programmes on the income and living conditions of these vulnerable segments of the population living on agriculture will have direct consequences for their health and nutrition. In the case of each of these segments who are at "risk" it would be possible to identify the relevant agricultural policies and programmes or, in their absence, to articulate the need for them.
SECTION II

DIRECT LINKS BETWEEN AGRICULTURAL OUTCOMES AND HEALTH OUTCOMES

1. The Main Linkages

The main linkages between agriculture and health are to be found in -

(a) the contribution of agriculture to the increase in productivity and incomes in general and the alleviation of poverty in particular;
(b) the increase in the output of food and the impact of agriculture on food availability and food prices;
(c) the changes in technology and its effects on the health of agricultural workers, farm households and consumers of agricultural products.

The nature of each of these links and the way in which they impact on health would depend on the mix of agriculture and the structures of production which are specific to a given country. In certain national contexts, the agricultural strategy which is aimed at food, self-reliance may benefit a large segment of small producers to improve their living conditions and promote their well-being. Such was the case in Sri Lanka. In others where food produced by small-scale cultivators is being exported, diversification for export may be the strategy which improves the incomes in this segment. A relevant example is Thailand. Policies for increasing agricultural output in a situation where land-ownership is highly unequal may result in the further impoverishment of the low income smallholders as has happened with the introduction of high yielding varieties in several countries.

The impact of agricultural policies on incomes would have numerous ramifications all of which would eventually affect the purchasing power of households favourably or adversely and by this means, their food consumption and health-related expenditures. An attempt to trace these ramifications for the entire population at different income levels would be a very time consuming task which would be covering a vast range of income effects of widely varying significance. No doubt it would be possible to capture most of these effects through an appropriate model using such techniques as social accounting matrices. However, for the purpose of this exercise it would be sufficient if the impact is examined on a more selective basis in terms of the poorest income deciles in a country. The agriculture-linked population which is living below the poverty line which is defined for the country, would be the appropriate group which has to be considered for the likely impact of agricultural policies and household incomes. It is this group which is at the margin and exposed to the health hazards of poverty through inadequate food consumption, poor housing and sanitation and low levels of literacy. Significant increases in the incomes of these groups will translate themselves directly into an improvement in nutritional status and health.
The second linkage relates to a set of policies which range from the priority assigned to food production to the policies and programmes pursued to maintain an adequate supply of food to the population at reasonable prices. In most countries given the capacity for food production, these policies are closely interlinked as has been demonstrated in the case of Sri Lanka. The task of reconciling the interests of the producer for the purpose of food self-sufficiency with the interests of consumers presents problems which are of a particularly complex nature. Sri Lanka has attempted to balance guaranteed pricing schemes and massive transfers of resources to food production at one end with food subsidies and state control of the major food items at the other.

The third linkage relating to technological change contains the most readily identifiable impacts on health. These include the impact of major irrigation schemes on the spread of certain diseases such as malaria, diarrhoea, schistomiasis, the health hazards of pesticides and weedicides, the occupational risks of mechanisation. These may have a differential impact on the genders. It has to be noted that technological changes in agriculture can have both positive and negative outcomes in health. Agricultural technology has produced dramatic improvements in the productivity and quality of staple foods. In certain contexts, it can concentrate on increasing output of the staples of the poor - the cheaper starchy foods and coarse grains. It can improve the nutrient quality. The technological changes also help to reduce the input if human energy in highly arduous manual operations and make the agricultural occupation less onerous and more healthy.

2. The Disaggregation of Health related Components

The chart which follows attempts to provide a visual presentation of these main linkages as they flow out of the agricultural component to the health outcome. The principal components of agricultural strategies and policies that are depicted in the diagram provide a basis for uncovering and identifying the health related elements. It would be useful to enumerate these in a list of questions under each element so as to focus on the relevant agricultural policies, and policy instruments which lead to socio-economic outcomes, which in turn produce the main linkages between health and agriculture in terms of poverty alleviation, food and nutrition and the health implications of technical change.

i. Goals
   - How are the stated goals of agriculture related to poverty alleviation, food availability and nutrition? How are these concerns reflected in the main sectoral strategies and objectives?
ii. Poverty Alleviation

- To what extent is the allocation of resources directed towards the poorest and backward segment of the agricultural sector? Do the priorities assigned to increasing agricultural output neglect the possible repercussions of policies on the vulnerable groups in agriculture, for landless labour, owner cultivators with inadequate land resources, systems of cultivation with inadequate water, women and their role of agriculture. (Many countries in their effort to increase production has concentrated on areas where the returns are highest at the expense of areas where returns are highest at the expense of areas where the need was greatest. This is well documented in the experience based on the introduction of high yielding varieties in rice and wheat.)

- What is the priority given to the production of staple food as against non-food items; too expensive high quality nutrient rich products as against high calorie foods from which the poor get their proteins, as for example, cereals and pulses; cheap staples such as roots, yams and tubers which form a high proportion of the basket of the poorest.

- Is priority given to high yielding varieties as against robust products suitable for local conditions with lower production costs?

- Is cash cropping, with its capacity to generate employment and raise incomes at the expense of traditional farming, having adverse impacts on nutrition of the most vulnerable groups?

- Are there policies to improve access to poor smallholder farmers, tenant farmers and the landless to land?

- Are there policies to improve their access to agricultural resources - water, credit, seed?

iii. Food and Nutrition

- Do pricing policies take account of food and nutrition issues - especially in relation to food prices?

- What is the impact of guaranteed prices on conditions and incentives relating to food production on the one hand, and to food consumption and food security on the other?
- What impact do food subsidies have on conditions and incentives relating to food production on the one hand and food consumption and food security on the other?

- How realistic are guaranteed prices as against market prices?

- Is there legislation relating to agricultural land which impede agricultural growth?

- What are the programmes to minimise post harvest losses.

- Are home gardens promoted to provide complementary nutrients?

- Is there awareness of health risks of dangerous crops/products such as tobacco? Are efforts made to deal with them? Are farmers of harmful crops provided with other equally income yielding crops or alternative employment to enable regulatory interventions to be effective? To what extent is concerted action through public policies, propaganda, information and education, meaningfully endeavouring to protect health by reducing the demand for them?

iv. Technical change and research

- What are the health hazards of major development projects such as irrigation, land settlement, e.g. environmental damage, spread of waterborne diseases, malaria, vulnerability of newly settled population in terms of social dislocations, nutrition, and new health hazards?

- What are the effects of technical changes on labour, employment and the use of human energy, particularly of women?

- What Policy initiatives and safeguards exist as regards health risks from agrochemicals, pesticides etc.?

- What are the policy initiatives and safeguards regarding accidents and injuries resulting from the mechanisation of agricultural operations - ploughing, threshing etc.

- Does Scientific Research focus on improving conditions of poor farmers through variety improvements, crop mixes and overcoming problems of seasonal fluctuations, droughts, floods etc.
SECTION III

THE HEALTH IMPACT OF AGRICULTURAL POLICIES IN SRI LANKA

This section attempts a selective application of the analytical framework set out in Chart in Section II to some of the major agricultural and food policies that were pursued in Sri Lanka. It does not attempt to provide an overview of the entire range of agricultural programmes and policies covering the different crops and subsectors. It focuses on those components of agricultural policy where the impact on poverty alleviation, food availability and technological change are likely to have been the greatest. In doing so the analysis attempts to illustrate how the health-related policy components could be identified and developed to a "health policy" within the agricultural sector.

The boundaries of agricultural policy cannot be defined very precisely or rigidly. Agriculture narrowly defined will deal only with the policies and programmes which are concerned with agricultural production. In most national systems the subject of food which includes food supply and food distribution and relates to the needs of demand of the consumers would be either a separate or part of a separate portfolio. In Sri Lanka agriculture and Food have sometimes often combined in one Ministry, and on other occasions have been subjects of different Ministries. Food availability and prices of food would not only be determined by domestic food production and producer prices administered by the Ministry of Agriculture; they would also depend crucially on other policies such as food subsidies, systems of procurement and distribution. These in turn will be governed by macro-economic policies adopted in the management of the economy - such as policy, budgetary, monetary and exchange rate policies. A full analysis of all these implications for food prices and food availability do not fall within this paper. Even though the agricultural strategy had many elements which focused directly on the poorest strata in rural Sri Lanka, it is inevitable that services and programmes directed at increasing production are utilised best by the potentially efficient farmers, with human and other resources for rapid absorption of the new techniques. Agricultural services tend therefore to concentrate on the farmers with demonstrable potential for high productivity and leave behind the poorer or less efficient producers.

These groups who lag behind, or are altogether neglected by the system can be identified in various parts of the agricultural sector. The identification of these groups is one of the first prerequisites for identifying the key linkages between agriculture, poverty alleviation and improvement of health and nutrition. The chart is an initial attempt to map the main pathways along which the socio-economic outcomes of agricultural policy eventually link with health and nutrition. Each item
which is enumerated would have to be analysed in much greater
detail in a given national context to identify the various
health-related elements in the policies themselves, and their
specific health or nutritional outcomes.

The whole agricultural policy, the issues and questions they
raise and their implications for health cover too wide an area
for a study of this nature to be meaningfully undertaken. The
area of study has therefore been narrowed down to smallholder and
peasant agriculture and to agriculture devoted primarily to the
production of food items other than tea. Within these limits it
examines rice production - the major programme in smallholding
agriculture - other food crops, coconut, sugar, and the small-
holdings under tree crops. Within this area the principal
linkages between agricultural outcomes and health outcomes are
examined in terms of:

(i) the contribution of agriculture to income
generation and poverty alleviation;
(ii) the contribution of current agricultural programmes
to food availability and the satisfaction of
the nutritional needs of the population;
(iii) the intensification of existing health hazards and
the new health hazards generated by technological
changes in agriculture.
(iv) health implications of important demographic
changes resulting from agricultural development;
(v) other special health problems which are related to
agriculture.

The contribution of agriculture to income generation and poverty
alleviation

The agricultural strategy in Sri Lanka during the last four
decades centered on the paddy rice economy. The increase in
domestic paddy cultivation became a fundamental policy objective
of the government since independence in 1948. The concentration
of effort on the rice sector fulfilled several socio-economic
objectives. First, in order to achieve increased production
government programmes had to improve the productivity of what was
in the 40s, the most backward and least productive of the
agricultural sectors - the peasant smallholding sector. Second,
rice production was seen in the larger context of import
substitution and savings of foreign exchange to assist in the
management of the country's balance of payments. Third, the
efficient administration of the food rationing scheme had to rely
on the ready availability and distribution of rice. The special
elements of the paddy programme which had an impact on the
alleviation of poverty was the land settlement programme through
which the poor landless peasants in the densely populated wet
zone were resettled in agricultural schemes in the dry zone under
which they obtained an economic allotment of land. These schemes
were generously provided with resources to develop the
infrastructure for the settled communities including housing and
other civic amenities such as medical centres, schools and
townships.
This peasant sector in agriculture, however, continued to have marginal groups. These included:

- farming communities depending on minor irrigation schemes with uncertain supplies of water or with land subject to periodic flooding and inundation;
- farmers with very small holdings and fragmented land allotments, insufficient to provide subsistence income;
- categories of landless labour suffering from seasonal unemployment and underemployment;
- the second and third generation of the newly settled population who had limited or no access to irrigated land and often engaged in marginal cultivation on illegal encroachments;
- women whose participation in agriculture was adversely affected as a result of the new technologies.

In each of these areas it is possible to identify government initiatives directed at the amelioration of existing conditions. For example, agricultural investments include the improvement and rehabilitation of minor irrigation schemes and flood protection projects which affect the first category that has been enumerated. The government is greatly concerned with the problems of the 2nd and 3rd generation settlers. This, however, remains less tractable as it has to be eventually solved through greater diversification of the rural economy and expansion of non-agricultural employment which can absorb new entrants to the workforce in these settler communities. The landless labour have received priorities in the selection for settlement schemes but this has had a limited impact on the problem. The problems of women in agriculture are beginning to receive special attention through a Ministry which has been created to deal with the role and status of women. Each of these initiatives offers scope for the integration of health and agriculture.

Outside the paddy sector there is a considerable section of the farming population engaged in seasonal agriculture which fall into the vulnerable category. These include farmers whose main livelihood has been an unstable form of highland agriculture. These are mainly in the districts which fall into the dry zone and are in locations where there is no potential for irrigation. These communities have been included in some of the integrated development programmes that are being implemented by government. Here again, there would be ample opportunity for intersectoral programmes in which agriculture and health could collaborate.

In tree crop agriculture vulnerable groups are to be found in several well defined areas. The group which has been recently the focus of attention is the resident workforce of Indian descent in the plantation sector. Agriculture specific policies in this sector relate essentially to wage policy and the other employment benefits for this workforce. This is one of the sectors in which there has been significant collaboration between the agricultural managers and health personnel for improvement of the health and nutritional status in general and child and
maternity care and nutrition in particular. The agricultural component for the improvement of health and nutrition in this area would have to include measures at agricultural diversification, promotion of home gardening and livestock.

Another readily identifiable segment is the rural population in the villages which bordered the plantations which generally have inadequate land resources and are heavily dependent on seasonal employment in the plantations. Agricultural strategies would need to pay special attention to these rural communities which comprise the segment which is worst affected by poverty.

The third identifiable component is the group of smallholders depending on export crops. In many cases the plantation in these smallholdings is superannuated and low yielding. They require replanting but most households in this group are unable to forego their present income to replant and increase productivity in the long run.

Food availability and nutrition

The contribution of agriculture to food availability and nutrition could first be examined in terms of the average food basket and the per capita food availability for the country as a whole. The per capita food availability is set out in the table below:

The age adjusted norm for the daily nutritional intake per head has been estimated at 2,047 calories per day by the Department of Census and Statistics in collaboration with the Medical Research Institute. This is derived from a daily equivalent of 2,500 calories. The food availability for the period 1983 to 1987 has been above the age adjusted norm. The data on food availability is available from food balance sheets from as far back as 1950. The trends indicate that the average consumption per head per day has been steadily increasing from an average 1950 in the 1950's to 2,160 in the 1960's, to 2,230 in the 1970's and finally 2,300 in the 1980's. These are averages for the three decades 1950 to 1980 and the 7 year period 1980 to 1987. In terms of the overall demand for food it can therefore be said that policies of agricultural production combined with policies relating to food supply and availability succeeded in increasing the average consumption of food above the minima.

