UNITED NATIONS RESEARCH INSTITUTE FOR SOCIAL DEVELOPMENT

P r o g r a m m e   II

SOCIAL AIMS IN DEVELOPMENT PLANS

A report on a tentative investigation into the social
significance of development plans and into the valuation
systems (preferences) by which the planners are guided
in preparing plans.

by

Jan Drewnowski

and

Muthu Subramanian

Geneva, 22nd April, 1969   (Rev.1)

GE.69-18671

C O N T E N T S

1. INTRODUCTION

1.1 The subject of the study

This paper is part of a series of UNRISD studies on the quantification of social concepts. The reader is referred to earlier UNRISD[1] work for the explanation and justification of the methodological approach which has been developed and is in current use in the Institute.

The subject of the present paper is social aims which appear as targets in development plans of developing countries. They will be studied not for the sake of a description of the contents of plans[2] but to make clear the true social significance of the plans by finding out what impact they have on final social aims and to enquire into the priority patterns or preference systems (in respect of these social aims), which are implied in the plans. The insight into these priority patterns might contribute (however modestly) to the solution of the important problem of weights for the level of living index.

1.2 The role of social aims

The possibility of obtaining this kind of results from the analysis of development plans is based on the approach to the social problems in development as elaborated in the previous work of the Institute. Its basic tenet is that the improvement in the conditions in which people live has to be accepted as the essence of development and the criterion by which its achievements should be assessed. This is of course a value judgment, but one which is nowadays universally accepted and on which the United Nations attitude to development is based. Once this is agreed the respective places of social and economic elements in development become clear. The social elements become final aims of development planning. Economic elements take the place of primary factors or intermediate aims through which final aims can be reached. Social elements which enter

[1] UNRISD Report No. 3, (February, 1966), UNRISD Report No. 4, (September, 1966), UNRISD Working Paper Measuring Social Variables in Real Terms, (February, 1968).

[2] Such a study was published as a UN document E/CN.5/394, Preliminary Report on Targets in Social Development, 19th April, 1965.

development plans as plan targets must be given quantitative expression.

The term "social aims" as used in general discussion has often a rather vague meaning. Plan targets on the other hand must not only be quantitatively expressed but also are meant to be reached within a determined time. Consequently not all social aims can serve as plan targets. They may be either not quantifiable (at least for the time being) or are not liable to become a subject of state activity. There is a class of social elements which can be quantified and has been tentatively quantified already.[1] These are the social elements which can be made into components of the level of living of the population. They have been made measurable by means of the level of living index. The level of living covers many of the important social elements and certainly most of these that can be influenced by organised state activity. The social plan targets can therefore be formulated in the form of a set of social aims quantified very much in the same way as level of living components are. They need not, however, be stated in terms of exactly the same indicators as the level of living components and the number of social plan targets does not need to be the same as the number of the level of living indicators. But both are sets of variables of a similar type and as a first approximation it is possible to use the level of living components as targets of development plans.

A plan may be looked upon therefore as a blueprint for action which is supposed to bring a number of quantified social aims (social variables) from their initial levels at the beginning of the plan period to higher levels at the end of it. To decide about the size of increments to be achieved in particular variables during the plan period the planners must decide what relative values they attach to them. Once this is done an attainable optimum position for the whole set of social variables may be determined.

Once the final targets of the plan are established the system

[1] UNRISD Report No. 4, The Level of Living Index (September, 1966) and UNRISD Working Paper The Level of Living Index - New Version (March, 1968)

of intermediate targets can be elaborated and the allocation of resources decided.

This is what the approach to the plan should be if the social aims are to be given their proper place.[1] In practice it is not so. Social aims are not given the central place in plans and their achievement does not constitute a criterion for the allocation of resources. Sometimes social aims are even not explicitly stated in the plan. But even then it does not follow that the plan is not expected to bring any change in people's level of living. In many cases the planners have an intention of brining about an improvement in the conditions in which people live but for various reasons, the intention is not clearly reflected by the plan targets. Even the exceptional case when planners are not motivated by any social improvement aims, then the plan is bound to have some social implications.

In whatever way the plan is made it can always be restated in such a way as to bring the social targets into focus and show their increments as the true substance of the plan. It is only when we look at a plan in this way that we can assess its real significance.

1.3 Valuation problems

This way of looking at a plan may open also possibilities for further investigation into the planning process.

When we have a set of final aims established as final plan targets a valuation of the social aims must have taken place. A pattern of final aims that has emerged in the plan is in fact a maximisation of the combined values of these aims under constraints of technical possibility.

The valuation of these aims can be expressed by some preference function. It would be very interesting to have some more information about that function and this for several reasons.

[1] See UNRISD working paper: A Planning Model for Social Development (June, 1968)

First: it is illuminating to know the preferences of the plan-makers as a quantitative expression of their political convictions. In fact political platforms can be interpreted as alternative preference systems which is bound to bring clarity into political discussion.

Second: criteria for the allocation of resources are in the last instance derived from preferences. The consistency of all development plan targets depends on appropriate application of these criteria and there-fore on preferences.

Third: it is interesting to discover whether there exists some regularity in the pattern of preferences as between countries. It might be expected that countries with a similar socio-economic structure and at a similar development stage might show such similarities. If this were found to be the case some standard system of valuation of social aims could be formulated which would reflect real conditions in a class of countries and at a given historical period. These valuations might be used as an objective basis to the weights system to be applied in a level of living index.[1]

It should be realised that when the expression "knowing the preferences" is used it never means that all the values of the preference function are known. This will never be achieved.

All we may expect to obtain is the information about some fragments of the preference function. Probably most we can hope for are the marginal substitution rates for all the variables of the function in the immediate vicinity of the equilibrium points, which in this case have to be interpreted as the approved targets of the plan. Another kind of inform-ation may refer to the shape of the function. From theoretical consider-ations we infer that the function is convex to the origin but empirical confirmation of that property (which might be derived from the plans) is also of interest.

The task of the present study will therefore consist in the examination of national development plans which are at present in operation

[1] Cf. UNRISD working paper Measuring Social Variables in Real Terms (February, 1968)

in developing countries, with two purposes in mind. First the extrication
of social aims contained in the plans and their re-statements in the form
which final targets of the plans should take. And second - an attempt to
gain some knowledge of the valuations implied in the plans.

It has been possible to fulfil these tasks only partially
and rather imperfectly.

2. MATERIALS

The material analysed for the purpose of the present study was
rather extensive. In all 61 national development plans were examined.[1]
The idea was to analyse development plans of all developing countries,
taking however only one plan for each country, if possible the latest.

Only a few criteria were applied in qualifying the plan for the
preliminary analysis. First the plans had to be national, that is they had
to cover the whole national territory and not one region, the whole economy
and not one sector, (e.g. manufacturing industry or the government sector).
Secondly, the plans had to be of a middle term type, i.e. to cover a time
span of between three and seven years or the long term or "perspective" type.
These are plans in which planners' preferences can be expressed with
sufficient clarity. The "operative" one year plans are too much dependent
on existing conditions which cannot be changed within a year to serve as an
expression of the aspirations of the planners: Long term "perspective" plans
are few but when they were available they were taken into consideration as
they give an even stronger indication as to what way the planners think the
country should develop. It has to be admitted that the planners' attitudes
as to the country's needs may indeed change before the plan's time span is
over. This is particularly true of the long term "perspective" plans. But
we should not bother about that. The aspirations of the planners' at the
time of plan preparation is what we want to know. For the same reason
feasibility of a plan was not one of the criteria for its inclusion in th
study. For one thing many of the plans were still in operation and to assess

[1] See the Annex for a list of plans examined and further explanation about
materials used.

their feasibility would not have been possible. But it was also a matter of principle. The plans were to be examined with the aim of revealing the system of valuations implied in them. An unrealistic plan, based on an erroneous view on the country's possibilities or external relations affecting its development might very well serve the purpose of assessing planners' aspirations. One condition only has to be fulfilled, namely that the plan should constitute a genuine and serious effort at formulating the development objectives of the country. But this can be generally assumed to be the case.

The 61 plans selected for examination fulfilled these conditions. They had to be further examined for social targets they contained.

To be useful for further analysis the plan had to contain social targets, i.e. social objectives expressed in a quantitative form. That means in physical terms, as it is evident that what is expressed in monetary terms is not the intended achievement in social objectives, but the resources allocated to this aim.

It was not sufficient for the purpose of the study that some of the social aims should be quantified. It was necessary that quantification should cover at least a few social aims the same in all the plans under study. Only then we are able to find out and compare the valuation systems which are implicit in the plan targets. It was decided to limit the number of social aims to be examined to three only. They were the familiar level of living components of: (1) Nutrition; (2) Health; (3) Education. A further simplification was introduced by using only one indicator for each component.[1]

Not many plans contained even that limited amount of quantitative information. Many plans contained statements about the desirable objectives not expressed in any quantitative form whatever. If some objectives were quantified (i.e. made into targets) they were most often the economic and not the social ones. In fact there existed not a single plan in which a quantification of at least a few economic targets was not attempted.

[1] For more details see section 3 below

But they were many in which the social targets were not quantified at all. Where they were quantified they were often quantified in monetary form only. That sort of quantification, significant as it is for the allocation of resources, is useless for the kind of examination envisaged in the present study. There were also some cases when quantitative social targets were included in the plan but could not be expressed in the level of living indicators chosen for the comparison.

The greatest difficulty consisted, however, in being able to have the same social aims quantified in a number of plans. In contrast to the economic targets when such as GNP per head, GNP rate of growth, investment rate and several others appeared practically in every plan, there seemed to be no clear pattern for social targets. They varied very much from plan to plan making comparisons difficult.

Under such conditions it was possible to find only 14 plans in which the required data for the three components were available. These were:

Country	Title of the Plan	Time span years
Ethiopia	Second Five Year Development Plan...1963-1967	5
Ghana	Seven Year Development Plan,1963/64 to 1969/70	7
Malagasy	Plan Quinquennial 1964-1968 (avec horison décennal 1973)	14
Morocco	Plan de Developpement 1965/1967	4
Tunisia	Perspectives décennales de développement 1962-1971	10
China (Taiwan)	Fourth Four Year Plan for Economic Development ... 1965-1968	4
India	Third Five Year Plan 1961-1966	5
Pakistan	Third Five Year Plan (1965-1970)	5
Thailand	National Economic Development Plan 1961-1966 - Second phase 1964-1966	3
Turkey	First Five Year Development Plan 1963-1967	5
Bolivia	Plan de Desarollo económico y social 1962-1971 /1962-1966/	5
Colombia	Plan general de desarollo económico y social /1961-1964/	4
Trinidad and Tobago	Draft Second Five Year Plan 1964-1968 /1963-1968/	6
Venesuela	Plan nacional de desarollo económico y social 1965-1974	4

Further analysis is concerned with these plans only

3. ASSESSMENT OF THE SOCIAL SIGNIFICANCE OF DEVELOPMENT PLANS:

3.1 Basis

As explained in the previous section, a very simple pattern
of social aims has to be adopted for the purpose of the present study.   It
has been assumed that there are three social aims only - Nutrition (N),
Health (H) and Education (E).   Each of these aims (which are also components
of the level of living index) has been assumed to be reflected through one
indicator only - namely (i) calories intake per capita daily as a percent of
requirements, (ii) access to medical care - percentage of population having
access and (iii) primary school enrolments as a percent of population aged
5-14 years.   Thus the values of these three indicators have been assumed to
reflect the social aims implicit in development plans.   The assessment of
the true contribution of the plan to the improvement of the welfare of the
people (strictly speaking to the flow of welfare, i.e., The Level of Living)
has been made in the study by relating any increase/decrease of the level of
the above three social indicators to the level of these indicators at the
beginning of the plan.   Since the duration of the plans varied considerably
among countries, all analyses have been made with annual average increases
only.

3.2 Coverage:

The study and the analyses relate to 14 countries with data on
the specified indicators.   In fact, information on the specified indicators
seems to be the maximum possible out of the materials provided in the
development plans.   The plans cover all the three developing regions of the
world - Asia, Africa and Central and South Americas - and the countries have
a per capita GNP in 1960 of 45 to 958 in U.S. $.   It seems that the 14 plans
considered for analyses reflect the developing part of the world and hence the
results of the analyses can be generalized.

3.3 Intra-sectoral relations:

In this exploratory study, the relationship between the initial
levels of the indicators and their subsequent annual average increments have
been considered using the level of indicators in real terms and in 0-100 scale.

Table 1 and graph 1 give the annual average increases in the three indicators
in real terms as related to their initial levels, also in real terms.   It
should be realized even at this stage, that any relationship between the
increases and the corresponding initial levels refer to the state of relation-
ship existing at that point time as observed empirically and does not provide
any information as to the ideal or the best relationship that should exist
between these variables.   From the available data, it seemsthat other things
remaining the same, there exists no logical relationship between the initial
levels of nutrition[1] and the annual average increases in that level; but
there seems to exist more or less a clear relationship between the initial
level and the corresponding increases in respect of health and educational
indicators.   Also Ghana seems to be out of line with regard to the level
increase relationship as far as education and possibly nutrition are concerned.
It is difficult to draw any inference from the bivariate relationship as, by
definition, social aims when optimised bring out variations in the relation-
ships between levels and increases in a specified indicator as some sort of
substitutability between the possible alternatives operate so as to maximise
the overall impact.   Before dwelling at length on this bivariate relation-
ship it is worthwhile extracting, if possible, relevant information under
realistic assumptions on the intersectoral relationships.

