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A Note on Measures of Inequality with Illustrations from Nepalese Health Sector

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Inequality refers to the situation in which the particular variable under investigation does not show equality. The citizens of UDC's and DC's are suffering from the economic inequalities as well. Many economic variables such as income, wealth, tax, land, import, export, education health, regional development etc. are not distributed proportionally. The problem of equal distribution of variable under consideration is more acute in UDC's than DC's. Such disparities on the distribution of the variable can be measured by taking the different groups of people or different geographical areas.

A technical note of the methods of measuring inequality is briefly summerised as follows

The first measure of the inequalities is the coefficient of variation (V). It is the easiest method to measure inequality. The coefficient of variation is defined as the ratio of standard deviation to the mean value of the investigating variable under question.

$$\therefore \quad V = \frac{\sigma}{\overline{X}}$$

Where, V = Coefficient of variation,

σ = Standard Deviation, and

$\overline{X}$ = Arith metic mean.

The second measure of inequality is the concentration index (C). The method to calculate the concentration index is:

$$C = \frac{V}{2}$$

Where, C = Concentration index,

$$V = \frac{\overline{d}}{\overline{x}}$$

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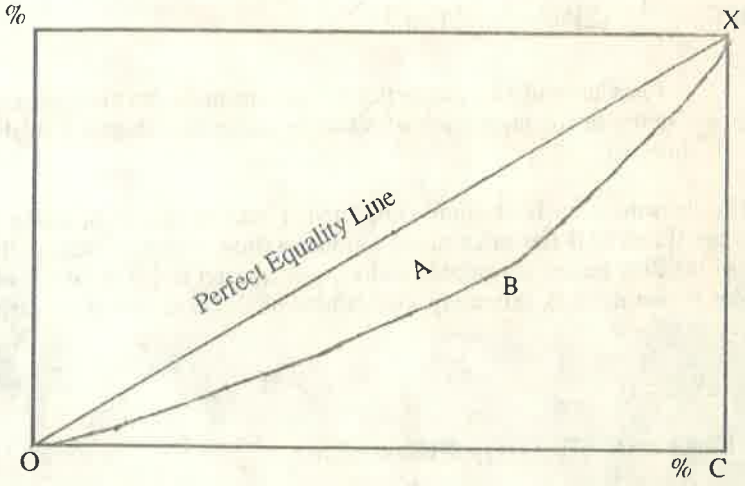
and $$\bar{d}=\frac{1}{n}\sum_{i=1}(|xi-\bar{x}i|)$$

The third measure of inequality is the Ginni coefficient (G.C) named after the Italian statistician. The Ginni coeffient is the differnces between the absolute equality line and the Lorenj curve of the two distributions. Therefore, Ginni coefficient is exactly one half of the relative mean difference defined as the Arithmetic mean of the pairs of incomes divided by mean income. This method of measuing inequality is very important because, it is widely accepted and used. It presents, the concentration ratio between Lorenj curve and absolute equality line. So, Ginni coefficient is the ratio of the area between diagonal and the curve to the area of the triangle below the diagonal. This can be illustrated with the help of the diagram.

The line ox is the absolute equality line which is based on the 45° line. The lower part of the curve is known as the Lorenj curve which is used to measure the inequality of variable under consideration. In other words the purpose of this curve is to show the degree of inequality in the relevant distribution where from it is taken. Now the area between Lorenj curve and absolute equality line is denoted by A which is called the concentration area of the inequality and the area of the triangle (O X C) below the diagonal is denoted by B.



$$\therefore \text{ G. C.} = \frac{A}{A+B}$$

It means Ginni coeffieient is the ratio of the concentration area (A) to the area below the absolute equality line A+B.