As against this, however, it would be necessary to examine the distribution of the food intake which would be a function of incomes and food expenditure. The recent analysis of the data on the socio-economic survey of 1985/86 indicates that approximately 49% of households are energy deficient in the sense that their nutritional intake is below 100% of the recommended intake. Within this the households which are considered nutritionally at risk in that they consume less than 85% of the recommended intake comprise approximately 22% of the total number of households; within this group, the households identified as
### PER CALORIE INTAKE IN SRI LANKA 1960-87

**Selected Items and Total**

<table>
<thead>
<tr>
<th>Year</th>
<th>Rice (Flour)</th>
<th>Wheat (Grains)</th>
<th>Other Roots, Tubers (Flour)</th>
<th>Meat</th>
<th>Eggs</th>
<th>Fish</th>
<th>Milk</th>
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<td>42.25</td>
<td>2158.14</td>
</tr>
<tr>
<td>1973</td>
<td>853.61</td>
<td>326.84</td>
<td>24.61</td>
<td>159.58</td>
<td>5.57</td>
<td>9.29</td>
<td>34.88</td>
<td>45.60</td>
<td>2169.42</td>
</tr>
<tr>
<td>1974</td>
<td>943.98</td>
<td>310.80</td>
<td>28.15</td>
<td>189.69</td>
<td>3.80</td>
<td>6.97</td>
<td>26.71</td>
<td>34.79</td>
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</tr>
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<td>1975</td>
<td>788.18</td>
<td>367.75</td>
<td>32.81</td>
<td>261.87</td>
<td>5.07</td>
<td>7.23</td>
<td>33.98</td>
<td>34.77</td>
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<td>1976</td>
<td>896.51</td>
<td>585.55</td>
<td>31.81</td>
<td>198.56</td>
<td>4.29</td>
<td>7.01</td>
<td>32.69</td>
<td>35.47</td>
<td>2172.07</td>
</tr>
<tr>
<td>1977</td>
<td>1042.22</td>
<td>409.98</td>
<td>37.06</td>
<td>144.92</td>
<td>4.29</td>
<td>7.20</td>
<td>24.46</td>
<td>42.33</td>
<td>2343.10</td>
</tr>
<tr>
<td>1978</td>
<td>929.21</td>
<td>429.43</td>
<td>25.01</td>
<td>149.81</td>
<td>4.21</td>
<td>6.68</td>
<td>40.15</td>
<td>49.73</td>
<td>2325.41</td>
</tr>
<tr>
<td>1979</td>
<td>870.43</td>
<td>361.54</td>
<td>21.17</td>
<td>140.54</td>
<td>4.09</td>
<td>7.87</td>
<td>36.59</td>
<td>53.40</td>
<td>2163.60</td>
</tr>
<tr>
<td>1980</td>
<td>966.00</td>
<td>204.14</td>
<td>21.87</td>
<td>150.12</td>
<td>4.28</td>
<td>9.76</td>
<td>38.91</td>
<td>53.12</td>
<td>2169.40</td>
</tr>
<tr>
<td>1981</td>
<td>983.41</td>
<td>239.70</td>
<td>19.56</td>
<td>138.49</td>
<td>4.12</td>
<td>9.84</td>
<td>38.79</td>
<td>47.99</td>
<td>2200.12</td>
</tr>
<tr>
<td>1982</td>
<td>944.29</td>
<td>264.86</td>
<td>20.75</td>
<td>146.21</td>
<td>4.01</td>
<td>9.05</td>
<td>41.92</td>
<td>47.89</td>
<td>2188.69</td>
</tr>
<tr>
<td>1983</td>
<td>1002.75</td>
<td>253.51</td>
<td>23.46</td>
<td>169.80</td>
<td>4.02</td>
<td>9.77</td>
<td>45.91</td>
<td>60.49</td>
<td>2361.43</td>
</tr>
<tr>
<td>1984</td>
<td>1031.50</td>
<td>283.17</td>
<td>27.01</td>
<td>161.48</td>
<td>6.42</td>
<td>9.48</td>
<td>45.62</td>
<td>53.55</td>
<td>2385.05</td>
</tr>
<tr>
<td>1985</td>
<td>1089.47</td>
<td>503.77</td>
<td>16.51</td>
<td>137.81</td>
<td>5.16</td>
<td>10.46</td>
<td>43.18</td>
<td>61.52</td>
<td>2517.48</td>
</tr>
<tr>
<td>1986</td>
<td>988.78</td>
<td>270.84</td>
<td>34.46</td>
<td>112.46</td>
<td>7.13</td>
<td>10.90</td>
<td>43.57</td>
<td>45.40</td>
<td>2376.83</td>
</tr>
<tr>
<td>1987</td>
<td>902.90</td>
<td>279.21</td>
<td>13.69</td>
<td>99.14</td>
<td>7.93</td>
<td>13.13</td>
<td>47.88</td>
<td>61.71</td>
<td>2267.40</td>
</tr>
</tbody>
</table>

**Note:** Total Calorie intake is worked out on the basis of all food items.

ultra-poor, with calorie intake below 80% of the normal and a proportion of food expenditure more than 80% of the total budget, is approximately 2.9%.

The data from the most recent nutritional surveys also indicate the prevalence of a high degree of malnutrition - vide table below:-

<table>
<thead>
<tr>
<th>Survey Year</th>
<th>Age Group</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Acute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;75 %</td>
</tr>
<tr>
<td>1975/76</td>
<td>06 - 71 months</td>
<td>3.4</td>
</tr>
<tr>
<td>1981/82</td>
<td>06 - 60 months</td>
<td>-</td>
</tr>
<tr>
<td>1987</td>
<td>03 - 36 Months</td>
<td>38.1*</td>
</tr>
</tbody>
</table>

* - 2.00 or more standard deviation from NCHS/CDC/WHO reference.


The performance of the agricultural sector can now be set within this framework of food availability and nutrition. The production of the principal items of food including livestock is shown below:-

**Selected items of principal foods produced locally**

<table>
<thead>
<tr>
<th>Paddy</th>
<th>1977</th>
<th>1987</th>
<th>Percent increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area cultivated - '000 ha.</td>
<td>828</td>
<td>896</td>
<td>8</td>
</tr>
<tr>
<td>Production - metric tons</td>
<td>1.65 mn</td>
<td>2.1 mn</td>
<td>31</td>
</tr>
<tr>
<td>Yield per hectare - kg.</td>
<td>2521</td>
<td>3500</td>
<td>38</td>
</tr>
<tr>
<td>Fertiliser used - metric tons</td>
<td>82,569</td>
<td>197,380</td>
<td>140</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Food Crops</th>
<th>1977</th>
<th>1986</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total area '000 hectare</td>
<td>252</td>
<td>218</td>
</tr>
<tr>
<td>Total production '000 Mt.</td>
<td>801</td>
<td>852</td>
</tr>
</tbody>
</table>

**Selected crops**

<table>
<thead>
<tr>
<th>Manioc</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Area - '000 ha.</td>
<td>55</td>
<td>27</td>
<td>- 5</td>
</tr>
<tr>
<td>Production '000 Mt.</td>
<td>545</td>
<td>503</td>
<td>- 8</td>
</tr>
<tr>
<td>Yield per hectare-Kg.</td>
<td>10,027</td>
<td>18,207</td>
<td>82</td>
</tr>
</tbody>
</table>
Red Onion
- **Area - ha.** 8,163 8,637 6
- **Production '000 Mt.** 66 76 15
- **Yield per hectare - kg.** 8,161 8,856 8

Potatoe
- **Area - ha.** 3,200 7,880 142
- **Production - Mt.** 33,422 108,100 230
- **Yield per ha - kg.** 8,161 8,856 16

Sugar
- **Produced - '000 Mt.** 1983 1987
  - 21.83 34.54
  - Increased 58%
- **Imported - '000 Mt.** 268.33 339.44
  - 27%
- **Available supply '000 Mt.** 258.35 339.66
  - 31%

Livestock
- **No. of beef cattle slaughtered** 195,000 197,000 1
- **No. of sheep and goats** 129,000 144,000 12
- **No. of pigs** 19,000 17,000 11
- **Litres of milk - million** 216 195 19
- **No. of eggs produced - millions** 380 815 114

Source: Central Bank.

The imports of food items in 1987 are shown in table below:

The imports of food items in 1987 (in thousand m.t) - Population 16,361,000

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Gross imports</th>
<th>Percentage of available supply</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Cereals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td>150.55</td>
<td>6</td>
</tr>
<tr>
<td>Maize</td>
<td>13.70</td>
<td>23</td>
</tr>
<tr>
<td>Wheat Flour</td>
<td>438.18</td>
<td>100</td>
</tr>
<tr>
<td><strong>B. Roots/Tubers and Starchy Food</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potatoes</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td><strong>C. Sugar</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refined</td>
<td>339.49</td>
<td>90</td>
</tr>
<tr>
<td><strong>D. Pulses and Nuts</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soya bean</td>
<td>0.20</td>
<td></td>
</tr>
<tr>
<td>Cowpea and Dhall</td>
<td>45.24</td>
<td>67</td>
</tr>
<tr>
<td>T.V.P.</td>
<td>0.32</td>
<td></td>
</tr>
<tr>
<td><strong>E. Vegetables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Onion</td>
<td>34.40</td>
<td>35</td>
</tr>
<tr>
<td>F. Meat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Tinned</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Beef</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Pork</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>Mutton (Goat &amp; Sheep)</td>
<td>0.06</td>
<td></td>
</tr>
<tr>
<td>Poultry</td>
<td>0.10</td>
<td></td>
</tr>
<tr>
<td>G. Fish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fresh</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>Dried and Salted fish</td>
<td>35.37</td>
<td>87</td>
</tr>
<tr>
<td>Tinned fish</td>
<td>7.74</td>
<td>100</td>
</tr>
<tr>
<td>H. Milk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cow</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>Tinned (Whole Dried)</td>
<td>35.78</td>
<td>88</td>
</tr>
<tr>
<td>Condensed Milk</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>I. Oil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Margarine</td>
<td>0.73</td>
<td></td>
</tr>
<tr>
<td>Butter</td>
<td>1.88</td>
<td>85</td>
</tr>
<tr>
<td>Cheese</td>
<td>0.33</td>
<td></td>
</tr>
</tbody>
</table>


It would be seen that Sri Lanka has been able to move a great distance in the direction of self-sufficiency on a large number of food items including the staple diet. In 1987 it imported less than 6% of the available supply of rice. It is, however, heavily dependent on imports for its consumption of bread and wheat flour products, sugar, pulses and to a lesser extent milk.

The nutritional and policy plan has identified a number of areas in which agricultural policy could be oriented to nutritional objectives. These include the production of coarse grains, roots, tubers and yams which comprise a considerable proportion of the diet of the poorest households; the fortification of staple foods with additional nutrients such as a mixture of wheat flour with soya flour; the production of nutrition rich food items which would be available to households on reasonable prices, soya, winged bean etc.; promotion of nutrition oriented home gardening; the promotion of inland fisheries to provide a cheap source of protein for the population which do not normally receive the output of the coastal and other marine fisheries.

One of the goals which receive high priority from all governments is the maintenance of prices of essential food items at reasonable levels. The food policy in Sri Lanka had several elements which were directed towards the achieving of this goal. First the government provided a food ration at subsidised prices, almost to all households. The scheme underwent numerous changes over the last four decades. A reduced ration was provided free, in the late sixties, and finally the rationing scheme was replaced in 1979 by a food stamp scheme which covered half the
population. The food rationing scheme was administered through a system of food distribution which became the outlet for various other essential food items such as flour, sugar, pulses, dried fish etc. Over a long period of time the government succeeded in containing the prices of food within very moderate increases. This, it was able to do primarily through a state trading system which was responsible for the procurement of local produce as well as the import of essential food items. However, the food rationing scheme with the state trading system imposed a heavy fiscal burden on the government budget.

The food stamp scheme which limited its coverage to low income households provided the opportunity for better targeting to take account of the nutritional objectives. A restructuring of the scheme, with these objectives in mind, was attempted in the mid-80s but it had to be abandoned due to political pressure which resisted any reduction in the coverage of the scheme. The most recent attempt at dealing with the problems of malnutrition and poverty is the Janasaviya programme. This is primarily a programme for the alleviation of poverty and would eventually replace the food stamp scheme. The scope of this programme extends well beyond agricultural and food policies, although it contains important elements of both. It is therefore not being discussed in depth in the present analysis of the health implications of agricultural policy.

It would be seen that many important components of agricultural policy - the rice programme, the land settlement programme, the food subsidy and food policies in general - contributed substantially to the alleviation of poverty and the amelioration of living conditions of the rural poor. Consequently, they combined with other social welfare programmes to improve their health and nutritional status. The health and nutritional outcomes of agricultural policy however were seldom consciously articulated and defined as objectives of agricultural policy. They were the by-products of the policy. Nevertheless, it could be seen from the foregoing analysis, that the health related impacts could have been identified and incorporated as part of agricultural policies in terms of their concerns with poverty alleviation, food and nutrition. Once this is done, the relevant population groups who were affected by agricultural policies could be clearly identified. The agencies responsible for health and health services could then collaborate actively in these agricultural programmes, in an integrated inter-sectoral effort to improve the well-being and quality of life of the poor.

There are two noteworthy examples of agriculture linked policies which have a direct impact on food prices and nutrition. Some of these policy initiatives will originate outside the agricultural sector and will be managed by policy-makers who are responsible for macro-economic policies. The examples concern two important components in the food basket - coconut and sugar.
Coconut provides approximately 16% of the average calorie intake of a person, 7% of the average daily consumption of protein and 60% of the fats. It is a common item of food consumption in all income groups, particularly in the densely populated wet and intermediate zones of the country in which the coconut plantation is located. The domestic prices of coconut are set by the prices in the international market and the export duties that are levied by the government which eventually control the allocation between exports and domestic consumption. International prices for coconut have fluctuated very sharply depending on the supply of coconut in the world market as well as other substitutes. The domestic output of coconut has also varied widely depending on the weather. In the past, export duties have been instrumental in regulating both the domestic supplies and prices and maintaining a relatively stable price level and availability. This situation has undergone very significant changes after the liberalisation policies adopted by the government in 1978. There has been a renewed effort to stimulate local production by providing adequate incentives to coconut producers and allowing market prices to reflect more freely the movement of international prices. With devaluation, these prices have been favourable to the local producer. This has led to the diversion of supplies from the domestic market to the external market and consequently increased domestic prices. The government has used the export duties more purposively to achieve the objective of production and export.

In the long run it is likely that this would lead to several consumer responses. There would be a tendency to find cheaper substitutes for coconut such as soya milk if this is available in sufficient quantities at competitive prices. There is a major production effort to increase the output of soya. The substitution of soya for coconut would have beneficial effects both in terms of increasing export earnings from coconut as well as substituting a product which would be more health promoting. Apart from the many positive nutritional characteristics of coconut, it contains a high cholesterol content which is likely to add to the increase in cardiovascular diseases which have become a leading cause of mortality in the changing disease pattern of the country. A programme for coconut production would require therefore a careful analysis of potential production and health effects and call for the collaborative effort of professionals from many fields which include macro-economic policy-makers, health professionals and nutritionists.

In the import substitution programmes undertaken by the government, sugar has been given high priority. At present the annual consumption of sugar in Sri Lanka is approximately 350 thousand tons of which more than 90% is imported. The 10% which is produced locally is manufactured in four factories in the East and South of the country. The government's objective in its current plans is to increase domestic output to satisfy approximately 50% of the total domestic consumption. The analysis of the import substitution projects have indicated that the production of sugar would yield a negative rate of return and
would impose a heavy cost on the economy. In the effort to maintain its import substitution programme as well as to contain the prices to the consumer at reasonable levels, approximately Rs. 300 million is allocated annually to subsidise domestic sugar production. In order to attract private capital to the new projects the government has guaranteed a rate of return of 14.5% to private investors. In the new project that has been implemented, 51% of the equity is owned by private investors of which 15% is domestic and 36% foreign. In order to ensure the agreed rate of return, the government has had to guarantee a higher ex factory sugar price than either the import price of sugar or the price which has been paid to the older sugar factories at the rate of subsidy that has been approved. Taxes on sugar which is a basic item in the food basket will have adverse affects on poor households. One calculation has shown that the poorest 25% of the population pay back as taxes on sugar as much as 80% of the income supplement they receive through food stamps. The programme of import substitution in sugar is therefore likely to have serious adverse effects on the food budget of the poor, if there are no compensating interventions to protect them against the these effects.

The intensification of existing health hazards and new health hazards generated by technological changes in agriculture

The health impact of technological change in agriculture has been considered mainly in relation to the health risks generated by the major irrigation schemes and new settlements; health effects of the use of pesticides, insecticides and agro-chemicals; and the occupational hazards of agricultural workers using agricultural equipment for various operations such as ploughing and threshing. The nature of health risks under the first category, i.e. irrigation and new settlements are examined in greater depth in the study on Mahaweli. The Sri Lankan experience illustrates what has been commonly observed in other countries. With new settlements in areas sparsely populated, and the conversion for forest to agricultural and other uses, there has been a recrudescence of malaria and water borne diseases. The irrigation system feeding a large population has numerous problems of transmission due to such factors as poor sanitation and fecal pollution. The health impact of agricultural programmes in this field is receiving greater attention than in the past. Past policies were confined to providing medical facilities in new settlements. The new health hazards that are introduced by these schemes were not closely analysed and studied. In the recent past there has been greater concern for identifying the possible negative impact on health and for taking anticipatory action.

