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Number 7

A Study of Disparities in Income and
Social Services Across Provinces in Thailand

by

Oey Astra Meesook



คณะเศรษฐศาสตร์
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ACROSS PROVINCES IN THAILAND

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June 1977

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Note

Table 2.1.2 which gives detailed changwad data for report is not published here, because its inclusion would make this published report too voluminous. However, it is available on request from the Economic Research Unit, the Faculty of Economics, Thammasat University. The table consists of the following data :

1. Income : Gross Provincial Product per Capita, 1970, 1976; Annual Growth Rate in Gross Provincial Product per Capita, 1970-1976; Government Expenditure per Capita, 1970,1976; Annual Growth Rate in Government Expenditure per Capita, 1970-1976; CAO Expenditure per Non-municipal Population, 1974/75; Population per Government Employee, 1970.
2. Degree of Urbanization : Percentage of Population in Municipal Areas, 1970; Percentage of Households in Agriculture, 1970; Percentage of Economically Active Population in Agriculture, 1970; Population per Square Kilometer, 1976.
3. Demographic : Average Household Size, 1970; Median Age, 1970; Children Ever Born Alive per 1,000 Women, 1970; Number of Births per Thousand Population, 1972; Number of Deaths per Thousand Population, 1972; Infant Mortality, 1972; Annual Rate of Population Growth, 1970-1976; Number Receiving Family-Planning Service per Thousand Population 1972-1973.
4. Labor : Percentage of Population Who are Economically

Active, 1970; Percentage of Economically Active Population Employed, 1970.

5. Education : Percentage of Population Who are Literate, 1970; Average Number of Years of Schooling for Population 6+, 1970; Percentage of Population 6+ Without Schooling, 1970; Percentage of Population 6-29 in School, 1970; Percentage of Students in Population, 1970; Students Per Teacher, 1973; Student Per Classroom, 1973; Average Number of years of Schooling of Teachers, 1973; Current Expenditure on Primary Education per Capita, 1975 (CAO); Capital Expenditure on Primary Education Per Capita, 1975 (CAO) Total Expenditure on Primary Education Per Capita, 1975 (CAO); CAO Lower Primary School Enrollment Rate, 1975; CAO Upper Primary School Enrollment Rate, 1975; Secondary School Enrollment Rate, 1975.

6. Health : Number of Patients With Communicable Diseases Per Thousand Population, 1974; Percentage of Deaths from Communicable Diseases, 1974; Population Per Ministry of Public Health Hospital, 1973; Population Per Hospital, 1973; Population Per Hospital Bed, 1973; Population Per Provincial Hospital Bed, 1973; Population Per Doctor, 1973; Population Per Government Doctor, 1973; Population Per Nurse, 1973; Rural Population Per First-Class Health Center, 1973; Rural Population Per Health Center, 1973; Expenditure on Health Per Capita, 1977.

7. Housing : Percentage of Houses Using Local Materials,

1970; Percentage of Houses Using Reused Materials, 1970; Percentage of Houses Owned, 1970; Percentage of Houses With Piped Water, 1970; Percentage of Households Using Well Water, 1970; Percentage of Houses With Electricity, 1970; Percentage of Houses With Toilets, 1970; Rural Population Per Government-built Public Well, 1974; Rural Population Per Otherwise-built Public Well, 1974; Rural Population Per Public Well, 1974; Percentage of Villages With Electricity, 1976.

8. Communication : Population Per Registered Vehicle, 1969; Percentage of Households With Radios, 1970; Percentage of Households With Televisions, 1970; Percentage of Households With Cars, 1970; Population Per Telephone, 1974; Shortest Road Distance to Bangkok; Rural Road Needs Per Thousand Rai of Cultivated Area, 1977; Number of Train Stops Per Thousand Sq. Km.; Kilometers of Railway Per Thousand Sq. Km.

9. Security : Number of Crimes Per Thousand Population, 1974; Percentage of Crimes Caught, 1974; Number of Police Stations Per Thousand Sq. Km.; 1974; Population Per Policeman, 1974.