From the above fact it is found that the Ginni coefficient is closely related with Lorenj curve. For the construction of Lorenj curve the cummulative percentage shares

of.vaiable under investigation and the population are needed. These units have first to be ordered according to the ratio of advantage. For Ginni coefficient few clear methods of calculation are available in the literature. But it is easy if the value needed for the construction of Lorenj curve have already been calculated. Practically, Ginni coefficient can be calculated by using the following formula for individual and group data:

For individual data.

$$G.C = \frac{1}{2n^2\mu} \cdot \sum_{i=1}^{n} \sum_{j=1}^{n} (yi-yj)$$

$$= 1 - \frac{1}{n} - \frac{2}{n^2\mu} (y_1 + 2y_2 + \ldots + ny_n)$$

Where, n= number of observation,
μ= mean value of y
and for $(y_1 \geq y_2 > \ldots\ldots\ldots\ldots \geq yn)$

For grouped data:

$$G.C. = \frac{1}{100} (\Sigma Piqi + 1 - \Sigma Piqi-1$$

Where, Pi= Cummulative proportion of persons in the ith class interval.
q_1 = Cummulative proportion of variable under investigation in the ith class interval.

The theoritical basis of Ginni coefficient is that the value of Ginni coefficient lies between 0 and 1. If the value of the Ginni coefficient is zero there is the absolute equality of the distribution of variable under consideration and if the value of the Ginni coefficient is one there is extremely inequalities of the distribution of variable under investigation.

$\therefore \leq GC \leq 1.$

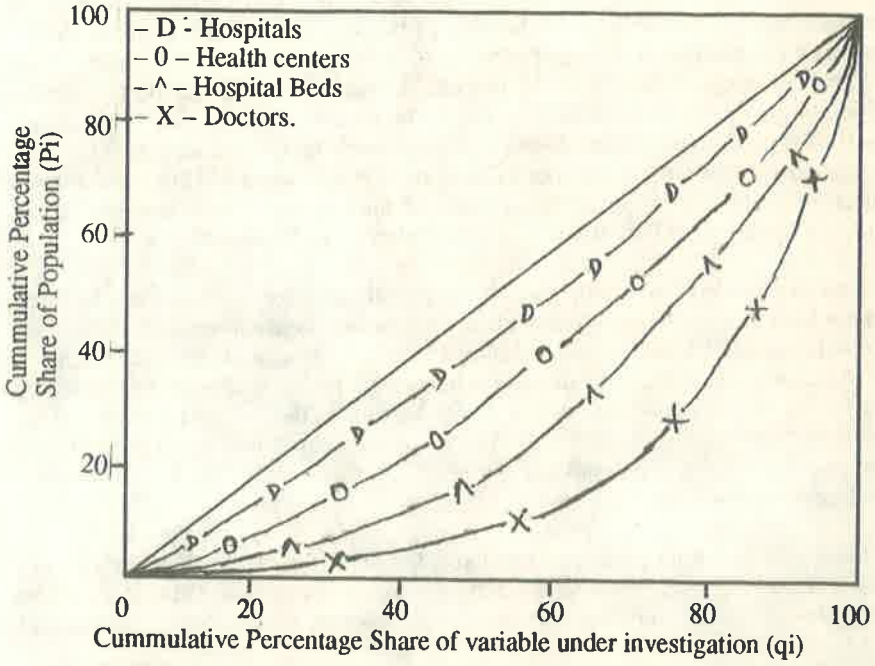
THE NEPALESE HEALTH SERVICES

Nepal is unique country in which every sector of the economy is extremely paralysed in the sense of development. These sectors are unable to meet the basic requirement of the people. The urban sector of Nepal is more developed than the rural one. The concentration of the human facilities, by virtue of the development centred within the urban areas. The inequalities of all the economic variables is inherited and being pushed to the Nepalese people into poverty. Social justice such as equal distribution of health, education and employment facilities could not be expected proportionately. The inadequacy of such basic needs always push the people under severe undernourishment which ultimately prevents to labour hard and hence people are inherited with poor health and education as well. The health service of an economy is

one of the basic needs of the people. This sector is badly affected by the unjust distribution of physician and other nursing persons due to the fact that most of the physicians are stationed in the facilited urban areas. In such a situation the Nepalese people in the rural areas are not largely affected by the health facility. 1989 data show. that one bed is available for 3872 people. The total number of doctors were 1196 in 1990/91 and one doctor is available for 1544 people (SPB: 1992). This article will evaluate and examine the inequalities of the distribution of health workers of Nepalese economy.