There has been no systematic effort to deal with the problems of pesticide use as well as the occupational hazards of mechanisation. If at all they have been dealt with in an ad hoc manner and treated as a residual problem for the health services. Legislation has been enacted to regulate the production and trade
of pesticide and related products but there is little evidence of a systematic and co-ordinated programme of enforcement, education, information and monitoring which reaches rural communities and their households. The available information indicates that over 80% of the cases of poisoning were the result of accidental exposure to agro-chemicals, and that most of the cases of suicide were due to the consumption of pesticides, weedicides and insecticides that are freely available in households for use in agriculture. The Ministry of Health has reported that "the easy availability and indiscriminate use of weedicides and pesticides has resulted in poisoning become one of the leading causes of mortality in the country". (Annual Health Bulletin,(1987) of the Ministry of Health.) Agricultural expansion work includes a programme for the dissemination of information relating to the use of agro-chemicals and pesticides. These, however, are more concerned with the agricultural aspect such as the correct dosage, times of application and do not focus sufficiently on the health hazards.

The entire field relating to the health hazards of the agricultural occupation is one which is relatively neglected. It includes not only pesticides but other technological changes such as the introduction of tractors, threshing equipment, transport equipment. The occupational health of agricultural workers in Sri Lanka is a field in which there could be closer collaboration between the two sectors.

There has been greater co-ordination of effort between the health and agricultural sectors on the problems relating to the control of vector-borne diseases. The Ministries of Health and Agriculture have initiated collaborative efforts regarding the use of pesticides to avoid as far as possible agricultural applications which could result in the vectors developing resistance to the insecticides that are used against them. Programmes for mobilising community participation for the control of malaria, which include methods such as the use of fish which feed on mosquito larvae, and the identification and cleaning of breeding sites, are being undertaken.

The newly settled population in agricultural schemes is a group which is specially vulnerable in terms of health. Most of these aspects are examined in the paper on the Mahaweli project. The displacement of migrants from their developed habitats where they had developed their food habits and had access to food of a certain type, and the process of adaptability to a new and different agro-climatic environment, including a somewhat different pattern of food availability would have adverse effects on their nutrition. In addition to the stresses of the new environment, it has to be noted, that generally the settlers would be selected from the more deprived social strata. In the initial phase of settlement the agricultural workers often migrate without their families. Housing conditions are poor, and the social infrastructure is in the process of being developed. Not only will the migrant population not be exposed to the new health hazards of the schemes such as malaria, and the
intensification of water-borne diseases; they may also introduce
diseases which had been endemic in their original habitat to the
new communities in which they are settled. The migrant
population in the first phase of settlement is a specially
important target group for collaboration between health and
agriculture.

Some General Issues in Agricultural Policy

Agricultural policies in Sri Lanka raise several general
issues which impinge on macro-economic policies and the national
development strategy as a whole. Critics of past agricultural
policies have raised a number of controversial questions
regarding the priority given to the import substitution of rice,
and the neglect of the plantation agriculture. These issues
require treatment in depth and cannot be discussed within the
limited purview of this paper. It is necessary however to point
out that a better balance might have been possible with more
positive effects on economic growth, poverty alleviation and the
physical well being of the population.

The phase of import substitution in rice is fast reaching
its limits, within the present pattern of cereal consumption.
There is further potential for import substitution, through
changes in the dietary pattern and substitution of rice for wheat
flour. This will require intensive efforts, with appropriate
management of pricing policies and other incentives which will
have short-term and long term implications for food prices, food
consumption and nutrition. These require collaborative analysis
and planning between agricultural and health planners and policy
makers.

Self-sufficiency in rice will also call for new efforts at
diversification and export promotion. The recent initiative to
increase agricultural productivity at the village level - the
programme of Agricultural Productivity villages - will introduce
new cropping patterns which can alter the old balance between
food and non food crops, as well as the balance between
production of essential food items for the domestic market and
production which is more export oriented and specialised. These
changes will in turn have implications for food nutrition and
health. For example, in such a pattern of production lower
priority might be given to production for household production,
the mixed farming unit, the home garden with nutritional
objectives, all of which can have adverse consequences for
health. On the other hand, these may be offset by rapid
increases in household incomes, provided other policies and
interventions combine to translate these income increases to a
higher quality of life and better management of household
resources with adequate attention to food nutrition and health.

In Section III two items of the food basket were selected
for analysis of policy makers - coconut and sugar. Similarly, it
would be possible to examine other major items such as milk and
livestock which are included for import substitution in the agricultural plans. The policy analysis in respect of coconut and sugar reveals the complexity of the linkages that exists between macro-economic policies, production objectives of the agricultural sector and the food, nutrition and health needs of the people.

**Conclusion**

This paper has presented the general framework of analysis which would facilitate the identification of the linkages. In doing so it has focused on the more critical linkages relating to poverty, food and nutrition and technology. The second step in the analysis of agricultural policy for health impacts would be to take each component and seek to focus on the specific linkages in each of them which are amenable to policy intervention. The methodology that has been proposed has therefore the following elements which identify -

1. The structure of agriculture, the priorities of current agricultural policies, the projects and programmes flowing from these policies, which have an impact on health.

2. The main health related policy linkages in agriculture, focusing on poverty alleviation, food and nutrition and technological change.

3. The main population groups engaged in agriculture which can be identified as vulnerable groups and the impact of current agricultural programmes and policies on these groups.

4. The average food basket, the major items in the food basket and programmes and policies pertaining to them which have an impact on food prices, nutrition, health. Here the long term-term impact of import substitution programmes and the opportunities available for health promoting substitution and dietary change could be identified.

5. Major agricultural development projects such as multipurpose river diversion projects, new settlement programmes which have far reaching consequences for the environment and health.

6. Technological change and its impact on the agricultural workforce, farm households, consumers of agricultural projects and the health environment as a whole.

This paper has not discussed in depth the agencies that would be responsible for the formulation of policy and policy intervention. In each of the areas that have been discussed the agriculture-health link would require the collaboration not only
of the professionals of the agricultural and health sector but also the policy-makers in other sectors including those responsible for macro-economic management. This was illustrated in the brief analysis of policies relating to coconut and sugar. The next stage of this exercise would be to take it further to identify the package of policy interventions in specific areas and the mechanisms for coordinating the formulation and implementation of policy.
INTRODUCTION

Mahaweli is the largest single agricultural development project in Sri Lanka. The original Master Plan for the project envisaged

a) the provision of irrigation facilities to 340,000 hectares of paddy. Approximately two third of this extent comprises new land in the North Central, Eastern and Northern Provinces in the country. The balance one third which is in the same area, and is already cultivated, would receive an augmented and more regular supply of water which would increase its cropping intensity.

b) development of hydro-electrical power to an installed capacity of 500 Megawatts;

c) the integrated development of the region, with crop diversification and agro-industrial development.

The implementation of the project was planned over a period of 30 years. The first phase which covered the area designated as system H was undertaken in the early seventies. Towards the end of the Seventies the implementation of the project was accelerated and the main components of the project benefiting an extent of 130,000 ha of new and 36,000 ha of already cultivated land were included in a programme to be completed within a period of six years.

The Accelerated Mahaweli Project concentrates on five of the largest viable projects viz. Victoria, Maduru Oya, Kotmale, Moragahakanda and Randenigala. Being a diversified resettlement programme the Mahaweli project will have aspects which extend beyond the agricultural sector for it will have to deal with problems that flow from such phenomena as internal migration, diversification of the rural economy with small industries and other non-farm activities, the development of the infrastructure relating to new settlements such as water, environmental management and new urban centres. Even the settlement pattern has been restructured. The lay out of settlements in the older Gal Oya and Walawe irrigation schemes was on highland allotments, arranged in dispersed ribbon pattern. The Mahaweli has adopted the profile of the 'cluster' system which is a grouping together of households in well-planned hamlets. The concept of the traditional purana villages influenced the creation of the hamlet type of settlements for the area.

A special statutory authority was established to implement the project. The organisational structure and powers of the Mahaweli authority were similar to the statutory boards which were set up to implement other major multi-purpose projects in the past, but the structures were modified and improved on the
basis of the lessons learnt from the experience of these earlier projects. The Mahaweli Authority was responsible for the integrated development of the region which came under the command of the irrigation system of the project and combined a large number of the functions normally performed by the line Ministries with their departmental structures. It was therefore better organised and empowered to undertake the horizontal co-ordination of a large range of development activities within the region. As would be seen later this was particularly effective in the case of the intersectoral co-ordination required for primary health care. Under the Mahaweli authority separate agencies were entrusted with specific components of the development programme. The Mahaweli Economic Agency was responsible for agricultural economic and social development and land settlement.

The Mahaweli was the largest single investment that has been undertaken by the Government. The relative magnitude of the outlay can be appreciated when it is compared with the total annual capital expenditure of the recent past or the total gross capital formation of the country as a whole. The total investment made up to the end of 1986 amounts to Rs 44 billion (in 1986 constant prices) which is the equivalent of 125% of the entire government capital expenditure for 1986 including Rs 7.5 billion of amortisation payments on the public debt, or 104% of the gross capital formation for that year. These magnitudes indicate the scale of the concentrated organisational effort and mobilisation of human resources that were needed to implement the project during a period of about 7 to 8 years.

Internal migration

It has been estimated that approximately 54,000 families with a total population of about 300,000 have been settled in the Mahaweli project up to 1986. This does not include the population that would have migrated into the area for various economic activities and who have not come under the regular programme of settlement. Of the settler families approximately 50,000 families have migrated in the period 1980 - 1986. These figures provide some perspective of the dimensions of the effort involved in the transfer of population, their settlement and the scale of the services and other facilities needed.

The settlers have come from different parts of the country. They are selected on specified criteria - age, education level, tenurial status, working capacity, family encumbrances, farming experience and personality. The highest scores are given to those in the age groups 25-29 years and 30-39 years after which the score for this criterion declines. High scores are also given to the literate and the landless. The weightage given to the criteria raises a number of issues.

First, the age criterion suggest that the programme is aimed at mitigating the problems of unemployment among the young. This is reflected in the weightage given to the young unlike in the past when selection was on the basis of families
with a fairly balanced age structure. Consequently, the settlement of Mahaweli may run into different social and health problems. Age-wise the community may not be well balanced and may not form viable social units. This, however, may be partly offset by the tendency of some of these younger families to migrate with their dependent parents, and other members of the parental family. Some of the social as well as intergenerational problems arise from the very migration process itself which results in displacements and changes in the traditional life styles. This can lead to an increase in mental ill health of all types.

Second, the selection criteria in regard to family size tend to give preference to those in the high fertility groups. A significant proportion of the families are likely to be in the peak of their reproductive age, and their family size may continue to increase, unless there are effective family planning interventions.

Third, it has also been pointed out that the weightage given to literacy and education combined with younger age can result in greater receptivity to programmes for improvement of health behaviour.

Fourth, the settlers are from different areas having different environmental, social and economic conditions. The food habits, the health behaviour and access to food resources of the migrants in their original habitats are likely to be significantly different from what is available in the Mahaweli settlements. A significant proportion come from the wet zone. The Mahaweli environment, on the other hand, belongs to the dry zone which is characterised by relatively sparser rainfall which is highly seasonal. Humidity is low and temperatures are high. Rainfall unreliability and the late or early arrival and departure of the monsoons disrupt the normal working cycle; the frequent non-arrival of rains leading to prolonged droughts brings with it numerous health hazards. In addition to these problems, migrants are likely to introduce into the new community diseases which were endemic in their earlier habitats.

Fifth, the policies are such that once selected and granted allotments, the settlers are at liberty to decide how they would establish their residence in the area. It has been revealed from the experience in the H areas that initially males alone come in for settlement, construct temporary huts for themselves and bring their families only after obtaining one or two harvests. This is an understandable and valid procedure. However, this practice can limit to a very high degree, the settlers adopting a sound health discipline such as having proper food at correct times, drinking boiled or safe water, maintaining personal cleanliness etc. It can also lead to loneliness and depression and even lay the path to spread of social diseases.

In view of these problems the Ministry of Health has recommended the following:
a) Measures that enable the settlers to have habitable permanent dwellings in the early stages of settlement.

b) intensification of the community development strategy, and

c) the modification, where necessary, of the policy relating to selection criteria.

Services and Health status of Mahaweli area

The health system in the Mahaweli area is part of the national health system and is organised in the same manner as for the rest of the country. The Institutional framework for health services in the Mahaweli settlements themselves, including preventive and curative care is in the process of being developed. The present health services in the Eight districts, within which the Mahaweli area falls are managed at the apex by five Superintendents of Health Services (SHS) Divisions and ten Medical Officers of Health (MOH) areas. According to a Ministry of Health-WHO report it is revealed that health resources in the District covering the Mahaweli area is lower than the national average in a number of aspects.

"a) Number of beds per 1000 population is lower in some of the districts;
b) Number of districts are severely affected by health staff shortage;
c) The national 'by-passing' of lower level facilities is also very much in evidence in most areas"

The priorities for health in the Mahaweli area, as perceived by the Mahaweli Authority include the following:

1. Provision of adequate and safe water supplies to all settlers.
2. Immunisation of infants.
3. Environmental sanitation and environmental protection.
4. Health education.
5. Spraying of dwellings with insecticides.
6. Providing permanent housing on allocation of land.
7. Pre-settlement medical screening of all settlers.
8. Setting up of a health monitoring system at hamlet level.
9. Setting up of a malaria surveillance system.
10. Preliminary assignment of health staff.
11. Organising volunteer health workers.
12. Adoption of a significant reporting system.

According to the Health Ministry-WHO report, the health situation in the Mahaweli area is not very different from the rest of the region. In general, the vital statistics of

1 A proposal for health service in the operational and accelerated Mahaweli development area. The Ministry of Health, Colombo, 1979.
Sri Lanka are quite favourable for a developing country and its health care system had been able to maintain infant and maternal mortality at very low levels compared with those of other developing and developed countries. Infant, neo-natal and maternal death rates in the Districts which cover the Mahaweli settlements are indicated in Table 1. It should be noted that the data represent the situation in these Districts as a whole and that the population in the Mahaweli settlements is only a small proportion. Furthermore the District data may exclude the District residents who report to hospitals which are outside these Districts, and whose deaths will be registered through those institutions. But even when allowance is made for these factors, the data presented in the table is broadly indicative of the conditions that prevail in the Mahaweli area. As would be seen later this is confirmed by the data collected in the Village Health project for the H system of the Mahaweli project which comprises more than 50% of the settled population. Infant mortality is lower than the national average for all these districts. It is significantly lower for Trincomalee and Polonnaruwa. Polonnaruwa however, reveals higher maternal mortality rates than the average whereas the other districts have rates which are either same as the national rate or lower. The exceptionally low maternal mortality rate of 0.2 per cent in Trincomalee indicates the better standard of hospital and other facilities available in the District.