    3.4   Intersectoral relations: Any intersectoral comparison presupposes
the existence of a comparable base.   There are different ways of establishing
a comparable scale.   The levels or increases in the variables can be assessed
against unit cost-average or marginal - marginal productivity or marginal
utility.   Since we have no data on unit cost of social indicators we are
unable to use this as the criterion.   Marginal productivity as a criterion
for assessing the preferences of planners is considered not applicable to the
present study which is based on the implicit assumption of having the improve-
ment in the "level of living" as the main aim and object of development.[2] This

---

[1] Hereafter by nutrition (N) we mean calories intake per head per day as a %
    of requirements, by health (H), the percentage of population having access
    to medical care and by education (E) the percentage of population aged 5-14
    years enrolled in primary schools.
[2] See also "Discussion" below.

leaves us with the "marginal utility" scaling. Since the purpose of the study is to reveal the preferences of the planners among the three social sectors considered and since these preferences can be adequately reflected through the contribution of the improvements in the three sectors to the overall improvement in the level of living of the population and the marginal utilities[1] would, in effect, be reflected by these contributions of the individual sectors, it was found impossible to use that criterion which we are trying to develop. Instead we attempted to construct an empirical scale as follows:

3.4.1 Scaling: Given the primary enrolment ratio (which has both an upper (100) and a lower (0) limits), the corresponding points of the nutrition and health indicators were derived[2] assuming that the interrelationships between the three given social indicators - p.c. calorie as % of requirements (N), percentage population having access to medical care (H) and primary enrolment ratio (E) - are linear. The values thus derived empirically are:

Indicator	Index Values	
	0	100
per capita calorie intake per day as percentage of requirement	60	160
percent population having access to medical care	0	100
primary enrolment ratio	0	100

These critical values are different from those enunciated in the UNRISD Report No. 4 dealing with the Level of Living Index[2] as the latter values having been arrived at through the judgements of the experts in the respective fields

[1] See Sec. 3.6.2.1 where the authors give explanation and justification for the term used here

[2] For deriving these critical values of the indicator scale, we have fitted regression lines taking any two of the three indicators at a time and considered the averages of the values corresponding to the zero and similarly to the hundred of the primary enrolment ratio.

[3] UNRISD Report 4: The Level of Living Index.

and of the author of the report cited.

The critical values given above imply that a 1 point increase in the consumption per capita of calories related to requirement corresponds to a 1 point increase in the percentage of population having access to medical care and to a 1 point increase in the primary enrolment ratio. These correspondences have nothing to do with the comparative subjective valuation or importance of the three indicators considered. These are only correspondences observed through a cross-country analyses of the available data and reflect the actual comparative relationship existing among these indicators. With these critical values as the base, the observed values have been converted to index values on a (0-100) scale and only these index values have been used in the further analyses dealing with the intersectoral comparisons.

3.4.2: <u>Substitution Rates</u>: The indices thus derived for each of the three indicators for different countries have been analysed to get at the possible substitution rates existing between the three sectors under consideration as reflected through the specified indicators. Any substitution between two indicators is possible only with regard to a change in the indicators themselves. It is not possible to substitute the levels of different indicators at a point of time but only the changes in them over a period of time can be considered for substitution. (Substitution is <u>dynamic</u> rather than <u>static</u> by definition). Thus any analyses for substitution rates can only be done with changes in the various indicators under study and hence we attempted to derive the increases in each of the three indicators over a specified period of time.

3.4.2.1: <u>Annual Average Increase</u>: Since the three indicators under consideration have an upper and a lower bound and the values increase continuously over time, the annual average increment would reflect progress in the specified indicators better than the one using annual average rate of growth. Assuming the social indicator (S) to be a momotonic increasing but

bounded function of time (t) we have its path[1] defined by

$$S = T \left(1 - e^{-\rho t}\right) \quad t \geqslant 0 \quad 0 < \rho < 1$$

where T is the upper bound of the variable $\underline{S}$,

    ρ the rate of growth of the variable $\underline{S}$,

and   t is time

In the present study T being 100 we have

$$S = 100 \left[1 - 1 + \rho t + 0 (t) \right]$$

$$= 100 \, \rho t$$

Hence $dS = 100 \, \rho dt$ or $\dfrac{dS}{dt} = 100 \, \rho$

Thus to the second degree of approximation the annual average rate of bounded growth of social factors during a certain interval of time equals the annual average increment during the same period. Hence for the present analyses we have considered the annual average increases in the social indicators rather than the annual average rate of growth or annual average rate of bounded growth.

3.5   Patterns of increases

      Index values of the levels of the indicators at the beginning and at the end of the plan period as also the annual average increases in those indices are given in Table 2 and the relationships of the initial index values of the three indicators with their annual average increases are given in Graphs 2a, 2b and 2c. The findings of these graphs are not, in any way, substantially different from those using the indicator values in physical terms (vide sec. 3.3 above). There seems to be not any marked bivariate relationships between the initial level and increase in that level of the three indicators considered intrasectorally. But graphs 3a, 3b and 3c relating the annual average increases in nutrition (N) with those in health (H) and in education (E), those in health (H) with those in education (E) respectively give a different version though even here we are dealing with bivariate but intersectoral relations.

[1] Baster, N. and Subramanian, M (1967): Aspects of Social and Economic Growth; Growth Patterns and Productivity Effect, UNRISD Report No. 8.

Increase in the nutrition index given by ΔN seemed to be accompanied by a decrease in health index given by ΔH; but any increase in the nutrition index given by ΔN seemed to be accompanied by an increase in education index given by ΔE. There seems to be no systematic pattern between increases in education index (ΔE) and increases in health index (ΔH). This suggests that there exists two welfare targets - one for education and the other for something reflected through nutrition and health. While the former is rather clearcut, it is necessary to identify the latter target. One possibility is to consider the latter as a health objective designed to be achieved by a proper combination or "optimum regime" of direct health targets and indirect nutritional targets. From the diagram (Graph 3) it seems that there exists a tendency among the countries considered for the analyses, to achieve the desired improvement in the health status of the community either by providing better health facilities or by improving the nutritional status of the population - the former being direct and immediate while the latter is indirect and long term. Naturally this raises a conflict and hence a choice. Probably the health objective (H) can be formulated as

$$H^* = \alpha h + \beta \int_{t_o}^{t_p} ne^{-\rho t} dt \quad \text{when } 0 < \rho < 1$$

when H^* - is the quantifiable health objective - say reduction in the standardised death rate/expectation of life at specified year

    h - the direct health activities to achieve that objective - probably through curative services[1]

    n - the indirect nutritional improvement - say p.c. calorie consumption per day - presumed to have a long term impact on the objective

    α, β the parameters reflecting the marginal contribution of h and n to the health objective (H)

    ρ the time discount rate

and t_o, t_p the initial and terminal year of the Development Plans.

---

[1] In fact there is choice between preventive and curative services as well but for the present we are not going deep into this problem.

Graph 3 (b) giving the relationship between increases in p.c. calorie consumption (N) and in access to medical care (H) brings out clearly the scatter around the normal line suggesting the possibility that for a given period of time, assuming the parameters α, β to be invariant over space and time, the countries considered for the study are adopting varying time-discount rates.   In the absence of any information or knowledge on the parameters α and β and on the quantified health objective it is not possible to estimate the assumed time-discount rates of the different countries considered for analyses.   We do hope, one day, with the availability of relevant data it would be possible to identify the discount rates different countries are adopting.   Having thus given up our attempt in this direction we proceeded to look at the data from a different angle.

Since a study of graph 3 suggests the existence of some sort of substitutability between the annual average increases in each of the three indicators - nutrution, health and education considered for the analyses - we made a study of the pattern of increases in these three as a first step. Graph 4 gives the pattern of increases for the 14 countries for which we were able to assemble relevant data.   There seems to exist four distinct patterns of increases among these 14 countries and these four types are given by the following countries:-

Group	Country	Order of increases
Type 1	Bolivia Ethiopia Trinidad and Tobago Venezuela	Nutrition, Education, Health
Type 2	Ghana Tunisia India Pakistan Malagasy	Education, Nutrition Health
Type 3	Morocco China (Taiwan) Thailand Turkey	Education, Health, Nutrition
Type 4	Colombia	Health, Education, Nutrition

It is quite evident from these groupings that there exists some sort of logical order in the pattern of increases observed. It should be realised, at this stage as well, that we are trying to identify what the patterns are and are not as much concerned with why they are. Any study on the latter aspect involves much more analyses with the type of data that are, unfortunately, not available at present. For the present we are attempting from the patterns we observe to define or identify that pattern space from which selection is made by different countries assuming the homogeneity of these countries on the relevant variables. We approach this problem through two ways -. ordinal and cardinal - making our assumptions explicit in both cases.

3.6 **Preference Patterns:** In earlier chapters we have made certain preliminary investigations with a view to formulate justifiable assumptions needed for the subsequent analyses. These analyses are intended to quantify the preferences of the social planners as revealed through plans. The quantification of the preferences can take many forms. It is not necessary that this has to be ' measurements' in the proper sense. They may form a set of orderings or rankings and are comparablewithin and between different types of values, so that arithmetical operations are rationally permissible on these ranking scores. For this purpose we have developed earlier constant and common measure units reflecting 'correspondences' by converting the values to those on a 0-100 scale. We can thus assign numerical scores to the annual average increases in the three sectors - nutrition (N), health (H) and education (E) - using a method that is isomorphic to some numerical structure, e.g., arithmetic. We assume at this stage, that the fourteen countries selected for analyses form a representative (though not a random) sample of all the developing countries in the world for which comparable data on the information needed exists.

3.6.1 **Ordinal approach:** Table 3 gives the ranking of the increases in the three indicators considered for the analyses in respect of each of the 14 countries dealt with. Each country has a set of orderings in respect of the increases in the three indicators. We are attempting to develop a method here, which would enable us to identify a country with a certain set of orderings under certain conditions. We assume that the orderings of increases among the developing countries are independent of each other, i.e. the observed orderings of the increases in three sectors for any country are independent of those of any other country.

Following Raiffa and Schlaifer (1961)[1], there exists two basic data needs to make any logical analysis of decision problems:

1. Space of orderings.[2] $\Omega = (W)$

   Each planner selects a single set $\underline{W}$ from some domain Ω of possible sets.

2. State space:[2] $\Theta = (\theta)$

   Each country believes that the consequence of adopting a set of ordering $\underline{W}$ depends on some state of the country at that point of time. Each possible state can be identified by a θ within domain Θ. That is, there exists one to one correspondence between W in Ω and θ in Θ and not between W in Ω and a country in the world. The utility evaluation of the planners may be formulated as $U = U(W, \theta)$ in $\Omega \times \Theta$.

   The orderings referred to under (1) relate to the ordering of annual average increases. Of the possible sets of orderings which are seven in number (assuming that a set $(1, 1, 1)$ is possible), [3] we have only four sets distinctly different for the 14 countries. Assuming the independence of the sets of orderings we have any of the sets to have a priori probability[4] of selection of $\frac{1}{7}$. The following table gives the posterior probabilities of the selected sets:

Set			posterior probability	prior probability
$\tilde{N}$	H	E		
2	3	1	5/14	2/14
1	3	2	4/14	2/14
3	2	1	4/14	2/14
3	1	2	1/14	2/14

From the above table it seems that the set $(2, 3, 1)$ is more preferred than the rest; more cautiously, sets $(2, 3, 1)$, $(1, 3, 2)$ and $(3, 2, 1)$ have a probability of preference significantly higher than any of

---

[1] Raiffa, Howard and Schlaifer, Robert (1961): Applied Statistical Decision Theory, Division of Research, Graduate School of Business Administration, Harvard University, Boston, Mass. (1961).

[2] Both Ω and Θ are three dimensional real spaces.

[3] We made this assumption to allow for the possibility that there may not exist any strict preferential ordering among the three sectors considered. The establishment of a scale for comparison across the sectors and our consideration that the social aims are the final aims implicitly allow for the possibility that the three sectors might have been given equal weights, i.e. one is not preferred to the other. (Equality of the preferences is also transitive).

[4] Since there are a finite number of logical possibilities, there are only a finite number of truth sets and hence the process of assigning probabilities is a finite one.

the remaining four sets. <u>This finding shows that education is never the last and health never the first.</u> In other words, the chances of health having the highest priority or/and the chances of education getting the lowest priority assuming the choice is restricted to nutrition, health and education is very rare. This is as far as we can go with the ordinal-scale approach confined to a single space. The results are more general and the researcher less liable to be criticised.

Thus of all the possible sets (W) in the domain Ω, the preferences seem to be for the three sets (2, 3, 1), (1, 3, 2) and (3, 2, 1). We have, so far considered only one aspect of the problem viz. selection of preference-set among all possible sets unconditionally. But let us now introduce the second specification (i.e. state space). Here again (with the existence of a comparable scale[1]/) we can rank order the values of the three indicators (N, H, E) at the beginning of the plan period for the fourteen countries as follows:-

Country	Initial Values			Annual average increases			Ordered sets					
							Initial value			Annual av.inc.		
	N	H	E	N	H	E	N	H	E	N	H	E
Ethiopia	31.2	1.0	3.9	0.4	.08	.24	1	3	2	1	3	2
Morocco	34.0	16.5	26.8	0.0	.20	1.43	1	3	2	3	2	1
Pakistan	38.0	3.3	28.5	3.0	.14	3.42	1	3	2	2	3	1
Malagasy	43.3	10.6	40.0	0.8	.27	2.93	1	3	2	2	3	1
Thailand	60.7	8.8	55.1	-3.6	.30	0.87	1	3	2	3	2	1
Turkey	69.4	17.7	46.8	0.4	1.92	2.06	1	3	2	3	2	1
Ghana	21.8	6.8	34.2	5.8	.46	8.59	2	3	1	2	3	1
Tunisia	22.0	10.6	52.3	1.8	.78	4.89	2	3	1	2	3	1
India	31.3	5.1	37.7	1.8	.16	1.90	2	3	1	2	3	1
China (Taiwan)	42.6	11.4	77.5	0.0	.08	0.30	2	3	1	3	2	1
Venezuela	45.0	40.8	62.6	3.7	1.08	3.20	2	3	1	1	3	2
Bolivia	12.7	25.7	38.8	2.2	.22	2.02	3	2	1	1	3	2
Colombia	22.9	34.1	48.0	0.4	2.28	1.25	3	2	1	3	1	2
Trinidad and Tobago	36.0	56.1	95.3	2.1	-1.47	-0.50	3	2	1	1	3	2

1/As the one developed in this paper.