A STUDY OF DISPARITIES IN INCOME AND SOCIAL SERVICES
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I. Introduction

By far the most noteworthy feature of the Fourth National Economic and Social Development Plan of Thailand when compared with earlier plans is its marked shift in emphasis from growth to equity considerations.^{1/} For the first time, the planners give explicit and serious recognition to the problem of disparities in the standards of living of different population groups, in particular the glaring disparity between the urban and rural populations. Accordingly, the Fourth Plan expresses its concern throughout its volume over this matter, and repeatedly attempts to quantify the extent of the problem by comparing various statistics pertaining to urban and rural areas. More importantly, in a great many instances it goes so far as to commit itself in quantitative terms as to the size of the reduction in disparities that will be achieved during the period of the Plan.

^{1/} The Fourth Five-Year National Economic and Social Development Plan (1977-1978), National Economic and Social Development Board, Office of the Prime Minister, Bangkok, Thailand, January 1977

A closer examination of the Fourth Plan reveals that the commendable intentions of the planners are not matched by an equally commendable plan of action. The objective of economic growth is still given a great deal of importance, the difference being that it is now accompanied by qualifying statements on equity. The discussion in the Plan concerning equity considerations reflects at least two problems for which as yet the planners have no answers. The first is that they have very little idea what measures the government should take in order to reduce the disparities between different groups of the population. Nor are they clear what effect some of their policies, whether actually directed at the equity question or not, will have on the distribution of income and other measures of material welfare. The second problem is the failure of the planners to confront the growth-versus-equity problem. No attempt is made to examine the relationship between the two possibly competing objectives, and the extent of the trade-off, if any, between them. Thus the Fourth Plan treats them as two parallel objectives without setting priorities for them. The upshot of these two problems is that the government will be unclear about the impact of its policies on the distribution of income; it will not be sure how to improve the income distribution even given that it would like to; it will be unaware when a policy designed to further one objective come into conflict with the other; and lastly, even if it became aware of such a trade-off, it will find no guidance in the Plan for the resolution of the conflict, since no priority has been set as to which is to be

the primary objective.

Given the above considerations, it comes as no surprise that some of the more definite statements in the Plan concerning the reduction in income disparities among population groups have to do with a better distribution of social services among them. It is not difficult to see why the planners would opt for such an approach. The provision of social services is an accepted function of the government. It would be politically unwise for anyone to question the government for attempting to even out the provision of social services among different groups. Furthermore, such a course of action involves the reallocation of resources already at the government's disposal. It bypasses the issue of where the resources should come from in the first place. Finally, it does not require that the government take any steps which will bring it into conflict with the rich and powerful. Yet it can lay claim to doing its part in improving the income distribution in the country.

Recognizing that some of the major issues of income distribution have not been faced by the planners is not to deny the potential importance of the role of public services in reducing disparities in the living standards of people. Given that the level of material welfare of individuals depends on their access to social services as well as on their incomes, a more conscientious effort to provide the poor with public services is one way of improving the distribution of material welfare among different population groups. Moreover, if it

is not politically feasible to reduce income disparities in other ways, then it could be argued that there is a case for concentrating on what is possible and clearly works in the direction of greater equity.

This paper takes as its starting point that the equitable provision of social services by the government is one way of bringing about greater equity. It raises some questions concerning how much we know about the existing distribution of social services in Thailand; what it will take for the government to satisfy its objectives as stated in the Fourth Plan; and what some of the major problems involved will be in the execution of the Plan.

The study uses the changwad as the basic unit of study.^{2/} The changwad is a natural choice if one is interested in an analysis which goes beyond the level of the region as usually defined in government work. Moreover, it is a basic administrative unit and therefore it should be relatively easy to obtain data for it. The exercise attempted in this paper is designed to demonstrate the difficulties involved when one is concerned with distributional considerations. If this paper shows the discouraging result that

^{2/} The changwad is commonly translated into English as province. There are altogether 71 changwads in Thailand. Each one of them is made up of a number of amphurs, which in turn are made up of tambons, consisting of a number of mubans or villages.

it would be quite difficult to achieve some sort of equality at the changwad level in the provision of public services, it is important to remember that even such an achievement would still leave a great deal of room for great disparities to exist within each changwad. What is already difficult with 70 changwads would be that much more so with over 500 amphurs, not to mention 5,000 tambons and, finally, 50,000 villages.