Table 1 - Vital Statistics in the Mahaweli districts, 1985

<table>
<thead>
<tr>
<th>District</th>
<th>Crude Birth Rate 1987</th>
<th>Crude Death Rate 1987</th>
<th>Maternal Mortality Rate 1983</th>
<th>Infant Mortality Rate 1983</th>
<th>Neonatal Mortality Rate 1983</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matale</td>
<td>24.0</td>
<td>5.9</td>
<td>0.4</td>
<td>20.0</td>
<td>12.9</td>
</tr>
<tr>
<td>Trincomalee</td>
<td>21.7</td>
<td>4.2</td>
<td>0.2</td>
<td>13.7</td>
<td>6.2</td>
</tr>
<tr>
<td>Kurunegala</td>
<td>20.9</td>
<td>5.7</td>
<td>0.6</td>
<td>27.1</td>
<td>18.1</td>
</tr>
<tr>
<td>Anuradhapura</td>
<td>21.7</td>
<td>5.9</td>
<td>0.6</td>
<td>23.6</td>
<td>13.0</td>
</tr>
<tr>
<td>Polonnaruwa</td>
<td>21.3</td>
<td>4.7</td>
<td>1.4</td>
<td>10.2</td>
<td>4.4</td>
</tr>
<tr>
<td>SRI LANKA</td>
<td>21.9</td>
<td>5.9</td>
<td>0.6</td>
<td>26.4</td>
<td>17.3</td>
</tr>
</tbody>
</table>

* Provisional
Source: Registrar General's Office.

The data on the health infrastructure in the districts which serve the Mahaweli project are presented in Tables 5 to 7. The availability of medical institutions is indicated in Table 5. It is self-explanatory and needs no elaboration. Table 6 indicates the key health personnel in the Mahaweli districts. Table 7 gives immunisation coverage in the Mahaweli area.

The country health programme recognises 36 diseases and conditions as requiring priority attention of the health services. Of these, ten diseases are considered as of primary concern in the Mahaweli development area by the Health Ministry - WHO team. These are 1. Malaria, 2. Gastro-enteritis, 3.
Accidents, poisoning and violence, 4. Bacillary dysentery and amoebiasis, 5. Anaemia, 6. Avitaminosis and other nutritional deficiencies, 7. T.B. (all forms), 8. Typhoid, 9. Respiratory diseases and 10. V.D. Healthwise although the Mahaweli area reveals very little difference from other areas of the country some significant characteristics which distinguishes this area from the rest of the region are indicated. These are:

1. Accidents are higher than average in H area.
2. Gastro-enteritis is much higher than the average in C area.
3. Malaria is much higher than the average in 10 of the 12 institutions tested (all areas)
4. Nutrition was found to be very poor in all developed areas.
5. In general, diseases of the circulatory system was lower than the average.
6. Polio seems to be higher than the average in most areas.
7. Matale and Kurunegala show higher levels of viral hepatitis.
8. V.D. - Anuradhapura Clinics showed 300 per cent increase in attendance in 1979.

Primary Health Care

Within the Mahaweli Area itself the government has been able to implement a Village Health Project supported by the UNICEF and CIDA (Canadian Development Authority) It covers system H which has a settler population of 23,000 families and is expected to serve as a model for replication in the rest of the Mahaweli area. The Project was designed mainly to develop a Primary Health Care System with health volunteers and para medicals. It covered nutrition, immunisation, primary education, child care, water supply and environmental sanitation, development of basic life skills and community participation. As stated earlier, the Health system in the Mahaweli project is part of the national health system and is organised in the same manner as for the rest of the country. While the Mahaweli Development Authority is responsible for the horizontal intergration of certain sectoral activities such as irrigation, water management, agriculture, and community development, and most other services provided by line Ministries, health and education are administered by the national line Minister. Nevertheless the horizontal organisation of other work by the Mahaweli Development Authority has provided an overall framework which facilitated the integration of the different elements of the village Health Project.

A recent evaluation of the project adjudged the project "an outstanding success. A remarkable achievement which is almost unique is the successful intergration of activities for economic development and for social services, especially for the health of women and children. A truly synergistic balance between purely technical improvements in agriculture irrigation water management and similar activities promoting economic progress have been
associated with the development of excellent services to improve the quality of life of the settlers". Many of the health outcomes of the project are impressive, infant mortality is below the national average and in the region of 15 . Over 90% of the births are institutionalised. Progress has been made in the control of diarrhoea, and malaria. Immunisation coverage is approaching universality, 95% . Growth monitoring is undertaken by 94% of the mothers. Model home gardens have exceeded the targets. Targets in most of the other components, water supply, development of basic skills, fuel saving and training have been fully achieved. Nevertheless, the surveys have noted a high level of malnutrition "About a third of the babies are low births weight. about a third of the children are below the third percentile of growth charts; about half of the mothers are anemic and many severely so".

Malaria

In Sri Lanka the Anopheles cuticifacies is mainly a dry zone species. Consequently, the dry zone is the major malaria endemic region and Mahaweli falls within this zone. Eradication of malaria is a major health problem in the Mahaweli area and because of in-migration of settlers and water diversion the situation may become very critical. It is also revealed that in the Mahaweli areas positive rates have increased in all divisions and is above the national average in three of the five. In general, the percentage of OPD cases of malaria recorded is far above the national average of 4.9 per cent. The vulnerability of the areas had been recognised and the anti-malaria campaign has been fully involved from the planning stage of the Mahaweli project.

It is relevant to note that this mosquito prefers to bite animals rather than human beings for its blood meals. In the Mahaweli environment large tracts of jungle are cleared, water courses and bodies are increased, new areas come under water and the wild animals are forced to migrate elsewhere. The natural animal hosts being scarce or absent, its survival depends on the new host, man, who falls victim to its attacks. Consequently, the potential for malaria has increased in the Mahaweli area which is already in the endemic zone. Another factor that enhances the malarialogenic potential is the settler. Under the settlement policy people from different parts of Sri Lanka are admitted to these areas as workers and settlers. The majority of them come from less malarial or non-malarial areas.

Hence, a large majority of these new residents have very low immunity levels or no immunity against malaria. In this situation the new residents are easily infected by the malaria parasite and are subjected to more severe attacks of malaria than the local residents who have a high degree of immunity.

The prevention of malaria is considered a vital issue in the development of the Mahaweli Scheme. Definite policies therefore, have been adopted for its control or eradication. According to
the Anti-Malaria Campaign the main objectives for the programme are -

a) prevention of deaths due to malaria,
b) elimination of malignant malaria progressively,
c) reduction of the incidence of malaria and minimising the loss in non-working days.

The achievement of these objectives is through definite work programmes carried out in close cooperation with the settlers who are the chief beneficiaries in this scheme. The work programme according to the campaign will be -

1. residual spraying of households and outhouses with Malathion on a three month cycle,
2. coordination of the agricultural use of insecticides with the malaria-control programme. The Ministries of Health and Agriculture have initiated a dialogue to examine how they could collaborate to reduce the risk of the vector building up resistance to the insecticides in use.
3. drug administration - five-day remedial treatment to all cases and prophylactic treatment to officers and workers;
4. Case detection. There are 36 Special Indicator Institutions for this purpose.
5. Entomological investigations. Twelve entomological teams carry out this type of investigations in the malarious areas of the country,
6. Other control methods eg. intermittent flushing of streams, water courses etc. biological control etc.
7. Training and health education, and
8. Research and field trials.

Accidents, poisoning, violence

Detailed information on accidents is not readily available. However, with such an influx of people, especially of the younger active age groups, from different environments and with varying exposures to new agricultural technology there is the possibility for many accidents to occur due to unfamiliarity and inexperience in the use of modern equipment. Construction work goes on at a rapid rate and the equipment used is heavy and sophisticated. Under those conditions, the workers, unless properly cautioned and trained, are bound to have accidents which can vary from minor to major. Moreover, the majority of the settlers are not familiar with mechanised agriculture. Consequently, there is always the probability for some serious mishaps to occur owing to inexperience and incompetence.

During the early stages of the scheme the accident rate in the Mahaweli area varied from about 10.1 per cent to 24.4 per cent when the national average was 10.7 per cent. Whether the
accident rate has appreciably decreased is doubtful for the careless use of agricultural equipment, especially by young settlers is observable. Tractors of various sizes, which are a common sight in the area, are driven on the road without dismantling attachments used in the fields thereby leading to obstruction of highways and serious accidents involving both man and other vehicles. Overloading of trailers leading to capsizing is another common feature. Careless handling and stacking of paddy and other cereals have caused unnecessary accidents especially during harvest time. Above all, unprotected belt-driven devices such as blowers, threshers, crushers etc. are causing a number of serious accidents quite frequently. In most cases accidents are caused by ignoring elementary precautions. These can certainly be corrected with carefully planned initial training.

Poisoning

In the agricultural sector problems of toxicity arise from the use of agro-chemicals. Although definite information on pesticide use and its associated problems of toxicity is not available, the Ministry of Health data on admissions to hospitals and deaths due to poisoning in the Mahaweli district hospitals reveals the status of this phenomenon in the area (Table 2).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Kandy</td>
<td>24</td>
<td>13</td>
<td>17</td>
<td>39</td>
<td>25</td>
</tr>
<tr>
<td>Matale</td>
<td>20</td>
<td>45</td>
<td>73</td>
<td>33</td>
<td>53</td>
</tr>
<tr>
<td>Kurunegala</td>
<td>8</td>
<td>4</td>
<td>26</td>
<td>122</td>
<td>111</td>
</tr>
<tr>
<td>Anuradhapura</td>
<td>11</td>
<td>12</td>
<td>33</td>
<td>24</td>
<td>55</td>
</tr>
<tr>
<td>Nuwara Eliya</td>
<td>-</td>
<td>45</td>
<td>22</td>
<td>62</td>
<td>63</td>
</tr>
<tr>
<td>Badulla</td>
<td>7</td>
<td>9</td>
<td>16</td>
<td>28</td>
<td>42</td>
</tr>
<tr>
<td>SRI LANKA</td>
<td>236</td>
<td>217</td>
<td>463</td>
<td>641</td>
<td>690</td>
</tr>
</tbody>
</table>

Source: Pesticides in Sri Lanka, Friedrich-Ebert-Stiftung

The national increase of death specific to this cause was 192.4 per cent over the period 1977 to 1981. This increase coincided with the national increase in the use of pesticides. In the Mahaweli area except for Kandy all other districts show a phenomenal increase in death due to pesticides. The highest increase was registered in Kurunegala where around a fourteen-fold increase is shown. This district is one of the largest paddy growing areas in addition vegetable growing with very high use of agro chemicals is expanding very rapidly in the area. Badulla comes next with a six-fold increase and then Anuradhapura with a four-fold enhancement. Additionally, of the total deaths due to pesticides in 1981, 16.1 per cent was from Kurunegala
whilst Nuwara Eliya registered 9.1 per cent and Kandy 3.6 per cent. At national level too the figures are quite revealing.

In 1986, 57 per cent of admissions of cases of poisoning and 66 per cent of death by poisoning, in the country as a whole were due to pesticide poisoning. It is also indicated that in 1986 pesticide poisoning was the sixth leading cause of death in government hospitals (Table 3). Jeyaratnam et al. show that between 1975 and 1980 an average of 13,000 people annually were admitted for acute pesticide poisoning\(^1\).

### Table 3 - Leading causes of death in state hospitals, 1986

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Deaths</th>
<th>Percent of total deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischaemic heart diseases</td>
<td>2,585</td>
<td>9.5</td>
</tr>
<tr>
<td>Signs, symptoms and ill-disposed conditions</td>
<td>2,140</td>
<td>7.9</td>
</tr>
<tr>
<td>Slow, fetal growth, fetal malnutrition and immaturity</td>
<td>1,650</td>
<td>6.1</td>
</tr>
<tr>
<td>Diseases of the gastro-intestinal tract</td>
<td>1,581</td>
<td>5.8</td>
</tr>
<tr>
<td>Cerebrovascular diseases</td>
<td>1,566</td>
<td>5.8</td>
</tr>
<tr>
<td>Pesticide poisoning</td>
<td>1,452</td>
<td>5.8</td>
</tr>
</tbody>
</table>

Source: Ministry of Health. Statistical Division

Out of this number almost 1000 died. The most common causes of poisoning were attempted suicide registering 73.1 per cent and occupational exposure 17.1 per cent. Fernando too, underscores the fact that the number of deaths from pesticide poisoning is more than the total number of deaths from rabies, snakebites, polio, diphtheria, tetanus, whooping cough and malaria in 1984. Furthermore, he shows that five out of 1000 of agricultural workers are hospitalised for pesticide poisoning\(^1\).

Initially, it was only the plantation sector that used pesticides and other agro-chemicals to protect its crops and increase production. But during the last 2-3 decades, the food crop sector has been increasingly using agro-chemicals for the purpose of not only crop protection but also improving yields. One of the major contributory factors for this increase was the introduction of new improved crop varieties leading to the "seed-fertilizer-pesticide" revolution. Undoubtedly the use of high yielding seed varieties have multiplied agricultural output but has also led to a reduction in genetic diversity of crops and an increase in their vulnerability to diseases and pests. For

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\(^1\) Effects of agro-chemicals on human body. Use of pesticides and health hazards in the plantation sector. F.E.S. 1988.
example, in Sri Lanka there were at least 382 paddy varieties in
the past according to historical records. But today about 95 per
cent of the paddy area is sown with less than a dozen improved
varieties. The traditional paddy varieties now occupy less than
five per cent of the sown area.

Within the food sector, the crop using the largest amount of
agro-chemicals now is paddy. This crop is grown in an area of
approximately 1.3 million acres by about eight million farmers
who are widely dispersed over the island with a very high
concentration in the Mahaweli area and other irrigation project
locations. The paddy output has now more than doubled during the
last three decades (Table 4). The national average yield during
Maha season is about 3.6 tons per hectare compared with the
average of about 2.0 tons per hectare in the late sixties. This
performance is due mainly to high yielding varieties combined
with the intensive use of pesticides and other agro-chemicals.

Table 4 - Average yield of paddy, 1960-1986

<table>
<thead>
<tr>
<th>Year</th>
<th>Maha MT/HA</th>
<th>Yala MT/HA</th>
<th>Annual MT/HA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960/61</td>
<td>1.9</td>
<td>1.9</td>
<td>1.8</td>
</tr>
<tr>
<td>1968/69</td>
<td>2.7</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>1978/79</td>
<td>2.8</td>
<td>2.6</td>
<td>2.7</td>
</tr>
<tr>
<td>1979/80</td>
<td>3.0</td>
<td>2.9</td>
<td>2.9</td>
</tr>
<tr>
<td>1981/82</td>
<td>3.2</td>
<td>3.4</td>
<td>3.2</td>
</tr>
<tr>
<td>1982/83</td>
<td>3.7</td>
<td>3.7</td>
<td>3.5</td>
</tr>
<tr>
<td>1983/84</td>
<td>3.0</td>
<td>3.1</td>
<td>3.1</td>
</tr>
<tr>
<td>1984/85</td>
<td>3.5</td>
<td>3.3</td>
<td>3.4</td>
</tr>
<tr>
<td>1985/86</td>
<td>3.6</td>
<td>3.3</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Source: Department of Census & Statistics

Majority of occupational exposures to pesticides are due to
the farmers' own carelessness or lack of serious interest in the
health hazards that may result from using pesticides without
proper precautions. A common observation is that the majority of
farmers in the area do not use special protective clothing or
other measures when applying agro-chemicals. According to
Abeysekera, "neither the cleaning of hands, body and clothing
after spraying chemicals and the cleaning of equipment seems to
be strictly adhered to. In some instances, it also appeared that
they were even in the habit of smoking or chewing betel while
handling the sprayer. It was found that the sprayers at times are
washed in nearby streams. It was also shown that the empty cans
and bottles of pesticides are carelessly disposed of. Most of
the farmers seem to be in the habit of disposing of them rather
indiscriminately and a few others seem to have sold the empty
containers 1".

1 Abeysekara W.A.T - Pesticide use in the food production sector
in Sri Lanka
Food and Nutrition.

Rising food prices affect the entire country; its impact is greatest on households which are not engaged in food production but even in food producing households a significant proportion of the food basket is purchased in the open market. The period after 1977 which was also the period when the Mahaweli settlements took place was one of rapid inflation. The food prices according to the Colombo Consumer Price Index increased by approximately 300% between 1977 and 1988.