Thus considering the state-space defined by the ordered set of the level of three indicators - nutrition, health and education - we find that, even here, there is a clustering of countries with the state-ordering set (1, 3, 2) followed by (2, 3, 1).[1] Assuming the choice-set in the ordering-space is independent of the state-set in the state space we can have 7 x 7 or 49 possible combinations of the choice-set and the state-set, or each of the 49 combinations have a prior probability of 1/49. But, since, there seems to exist only three clusters in the state-space and four clusters in the choice-space we can have only 12 combinations assuming independence of choice set and state set, each with a probability of 1/12. In other words the whole decision takes place under a very restrictive domain defined by these twelve alternative possible combinations. From the above table it seems that, of the six countries belonging to state-set (1, 3, 2) the choice-sets are 3 with (3, 2, 1), 2 with (2, 3, 1) and 1 with (1, 3, 2), i.e. of the seven possible choices, only that set which has a high priority for education seems to have been preferred. Subject to all the limitations inherent in the interpretations due to small number of countries, it can be inferred that there seems to be a one-to-one correspondence between the state-set (1, 3, 2) and the choice -set (3, 2, 1). For the 5 countries belonging the state-set (2, 3, 1) we find that 3 have a choice-set (2, 3, 1), one a choice-set (3, 2, 1) and one a choice-set (1, 3, 2). Similarly for the three countries belonging to (3, 2, 1), two opted for a choice-set (1, 3, 2) and one for (3, 1, 2). Thus we can postulate (subject to limitations due to the small number of countries) that the following pairs exist:

State-set in Θ	Choice-set in Ω
(1,3,2)	(3,2,1)
(2,3,1)	(2,3,1)
(3,2,1)	(1,3,2)

The above findings seem to be too good to be true. They are consistent with what can be expected and seem to imply that the planners

[1] It seems that in most of the countries, the level of health indicator, as reflected through the percent population having access to medical care, is much lower than the corresponding levels of nutrition and education as measured by the indicators used in this study.

seemed to have followed a pattern that can be explained rationally. Had
they been indiscriminate there would have been fourteen different observed
choices among the theoretically possible forty-nine random sets. But, in
fact, there were only eight state/choice sets as follows:[1]

Ordering of N,H,E.		
state	choice	frequency
132	321	3
231	231	3
321	132	2
132	132	1
132	231	2
231	321	1
231	132	1
321	312	1

There seems to be some sort of logical consistency among the observed
preference patterns of the planners. With this observed consistency under
more general assumptions we are in a better position to approach the planners
preferences from the cardinalists' point of view.

3.6.2 Cardinal approach: Much of the motivation for this
section came from the conviction of Frisch (1962)[2] (and Harrod) that in any
dynamic analysis of choice cardinal utility is absolutely necessary and that
"it is possible to measure cardinal utility with a degree of approximation
comparable to that with which we can measure the general run of demand
elasticities." We assume at this stage that the planners' preferences as
reflected in the development plans are the same as those of a majority of if
not all, the population in the country.[3] If any similarity exists among the
preference patterns of the individuals, then the method of majority decisions
will yield a complete social ordering satisfying the Pareto Rule and the
condition of the Independence of Irrelevant Alternatives.[4] Our object is
"to derive utility functions from observed behaviour of individuals under

---

[1] The occurrence of such an event is very rare statistically.
[2] Frisch, Ragnar (1962): Dynamic Utility, Memorandum, Institute of Economics,
University of Oslo, Norway.
[3] This assumption is not necessary for this section. We assumed nevertheless
for generality and for connecting the present with the traditional welfare
economics.
[4] This implies the existence of "objective" relations free of value judgments.

different circumstances," (Tinbergen, 1968) [1]/subject to the above assumptions.

Following Bergson (1938, 1949), [2]/ we assume that the social welfare function, U, is a real valued function of utility derived from the variables that might be considered as affecting welfare, in the present case Nutrition (N), Health (H) and Education (E) in the following form:

U = U (N, H, E) so that given the values of N, H and E and the form of the function, U is completely determined.... We preferred this Bergson's stronger assumption as from Bergson's U, we can obtain a complete social ordering in the sense of Arrow but the converse need not be true. [3]/

It is not necessary that for the proper identification of U, all the three variables N, H, E have to be in monetary terms. Measurability in money is by no means a necessary condition for utility evaluation. The utility evaluation of individual sectors through decomposition is possible "whenever the consequence of (W, θ) is measurable in some common unit or numeraire". With our 0-100 scale developed earlier implying correspondences among values of different sectors we are able to satisfy this criterion.

Thus with comparability of values across and within the sectors and with the existence of the social welfare function U, it is possible to estimate the parameters (preference weights) if the shape of the function and the value of the variables are known. Following welfare economics, we can formulate the shape of the utility curve U as a monotonic increasing function of the consumption C

$$U = U (c)$$

$$= \alpha c^2 + \beta c + \gamma \text{ such that } \alpha < 0, \ \beta > 0, \ c > \text{Abs} \left(\frac{\beta}{2\alpha} \right)$$

Here U represents the average utility on a macro level and C the average per capita consumption expenditure (in both private and public) - in U.S. dollars.

[1]/Tinbergen, Jan (1968): comments on Myrdal's "Asian Drama", Netherlands Economic Institute, Rotterdam, 1968 (mimeographed).

[2]/Bergson, A (1938): "A Reformulation of certain aspects of Welfare economics," Quarterly Journal of Economics, Vol. Lll, pp. 310-34, 1938
                    (1949): "Socialist Economies" in H.S. Ellis (ed.): A Survey of Contemporary Economics. Philadelphia, p. 419, 1948

[3]/Sen, A.K. (1966): Planner's Preferences: Optimality, Distribution and Social Welfare, Delhi School of Economics, University of Delhi, India, 1966.

Also we know that Utility is a function of nutrition, health and education so that

$$U = U(N, H, E) \tag{ii}$$

such that U_N, U_H and U_E are positive but U_{NN}, U_{HH} and U_{EE} are negative. That is marginal utility decreases as the level of the variables increases. Even here it should be recalled U, N, H and E are all in per capita terms on a macro level.

Thus equating (i) which expresses utility derived from consumption to (ii) which expresses utility in physical terms we have

$$\alpha \, c^2 + \beta \, c + \nu = U(N, H, E) \tag{iii}$$

The left hand side of (iii) gives the form but not the value of the function U (C) as the parameters α, β, ν are not known. If the value of the function U (C) and if the form of the function U (N, H, E) are known then it is possible to estimate the parameters of the function U (N, H, E). In the absence of any information on the value of U (C) and on the form of U (N, H, E) we shall try to estimate the parameters of U (N, H, E) in an indirect way.[1] We shall formulate two or more logically consistent forms of U and test if it satisfies the criterion of equality between the left and the right hand side values of equation (iii) and adopt that one which does.

Let us assume that

$$U(N, H, E)[2] = L(e) = N + H + E$$
$$\text{and} \quad U(N, H, E)[3] = L(s) = \frac{3 \, N \, H \, E}{NH + HE + EN} \quad \text{are two logically consistent}$$

forms of U. The latter form satisfies all the conditions enunciated under (ii) above.

---

[1] This implies that the equality (iii) does not determine the parameters of U (N, H, E) in the present case.

[2] It should be realized that this violates the assumptions enunciated earlier. We used this form to test the validity of our assumptions. This form implies that utility value is reflected through an equally weighted combination of the three individual values.

[3] This can also be written as $(N.1/N + H. 1/H + E. 1/E) / (1/N + 1/H + 1/E)$ implying that the utility value is a sliding-weighted combination of the three individual values.

3.6.2.1 <u>Static approach</u> Table 4 and Graphs 6 and 7 relate the equally weighted level of living index[1] L_o (e) and the sliding weighted level of living index[1] L_o (s) both at the beginning of the plan period with p.c. consumption expenditure (in 1960 U.S. $) at the beginning of the plan period (C_o) respectively. The relationship between equally weighted level of living index L_o (e) and per capita consumption (C_o) at the beginning of the plan period follows the second degree curve in C less than that between the sliding-weighted level of living index (L_o) (s) and per capita consumption (C_o) at the beginning of the plan period. Similarly the relation at the end of the plan period[2] (Graphs 8 and 9). These results imply that L (s) satisfies our assumptions better than L (e) as the relationship between L (s) and C is of second degree. Thus of the two possible alternatives, we have selected L (s) as reflecting utility under the conditions specified, i.e,

$$\alpha \, c^2 + \beta \, c + \gamma = U = 3 \, NHE/NH + HE + NE$$

where C is the per capita consumption expenditure in U.S. $,

     N is the calorie consumption per capita per day as % of requirement

     H is the % population having access to medical care

and   E is the primary enrolment ratio. This gives the planner's preference weights as "1/s" when <u>s</u> is the level of the specified social indicator, i.e. the inverse of the initial level of the social indicator seem to be the weights attached and given C, it seems that the maximisation of U takes place using a sliding-weighted additive value of the social indicators. The results thus arrived at under static conditions have been tested for its validity under dynamic setting using three forms of the marginal utilities as reflected through the level of living index arrived at with different weighting patterns.

[1] This implies identification of utility value with the value of the level of living index.

[2] The correlation coefficient between L_o (e) and C_o is .74 and that between L_o (s) and C_o is .80. Similarly the coefficient between L_p (e) and C_p and that between L_p (s) and C_p are respectively .78 and .83. In all cases C is represented by

$$\alpha \, c^2 + \beta \, c + \gamma,$$

so that the relations between L and C are of second degree

3.6.2.2 _Dynamic approach:_ With the initial level of the indicator as the weight, it is possible to have two forms of increases in the level of living index reflecting increased utility as follows:

$$\Delta U = \left(\frac{1}{N}\, \Delta N + \frac{1}{H}\, \Delta H + \frac{1}{E}\, \Delta E\right) \Big/ \left(\frac{1}{N} + \frac{1}{H} + \frac{1}{E}\right) \qquad (i)$$

$$\Delta U = \frac{1}{n}\left(L_p\,(s) - L_o\,(s)\right) = \Delta L\,(s) \qquad (ii)$$

where　　ΔU is the increase in utility value U

ΔN is the increase in the nutritional level, N

ΔH is the increase in the health level, H

ΔE is the increase in the education level, E

$L_p\,(s)$ is the value of the sliding weighted level of living index at the end of the plan period

$L_o\,(s)$ is the value of the sliding weighted level of living index at the beginning of the plan period

n is the duration of plan in years

and all increments are annual average increases during the plan period.

　　　　Graph 5 gives the relationship between the initial consumption expenditure (per capita) in U.S. $ and annual average increases in it during the plan period. Graph 10 giving the relationship between the initial level of living index (sliding weighted)[1], ($L_o\,(s)$ and annual average increase in that index, $\Delta L\,(s)$ seems[2] to give a correlation higher than the one between the initial level of living index (sliding weighted), $L_o\,(s)$ and the sliding weighted annual average increases, $\sum\limits_{i=1}^{3} \frac{\Delta I_i^{\,p-o}}{I_i^{\,o}}$, as given by Graph 11. Thus of the two possible alternatives the former seems to give a consistent relationship ($\Delta L\,(s)$ increasing with $L_o\,(s)$ similar to ΔC increasing with C_o) and has been selected for further analysis.

[1] To recapitulate, this is the form of index acceptable under the stated assumptions as described in sec. 3.6.2.1 and is given by L(s)=(3NHE/NH+HE+NE).
[2] With the small number of observations, it is difficult to test for any statistical significance. The correlation coefficients are,

(i) $\Delta L\,(s)$ and $L\,(s)$ = .40

(ii) $\sum\limits_{1}^{3} \frac{\Delta I_i^{\,p-o}}{I_i^{\,o}}$ and $L\,(s)$ = .29

As the next and final step we assessed this increase in sliding weighted level of living index ΔL (s), against the possible alternative, increase in the equally weighted level of living index, ΔL (e). For this purpose we tried to make use of the relation

$$\alpha c^2 + \beta c + \gamma = U (N,H,E)$$ where $U (N,H,E)$ has been identified with L (s) and L (e).

Since $\alpha c^2 + \beta c + \gamma = U$, $2 \gamma c + \beta = \dfrac{dU}{dc}$, i.e. the relationship between the ratio of the increase in the utility and per capita consumption expenditure (in U.S. \$), $\Delta U/\Delta C$, has a linear relation with the initial level of per capita consumption expenditure, $\underline{C}$. Table 5 and Graphs 12 and 13 relate the marginal utility as reflected by the equally weighted ($\Delta L(e)/\Delta C$) and sliding weighted ($\Delta L(s)/\Delta C$) level of living index to the initial level of p.c. consumption expenditure, $\underline{C}$. For the fourteen countries considered for the analyses, the linear correlation between ΔL (s)$/\Delta C$ and C, is greater than that between ΔL (e)$/\Delta C$ and C. This implies the existence of the logical truth-relationship between ΔL (s)$/\Delta C$ and C. The relation between L (s) and C is thus given by

$$L (s) = \alpha c^2 + \beta c + \gamma \qquad\qquad c \geqslant 0$$
$$L (s) \geqslant 0$$

Thus under the given assumptions it seems that L (s) reflect the utility aspect much better than L (e). That is the planners' preference weights seem to be proportional to the inverse of the initial level of the indicators themselves. If we agree that utility is monotonic increasing but with decreasing marginal rate with reference to p.c. consumption expenditure in U.S. \$ then this is reflected through a weighted combination of the level of the three indicators considered here in the analyses with weights proportional to the inverse of the level of the indicators themselves. This implies that the substitution rates between any two of the three indicators are given by the inverse ratios of the square of their levels.

$$U = 3NHE/NH+HE+NE$$

$$\frac{\partial U}{\partial N} = 3H^2E^2/(NH+HE+NE)^2$$

$$\frac{\partial U}{\partial H} = 3N^2E^2/(NH+HE+NE)^2$$

so that $\eta_{NH.E} = \dfrac{\partial U/\partial N}{\partial U/\partial H} = \dfrac{H^2}{N^2}$.

i.e rate of substitution of Nutrition by Health given the Education value is inversely proportional to the square of the levels of these two indicators.

4. CONCLUSION:

The present study is an attempt at developing a methodology and at deriving the preference weights assumed[1] to be attached to the three social sectors - Nutrition, Health and Education - as reflected through the percentage of calories consumed per capita per day to the requirement, proportion of population having access to medical care and primary enrolment ratio respectively. The study is greatly handicapped by the lack of sufficient data and the problem turned out to be to develop the best approach possible with the available data rather than to get at the best approach. Also the study was mainly concerned with the developing countries. Of the 61 National Development Plans examined only 14 turned out to be having at least the minimum information needed for the analysis. The spread of the 14 countries examined on the national income scale brought out the possibility of generalization of the conclusions.

The study has been based on an assumption that there exists a universal macro-utility space for the developing countries and any choice made by the countries depends on the state of the country at that point of time. In other words, the country identity does not play too much role in the decision-making process of the social planners. This has been studied through both ordinal and cardinal approaches and the findings seem to confirm the possible existence of a generalized decision-making process among the developing countries considered.

The preference weights attached to the three sectors appear to be proportional inversely to the level of that sector at that point of time. Given the per capita consumption expenditure in U.S. \$ it seems that

$$U = (\frac{1}{N} . N + \frac{1}{H} . H + \frac{1}{E} . E) / (\frac{1}{N} + \frac{1}{H} + \frac{1}{E})$$

gives the utility value at a point of time and $\Delta U = U_p - U_o$ gets maximised subject to the constraint that $\alpha \Delta N + \beta \Delta H + \gamma \Delta E \leqslant \Delta C$ when α, β, γ are the marginal cost

ΔN, ΔH, ΔE and ΔC are anticipated increases.