II. How Much Do We Know?

In this section an attempt is made to give some idea of the extent and nature of the disparities across changwads of selected social indicators. The list of indicators should not be taken as in any way complete; it is only meant to serve as an illustration of the distributional problem.

The data used in this study have all been collected from government publications or directly from government agencies. Thus they are to be considered official statistics, in the sense that one can expect these very same numbers to be used for planning purposes. While suspicious-looking data may raise doubts about some of the conclusions drawn in this paper concerning the extent of inequality, the more important question which presents itself is how much confidence the government has in its own data which it will use for planning.

Some of the data series which have been collected are presented by changwad. Indicators are classified into major groups, such as education or health. The correlation between indicators in the same group is then shown, so that it should not be necessary to keep so many of them in further analysis. Three hypotheses which represent the motivating force behind this study are then tested. The first is that the level and quality of social services is positively correlated with the level of income, as measured by the gross provincial product per capita of the changwad. Second, the provision of social services is positively correlated with the degree of urbanization in the changwad. Third, the allocation of government expenditures by changwad is not such as to reduce the disparities in the existing levels of public services across changwads.

II.1 How Disparate Are the Changwads?

This section represents an attempt to describe different facets of disparities in Thailand, in which the changwad is used as the unit of study. It is meant to draw attention to the fact that disparities may be much greater than are commonly supposed. It is presumed that a simple description of the way things are is in itself interesting and useful; that indeed it is essential for our understanding of the overall distributional problem.

Two broad types of indicators are considered, descriptive

ones designed to give some idea of the existing state of affairs, and Policy-related indicators which either directly represent the size of governmental effort to affect descriptive indicators or indirectly reflect such an effort. Similar or related indicators are grouped into major categories. Indicators belonging to the same category often describe the same phenomenon and as such are substitutes for each other. They are presented together in part to show that the results of the study at later stages of the analysis are in no way dependent on our choice of indicators. A list of the indicators used is given in Table 2.1.1, while Table 2.1.2 gives for each of these the indicator values for the individual changwads.^{3/}

The indicators are self-explanatory and it only remains to be stressed that great disparities exist across the different changwads of Thailand with respect to all aspects for which we have information. We shall here use one or two series from each major category to illustrate this particular point.

^{3/} Bangkok and Thonburi, which are two different changwads, have been combined into one because many of the indicators are only available for the two changwads combined. In this study, Bangkok will be taken to include both Bangkok and Thonburi. In addition, Yasothorn is included in Ubonratchathani since most of the indicators refer to the time when they were still combined into one changwad. Table 2.1.2 is available on request from the Economic Research Unit, Faculty of Economics, Thammasat, University.

Table 2.1.1

A LIST OF INDICATORS USED, BY MAJOR CATEGORIES

<u>Category</u>	<u>Type of Indicator</u>	
	Descriptive	Policy-Related
1. <u>Income</u>	1.1 Gross provincial product per capita, 1970 1.2 Gross provincial product per capita, 1976 1.3 Annual growth rate in gross provincial product per capita, 1970-1976	1.4 Government expenditure per capita, 1970 1.5 Government expenditure per capita, 1976 1.6 Annual growth rate in government expenditure per capita, 1970-1976 1.7 CAO expenditure per nonmunicipal population, 1974/75 1.8 Population per government employee, 1970
2. <u>Degree of Urbanization</u>	2.1 Percentage of population in municipal areas, 1970 2.2 Percentage of households in agriculture, 1970 2.3 Percentage of economically active population in agriculture, 1970 2.4 Population per square kilometer, 1976	
3. <u>Demographic</u>	3.1 Average household size, 1970 3.2 Median age, 1970	3.8 Number receiving family-planning service per thousand population, 1972-73

Table 2.1.1 -- (continued)