The general adverse effects caused by the prevailing economic situation can be aggravated in the Mahaweli area because of the accelerated implementation of the project and the rapid influx of large numbers of people. In the early stages of the project the greater part of the food demand even for rice vegetables and other products that would be grown in the area would have to be met with supplies from outside. In this stage the settlers are likely to be specially vulnerable to food shortages and problems of the new migrants are likely to be compounded by the various factors described in the section on internal migration. As the project moves into full production a large part of the food requirements of the Mahaweli population will be met from the output of the project area itself. This will include rice which is the principal crop, pulses, vegetables, horticultural products and livestock products.

In the diversification programme viable alternative crops are considered in relation to their production potential and markets - national and international. At present the production programme included soya bean, pulses (cowpea, green gram, black gram) chillies, onions, vegetables (for export), groundnut and fodder etc. under irrigated farming. In the original master plan for Mahaweli, sugar and cotton were also contemplated. Plans in these crops however have not yet been developed. Table 1 reveals the major crops in the Mahaweli area for 1985/86. In areas where irrigation water is not available, the growing of economically viable perennials such as coconuts, mango, cashew etc. is to be attempted. In the highland allotments the farmers are encouraged to grow mango, lime, banana, and annual crops such as maize, chillie, vegetables, pulses etc. in the Maha season and sesame and cowpea in the Yala season for their home consumption. Settlers are also expected to grow five to ten coconut palms per household to meet their consumption demands and supplement their income with the sale of excess nuts.

The diversification programme has no consciously formulated health component; the two major objectives are enhancement of income of farmers and efficient use of land and water. After paddy the farmers prefer to grow chillie as a more secure venture because of better prices and markets. About five or six pickings over a period of seven to eight months are obtained and the income for the chillie crop over this period help supplement cash shortages during the paddy off-season. Multiple or mixed cropping enhances production, extends the harvesting period, obtains
effective water consumption and maintain soil structure and fertility.

Indirectly, both these objectives improve the quality of life of settlers' households. The higher the income the greater would be the accessibility to better variety and quality of food and higher the calorie intake. Less cash shortages indicate that households have regular meals. The growing of a number of subsidiary crops including fruits and vegetables in the home allotments gives the settlers at minimal cost a regular supply of essential food items. The available information on the nutritional status of the settlers, however, reveals the prevalence of a high degree of malnutrition. The data gathered in the Village Health Project have already been discussed. These are substantiated in various other surveys. The Ministry of Plan Implementation survey of 1981 in the Mahaweli H-area points to the high prevalence of chronic malnutrition. The rates are indicated in Table 5. It should be noted that the new settlers in the H-area were largely from economically disadvantaged groups which were nutritionally at risk and subject to chronic undernutrition before they migrated to Mahaweli. The very high level of acute malnutrition however suggests severe undernourishment, illhealth and subnormal food intakes in the more recent past and present.

Table 5 Prevalence of protein – Energy undernutrition amongst pre-school children (6-59 months)

<table>
<thead>
<tr>
<th>Area</th>
<th>Acutely undernourished 1 pc.</th>
<th>Chronically Undernourished 2 pc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>H - 1</td>
<td>12.5</td>
<td>37.5</td>
</tr>
<tr>
<td>H - 2</td>
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</tr>
<tr>
<td>H - 4</td>
<td>22.5</td>
<td>25.5</td>
</tr>
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<td>H - 5</td>
<td>20.4</td>
<td>32.1</td>
</tr>
<tr>
<td>H - 7</td>
<td>21.0</td>
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</tr>
<tr>
<td>H - 9</td>
<td>15.6</td>
<td>28.9</td>
</tr>
<tr>
<td>Area as a whole</td>
<td>19.6</td>
<td>30.4</td>
</tr>
</tbody>
</table>

1. Weight-for-height 80 per cent of NAS Reference median
2. Height-for-weight 90 per cent of NAS Reference median

Source: Ministry of Plan Implementation Report.

The conditions which have contributed to the high level of malnutrition among the Mahaweli settlers need closer investigation. The government policy of distributing equal allotments of land to the settlers has ensured that the distribution of land in the scheme is equitable. The size of allotment is based on estimates of cost and benefits of production that indicate that settlers would be able to obtain a reasonable farm income. The crop mix of farmers on both irrigable
and highland allotments can provide a substantial proportion of their food needs. The conditions are therefore favourable for the elimination of malnutrition.

The Mahaweli environment

In most cases environment issues are very closely related to development policies and practices. The Mahaweli programme too, has specific policies and guidelines to protect and control the degradation of the environment. Such policy issues become imperative because of the intimate relationship of the settlers' health and the quality of the environment they live in. In the Mahaweli programme, it appears that the major direct concern is not with the health implications as much as with the deforestation that is taking place and its impact on the environment. The determined policy orientation towards the goal of self-sufficiency in food had certainly led to agricultural extension having a strong impact on the environment. In this context it has been argued that the rapid extension of the Mahaweli areas has resulted in the degradation and depletion of forests and soils, loss and quality changes of surface and ground water leading to water-logging, salination, siltation, reduction in genetic diversity, soil, water and air pollution and entrophication.

Undoubtedly, there had been extensive forest clearance under the Mahaweli programme. It must however, be underscored that such activities are of comparatively recent times carried under controlled conditions, to some degree, in the dry zone which has a flat to gently rolling topography. The rainfall is seasonal. Deforestation in the area had been planned with ample protected forest areas and reserves to maintain some degree of ecological balance. It is however, too early to arrive at any definite conclusions as to salination, siltation and changes in the surface and ground water. The creation of new water bodies and changing in river courses have created newer riverine areas completely changing the previous environment. Over the long-term, irrigation without proper water control and management, salination etc. can occur but in the short-run there is little cause for alarm. Furthermore, with the use of more recent scientific knowledge and new engineering techniques it is doubtful whether Gal Oya conditions would be duplicated in the Mahaweli area.

On the other hand, health effects are more significant in this case because of its extensiveness and concentrated large population. However, clearing of forests naturally leads to a change in the micro climate of the area and to the invasion of insects and pests adapted to open drier terrain. In the Mahaweli area there can be an increase in health problems associated with snake bites, malaria, filaria, leptospirosis etc. and of course, there could develop new diseases with the colonisation of new species of insects, pests etc. But a more significant factor that can affect both the health and the environment of the Mahaweli area is the use of modern agricultural techniques. Besides the
use of numerous heavy equipment which can alter the environment structure, the use of pesticides and other agro-chemicals has become a great environmental hazard. There is much evidence to show that Mahaweli farmers with the desire to improve their income are using fertilizers and pesticides far above the actual requirements and frequency. In fact, this is a common feature among most farmers in the country. In this respect Abeyasekera’s findings on the indiscriminate use of pesticides are:

a) frequency of application has increased (more than the minimum of seven day interval);
b) application of dosages higher than what is usually recommended. The farmers are of the opinion that the recommended dosage is inadequate for effective pest control;
c) improper methods of application: disregard to instructions given;
d) non-adherence to safety measures;
e) improper time of stoppage of application (should stop two weeks before harvesting); and
f) poor storage,

Increase in the frequency of application and higher dosages mean an over-use of fertilizers etc. Such practices, over time, causes excessive nitrate levels on ground water and even nitrate run-off can lead to entrophication of surface water. Pollution of NO and soil not only damages the ecology of agriculture but also the ecological equivalence of the environment. In addition, over-use of pesticides and other agro-chemicals lead to overexposure of the farmers to chemicals which as discussed earlier is now a significant health hazard, in addition to higher chemical residues in food and the environment. The present indiscriminate use may give phenomenal results over a short period of time but in the long-run such use can destroy the natural predators and other non-vulnerable species and also increase the resistance of the very insect pests the farmers wish to eradicate. The Mahaweli settler farmers have much to learn about the use of agro-chemicals and there are no specific policy guidelines.

In this respect the UNEP recommendation, is relevant and must be emphasised. "The use of fertilizers and pesticides has to be guided inter alia, through training, awareness building and appropriate price policies, so as to establish integrated nutrient supply systems responsive to environmental impacts. Similarly, subsidies, which have led to the over-use or abuse of chemical fertilizers and pesticides, have to be phased out.

In its overview of the health situation the Ministry of Health has this warning to give: "As the population of the Mahaweli area increase the traditional defecation practices will lead to high transmission of water and food-borne diarrhoeal diseases such as gastro-enteritis, bacillary dysentary,--------

amebiasis and typhoid. These will increase from the outset because of the lack of safe water supplies and excreta disposal facilities. Hence, the provision of adequate supplies of safe water, sanitary latrines and proper permanent housing are priority health needs of the area. Equally important is the training and education of settlers on protecting the living environment.

Conclusion.

In an overall assessment of the performance of the project in terms of health development, the outcomes have been positive for an effort of this unprecedented magnitude with the numerous complex human problems that it faced. This performance was possible because the project was able to benefit from the vast experience it had accumulated from the implementation of similar land settlement projects over a period of nearly four decades. The main components of a multi-sectoral irrigation and land settlement project which have implications for health as illustrated in the Mahaweli project summarised below: clearly illustrated in the Mahaweli project,

1. Organisation. From the outset the organisational structure lent itself to integrated multi-sectoral implementation. Within such a structure it became possible to identify the main economic and social components and clearly define the responsibilities within a multi-sectoral programme. Many activities of line Ministries which were organised vertically could be co-ordinated horizontally as in the Village Health Project.

2. Internal migration. Most of the health-related issues of the project arise from the massive transfer of the population to new habitats. Some of these aspects are likely to escape attention unless there is a systematic identification of the possible health effect of the different aspects of the migration. These are:

- The stresses of adapting to a new environment; changes in food habits and access to food resources; new climatic conditions demanding changes in life styles;

- Exposure to new diseases in the new habitat as well as introduction of diseases which had been endemic in the old habitat to the new one.

- The age structure of the population; many families are in their peak reproductive age and have already demonstrated the potential for large size families. The selection criteria have brought together a population group which requires special family planning interventions. This becomes particularly important in relation to the acute problems of second generation settlers and the lack of economic opportunities which have already become evident in older settlement schemes.
Social dislocation. The age composition also draws attention to other features such as the possible skewed distribution of age groups the ratio of young to elderly, the extent of dependency, and their social implications for the growth of a balanced community life and intergenerational relationships. The supportive networks available in the original habitats through extended families and kinship are most often non-existent in the new settlement.

Early stage of settlement. This is the most vulnerable phase; settlers are likely to migrate without their families; most housing will be temporary; even after the families join them in the initial phase there are likely to be food shortages and high food prices until the project is in full production; the infrastructure for health and other basic services will not be fully developed.

3. Food and nutrition. Some of the impacts are already mentioned under internal migration. The Mahaweli settlements will be subject to the same effects of macro-economic policies as the rest of the population. These include the effect of macro-economic and sectoral policies on food prices, and household purchasing power. These effects can get accentuated owing to the special circumstances of the settlers, particularly in the early stages of the settlement as already indicated. The crop-mix and the utilisation of highland allotments can be planned to meet the objectives of agricultural diversification and farm incomes as well as those of nutrition.

The nutritional status of the Mahaweli settlers has given cause for serious concern. The combination of very low infant mortality with high levels of acute and chronic malnutrition has perplexed health professionals and nutritionists. A recent evaluation has this comment to make: "Research is required on the baffling findings of the residual high levels of undernutrition which according to the accepted theory is incompatible with the remarkably low IMR." (Consultant report on the evaluation of the village health project UNICEF/CID.) The selection criteria have resulted in a concentration of population who have been drawn from groups who were suffering from malnutrition prior to migration but who are relatively better educated than the average. The potential for programmes of health education and changes of behaviour for improvement of nutritional well-being is high.

4. Technological change. These include the effects of irrigation and forest clearing and the transmission of waterborne diseases, the recrudescence of malaria; special problems which arise as a result of the efficient and farflung irrigation network which also becomes a carrier of infection, faecal pollution and the effects of poor environmental sanitation; the use of agro-chemicals, pesticides weedicides fertilisers, on agricultural workers, farm households and consumers of
agricultural produce; the health effects of mechanisation on the quality of the agricultural occupation - the reduction of fatigue-intensive operations on the one hand and the risks of injury and accident on the other.

5. Agricultural policies in general and their impact on the Mahaweli project. The health impact of the Mahaweli project has to be seen in the context of the agricultural strategy as a whole and placed in the context of the analytical framework for health policy analysis in the agricultural sector as presented in the paper on that subject. The issues mentioned there which relate to import substitution in rice and the diversification of agriculture apply to the Mahaweli project. The pattern of agricultural development which leads to the expansion of non farm employment, the growth of agricultural processing and the promotion of rural and small-scale industrialisation will have special relevance for the problems of the second generation which have become acute in older settlement schemes and which can produce highly vulnerable and disadvantaged groups.
Table 6 - Key Health personnel in the Mahaweli Districts, 1987.

<table>
<thead>
<tr>
<th>District</th>
<th>Medical Officers (Curative Services)</th>
<th>Medical Officers (Administrative Services)</th>
<th>Dental Surgeons</th>
<th>Registered/ Assistant Practitioners</th>
<th>Nurses</th>
<th>Medical Officers of Health Services</th>
<th>Public Health</th>
<th>Public Nurses</th>
<th>Public Health Sisters</th>
<th>Public Midwives</th>
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<tr>
<td>Kandy</td>
<td>183</td>
<td>15.2</td>
<td>7</td>
<td>0.6</td>
<td>24</td>
<td>2.0</td>
<td>72</td>
<td>6.0</td>
<td>779 64.7</td>
<td>7 0.6</td>
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<td>2</td>
<td>0.3</td>
<td>10</td>
<td>1.4</td>
<td>50</td>
<td>7.2</td>
<td>195 28.0</td>
<td>5 0.7</td>
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<td>1</td>
<td>0.2</td>
<td>7</td>
<td>1.3</td>
<td>45</td>
<td>8.6</td>
<td>112 21.5</td>
<td>3 0.6</td>
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<td>-</td>
<td>-</td>
<td>1</td>
<td>0.3</td>
<td>20</td>
<td>6.7</td>
<td>40 13.5</td>
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<td>4</td>
<td>0.3</td>
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<td>93</td>
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<td>553 40.8</td>
<td>11 0.8</td>
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<td>3</td>
<td>0.4</td>
<td>3</td>
<td>0.4</td>
<td>53</td>
<td>7.9</td>
<td>256 38.2</td>
<td>3 0.4</td>
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<tr>
<td>Badulla</td>
<td>48</td>
<td>7.1</td>
<td>4</td>
<td>0.6</td>
<td>13</td>
<td>1.9</td>
<td>54</td>
<td>6.6</td>
<td>282 41.5</td>
<td>4 0.6</td>
</tr>
</tbody>
</table>

Rate per 100,000 population

1. Includes specialists
2. Excludes Medical Officers of health (given separately)
3. Includes Regional Dental Surgeons
4. Excludes Pupil Nurses

Source: Medical Statistics Unit.
<table>
<thead>
<tr>
<th>Division</th>
<th>BCG Coverage</th>
<th>Rank</th>
<th>DPT 3 Coverage</th>
<th>Rank</th>
<th>OPV 3 Coverage</th>
<th>Rank</th>
<th>Measles Coverage</th>
<th>Rank</th>
<th>TT + B Coverage</th>
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<td>7</td>
<td>46.0</td>
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<td>66.6</td>
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<td>Base Hospitals</td>
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<tr>
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<td>Duration of stay</td>
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</table>

Bed turnover rate: The number of times a hospital bed, on the average changes occupants during a period of time.

* Excludes De Soysa and Castle Street Maternity Hospitals, Lady Ridgeway Children Hospital and Eye Hospital.