No attempt has been made to relate any traditional utility theory to the present study as this study seems to be the first attempt from the empirical

[1] The allocation is taken to be rational rather than random.

side on a macro level and we hesitated to extend the micro theory implications to the macro-level. The only relevant assumption borrowed from the micro theory related to the form of utility curve in terms of per capita consumption expenditure as even on a macro level it will hold true. Also no data exists on marginal cost of the three indicators considered for analyses. It seems, however, that if we relate the results of thepresent study with those of the traditional utility theory, probably price increases directly with the square of the initial level of the indicators concerned.[1/]

Thus thepresent study brings out clearly that some noticeable pattern seems to exist among the analysed countries in the decision-making process by which they establish their social targets. It is on the level of development of the country rather than on its specific characteristics that the social aims in the development plans seems to depend to a great extent.

Under these considerations the following are the main findings of this Study:

(i) In general, the social targets in physical terms are not explicitly stated in the Development Plans of the developing countries.[2]

(ii) For the countries that specify the social targets in physical terms, the planned improvements in the three sectors - Nutrition, Health and Education - seem to have some consistency.

(iii) For the countries considered for analyses the preference order of increases in the three sectors seem to be nutrition followed by Education and then Health as reflected by the indicators considered for analyses.

(iv) There exists, of course, not much intra-sectoral relation between the levels and planned increases in the social sectors specified.

(v) But there exists distinct patterns of inter-sectoral increases in the social sectors.

$$[1/] \quad \frac{\partial U/\partial N}{p_N} = \frac{\partial U/\partial H}{p_H} \quad \text{so that} \quad \frac{\partial U/\partial N}{\partial U/\partial H} = \frac{p_N}{p_H} = \frac{H^2}{N^2}$$

where p_N and p_H are prices to increase nutrition and health indicators.

[2/] The desirability of stating social targets in physical terms is explained in the UNRISD working paper: "Planning Model for Social Development" (Geneva, June, 1968) but this is evidently not the practice followed so far by developing countries.

(vi)　On an inter-sectoral level, there exists marked relationship between levels achieved and increases planned in the three social sectors considered.

(vii)　The preference weights of the planners for the three sectors seem to be the inverse of the levels achieved in the same sectors.

(viii) The level of living index using sliding weights (UNRISD, 1966)[1] seem to have a high relationship with the utility curve formulated following the traditional utility theory.

(ix)　For all cases where utility curves in monetary terms are utilized there exists enough justification to use the sliding weighted level of living index.

(x)　The developing countries, as a whole, seem to be homogeneous with reference to the decision-making process as far as can be revealed through the 14 countries considered for analysis.

[1] UNRISD Report No. 4:　The Level of Living Index, September, 1966.

List of Development Plans examined

(documents marked * have been selected for detailed analysis)

REGION and COUNTRY		TITLE OF THE DOCUMENT
Africa		
Algeria		Plan de Constantine 1959-1963; Projet de rapport Géneral. Deuxieme partie.
Cameroun		Premier plan quinquennal de développement économique et social.
Congo (Democratic Rep. of)		Draft outline of the first five year plan. Economic Bulletin for Africa ECA 5, 80-83, Jan. 1965.
Congo (Brazzaville)		Plan intérimaire de développement économique et social 1964-68.
Dahomey		Plan de développement écon. et social du Dahomey 1962-65.
Ethiopia	*	Second Five Year Development Plan 1963-1967
Gabon		Programme intérimaire de développement, loi approbant le plan intérimaire biennal 1965-66.
Gambia		The Gambia government development programme 1964-67.
Ghana	*	Seven Year Development Plan, 1963/64 to 1969/70
Kenya		Development Plan 1964-70.
Libya		Five year economic and social development plan, 1963-1968.
Malagasy	*	Plan quinquennial 1964-1968 (avec horison décennal 1973)
Malawi		Malawi Development Plan 1965-1969
Mauritania		Plan quadriennal de développement économique et social, 1963-1966
Mauritius		Public Sector Development Programme, 1966-1970 (Mauritius Legislation Assembly Sessional Paper No. 4 of 1966).
Morocco	*	Plan de développement 1965-1967
Niger		Le plan quadriennal de développement 1965-1968 et les perspectives décennales.
Nigeria		National Development Plan 1962-68.
Sénégal		Deuxième plan quadriennal de développement économique et social, 1965-1969
Sierra Leone		Ten Year Plan 1962-1971
Somalia		First five year Plan 1963-67
Sudan		The Ten Year Plan of Economic and Social Development 1961/2-1970/71.

REGION and COUNTRY	TITLE OF THE DOCUMENT
Tanzania	Five Year Plan 1964-69
Togoland	Plan de développement économique et social 1966-70
Tunisia	Perspectives décennales de développement 1962-1971
Uganda	Uganda's Second Five Year Plan 1966-1971
Upper Volta	Projet de plan quinquennal (1963-67)
Zambia	First National Development Plan 1966-70

Middle East

Afghanistan	Second Five year Plan 1962-1967
Iran	Third Five year Development Plan (1962-66).
Iraq	The Five Years Detailed Economic Plan 1961/2 - 1965/66.
Israel	Targets and Outline of the Four Year Development Plan 1963/64 - 1966/67.
Jordan	5 Year Programme for Economic Development 1962-67.
Syrian Arab Republic	Programme of Economic Development for the ten year period 1958-1967.
Turkey *	First Five Year Development Plan 1963-1967
United Arab Republic	General Frame of the 5 year plan for Economic and Social Development July 1960 - June 1965

Asia and the Far East

Burma	Second Four Year Development Plan 1961/62 to 1964/65
Ceylon	The ten-year plan /1959-1968/
China (Taiwan) *	Fourth Four Year Plan for Economic Development 1965-1968
India *	Third Five year Plan /1961-1966/
Korea (Rep. of)	First Five Year Economic Development Plan (1962-1966) Adjusted version
Laos	Plan de développement économique et social 1959/64
Malaysia	Second Five Year Plan 1961-1965
Nepal	National Plan 1965-1970 of Nepal for the Public and Private Sectors.
Pakistan *	Third Five Year Plan (1965-1970)
Philippines	Five Year Integrated Socio-Economic Program for the Philippines (1963-1967)

REGION and COUNTRY		TITLE OF THE DOCUMENT
Thailand	*	National Economic Development Plan 1961-1966 Second phase 1964-1966
Vietnam (Rep. of)		Deuxieme plan quinquennal 1962-1966
Latin America		
Bolivia		Plan de desarollo económico y social 1962-1971 /1962-1966/
Brazil		Plano trienal de desenvolvimento económico y social (Sintese) 1963-1965
Chile		Programa nacional de desarrollo económico para 1961-1970
Colombia	*	Plan general de desarollo económico y social /1961-1964/
Ecuador		Plan general de desarollo económico y social del Ecuador /1964-1973/
Guatemala		Plan de desarrollo económico de Guatemala 1955/60
Panama		Programa de desarollo económico y social 1963
Peru		Plan nacional de desarrollo económico y social del Peru 1962-1971
Uruguay		Plan nacional de desarollo económico y social 1965-1974
Venezuela	*	Plan nacional de desarrollo económico y social 1965-1974
The Caribbean		
Guiana		Development Programme (1966-1972)
Jamaica		Five-Year Independence Plan 1963-68
Trinidad and Tobago		Draft Second Five Year Plan 1964-1968

ANNEX II

TABLES

List of Tables

Table 1 (a): Level of calorie consumption per head, per day as a
percentage of requirement at the initial and at the
final year of plan and the total and annual average
increase during the period, 14 countries

| Country | Indicator value | | Increase | |
	Initial	Final	Total	Annual average
Bolivia	72.7	83.6	10.9	2.2
Ghana	81.8	122.7	40.9	5.8
Tunisia	82.0	100.0	18.0	1.8
Colombia	82.9	84.4	1.5	0.4
Ethiopia	91.2	92.9	1.7	0.3
India	91.3	100.0	8.7	1.7
Morocco	94.0	94.0	0.0	0.0
Trinidad and Tobago	96.0	108.5	12.5	2.1
Pakistan	98.0	113.0	15.0	3.0
China (Taiwan)	102.6	102.6	0.0	0.0
Malagasy	103.3	113.8	10.5	0.8
Venezuela	105.0	119.7	14.7	3.7
Thailand	120.7	109.9	-10.8	-3.6
Turkey	129.4	131.5	2.1	0.4

Table 1 (b): Level of percentage population having access to
medical care at the initial and at the final year
of plan and the total and annual average increase
during the period, 14 countries

| Country | Indicator value | | Increase | |
	Initial	Final	Total	Annual average
Bolivia	25.7	26.8	1.1	0.2
Ghana	6.8	10.0	3.2	0.5
Tunisia	10.6	18.4	7.8	0.8
Colombia	34.1	43.2	9.1	2.3
Ethiopia	1.0	1.4	0.4	0.1
India	5.1	5.9	0.8	0.2
Morocco	16.5	17.3	0.8	0.2
Trinidad and Tobago	56.1	47.3	-8.8	-1.5
Pakistan	3.8	4.5	0.7	0.1
China (Taiwan)	11.4	11.7	0.3	0.1
Malagasy	10.6	14.4	3.8	0.3
Venezuela	40.8	45.1	4.3	1.1
Thailand	8.8	9.7	0.9	0.3
Turkey	17.7	27.3	9.6	1.9

Table 1 (c): Level of primary enrolment ratio at the initial and
at the final year of plan and the total and annual
average increase during the period, 14 countries

Country	Indicator value		Increase	
	Initial	Final	Total	Annual average
Bolivia	38.8	48.9	10.1	2.0
Ghana	34.2	94.3	60.1	8.6
Tunisia	52.3	101.2	48.9	4.9
Colombia	48.0	53.0	5.0	1.3
Ethiopia	3.9	5.1	1.2	0.2
India	37.7	47.2	9.5	1.9
Morocco	26.8	32.5	5.7	1.4
Trinidad and Tobago	95.3	92.3	-3.0	-0.5
Pakistan	28.5	45.6	17.1	3.4
China (Taiwan)	77.5	78.7	1.2	0.3
Malagasy	40.0	81.0	41.0	2.9
Venezuela	62.6	75.4	12.8	3.2
Thailand	55.1	57.7	2.6	0.9
Turkey	46.8	57.1	10.3	2.1

Table 2: Index of Nutrition (N), Health (H) and Education (E) at the beginning of the plan and at the end of the plan, and increase and annual average increase in the level of these indices during the plan, 14 countries

Country	INDEX											
	Nutrition				Health				Education			
	Initial	Final	Increase	Annual average increase	Initial	Final	Increase	Annual average increase	Initial	Final	Increase	Annual average increase
	$L_o(N)$	$L_p(N)$	$\lesssim \Delta(N)$	$\Delta L(N)$	$L_o(H)$	$L_p(H)$	$\lesssim \Delta L(H)$	$\Delta L(H)$	$L_o(E)$	$L_p(E)$	$\lesssim \Delta L(E)$	$\Delta L(E)$
Bolivia	12.7	23.6	10.9	2.2	25.7	26.8	1.1	.22	38.8	48.9	10.1	2.02
Ghana	21.8	62.7	40.9	5.8	6.8	10.0	3.2	.46	34.2	94.3	60.1	8.59
Tunisia	22.0	40.0	18.0	1.8	10.6	18.4	7.8	.78	52.3	101.2	48.9	4.89
Colombia	22.9	24.4	1.5	0.4	34.1	43.2	9.1	2.28	48.0	53.0	5.0	1.25
Ethiopia	31.2	32.9	1.7	0.4	1.0	1.4	0.4	.08	3.9	5.1	1.2	.24
India	31.3	40.0	8.7	1.8	5.1	5.9	0.8	.16	37.7	47.2	9.5	1.90
Morocco	34.0	34.0	0.0	0.0	16.5	17.3	0.8	.20	26.8	32.5	5.7	1.43
Trinidad & Tobago	36.0	48.5	12.5	2.1	56.1	47.3	-8.8	-1.47	95.3	92.3	-3.0	-0.50
Pakistan	38.0	53.0	15.0	3.0	3.8	4.5	0.7	.14	28.5	45.6	17.1	3.42
China (Taiwan)	42.6	42.6	0.0	0.0	11.4	11.7	0.3	.08	77.5	78.7	1.2	0.30
Malagasy	43.3	53.8	10.5	0.8	10.6	14.4	3.8	.27	40.0	81.0	41.0	2.93
Venezuela	45.0	59.7	14.7	3.7	40.8	45.1	4.3	1.08	62.6	75.4	12.8	3.20
Thailand	60.7	49.9	-10.8	-3.6	8.8	9.7	0.9	.30	55.1	57.7	2.6	0.87
Turkey	69.4	71.5	2.1	0.4	17.7	27.3	9.6	1.92	46.8	57.1	10.3	2.06

Table 3: Annual average increase in each of the three indicators —
Nutrition (N), Health (H) and Education (E) and their
rankings, 14 countries

Country	Annual average increase in			Ranking		
	N	H	E	N	H	E
Bolivia	2.2	.22	2.02	1	3	2
Ghana	5.8	.46	8.59	2	3	1
Tunisia	1.8	.78	4.89	2	3	1
Colombia	0.4	2.28	1.25	3	1	2
Ethiopia	0.4	.08	.24	1	3	2
India	1.8	.16	1.90	2	3	1
Morocco	0.0	.20	1.43	3	2	1
Trinidad and Tobago	2.1	-1.47	-0.50	1	3	2
Pakistan	3.0	.14	3.42	2	3	1
China (Taiwan)	0.0	.08	0.30	3	2	1
Malagasy	0.8	,27	2.93	2	3	1
Venezuela	3.7	1.08	3.20	1	3	2
Thailand	-3.6	.30	0.87	3	2	1
Turkey	0.4	1.92	2.06	3	2	1

Table 4: Per capita consumption (in U.S. dollars) at the beginning $\left(\begin{smallmatrix}C_o\end{smallmatrix}\right)$ and at the end $\left(\begin{smallmatrix}C_p\end{smallmatrix}\right)$ of plan period, increase ($\sum \Delta C$) and annual averag increase (ΔC) during the plan period, equally-weighted level of living index at the beginning ($L_o(e)$) and at the end ($L_p(e)$) of plan period and increase ($\sum \Delta L(e)$) and annual average increase ($\Delta L(e)$) thereof, the sliding-weighted level of living index at the beginning ($L_o(s)$) and at the end ($L_p(s)$) of the plan period and increase ($\sum \Delta L_o(s)$) and annual average increase ($\Delta L(s)$) thereof and the weighted increment in the level of the three indicators ($\sum \dfrac{\Delta I_i}{I_i} / \sum \dfrac{1}{I_i}$) , 14 countries