<u>Category</u>	<u>Type of Indicator</u>	
Descriptive	Policy-Related	
3. <u>Demographic</u>		
3.3 Children ever born alive per 1,000 women, 1970		
3.4 Number of births per thousand population, 1972		
3.5 Number of deaths per thousand population, 1972		
3.6 Infant mortality, 1972		
3.7 Annual rate of population growth, 1970-1976		
4. <u>Labor</u>		
4.1 Percentage of population who are economically active, 1970		
4.2 Percentage of economically active population employed, 1970		
5. <u>Education</u>		
5.1 Percentage of population who are literate, 1970	5.4 Percentage of population 6-29 in school, 1970	
5.2 Average number of years of schooling for population 6+, 1970	5.5 Percentage of students in population, 1970	
5.3 Percentage of population 6+ without schooling, 1970	5.6 Students per teacher, 1973	
	5.7 Students per classroom, 1973	
	5.8 Average number of years of schooling of teachers, 1973	
	5.9 Current expenditure on primary education per capita, 1975 (CAO)	

Table 2.1.1 -- (continued)

<u>Category</u>	<u>Type of Indicator</u>	
	Descriptive	Policy-Related
5. <u>Education</u>		5.10 Capital expenditure on primary education per capita, 1975 (CAO) 5.11 Total expenditure on primary education per capita, 1975 (CAO) 5.12 CAO lower primary school enrollment rate, 1975 5.13 CAO upper primary school enrollment rate, 1975 5.14 Secondary school enrollment rate, 1975
6. <u>Health</u>	6.1 Number of deaths per thousand population, 1972 6.2 Infant mortality, 1972 6.3 Number of patients with communicable diseases per thousand population, 1974 6.4 Percentage of deaths from communicable diseases, 1974	6.5 Population per Ministry of Public Health hospital, 1973 6.6 Population per hospital, 1973 6.7 Population per hospital bed, 1973 6.8 Population per provincial hospital bed, 1973 6.9 Population per doctor, 1973 6.10 Population per government doctor, 1973 6.11 Population per nurse, 1973 6.12 Rural population per first class health center, 1973 6.13 Rural population per health center, 1973 6.14 Expenditure on health per capita, 1977

Table 2.1.1 -- (continued)

<u>Category</u>	<u>Type of Indicator</u>	
Descriptive	Policy-Related	
<u>7. Housing</u>	7.1 Percentage of houses using local materials, 1970	7.8 Rural population per government-built public well, 1974
	7.2 Percentage of houses using reused materials, 1970	7.9 Rural population per otherwise-built public well, 1974
	7.3 Percentage of houses owned, 1970	7.10 Rural population per public well, 1974
	7.4 Percentage of houses with piped water, 1970	7.11 Percentage of villages with electricity, 1976
	7.5 Percentage of households using well water, 1970	
	7.6 Percentage of houses with electricity, 1970	
	7.7 Percentage of houses with toilets, 1970	
<u>8. Communications</u>	8.1 Population per registered vehicle, 1969	8.8 Number of train stops per thousand square kilometers
	8.2 Percentage of households with radios, 1970	8.9 Kilometers of railway per thousand square kilometers
	8.3 Percentage of households with televisions, 1970	
	8.4 Percentage of households with cars, 1970	
	8.5 Population per telephone, 1974	
	8.6 Shortest road distance to Bangkok	
	8.7 Rural road needs per thousand rai of cultivated area, 1977	
<u>9. Security</u>	9.1 Number of crimes per thousand population, 1974	9.3 Number of police stations per thousand square kilometers
	9.2 Percentage of crimes solved, 1974	9.4 Population per policeman, 1974

Since the study focuses on a few specific aspects, some additional tables are presented which summarize the information and assist in the interpretation of the raw data. Table 2.1.3 gives average values of all the indicators by groups of changwads classified by gross provincial product per capita in 1976. Five such income classes are given, but Bangkok, which properly belongs to the top income class, is considered separately. This is because of the special characteristics of Bangkok as a province, but also because many of the indicators are not applicable to Bangkok.^{4/}

Because there is considerable interest in the question of regional disparities, Table 2.1.4 gives average values for the indicators for the four regions of Thailand, the North, Center-East, Northeast and South. Bangkok is treated as a separate region. By referring to this table, one can immediately find out how an indicator varies across regions.