** Includes Maternity Home in-charge of Midwives.
### Table 8 - Utilisation of Medical Institutions in the Mahaweli Districts, 1987.

<table>
<thead>
<tr>
<th></th>
<th>Peripheral Hospitals</th>
<th>Rural Hospitals</th>
<th>CD &amp; Maternity Homes</th>
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</table>

Bed turnover rate: The number of times a hospital bed, on the average changes occupants during a period of times.

* Excludes De Soysa and Castle Street Maternity Hospitals, Lady Ridgeway Children Hospital and Eye Hospital.

** Includes Maternity Homes in-charge of Midwives.
THE MAHAWELI SCHEME PROJECT EFFECTS & IMPACTS

PROJECT ACTIVITY & OUTCOME

1. Design & Organization.

2. Settlement.
   Internal Migration.

3. Early Stage of Settlement.

HEALTH & RELATED IMPACT

Design of organizational structure for multi-sectoral implementation. Responsibilities defined, main economic and social components identified within programme. Line ministries coordinated, e.g. village health project.

Large scale transfer of population from one habitat to another. Changes in resource base and resource use, endemic diseases.

Stress in adapting to new environment. Food availability changed, habits had to change.

Exposure to new habitat associated disease. Carry disease from old habitat.

Age structure of settlement favours those at peak reproductive age. Need for special family planning interventions. Social dislocation. Higher ratio of young to old.

Skewed population distribution. Loss of familiar social networks.
Housing Temporary.
Food costs high. Infrastructure for health and basic services not fully developed.

Impact of National Policies.

Favourable impact of those policies which support prices of crops grown in the settlement, raise prices of competing food products. Unfavourable impacts from changes in macro economic and sectoral policies that lower purchasing power, raise input prices.

Changes in the transfers and subsidies to agriculture sector.

Impact through earnings and income of the agricultural producers and price for agricultural goods.

The nutrition status of the Mahaweli Settlers is a cause for serious concern. The educational attainments of the settlers has contributed to high infant & maternal survival, but those selected from poor and deprived groups more likely to have been malnourished prior to migration. Good potential for changes in behaviour for nutritional well-being.

5. Technological Change.

The irrigation system is an efficient new method for transmitting disease. Lack of toilets, use of the canals for cleaning.

Use of organic fertilizers, weedicides, pesticides at high levels. Possibility of contamination and poisoning.

Injury from farm equipment, threshers etc.

6. Agriculture Policies.

Commercialization, move away from subsistence to market production. Diversification. These factors affected by technology, change employment and incomes from agriculture production.

Changes in food self sufficiency at household level. Nutrition purchased and affected by prices and monetary factors.
POLICIES AFFECTING THE URBAN POOR
WITH SPECIAL EMPHASIS
ON HEALTH RELATED OUTCOMES.

THE CASE OF SRI LANKA

Introduction.

Policies formulated at the national level impart effects both within as well as outside the expected domains. Policies that are designed to enhance the performance of one productive sector impart effects to other sectors. As a result changes occur in the relative benefits and rewards for the participants within the respective productive sectors. For example, pricing policy designed to increase food production may adversely affect the wage earning groups in the urban sector, especially the urban poor depending on casual employment. This in turn would impact on the nutritional status of poor households and consequently their health. There are a range of policies starting from the macro dimension to specific sector policies, that have health related impacts and consequences on groups of the population.

Urban development policy affects the quality of the habitat of specific urban households. In Sri Lanka, large majority of the urban households in the metropolitan area of Colombo, live in habitats which are seriously deficient in basic amenities. The habitat exposes these households to health risks and vulnerabilities arising from the structure of the home, the crowded living conditions, the neighbourhood of the home and the water supply and toilet facilities available to them. Many squatters are located by the side of canals that transport effluent from factories. Although the policy framework has been put in place by the Central Environmental Authority, checking and policing is not as efficient as it must be. State interventions to grant better access to urban building sites, to improve the water and sanitation services to the sites, can reduce the risks of the poor quality of the living environment.

In 1981, approximately 22% of the population of Sri Lanka lived in urban areas and nearly half of them were in the Metropolitan Colombo. The population of the city of Colombo is expected to have reached approximately 650,000 persons by 1989. The density within the city would be 45,000 persons per square mile. Nearly half the city population is estimated to be living in congested, poorly serviced, substandard or low quality housing.

This case study attempts to develop the analytical tools to identify the links between selected policies and health outcomes of the urban poor. Section 1 identifies the urban poor, indicates the characteristics of the group selected for the exercise, Section II develops the analytical framework and specifies the set of policies that will be examined, Section III applies the method conceptually to 2 cases. Conclusions are presented in Section IV.
SECTION I  THE URBAN POOR: THE PREVAILING SITUATION

In this exercise we define the urban poor in the following manner.

Those households and individuals comprising the households that are located in a habitat of low quality or low standard housing and housing related services, including water and sanitation, waste disposal and surface water drainage.

Data for Sri Lanka indicate that all households in these habitats are not poor in income. However even the households which are not poor in income live in habitats or settlements which are seriously deficient in many respects. A large proportion of the homes in these settlements have poor quality floor, wall and roof material. The water supply and sanitation is mostly communal and inadequate to meet the needs of the households. Housing of poor structural quality is common to the rural sector as well. However, crowding and problems associated with waste disposal create higher risk of contamination of water supply and food, higher risk of the spread of and exposure to, particular types of infection, is particular to the urban poor.

The low quality structures are homes for approximately half the population of the city of Colombo. They are dispersed and in small pockets and have the additional characteristics that produce health hazards and make the household vulnerable to disease and ill-health. These characteristics include the proximity to open drains and canals which remain stagnant and polluted, garbage dumps and sites for commercial and industrial waste disposal. Therefore the group that is chosen for this policy interaction and identification of links is defined partly by the characteristics of their habitat.

Table 1

Characteristics of the Urban Housing Stock
1981

<table>
<thead>
<tr>
<th>Housing Stock</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Urban</td>
<td>509,459</td>
</tr>
<tr>
<td>Colombo City</td>
<td>84,536</td>
</tr>
<tr>
<td>Proportion of Slums &amp; Shanties</td>
<td>53%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Urban Housing Structural features</th>
<th>% of total Urban Stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent</td>
<td>46.5</td>
</tr>
<tr>
<td>Semi-permanent</td>
<td>27.7</td>
</tr>
<tr>
<td>Improvised</td>
<td>7.6</td>
</tr>
</tbody>
</table>

| Palm Thatch or metal sheets       | 35.3                   |
| Mud or Wooden Walls               | 31.6                   |
| Mud or earth Floors               | 18.8                   |
| Clay Brick Walls                  | 67.7                   |

<table>
<thead>
<tr>
<th>Amenities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Without formal toilets</td>
<td>16.4</td>
</tr>
<tr>
<td>Piped Water (including Standpipes)</td>
<td>46.5</td>
</tr>
</tbody>
</table>

The household income and purchasing power is expected to be a major factor in determining the choice of a place to live. However the location has features that individual households cannot easily change. The communal water supply and toilet services available to a large proportion of the urban poor cannot be improved by individual initiative for private use. In some settings lack of space precludes the development of private toilets. In others accessing state provided services such as the water supply, sewage system or the electrical power grid is not possible due to legal and administrative constraints. The transaction costs of obtaining connections are very high and income alone is not adequate to access basic services. Concerted state interventions are needed to overcome the legal and operational impediments.

Table 2
Indicators of Poverty in the Urban Sector
1985–86

1. Per capita Requirement of Calories 2018

2. Per capita Expenditure required to achieve the minimum calorie and protein requirement
   National Average Rs. 233
   Rs. 202

3. Households below Poverty
   Proportion % 203,473
   National proportion % 32.8

4. Proportion of Ultra Poor % 44.8
   National Average % 3.2

5. Proportion Nutritionally at Risk % 22.4
   National Average % 23.9

6. Proportion of Households
   Not achieving minimum calories % 53.8
   National Average % 49.2


Most squatter settlements are "tolerated" by the municipal authorities. Some form of regularization occurs over time. Tenure or title is not granted but official recognition takes the form of state provided basic services, communal toilets, and communal water taps. The lack of title is a disincentive to home improvement, upgrading or building permanent structures. The inability to develop private water supply and toilet services or to improve services through private effort affects the type of structure that households construct. The rate of upgrading is expected to be positively correlated with the quality of the basic services available to the home. Most households
tend to desire improvements in water and sanitation services. If they can be improved, homes tend to be upgraded faster. The impediments to the improvements in these services will constrain home improvement and upgrading.

The proximate habitat of the urban poor household can be characterize by the following features:

The home is crowded, built with significant use of non durable material.

During the time that meals are cooked, many homes are filled with smoke and soot because of the use of fire wood inside poorly ventilated homes.
A large proportion have no access to toilet facilities.
The majority of the poor urban households use common toilets which are over used and poorly maintained.
The water supply available to most poor households is a communal shared tap often by as many as 40 households (servicing 200 or more persons). Water is collected daily and periods of over 1 hour are spent by many households waiting their turn at the standpipe.

The vicinity of the settlement is often poorly maintained. Surface drainage is poor.
Many squatter settlements are located near polluted and stagnant canals. Waste disposal is poorly organized or not at all. Often there are large garbage dump sites in the immediate neighbourhood of the settlement. The flow of motor traffic in the vicinity adds to the noise, exhaust fumes and risk of accident.
SECTION II  THE ANALYTICAL FRAMEWORK

1. The Policy Variables

The following groups of policies will be considered:

I  Macro economic
   i. Fiscal Policy
      Government Expenditure,
      Social Welfare programs relating to minimum standard of living, food
      stamps and changes in eligibility criteria,
      non-indexation of the value of the food stamp
      Subsidy polices. Sectoral, Agriculture, industry.
      
      Government Revenue
      Pricing of basic goods acquired by the state, imports as in the case of
      consumer goods, flour, medicine, inputs for production of food and other
      commodities, fuel.
      Taxation of production and distribution.

   ii. Monetary Policy
         General level of interest rates and price of credit. Tight or loose money.

   iii. Trade Polices.
         International trade. Tariff, exchange rates,
         Internal trade regulated by taxes and fees.

II. Sectoral Policies at the Macro and sub-national Level.

   iv. Sectoral polices directed at productive sector. Agriculture, industry.
       Social overhead sector, housing, education, health, transport. Polices which aim to
       affect access either through the price system or through changes in supply, as in
       expanding, the school system, medical services etc.
       Urban development, access to habitat,

       The polices indicated above have independent as well as interdependent effects, outcomes
       and impacts on the special group considered here the urban poor.

       In addition to the above, the effects of international economic activity are transmitted to
       the national and sub-national levels. These are not the result of policy enacted at the national
       level. For example the adverse movement of the exchange rate will transmit effects through prices
for imported food items, intermediates such as agricultural inputs, fuel, and pharmaceuticals. Price increases in these important imports are generated by forces outside the national economy and not subject to its control. Policy is designed to either transmit effects directly to different groups or to absorb some of the effects through the government budget.

Therefore the economic management and its capacity to respond to changes in the international economy is of vital importance to the well-being of the poor and the vulnerable.

The policies that will be considered in the discussion can be identified in terms of:

National responses to the international economy; for example, price fluctuations of imports and exports.

Aims and objectives; the sector within which policy is cast, the sector(s) which it expects to affect,

Direct and indirect impact on different types of households; these include the impact on aspects of well being of the household, its capacity to consume defined by income, the effect on demand through changes in relative prices of basic goods and services.

The polices have been described in general terms without mention of scale, size of impact. Each category and type of policy has potential to affect the urban poor.

The policy is identified in terms of the impact channel and decomposed into effects on the household. The vulnerability and exposure to risk is assessed in terms of nutritional status and potential for illness. A net outcome in terms of health risk and exposure can be evaluated. Since the environmental features and vulnerabilities are known before hand, the policy needs to be assessed in terms of the possible degree and strength of the risk and exposure outcomes resulting from the policy. The vulnerability and changes resulting from policy can be examined in terms of special groups within the household, the infants, children, pregnant and lactating women, the sick and the aged. The possible duration of the impact effects, whether they are long or short lived can also be specified and the transitional impacts identified.


Purchasing Power affected by:
Wages, Profits, Income, transfers and relative prices. Especially, self employment and casual wage incomes.

Access to services. Changes in the delivery and pricing of housing and health services, transport and educational services. The latter affecting the processing of information related to opportunities for improvements in income and material well-being, nutrition choice, reproductive behaviour and family size.

The balance between state and private sector provision. Changes in the prices of services. Health, education and transportation.
Trade policy, effects on import and export opportunities, import substituting or export promoting, will affect urban poor especially the small scale traders. Effects through earnings and consumption.

Exchange rates, changes in relative prices of domestic and imported items, availability of food changed.

Interest rates, income, savings and assets.
Affected directly by monetary policy, by the policies above, special schemes discriminating in the favour of small scale, export production, sector or geographical region.

Institutional rigidities, traditional modes of behaviour and cultural practice will tend to modify the impact and effects of policy.

3. Duration of the effects of policy.

Depending on the type, scope and scale of the policy, its effects will be felt over a time period which is short, medium or long. Some policies will have temporary effects while others will be lasting or long lived in effect.

4. The Bundle of Basic Goods

The impact of policy and decision making can be examined by identifying a bundle of basic goods and services purchased by the poor. This basic bundle will consist the following:

Food, almost exclusively market purchases, domestically produced cereal, rice, imported wheat flour and flour based products produced in the neighbourhood or the vicinity, vegetables often the medium to low grade quality, small quantities of dried and fresh fish, coconuts, sugar primarily imported, milk powder quantity depending on the composition of the household.

Housing Services: location, squatter settlement, slum or crowded tenement setting, small proportion in small state sector apartments. Water and toilet services communal, over extended and usually in poor maintenance.

Clothing: The requirements in the urban sector are expected to be higher. The poorest will be tend not to have a regular change of clothing.

Health Care Services: State sector clinics, and central hospitals, many private hospitals and clinics. Access depending on income in the case of the private sector service. Growing community health volunteer system supported by the state sector personnel, but in very small scale at present. Maternal health care with supplementary feeding programs.

Education and Transport: Access to the education system depends on location. The urban poor are generally strategically placed to access schools that are superior to those of the average rural sector child. Supplementary feeding programs at school.
5. The Interaction between the environment and economic capacity

The urban poor are defined by both access to habitat as well as capacity for material well-being. Income and consumption levels dominate the definition. However, a semi-independent aspect that must be considered is derived from the specific characteristics of the environment. All urban poor are not confined to low-quality living environments and not all in such settings are poor in income. However, the environment is expected to impart vulnerabilities especially in the form of exposure to ill health or illness causing situations.

The urban development policies relating to physical planning are therefore independently important. Low income and the vulnerability it imparts to a household in terms of impaired nutrition and health status may be magnified or reduced by the type of environment. For example, housing that keeps away the damp is properly ventilated, and is serviced by safe drinking water and toilet facilities will not reinforce the detrimental effects of inadequate nutrition resulting from low income. The household in such housing will not be exposed to environmentally generated health risks in addition to the vulnerability resulting from the low income level. Furthermore, if the disposal of waste is efficient and the neighborhood is free from disease vector production, the reinforcing effects of health risks are reduced.

The urban poor are considered in terms of "natural" units, the households. The policies and their effects are then translated into changes in the capacity of households, their purchasing power and access to basic goods and services. The basic goods and services are defined directly. They are food and nutrition, shelter and housing services, clothing, educational services and health services. The health effects of the policies are then derived as direct or indirect effects.