Country	Per capita consumption				Index equal weight				Index sliding weight				Weighted increment
	C_o	C_p	$\sum \Delta C$	ΔC	$L_o(e)$	$L_p(e)$	$\sum \Delta L(e)$	$\Delta L(e)$	$L_o(s)$	$L_p(s)$	$\sum \Delta L(s)$	$\Delta L(s)$	$\sum \dfrac{\Delta I_i}{I_i} / \sum \dfrac{1}{I_i}$
Bolivia	75	89	14	2.8	25.75	33.10	7.35	1.46	20.92	29.96	9.04	1.81	1.632
Ghana	176	204	28	4.7	21.10	55.67	34.57	4.99	13.49	23.96	10 47	1.50	2.633
Tunisia	152	181	29	3.0	28.30	53.20	24.90	2.49	18.88	33.62	14.74	1.47	1.567
Colombia	85	91	6	1.5	35.00	40.20	5.20	1.31	31.97	36.14	4.17	1.04	1.172
Ethiopia	37	41	4	0.8	12.02	13.13	1.11	0.21	2.32	3.19	0.87	0.17	0.120
India	64	72	8	1.6	24.70	31.03	6.33	1.26	11.79	13.91	2.12	0.42	0.546
Morocco	156	159	3	0.8	25.77	27.93	2.16	0.54	23.56	25.43	1.87	0.47	0.510
Trinidad & Tobago	488	550	62	10.3	62.47	62.70	0.23	0.04	53.48	57.04	3.56	0.59	0.481
Pakistan	76	88	12	2.4	23.43	34.37	10.94	2.19	9.25	11.40	2.15	0.43	0.724
China (Taiwan)	167	189	22	5.5	43.83	44.33	0.50	0.13	17.80	24.66	6.86	1.72	0.039
Malagasy	44	64	20	1.4	31.30	49.73	18.43	1.31	21.06	29.88	8.82	0.63	0.814
Venezuela	722	966	244	61.0	49.47	60.07	10.60	2.65	47.84	57.49	9.65	2.41	2.536
Thailand	89	96	7	2.3	41.53	39.09	-2.44	-0.81	20.23	21.36	1.13	0.38	0.047
Turkey	174	202	28	5.6	44.63	51.97	7.34	1.46	32.51	44.03	11.52	2.30	1.712

Table 5: Initial per capita consumption (in U.S. dollars), (C_o), marginal increase in the equally-weighted index related to marginal increase in per capita consumption $(\Delta L(e)/\Delta C)$, and marginal increase in the sliding-weighted index related to marginal increase in per capita consumption $(\Delta L(s)/\Delta C)$, 14 countries

Country	C_o	$\Delta L(e)/\Delta C$	$\Delta L(s)/\Delta C$
Bolivia	75	.521	.646
Ghana	176	1.063	.320
Tunisia	152	.830	.489
Colombia	85	.872	.693
Ethiopia	37	.263	.213
India	64	.788	.263
Morocco	156	.675	.588
Trinidad and Tobago	488	.004	.057
Pakistan	76	.913	.179
China (Taiwan)	167	.024	.313
Malagasy	44	.935	.450
Venezuela	722	.042	.039
Thailand	89	-.352	.165
Turkey	174	.261	.412

Graph 1:   Initial level of and annual average increase, per cent, in (i) calorie intake per head, per day, as a percentage of requirements (N),

(ii) per cent population having access to medical care (H) and (iii) primary enrolment ratio (E); 14 Countries

Increase
(Δ N)

P.C. Calorie consumption as per cent of requirement (N)

Increase
(ΔE)

Primary enrolment ratio (E)

Increase
(ΔH)

% Population having access to medical care (H)
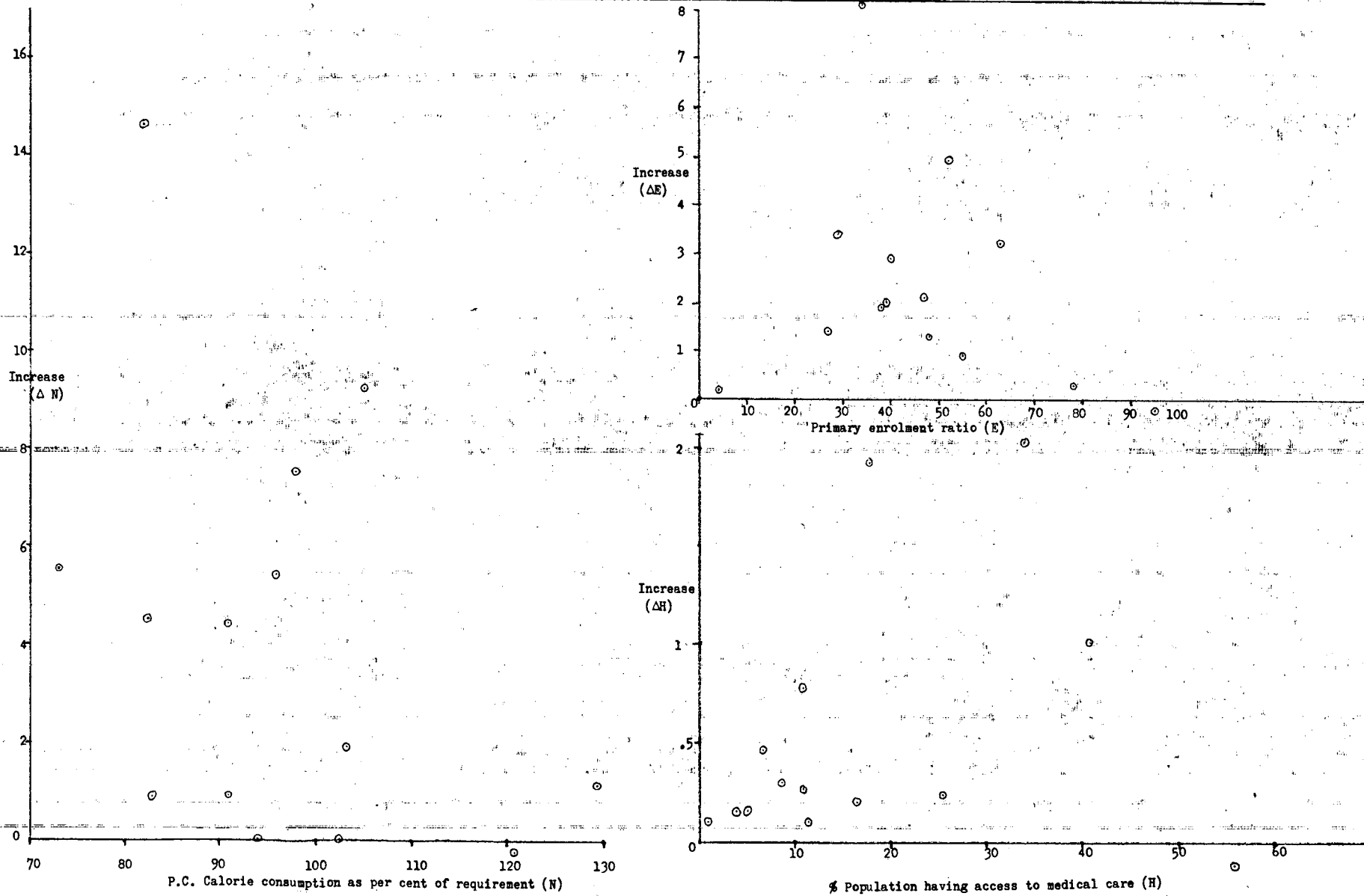
Graph 2a: <u>Initial level of Nutrition index ($L_o(N)$) and corresponding annual average increase in the Nutrition index ($\Delta L(N)$)</u>
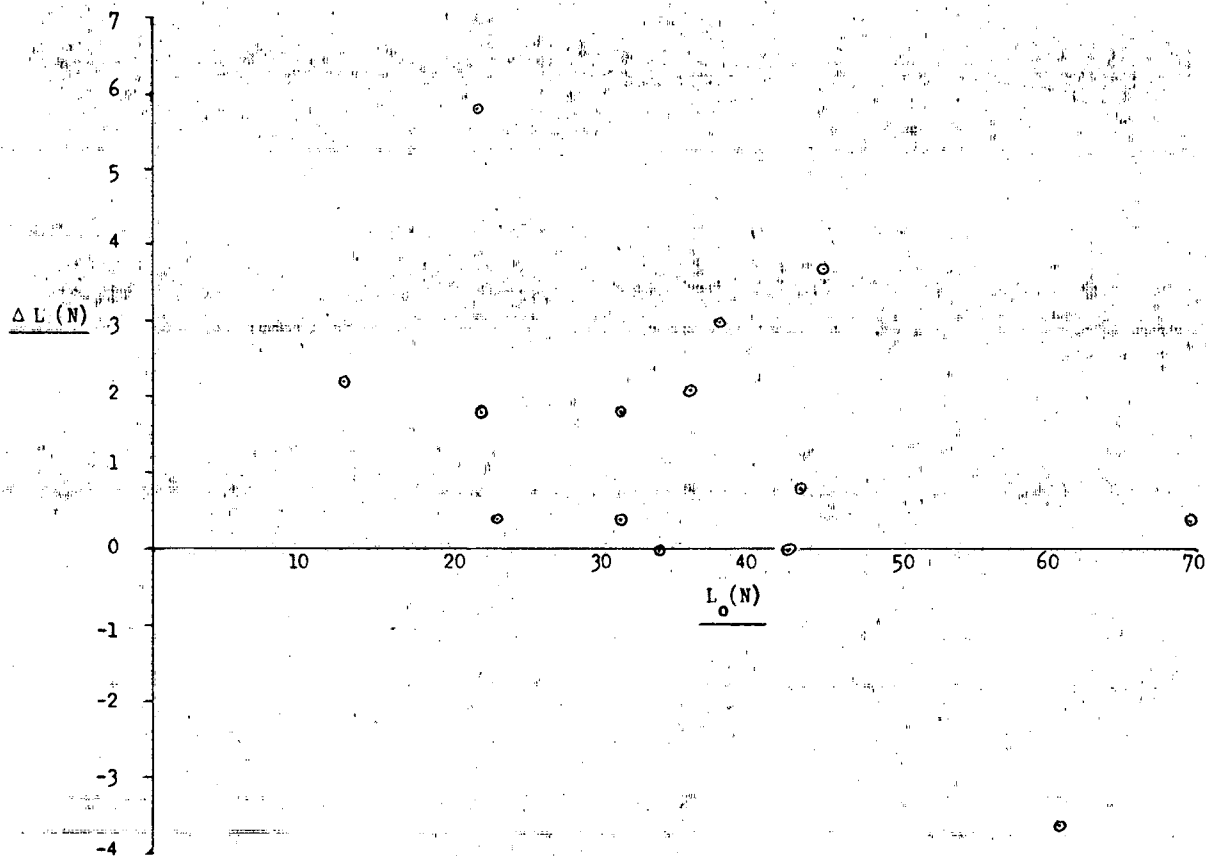
Graph 2b: <u>Initial level of Health index ($L_o(H)$) and corresponding annual average increase in the Health index ($\Delta L(H)$)</u>