To analyse the inequalities in health services of Nepal, Ginni coefficient alone is taken into consideration because it is the most widely used method of measuring inequalities of the variable under investigation as already said above. The variables such as number of hospitals, health centers, hospital beds and medical doctors are considered on the one hand and the zonalwise distribution of population on the other. The main theme of this article is to analyse the distribution of above said variables with the zonalwise distribution of population.

The following diagram shows the Lorenj curve of four indicators of medical services in Nepal.



From the above curve it can be said that the hospitals are much more equally distributed than other variables under question. Anoter indicator of the availability of medical facilities is as such that it is frequently employed and widely available is the number of hospital beds. The number of hospital beds are not evenly distributed with the proportion of the population in different region of the country. Similarly, the doctors are not equally distributed in the different zone and the diffenent region of the

country. Among the four indicators, the most wide uneven distribution can be seen in the part of doctors from the above figure.

Followings are the value of the Ginni coefficient of four indicators as explained above:

Particulars (1991)	Ginni coefficient in percent
Doctors	67.16
Hospital Beds	29.12
Health centers	16.91
Hospitals	4.64

The Ginni coefficient of hospitals by taking the zonalwise distribution is 4.64 percent. It means there is approximately equal distribution of hospitals in diffirent zones of the country. The disparities in the number of health centers is greater than the hospitals but lesser than the hospital beds. The value of the Ginni coefficient is 16.91 percent. These two indicators seem to be evenly distributed in different zones of the country. Another indicator of the availability of the medical facilities frequently employed and widely available is the number of hospital beds. There is the moderate distribution of the number of hospital beds in the different zones of the country. The value of the Ginni coefficient is 29.12 percent. It means only 29.12 percent is the inequalities in the distribution of hospital beds. The fourth indicator is the distribution of medical doctors through out the country. The value of the Ginni coefficient is 67.16 percent It is found that among the four indicators of health services, the most uneven distribution is of the doctors in differnet zones of the country. The disparities of the distribution of doctors in different zones of the country is 67.16 percent.

From the analysis of health services of Nepal, an amasing fact can easily be drawn about how much and where the medical facilities are concentrated. The hospitals, health centers, hospital beds to some extent, are evenly distributed in the different 14 zones of the country. But, the most important factor which can be considered as the key player in health services game to operate these facilities is the medical doctors whose distribution is extremely unequal as compared to other three indicators. This is the important reasons for the poor health of the people in different region, i.e., due to the poor distribution of doctors.

Mere existence of hospitals and health centers in different region of the country does not by itself guarantee good health services. So, it is necessary to distribute the medical personnel equally in different regions of the country to serve the people and to oprate other available facilities.

Finally this being the situation of health services the hospitals and hospital beds are to some extent evenly distributed, but these facilities are virtually concentrated in the different urban centres of the country. In this context, the majority of the people resides in rural areas. The facility of having transport from rural areas to urban one is far

from expectation in the existing condition. Therefore, the impact of these available facilities to the general health of people is being the fruits of sky.

Similarly, as stated above the distribution of doctors in regional basis is extremely uneven. This uneven distribution of physicians brought about a severe problem in the country. So, it deserves the attention that, only the hospitals and hospitals beds do not serve the gereral health of people, but equally it is necessary to provide necessary apparatus, incentive and facility to operate these apparatus. Special training programmes to the doctors from the different remote regions of the country should also be introduced frequently. So, in this respect, the goverment should take care of meeting necessary apparatus and facilities to the hospitals of different rgions and the more important duty that the government should undertake is to distribute the medical personnel evenly in different regions of the country.

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Annex

Table 1

Population, Number of Hospitals and Hospital Beds, Health Centres and Doctors by Zone.