Nutritional changes are expected if relative prices of major food items change without offsetting changes in income. For example if wheat flour increases without offsetting changes in cereal prices or incomes. The policy or decisions that results in a wheat price increase will affect the nutrition status of poor households depending on the size of the price increase. If large enough to result in a decline in the calorie availability of the household, it will tend to expose it to health risks. The effects will be larger if the household is simultaneously vulnerable or exposed to illness through the habitat and housing service. Offsetting effects may be generated if additional income earning opportunities are available without resulting in a net additional vulnerability. Some members of the household may be temporarily exposed to health risk during the period of adjustment to higher prices as new avenues of income are sought.

International price effects are transmitted to the domestic economy through trade. The manner in which these effects are internalized depends on the policy regimes that operate. The price effects may be transmitted to all consumers in a regressive manner (because of the inherent inequality of income) or modified by the application of discriminatory pricing and access according to economic strength. The latter is achieved through a social welfare system or a rationing system. The costs are absorbed and distributed through inflation or reduced availability of other goods and services. The effects of increased national costs of imported goods, depending on the size of the increase, will lead to economic consequences that impact on the general price level, interest rates, savings and real incomes. Fixed nominal income and wage earners will tend to experience hardship. The poor with a larger proportion of income devoted to food would be more affected than others. However, the urban poor will be at a greater disadvantage as they do not produce food and depend on exchange. The reduced availability in general would lower household food consumption among the urban poor. Nutrition of the vulnerable would be impaired and the risk of ill health increased.
6. Characteristics of the Urban Poor

The urban poor household has dimensions of poverty that are different from those of rural poor households. The urban poor are in the proximity of a range of services which reduce the effects of income related risks and vulnerabilities. Health, education and transport services are more readily available. However changes in the prices or the provision of these services impact strongly on the poor urban household. The poor urban household will tend to have a large proportion of members at the two ends of the earnings cycle. Young households at the formative stage of the family and old ones where the household head is not able to contribute income, will be in this category. The poor urban household faces an economic situation where market based transactions dominate. Almost all of the household needs have to be purchased. Policies that affect the availability and the prices of food items will affect the urban poor strongly. Items such as wheat flour are important in the diet of the urban poor household. A range of policies and internationally transmitted effects tend to raise the price of this commodity. Policies and transmitted effects, leading to inflation will adversely affect the real incomes and purchasing power of the urban poor.

Within this framework the household is considered as having the following characteristics:

Internal.

Demography and composition,
Education, skill and training,
Economic Resources, incomes
Assets convertible to purchasing power, savings, goods,

External.

Habitat, the location and the services that the household can access. Some characteristics of the habitat can be changed through purchase, these include the physical structure and its attributes and the services to the home. The location can be changed but it is more difficult and mobility is low in Sri Lanka.

The socio-economic context, economic supports, income levels, prices of basic goods and quality of social infrastructure.

The poor urban household is characterized by the insignificant contribution of agricultural goods produced by the household. Exchange through purchase predominates.

The household is constrained by both the internal as well as the external factors. The poor urban household is vulnerable to fluctuation in income and purchasing power and is exposed to health risks from the location it is able to select. The location provides access to employment and a range of other services including, health, education and transport. The choice of location is constrained by the available opportunities to generate income. Additional health risks are generated by a range of income generating activities at home. They produce hazards of fire, heat, and may expose children to potentially dangerous substances (e.g. kerosene in the case of small stores).
7. Features of the Habitat Accessed by the Urban Poor

The habitats that the poor can access within the urban setting have a range of negative characteristics. These include;

- poor water supply,
- low quality sanitation and waste disposal,
- poor drainage and protection from flood,
- congested or overcrowded neighbourhood,
- exposure to industrial waste, heavy motor traffic,

The habitat is also associated with access to specific types of employment and income generating opportunities. For the poor the neighbourhood is very important for generating employment and income. They access the localized casual employment markets, the self employed locate themselves in the proximity of the perceived market for their services or produce. The neighbourhood is therefore a vital part of economic resource of the poor household. The localized pools of opportunity are not the only income generating opportunities available or accessed by the urban poor. Transport affords access to other markets and opportunities. Some commute to other parts of the city for regular wage labour, but locate themselves according to convenience and the cost of housing. Decisions about location are affected by prospects of ownership of housing within the urban sector, and this in turn depends on the action of the state. Significantly large proportion of poor households in the urban sector generate income from home based activities. Small workshops, stores and food preparation enterprises are common. These add to the hazards and risks already present in the habitat.

A large proportion of the urban households cook their meals inside the main structure of the home. In the tenements, most do not have a separate area for cooking. In such settings many use fuel wood and the homes are smoke filled during cooking time. In the shanties and the squatter settlements, most households use kerosene for lighting. The lamps used are often improvised from bottles and susceptible to tipping over and spreading fire. The structures contain inflammable material, wood for the walls and coconut palm thatch for the roof. The proximity of other homes increases the risk of fire and smoke to the entire community.

8. Analysis of Policy Impacts

The analysis of policy and the health impacts can be considered in the light of the relationships that have been outlined. The framework is as follows:

Poor urban households with internal characteristics defined by demography (household size and composition), education and human capital attributes, income and purchasing power (which have features of stability and vulnerability).

Placed within a socio-economic context defined by state assistance and provision of goods and services. Availability of goods and services and ease of access, determined by prices and transaction costs, a social security and welfare system.
An economy with particular structural features and vulnerabilities, open (in terms of trade), dependent on export earnings to finance a range of basic consumer items including wheat, milk powder, sugar; intermediate products such as agro-inputs and crude oil for the production of fuel.

The effect of decision making and international fluctuations on the bundle of basic goods and services defined earlier is considered.

The nature of the impact depends on the strength of the price increase that is transmitted to the domestic economy and the urban poor in particular. Mitigating effects such as food security systems and income supports play a part if they exist.

The impact of sectoral policies in food and agriculture, services such as health, transport and education can be examined within a similar framework. However, the manner in which the policy effects are transmitted are not the same in all cases. Two different aspects have to be considered. First, the policy transmission mechanism. The policy variables that are affected, the target variables to be affected and the transmission mechanism that operates will differ according to the policy. The policy impact will have different duration and strength. Some effects would be temporary and adjustments will occur, while in other cases the impacts will be long lasting. Access to services such as education have impacts that are in general long lasting. Neither are the effects immediate. Transport cost increases will increase the cost of access to basic services in education and health as well as the cost of generating income. Incomes may be bargained up in time but with a definite lag. In the unorganized sector, wage and income increases may be slower to adjust to the cost increase. Some of the effects, as in the case of nutrition impairment through reduced food intake as a result of price increases, will have inter-generational effects. Nutritionally impaired children and relatively uneducated men and women will result from policies and decisions taken in the present. This will reduce the potential of some of the individuals to fully participate in the system in the future. Poverty and ill-health are transmitted through reduced access to education and information processing capacity.

Therefore the national, sub national and sectoral policies will affect the urban poor in the following manner:

Agriculture and Food and Nutrition policies through food availability and the cost of nutrition

Social Welfare policies, subsidies and income supports, supplementary income and guaranteed consumption.

Health services directly through provision as well as through transaction costs in the form of transport.
The costs of medication and pharmaceuticals.
Community health and services, community based interventions, state provided or assisted.

Policies related to the regulation of access to habitat and amenities such as water service and sanitation

Management of the macro economy and policies of adjustment at the national level lead to higher food, fuel and transport prices and result in increases in the cost of living.
The transmission of effects are through food and nutrition availability and prices. The impact of external factors and their management will affect the urban poor through their food budget and through higher fuel costs. The higher fuel costs will tend to impact on domestic food items transported to the urban areas as well as the cost of preparing food with the use of kerosene. Meanwhile the cost of generating income will increase if fuel costs are transmitted as higher transport fares. The control of transport prices depend on whether government policy will absorb the cost or subsidize the private passenger and goods transport sector through tax policies or permit the transmission of input costs as higher service charges. The latter would affect the incomes and real purchasing power of the urban poor. A set of policies related to social welfare, and the major productive sectors of the economy, the social infrastructure and the urban living environment can be decomposed into processes and impacts on the urban poor. The health consequences are deduced from the impacts.

SECTION III  APPLICATION OF THE METHOD

Context. Metropolitan Centre of Colombo Sri Lanka.

The metropolitan habitat can be divided into two major parts.

One consists of the locations which have tenurial forms, are legal and where transfer rights accrue to owners. These are habitats of the middle and upper income households and some of the lower income households. Among these habitats are those which the urban poor occupy, the slums and the congested tenements. Most have legal tenure in the slums and tenements but the form is not adequate to place the properties as collateral to formal financial institutions.

The other consists of the squatters and illegal occupants of land in the city and its outskirts. The state does not provide ownership rights in the manner of outright purchase to the squatters. But some form of official recognition is made by the authorities, ground rents charged in many instances.

The poor quality urban habitat has two components, one consisting of run down and over crowded tenements or small row houses and slums in the city center and the other, the squatter settlements where semi-permanent homes serviced by highly overloaded water supply and toilet facilities are the norm. The squatter habitats are also likely to be congested and in settings associated with additional health risks such as polluted canals and large storm water drainage areas liable to flood and rail line reservations. Sri Lanka does not have very large squatter settings as in other developing countries of the region. The urban poor are dispersed over the city and its outskirts. The dispersion is a function of untended public lands that are available for squatting. The locations that are chosen depend on the functioning of local networks. The choice of location is expected to be closely tied to employment and the origin of the household head or the spouse.

The urban development policy of the past decade has taken steps to enhance the delivery of basic services to most of the tenements and slum habitats in Colombo. Resettlement of squatters
is a small but important part of the policy. Meanwhile, in the city center, congested tenements are
being slowly replaced by apartments in a programmed manner. Evictions from squatter areas
seldom take place, the provision of basic amenities, communal facilities for water and toilet
services, is the first step towards state recognition and consolidation of the habitat. Nevertheless
there are many squatter settlements that have not received state assistance for basic services for
more than one decade.

Case I. Reconstituted Urban Habitat for the Poor.

The concepts developed in the preceding discussion are applied to the situation of an urban
habitat that has received the direct intervention of the government through its housing
development program (The Urban Component of the Million Houses program). Approximately 100
households from a poor quality neighbourhood are relocated on a prepared site, blocked out and
serviced with amenities including water supply, toilet and waste disposal and a community center.
The beneficiaries were provided with financial assistance to build permanent homes. Subsidized
loans that were adequate to build a core house were provided. The homes were serviced with
common piped water supply and toilets.

The households had been living in the vicinity in homes that were mostly constructed in a
makeshift manner. While the majority had concrete floors, they had started off with tamped earth
flooring. A significant proportion of the households had been without formal toilets, others use
communal facilities that are most often overused and poorly maintained. The water supply and the
toilet service had been seriously strained. The area was subject to flooding during the rainy season
and the nearby canal was clogged and stagnant most often. The households functioned as a
community which tended to cooperate for some types of collective action. Not much had been done
to improve the habitat through collective action. Mutual aid and assistance was provided in an
organized manner at critical times such as serious illness, birth or death. Organized income
generation within the community tended to be outside the law. Individual enterprise was present.
Most households derived incomes from irregular wage labour or tasks associated with trade. A few
were in government sector salaried employment. The community consisted of a mixture of the
different ethnic groups. The minority representation was higher than the national average.

The move to the new setting was accompanied by additional financial burdens. The
households were exposed to two competing forces. The loan obligation required a regular stream
of savings to be generated. Meanwhile the completion of the home required additional financial
obligations for many. Furthermore there seems to have been a tendency for the authorities to urge
and press for early completion of the homes. During the period of construction, some beneficiaries
seemed to have sold their plots illegally, realizing the high commercial value of the site. The
completion of the home became a high priority and it promised the potential of new sources of
income from illegal subletting or small scale economic activities in the home. The latter opportuni-
ty especially in preparation of food for nearby factory and government office employees, was
enhanced by the prospect of a better quality of neighbourhood.

The site had been prepared, waste disposal and surface drainage planned. However, the
canal that bordered the site, remained in virtually unchanged conditions. The communal toilets
and water supply required a system of maintenance. The settlers were not quite in a position to
undertake the maintenance and upkeep on their own. The community development council (CDC)
that had been formed when the settlement began did not have a financial base to undertake activities of this sort. Moreover these activities remained under the control of the branch of the government agency that completed the project. The transition to a self managed settlement was slow.

This type of intervention in the urban sector is relatively small and new in the form described above. The urban habitat in Metropolitan Colombo is characterized by the very poor living conditions available to approximately one half of the urban population. State sector interventions in the form of apartments for the low income and improvements of amenities in settlements has taken place on an expanded scale since 1977. Squatters and illegal occupants of state lands comprise the major portion of the urban poor households.

Case II.

An illegal squatter settlement.

Approximately 100 households, makeshift homes, many with wattle and daub walls, thatch or corrugated metal sheets for roofing.
Congested setting, access paths not well prepared.
Communal water supply and sanitation seriously over extended.
Most persons are employed as casual labourers or in small scale enterprise. A few are engaged in state sector wage employment.

This squatter site is located in the vicinity of a state developed apartment complex for the urban middle class. Facing the community is a upper income and middle income residential neighbourhood.
The squatters have been at this site for approximately 20 years. The state has indicated that the households will be relocated but no action seems to have been taken yet. The land occupied by the squatters has high commercial value for upper income residential dwellings.

The two communities are now exposed to a set of policy measures and the likely transmissions and outcomes related to health or the implications for health are traced.

State interventions and policy reach the urban poor in the following manner;

Income: casual labour, trade and small enterprise.

Prices: Inputs to small business affecting profits and income.
The bundle of basic goods consumed by the poor is dominated by food. The food bundle consists of items locally produced, rice and vegetables, milk (processed) and protein items. Imported wheat flour, and a small proportion of imported foods complete the food basket. Tobacco and beverages are locally produced or processed and consumed in relatively large quantities by the urban poor males.

The services available to the urban poor: housing and related services. The state grants access to locations or sites, provides basic services to squatter sites and improves existing services through the urban development program, to tenements and slum areas. The use of the housing service if the site or
the building is provided by the state, is regulated. For example home based activity and subletting is discouraged. Combining home improvement or home building with activities that tend to enhance the income flow are not planned in most state sector settlements.

Basic health services: in the form of clinics and hospital services. The pharmaceuticals have to be purchased in the open market in most situations in the state sector hospitals. The price of essential drugs are regulated by the state, the effectiveness may not be optimal nor beneficial to the urban poor.

Transport: passenger transport routes are regulated, fares are controlled for the total sector including the state sector.

Education: Access depends on the provision and location. Some urban schools have high demand and the poor are not likely to have equal opportunity to gain access even though they are in the vicinity.

The impact of economic policy on the urban poor tends to operate through the channels of income and prices. The urban poor are vulnerable and exposed to price changes in basic goods. They are also less able to produce subsistence goods for themselves due to a lack of access to land. The sites they occupy tend not to have legal title which impedes private initiative in home improvement. Basic services in water and sanitation are over extended and impart serious health risks to the household. The provision of basic services, community health interventions, adult education and efforts to improve the sanitation of the habitat all contribute directly to the reduction of some component of the health related risks faced by the urban poor household.

We will now examine the effects of different policies on the bundle of basic goods of the two urban poor communities.

Food

The urban poor like most urban households, purchase their food. However, since they have no refrigeration or capacity to keep food without spoiling, preparation is for the requirements of at most a day. Items such as rice, pulses, yams and condiments are purchased for requirements of more than one day. The period depends on the frequency of wage and income flows. A large proportion of the urban poor earn daily incomes. Vegetables, are generally purchased for daily requirements and so are the infrequent purchases of fish and meat. Seasonal price fluctuations and more importantly increases resulting from policy or international effects impact strongly on these households. On the one hand they do not have the advantages of bulk or quantity purchases, and therefore have to rely on reducing the expected quality to offset price disadvantages. The poor tend to buy the lowest quality vegetables brought into the city. On the other hand they are not able to easily substitute other food.