$\Delta L(H)$

$L_o(H)$
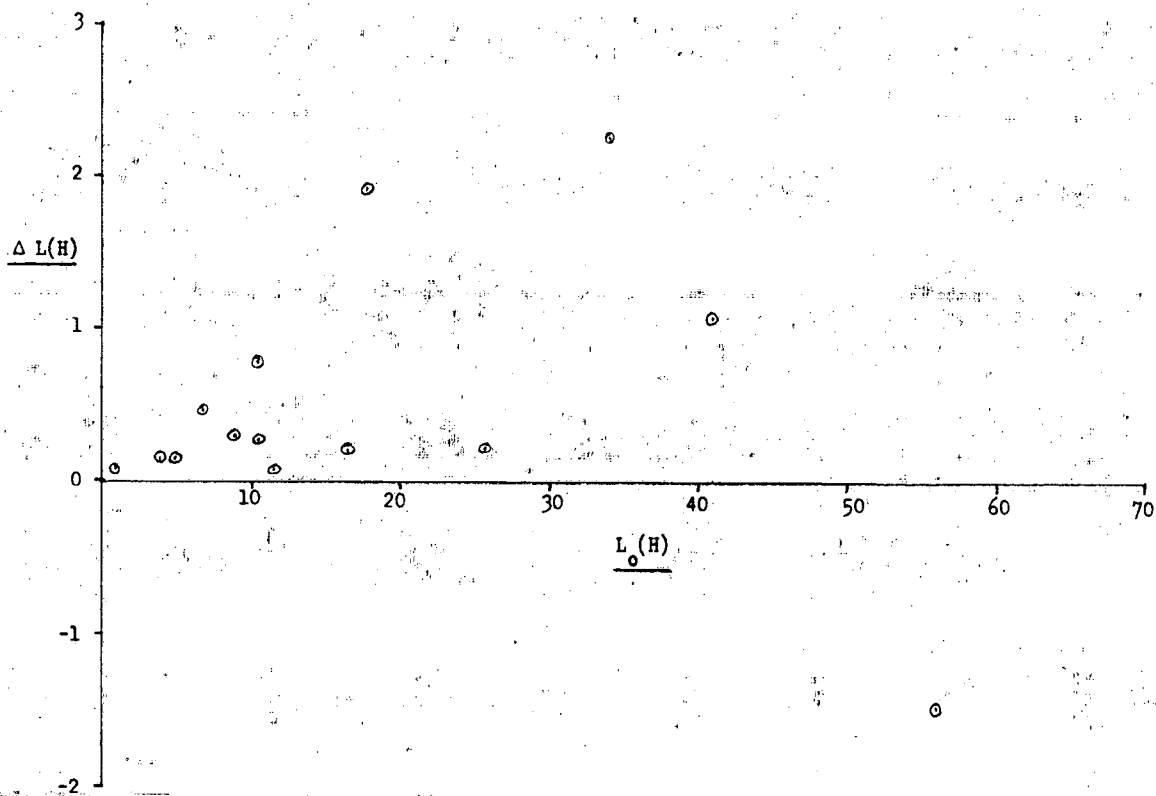
Graph 2c: <u>Initial level of Education index ($L_0(E)$ and corresponding annual average increase in the Education index ($\Delta L(E)$)</u>
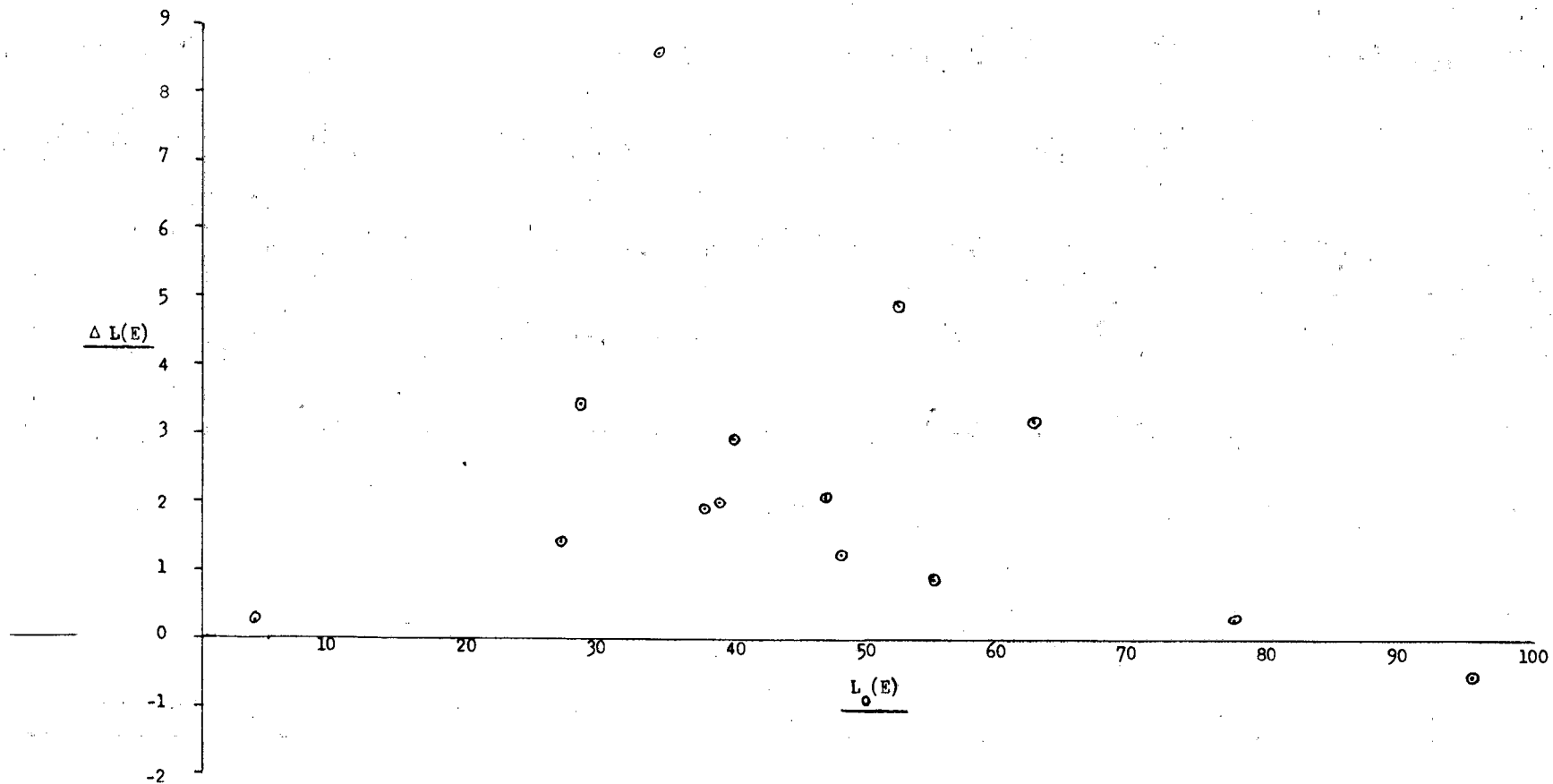
Graph 3: Scatter diagram of (a) annual average increases in nutrition index (Δ N) and those in health index (Δ H),
(b) annual average increases in nutrition index (Δ N) and those in education index (Δ E) and
(c) annual average increases in education index (Δ E) and those in health index (Δ H)
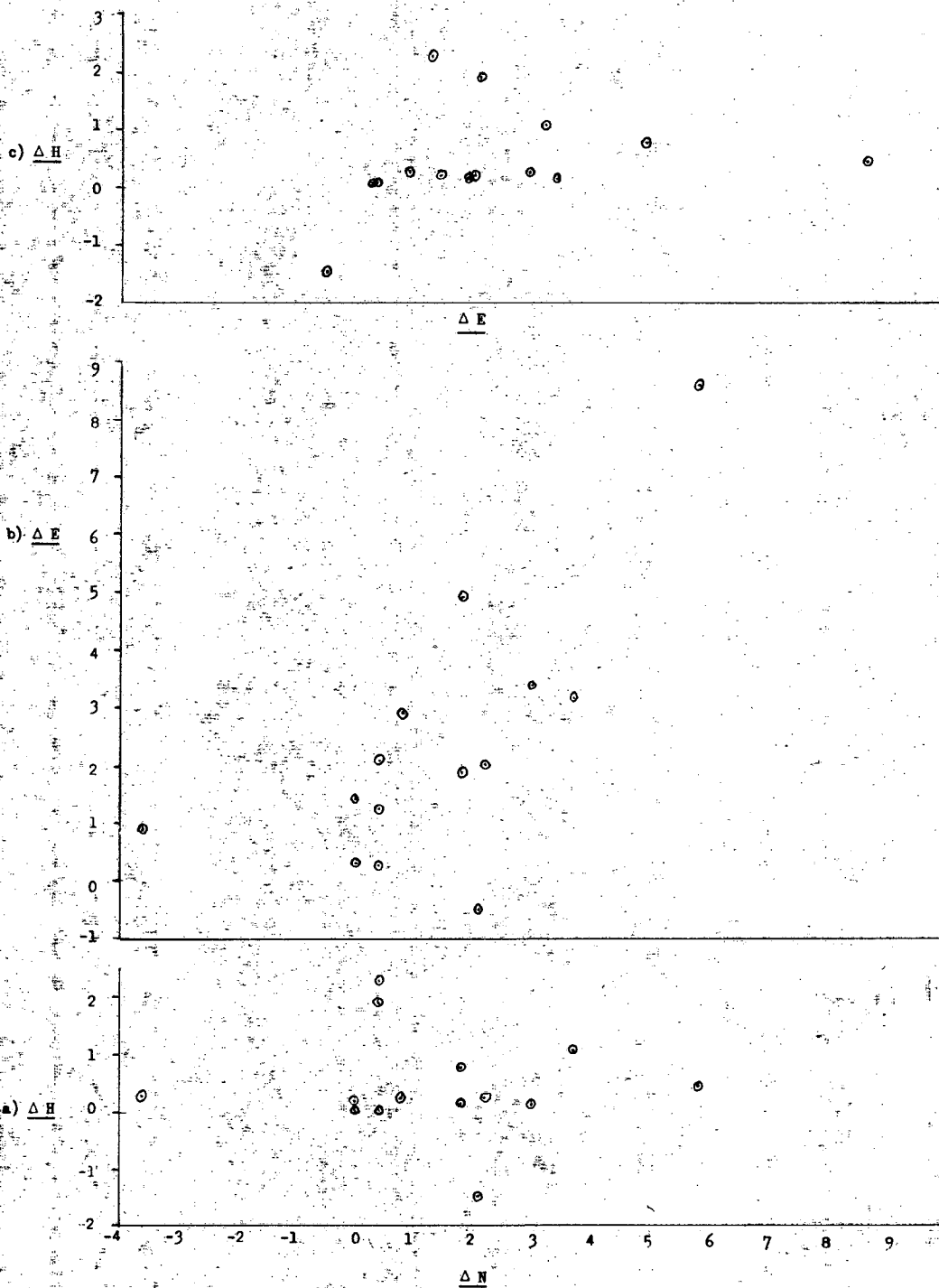
Graph 4: Pattern of annual average increase anticipated during the plan period in nutrition (N), health (H) and Education (E), 14 countries