Zone	Population (in million)	Hospitals	Hospital Beds	Helth Centers	Doctors
Mechi	1.12	4	95	48	19
Kosi	1.73	10	348	81	63
Sagarmatha	1.59	8	282	72	29
Janakpur	2.06	8	167	81	28
Bagmati	2.25	24	2076	52	854
Narayani	1.87	8	420	68	42
Gandaki	1.26	7	340	96	49
Dhauwalagiri	0.49	4	60	47	8
Lumbini	2.00	12	324	78	34
Rapti	1.04	5	110	54	7
Bheri	1.10	7	178	59	23
Karnali	0.26	1	15	54	6
Seti	1.03	8	243	70	21
Mahakali	0.66	5	110	49	13
Total	18.46	111	4768	919	1196

Source:- *Statistical Pocket Book 1992*, Central Burean of Statistics, Kathmandu.
Ministry of Health, HMG/N, Kathmandu

BOOK REVIEW

K. Subbarao (1989): Agricultural Marketing and Credit, Indian Council of Social Science Research (ICSSR), New Delhi, PP. ix+59, Price:Rs 25.I.C.

ICSSR has sponsored many research work in economics. This book is the second monograph under the second survey of research out of twenty-nine papers sponsored by ICSSR. The whole book has been divided into two parts. The first part is related to the marketing and the second part to the rural credit .

Indian agricultural marketing has been explained in six sections starting with the introduction where the author has mentioned the organization of the first part of the book. Section two discusses on the efficiency of the different agents involved in the marketing chain of indian agriculture which comprises the task of assembling the produce from widely scattered producers and moving them to the ultimate consumers. This process is complex one and varies from one region to another, from one commodity to another and so on. The author has realized this fack and has tried to make an assessment through a functional classification of the private and public agencies involved separately In this connection the author has attributed whatever inefficiency to the transportation problem in many parts of india. About the storage facility the author seems to be concerned about the problem of information.

Section three is concerned with the overall performance of argricultural marketing system. The author has distinguished the overall efficiency of the marketing system between technical efficiency and economic efficiency. This section reviews the analytical advances in the measurement of technical and economic efficiency of the marketing system, and evaluates the relative merits of alternative methodologies, giving the data base.

In section four, problems of agricultural marketing have been cited. In this regard the most urgent problem is the unduly depressed prices in the post-harvest period which has led to the intermediaries exploitation over small farmers and non–cultivating population. The overall problem can be summarized by saying that small farmers have a week bargaining power which has been attributed to their dependence on non-institutional source of finance inadequate storage, poor transportation, absence of information, ineffective market regulation, the pivotal position of traders and processors, and the absence of scientific grading.

Section five presents an analysis of the various polices and methods of state intervention followed in order to remedy the weaknesses of the marketing system and evaluates the impact of the public marketing policies on the returns to the agencies involved. In section six, the author sums up by explaining the role of market reforms in improving small farmers' bargaining power. In this connection he says that unless and until there is structural reforms marketing reforms alone can do only a little.

Part two of the book has been divided into three section. The first section highlights on the importance of rural credit, and also explains the organization of part two. Section two reviews the recent changes in institutional credit arrangements with

particular reference to equity. In this section the author has mentioned that there is size-class bias and regional bias in institutional credit because of unequal access to institutional credit. The problems of overdues has been highlighted as the major problem faced by all institutional financing agencies. However, the growing importance of credit in the light of new technology has been realized. Section three reviews analytical issues relating to the functioning of informal credit markets and the phenomenon of interlocking of markets. Problems relating to informal credits are small farmers' over dependence on village money lender and higher interest rates. In one place the author mentions "studies of informal credit market suggests that it is extremely important to understandthe nature of dependence of poor households and the social character of the control mechanism exercised by the lenders so that the limits to a particular policy can be better understood." The author suggests more region-specific research to further clarify the issues in the context of a changing situation. According to the author, supply side interventions through extention of commercial bank branches together with other interventions may have profound influence in lowering informal interest rates and small farmers' dependence on village money lenders.

To sum up, since the agriculture is the dominant sector in most developing countries, there has been an endless succession of literature in this area. However, relatively less attention has been given to the marketing aspect of agriculture resulting in a relatively limited availability of literature. Thus the present book has filled the void to some extent. It can be safely asserted that K. Subbarao has done a commendable job by accomplishing the research work on agriculture marketing and credit. His analytical presentation supported by figures and tables is very much lucid and convincing.

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