The imported food products such as wheat flour and sugar figure prominently in the poor urban household's diet.

Canned foods such as fish and milk also important. Meanwhile processed milk in liquid or powdered form is used by a significantly large proportion of the households.
Changes in subsidies and effects of imported prices of agricultural inputs such as fertilizers and agro chemicals have increased market prices of domestically produced food items such as rice, pulses, yams and vegetables. Recent increases in fuel prices increase production costs and prices of all domestically produced food items including fish.

The problems in the domestic budget as well as problems in the external sector has led to reductions in subsidies and a devaluation of the Rupee and domestic food.

The devaluation of the rupee has increased the rupee value of imported agriculture inputs and imported food.

Policies to increase domestic production through higher floor prices for subsidiary food crops, lentils and pulses has led to price increases in the short term.

The privatization of the state owned, National Milk Board resulted in an increase in the prices of milk.

The inflationary pressures in the economy since 1981 have tended to reduce the purchasing power of the urban wages. This affects nutrition. Although hard data are not available, intra family food distribution tends to be biased in favour of adult males. Therefore the children, and females would face increased nutrition risk.

Adjustment and Stabilization policies tend to have mixed effects on income and earnings of the urban poor. Slow down of government investment, construction and foreign trade reduce the growth of casual employment force the search for new opportunities.

**Health Care Services.**

The new settlement had improved access to health surveillance and intervention through the Community Development Organization formed when the project was underway. A day care center was set up along with a community center and reading room. The community was able to articulate its demands in an organized and systematic manner. The project assembled and directed a host of state sector services to the community as a result of the project. The Day Care Center provided nutrition support to the children in the community free of charge. Services of Family Health Workers were directed to the project area.

The squatter settlement, however was unable to "assemble" and articulate its needs as the new settlement. The Day Care Center set up with Assistance from a nearby Catholic church could not be sustained for long. The community depended on the health services and the clinics in the vicinity and used by other low income households in similar neighbourhoods.

Both communities had similar access to the health care system. The squatter settlement, being located in a mixed, middle and high income neighbourhood, found more private medical care in the vicinity. However the cost of medical service of private service is much higher. The new settlement received greater attention of the municipal health authorities as it quickly acquired "show piece" status.

The effects of international price increases on health care are transmitted primarily through the cost of medication and health care in the private sector. The medication given by the public health care delivery system has been reduced as a result of budgetary pressures.
forcing purchase from pharmacies. The prices of some drugs are subject to controls and the issues related to brand name and generic prescription remain unresolved. The impacts are the same for both communities.

**Education and other Services.**

The new settlement benefitted from state attention. Training facilities for adults and a day care center for preschoolers were set up. The type of school that the community could access however remained similar to what it had been before the project. The access to schools depend in large measure on the location. A squatter settlement may have, as in this case, better access to schools than a new state initiated settlement. Eligibility depends on location.

The same condition applies to other services. The mitigating factor is the deliberate action of the state to discriminate in favour of one community or setting. Often this occurs when a particular project area is adopted by state agencies. Then it receives preferential access to services. However after the attention is short lived.

**Housing Services.**

State policies had different impacts on the two communities. The households at the new settlement, received a new package of housing and related services. This tended to reduce some of the health risks related to the housing structure and the associated amenities. Water supply and sanitation remained communal services for both communities, however, for the new settlement, the density of use was substantially reduced. This paved the way for better maintenance of the facilities. The homes were better in structural quality in the new settlement, reducing the risks associated with damp. The space of afforded by the homes remained quite similar.

In a situation where the households gain access to urban land through state intervention, even if they are supported by lending schemes initiated by the state to improve housing, fluctuations and reduction in income induce economic stress. In the new settlement the households assumed a loan obligation to complete a small home. Most spent more than the loan obtained by additional borrowing or through windfall incomes. Some households constructed their homes with a large input of their own labour. For a small proportion of the households with unsteady and low income, the incentive to sell the home, even at a discount because of the lack of title, was overwhelming. The policy to improve the housing services through interventions that did not address the issue of unstable income resulted in some households reverting to the poor quality habitat. Meanwhile, a small proportion of households that were relatively well off but not able to directly access the site because they did not qualify for the program, were able to gain access through those who were in need of cash and willing to risk the unauthorized exchange. The sites that the urban poor inhabited, in spite of negative characteristics such as the proximity to a polluted canal, had high economic value. There was no legitimate market for most of this land and therefore it was not easily exchanged. Nevertheless the sites were proximate to a range of urban services and those with sufficiently large incomes could construct homes with the basic amenities. The access to this urban land was restricted and its conversion very slow and dependent on state intervention.

The macro policy effects both communities in a similar way. The impact of the policies are though earnings and prices. The manner in which the households earn income are broadly similar. However there are difference in the specific occupations arising from the location and the access to labour markets.
Other state policies and the effects of international economic movements tend to impact on both communities in the same way. The reduction of subsidies and the "pass on" effects of international price increases as in the case of fuel prices recently have the same impact on both communities.

The squatter community is not organized as in the new settlement. The type of community organization that is sponsored as a result of state intervention in the sites and services project is not present here. There is the ubiquitous death donation society which assists with funeral arrangements. In most squatter settlements there are other organizations and voluntary societies. They include the sports and welfare societies, and other related to events or occasions. Some are affiliated with the temple or place of worship in the neighbourhood. Societies that are organized to interface with the state or the municipal authorities are usually absent in squatter settlements. When specific needs arise, for example to address the threat of eviction, institutions and organizations form. Accessing the public authorities is when need arises and with some type of institution which is activated or created for that purpose.

The urban household in the squatter settlement is not able to overcome the deficits of the habitat in the same manner as the new site and services project area. The access to basic services and the possibilities for improvement are limited by state policy towards squatter settlements. Meanwhile the formation of community organizations to access other complementary services are not as easy as when a large visible project is initiated. Services and resources seem to be aggregated and flow into such settings more easily.

The poor urban household is exposed to a range of environmental hazards. These can be classified into two groups of hazard and risk. One resulting from the poor or improper waste disposal within the community. The community is exposed to the risks, associated with regular smoke inhalation from cooking fires that fill homes with smoke and infections from poor waste disposal. The type of housing, density of settlement and the waste disposal technology available to the poor has much to do with this class of risk. The other type of risk is associated with the location. The community may be exposed to industrial waste discharged into the canal bordering the settlement, exhaust fumes and risk of accident from the flow of motor traffic in the neighbourhood.

SECTION IV CONCLUSIONS.

The policies enacted and decisions taken in one sector or region of a country affect the livelihoods and well being of people in other sectors or regions. National level macro-economic policy changes tend to change prices and incomes through most of the economy. However the effects are not spread uniformly. Policies in agriculture will not benefit all groups in a similar manner. Mechanisms to increase agriculture incomes may increase the cost of urban wage goods and adversely affect those with unstable and low incomes in the urban sector. In nominal terms the average income of the urban sector will be higher than other sectors. However the urban household will incur higher costs to generate this income. Food costs will be higher and in most cases the urban household will not have home produced agricultural goods.

Most poor urban households can only access marginal sites to build homes. The habitat is often over crowded, poorly serviced with water supply and sanitation and waste disposal. The water supply and sanitation system is often communally used and over extended.
The mechanisms to generate building sites seem to work slowly. The state regulates the access to sites. A large component of the urban poor households are squatters and therefore lack title to the site. This discourages private investment in home improvement. The access to better quality services is also affected by the lack of legal title and tenure. Although evictions from squatter settlements are rare, the state retains the right to use these lands for alternative purposes. In some cases the lands that the squatters occupy have potentially high economic value. However the occupants are not able to sell nor capture these potential benefits. Furthermore the provision of basic services is considered a temporary measure to reduce the burden and the stress of a poor quality neighbourhood. Relocation to less crowded areas on the outskirts of the city is not favoured because of possible adverse effects on household incomes. A significant proportion of poor households generate income in the neighbourhood or through networks in the neighbourhood.

The impact of policies on the urban poor and their health is primarily through household income and the availability and price of basic goods. Increases in the price of food items cause immediate stress the poor urban household. Intra family food distribution may be disrupted and vulnerable groups may bear a greater burden. Policies that change food availability transmit stresses to specific groups such as infants weaned and on milk foods. Changes in availability and price of items such as wheat flour, sugar and milk powder, resulting from decisions affecting imports tend to transmit adverse effects to the poor urban household. Policies that address the food component of the agriculture sector, and attempt to transform domestic agriculture will have strong price and nutrition effects while the urban poor adjust and make changes. Stimulating production of the staple rice and managing the price of imported wheat to direct demand towards rice, the lowering of export duties for coconut to stimulate exports resulting in increased domestic market prices, are two important examples.

The intervention programs that seek to transfer purchasing power to the poor, depend on assessments of household income. However, there are no simple methods to incorporate the degree and intensity of income fluctuations for households outside the formal wage sector, into this measurement. Furthermore, the decline in real income as a result of general price increases are expected to be more pronounced for the urban poor household depending on casual, unskilled or small enterprise earnings. Specific vulnerable groups such as pregnant and lactating mothers and young children are reached by special programs to monitor nutrition and health. The detrimental effects of declining household income and purchasing power are mitigated by direct feeding and assistance through surveillance. However many other households may not qualify for such timed assistance and therefore some members may face additional risks due to declining economic fortunes.

The stresses, risks and vulnerabilities change in character over time. Some types of policies impart additional risks on the household for a short duration until incomes and prices adjust. However these adjustments do not take place uniformly for all households. Children, the aged, and the pregnant and lactating women require supports as soon as burdens and risks to nutrition and health appear.

The habitat exposes the poor urban household to a set of environmental hazards and vulnerabilities. The location generates risks linked to water supply, toilet facilities and waste disposal. The neighbourhood adds to the risks with crowding of homes, stagnant, polluted bodies of water and garbage. The home structure generates risks by exposing the household to damp, smoke in cases where cooking is indoors and fire hazards from fuel used for lighting. These vulnerabilities and risks interact with economic vulnerabilities generated by policies and transmitted through incomes and purchasing power.
EXPECTED HEALTH RELATED CONSEQUENCES OF NATIONAL POLICY

<table>
<thead>
<tr>
<th>TYPE OF POLICY</th>
<th>HOUSEHOLD EFFECT</th>
<th>EXPECTED HEALTH IMPACT</th>
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<tbody>
<tr>
<td>1 Demand management, Changes in</td>
<td>New employment generation reduced in the public sector. Households depending on</td>
<td>Reductions in the purchasing power of the household through income and price effects.</td>
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<td>government expenditure and taxation.</td>
<td>casual employment may be affected adversely. Temporary employment may be diminished.</td>
<td>For households at critical nutrition levels price increases pose additional risks.</td>
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<td>Subsidy reductions may generate price increases in basic goods especially food.</td>
<td>Intervention programs to ensure stability of nutrition at the household level is through</td>
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<td>Imported food items may contain higher transmitted prices, especially wheat flour.</td>
<td>maternal and child health clinics and supplementary feeding programs.</td>
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<td>Reductions in subsidy to fuel will generate price increases in transport and food.</td>
<td>Nutrition impairments may be spread unevenly through the household. The very young,</td>
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<td></td>
<td>aged and the sick may not obtain necessary minimum nutrition to recover or to avoid</td>
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<td></td>
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<td>health risks present in the environment.</td>
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<td>2 Stabilization Policies</td>
<td>Earnings for those in trade of imported consumer goods, hawkers etc.</td>
<td>Reduction in real income may reduce access to services such as health care at the same</td>
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<td>Price increases of imported goods, especially food and fuel if imports are reduced.</td>
<td>time.</td>
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<td>Some will lose.</td>
<td>Price increases of items with high import content: food and fuel. Primary effect on</td>
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<td>New employment opportunities in import competing production not likely to be</td>
<td>nutrition. Availability of health inputs including drugs and medicaments will tend to</td>
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<td>directed to urban poor households.</td>
<td>rise in price.</td>
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<tr>
<td>3 Sectoral Policies</td>
<td>Agriculture, price effects till supply adjustments take place. Employment in trade</td>
<td>Exposure to health risk through nutrition reductions as well as higher costs of health</td>
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<td>and services increase if expansion takes place, contract otherwise. If imported</td>
<td>care.</td>
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<td>production inputs are affected, public sector activity reduced, employment and</td>
<td>Higher cost of food if policy aimed at increasing rural incomes. If regional</td>
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<td>earnings of the urban poor in the respective activities may fall.</td>
<td>development policy has rural bias and focus similar effects.</td>
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<tr>
<td>4 Urban Development and Housing</td>
<td>Access to better quality water supply, sale drinking water; Better or less</td>
<td>Urban poor unable to readily substitute not able to cushion food price increases with</td>
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<tr>
<td>Policy</td>
<td>crowded toilet facilities; Homes with damp proof floors and better quality</td>
<td>subsistence agricultural production. Health effects through nutrition.</td>
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<td>structures; improvement in habitat with better surface drainage and waste disposal.</td>
<td>Reduction of risks resulting from poor quality, overcrowded habitat with overused</td>
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<td>services in water supply and toilet services.</td>
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<td>Risk of contamination and spread of disease from water and toilets reduced.</td>
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<td>Better quality structures reduce the risk of ailments resulting to continued exposure</td>
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<td>to damp during the rainy season.</td>
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<td>Risk of spread of infection due to congestion and crowding reduced.</td>
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<tr>
<td>TYPE OF VULNERABILITY</td>
<td>ORIGIN</td>
<td>IMPACT</td>
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<tr>
<td>1. Nutrition, availability and access lower than critical minimum. At specific times or stages, food availability is reduced.</td>
<td>Agriculture policy, Trade, especially imports of food, Instability of household income.</td>
<td>Through food prices on households and especially, children, women aged and sick.</td>
</tr>
<tr>
<td>2. Exposure to infection and ill health.</td>
<td>Lowered capacity to purchase food and nutrition, income and price effects of demand management, stabilization &amp; trade policies.</td>
<td>On all urban poor, especially those who depend on daily earnings, Depending on size of price increase nutrition of infants, pregnant and lactating women, aged and sick will be adversely affected.</td>
</tr>
<tr>
<td>3. Exposure to infection and ill health</td>
<td>Neighbourhood, Water supply, Toilet, Waste disposal, Structure of the home. Susceptibility to damp.</td>
<td>Ease of spread of disease within household and community. water borne, through household pests, flies, mosquitoes. Young, aged and sick, pregnant women at risk. Types of infections and health risks depend on the origin. Water borne, contaminated food as a result of over used and poor quality toilets, from the environment etc.</td>
</tr>
<tr>
<td>4. Exposure to infection and ill health</td>
<td>Nature of work and work effort, long hours, in the open or in the vicinity of traffic as in the case of hawkers.</td>
<td>Working adults, especially those in small trade, pavement hawkers, itinerant vendors in the city. Children in commerce especially those assisting vendors on the streets.</td>
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<tr>
<td>5. Exposure to ill health</td>
<td>Home based activity, producing fumes, dust and waste, especially chemicals.</td>
<td>Especially infants and young and those who spend most of their time in the vicinity the home.</td>
</tr>
<tr>
<td>6. Exposure to injury.</td>
<td>Types of work, small workshops, street vendors.</td>
<td>Adults and young.</td>
</tr>
<tr>
<td>6. Exposure to injury.</td>
<td>Home based activity, Dust and chemical hazard in a few cases.</td>
<td>Children, who may wander into work area use equipment and adults engaged in work or at home.</td>
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<tr>
<td>8. Exposure to injury.</td>
<td>Fire from kitchen in homes where cooking is indoors in the living space, no separate kitchen, Fire because of inflammable nature of structure, and risk of spreading due to close proximity of other homes.</td>
<td>Adults and children. Accidental use of kerosene.</td>
</tr>
</tbody>
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