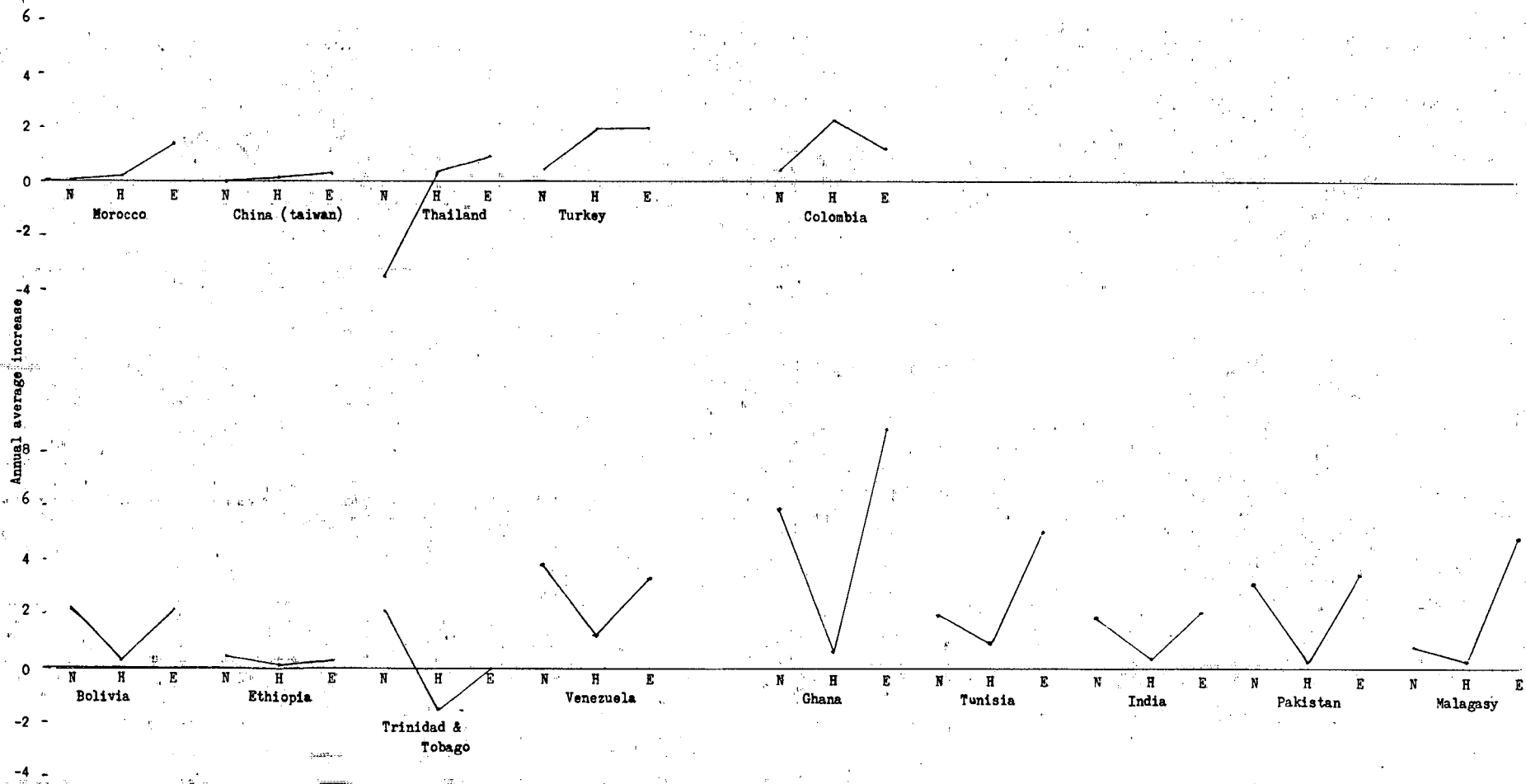
Graph 5: P.C. Consumption in U.S. dollars (C_o) and annual average increase in P.C. Consumption in U.S. dollars (ΔC)
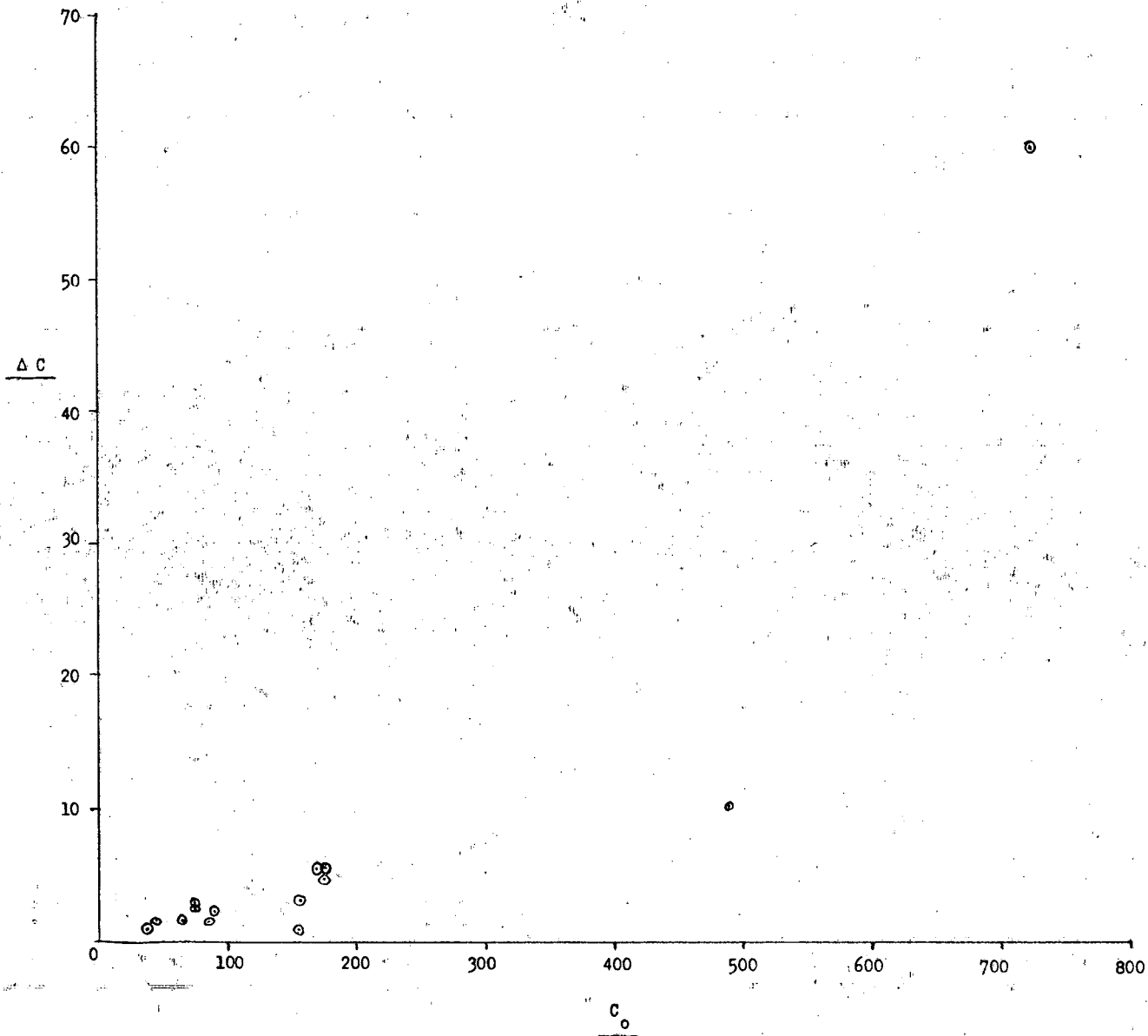
Graph 6: <u>P.C. Consumption in U.S. dollars (C_o) and the equally-weighted level of living index ($L_o(e)$) at the beginning</u>
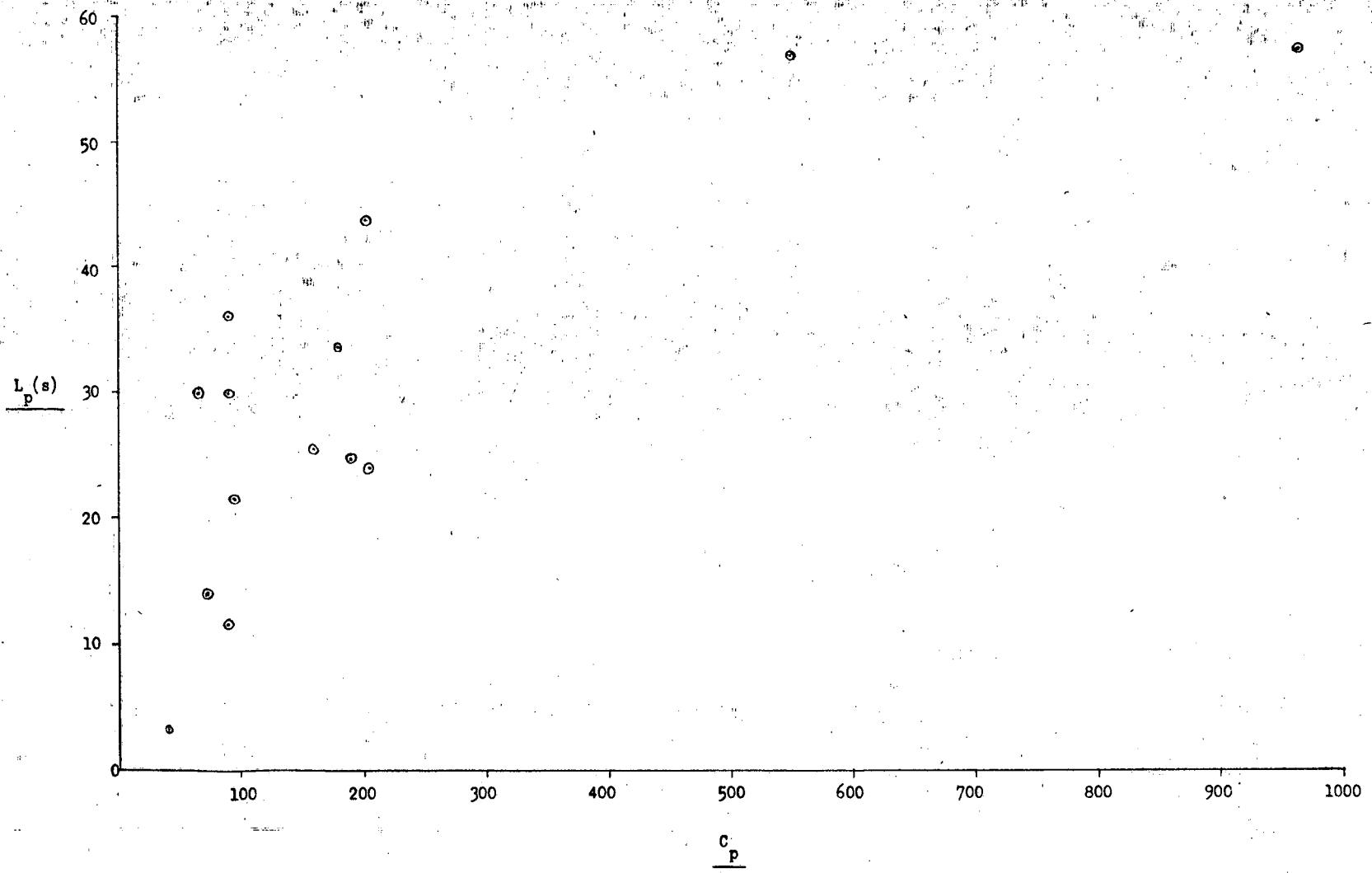<u>of the plan period</u>
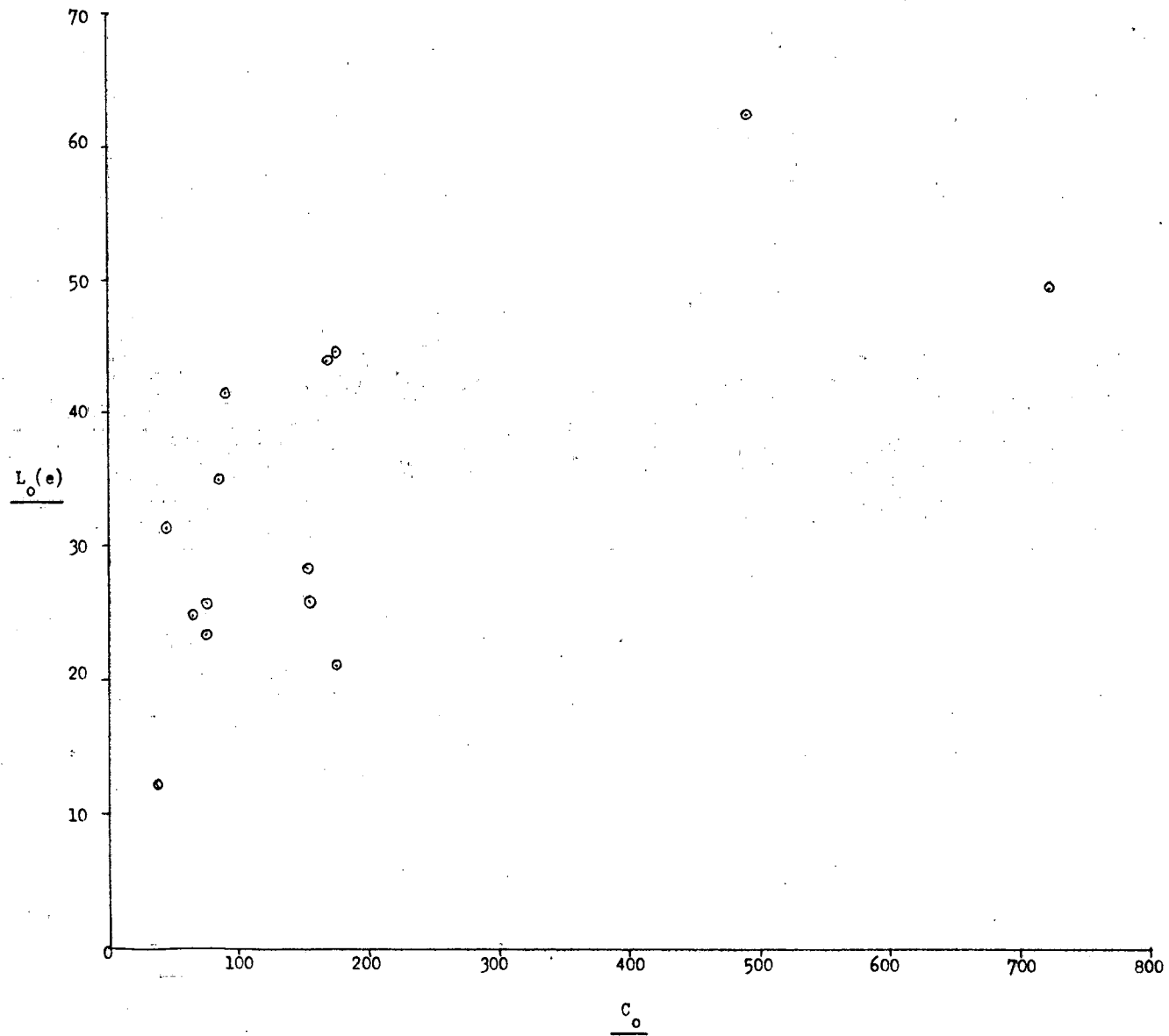
Graph 7: <u>P.C. Consumption in U.S. dollars (C_o) and corresponding sliding-weighted level of living index ($L_o(s)$) at the beginning</u>
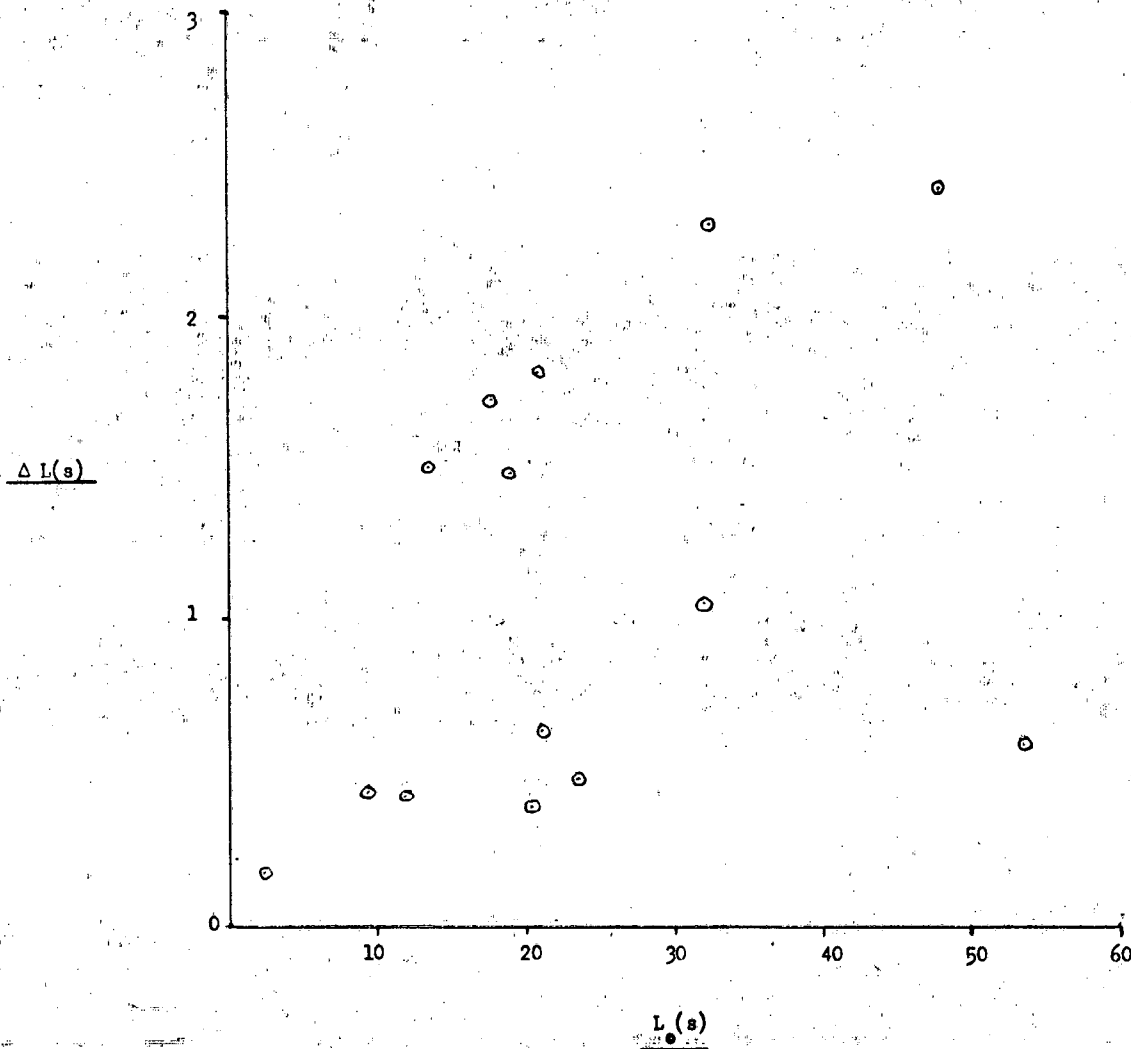<u>of the plan period</u>

$L_o(s)$

60 —

50 —

40 —

30 —

20 —

10 —

0

100   200   300   400   500   600   700   800

C_o
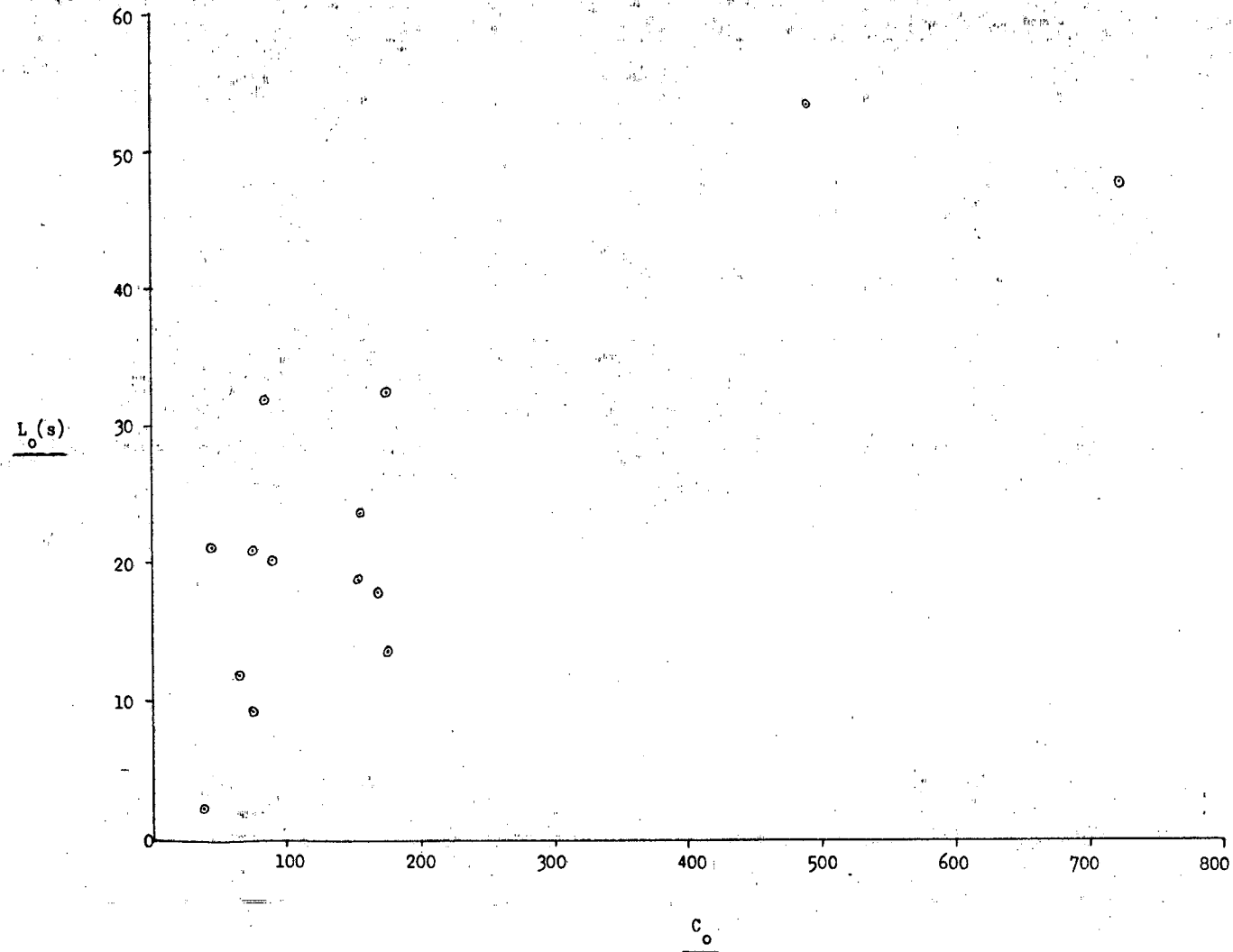
Graph 8: **P.C. Consumption in U.S. dollars (C_p) and corresponding equally-weighted level of living index at the end of the plan period ($L_p(e)$)**
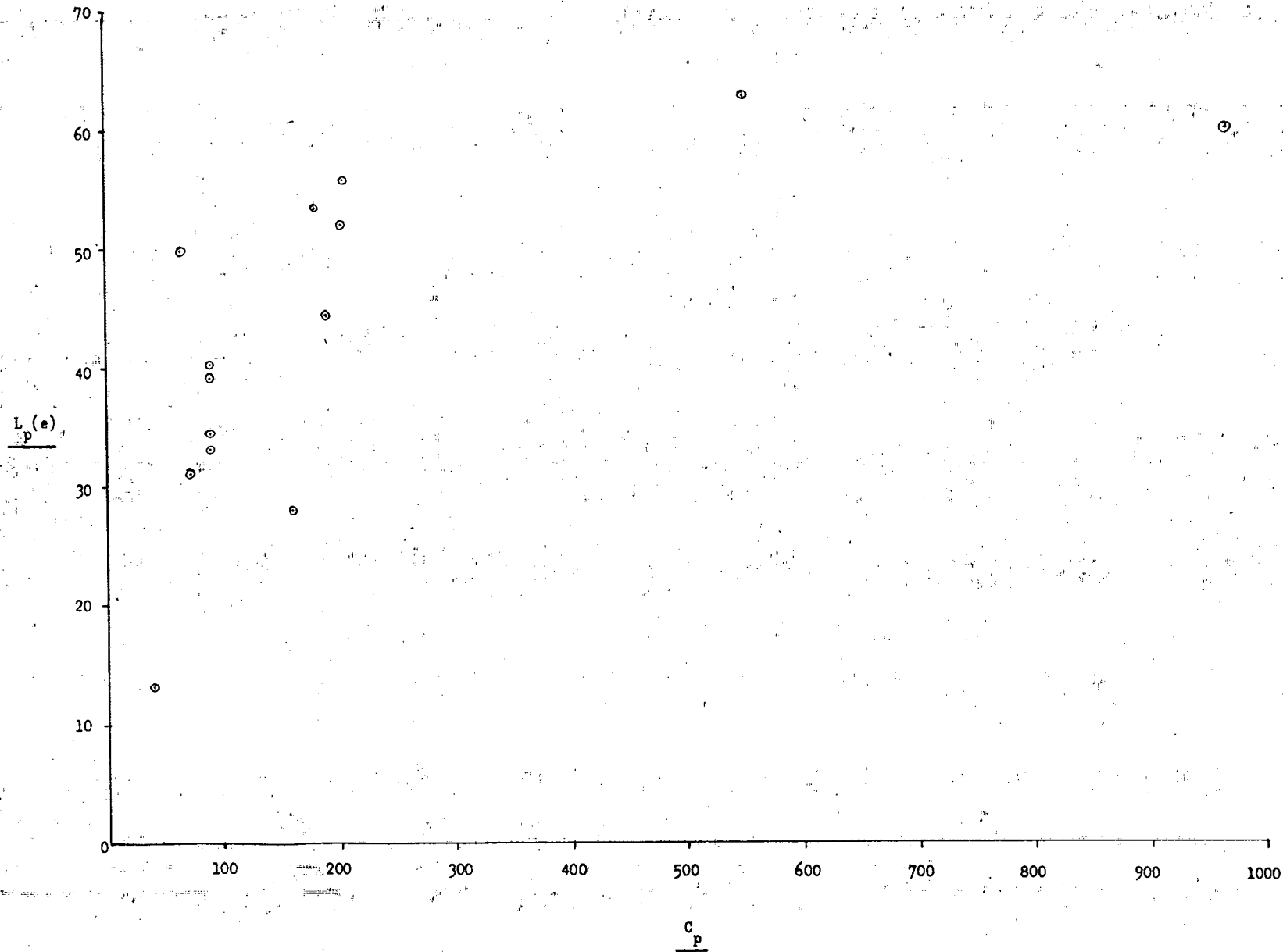
Graph 9: P.C. Consumption in U.S. dollars (C_p) and corresponding sliding-weighted level of living index $(L_p(s))$ at the beginning of the plan period
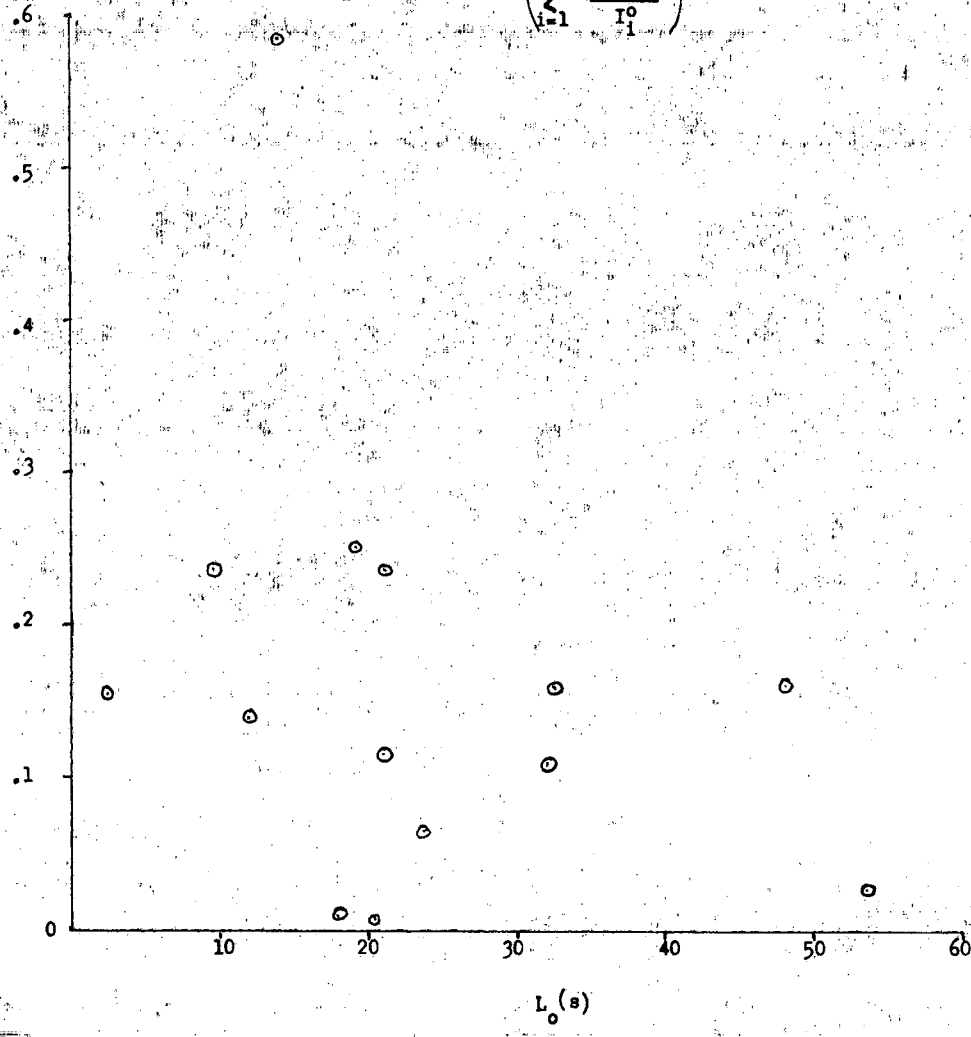
Graph 10: <u>Sliding-weighted level of living index at the beginning of the plan period ($L_o(s)$) and the annual average increase</u>

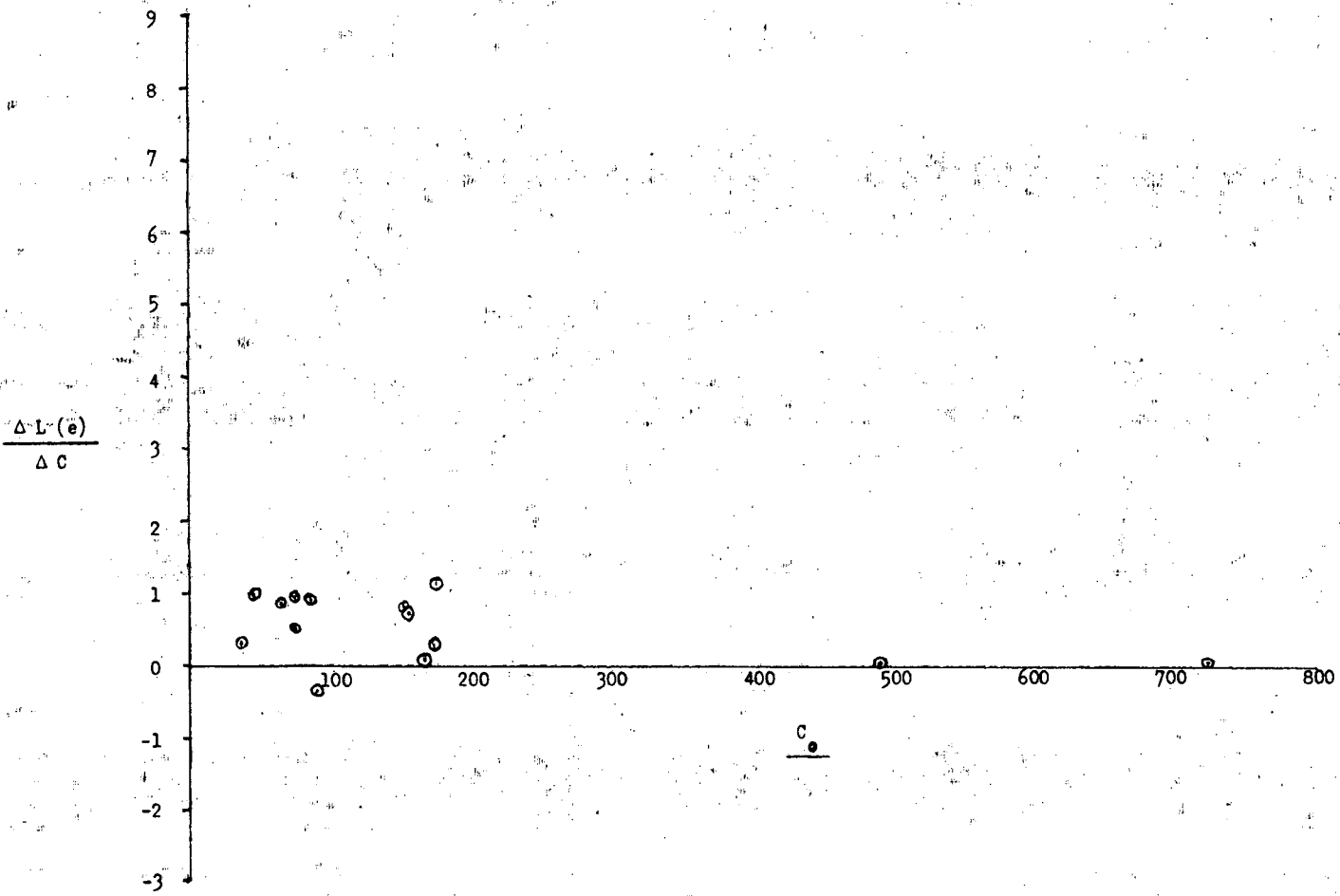<u>in the sliding-weighted level of living index ($\Delta L(s)$)</u>

Graph 11: <u>Sliding-weighted level of living index at the beginning of the plan period (L_0(s)) and the increase in the level of living index</u>

<u>by a sliding-weighted increment</u> $\left(\sum_{i=1}^{3} \dfrac{\Delta I_i^{p-o}}{I_i^o} \right)$

$$\sum_{i=1}^{3} \dfrac{\Delta I_i^{p-o}}{I_i^o}$$

$L_0(s)$

Graph 12: <u>P.C. Consumption in U.S. dollars (C_o) and corresponding marginal utility to the equally-weighted level of living index ($\Delta L(e) / \Delta C$)</u>

Graph 13: P.C. Consumption in U.S. dollars (C_o) and corresponding marginal utility to the sliding-weighted level of living index ($\Delta L(s) / \Delta C$)