1. Income Using data on the gross provincial product for 1970 and 1976, we have the following picture. The gross provincial product, adjusted for population size, varies enormously across changwads. In 1970, the lowest figure was 1,153 baht for Sisaket and the highest 23,482 baht for Phuket, a 20-fold difference. It is true that these findings reflect the fact that a few

^{4/} For example, indicators involving rural areas, such as rural school enrollment rates or rural population per public well.

changwads, in particular, Prachuabkhirikhan, Ranong, Bangkok-Thonburi, Samutprakan and Phuket, have per capita gross provincial products which are markedly higher than the rest. But even ignoring these five changwads still leaves a 6-fold difference between the highest and the lowest figures. In 1970, four changwads had gross provincial products per capita below 1,500 baht, all of them in the Northeast. Of the 13 changwads with gross provincial products per capita below 2,000 baht, all but one are in the Northeast and the remaining one is in the North. In contrast, of the 35 changwads with gross provincial product per capita greater than 3,000 baht in 1970, all but two are in the Center-East and the South.

Table 2.1.3

Average Values of Socio-economic Indicators for Changwads Grouped
by Level of Gross Provincial Product per Capita, Thailand

Gross Provincial Product per Capita, 1976 (baht)

Indicator	<4,000	4,000- 5,999	6,000- 7,999	8,000- 9,999	10,000 or more ^a	Bangkok- Thonburi
1. Income						
1.1 Gross provincial product per capita, 1970	1,747	2,485	3,500	4,097	9,893	12,838
1.2 Gross provincial product per capita 1976	3,119	4,869	6,741	8,587	22,073	19,154
1.3 Annual growth rate in gross provincial product per capita, 1970-1976	10.1	11.9	11.5	13.1	14.3	6.9
1.4 Government expenditure per capita, 1970	196	275	317	412	324	-
1.5 Government expenditure per capita, 1976	565	712	869	1,119	929	-
1.6 Annual growth rate in government expenditure per capita, 1970-1976	19.3	17.2	18.3	18.1	19.2	-
1.7 CAO expenditure per nonmunicipal population, 1974/75	25	34	27	36	40	-
1.8 Population per government employee, 1970	60	56	52	39	27	14
2. Degree of Urbanization						
2.1 Percentage of population in municipal areas, 1970	3.6	6.3	8.4	9.6	13.9	18.1
2.2 Percentage of households in agriculture, 1970	78.2	69.9	61.6	57.7	41.2	6.5
2.3 Percentage of economically active population in agriculture, 1970	91.8	85.6	79.7	59.9	59.2	19.9

Table 2.1.3 -- (continued)

Indicator	<4,000	4,000- 5,999	6,000- 7,999	8,000- 9,999	10,000- or more ^a	Bangkok- Thonburi
<u>2. Degree of Urbanization</u>						
2.4 Population per square kilometer, 1976	83	71	67	72	110	2,935
<u>3. Demographic</u>						
3.1 Average household size, 1970	6.0	5.7	5.5	5.5	5.8	6.0
3.2 Median age, 1970	15.3	15.9	16.4	17.0	16.7	18.5
3.3 Children ever born alive per 1,000 women, 1970	3,553	3,465	3,310	3,243	3,114	2,274
3.4 Number of births per thousand popual- tion, 1972	33.9	31.9	29.0	30.5	28.7	37.3
3.5 Number of deaths per thousand popual- tion, 1972	7.5	6.4	6.3	5.5	6.1	6.8
3.6 Infant mortality, 1972	2.7	2.2	2.9	2.0	2.4	3.7
3.7 Annual rate of population growth, 1970-1976	3.5	3.8	3.3	4.2	4.2	6.7
3.8 Number receiving family-planning service per thousand population, 1972-73	25	22	20	19	22	6
<u>4. Labor</u>						
4.1 Percentage of population who are economically active, 1970	82	78	74	74	68	54
4.2 Percentage of economically active population employed, 1970	37	53	63	74	81	93

Table 2.1.3 -- (continued)

Indicator	< 4,000	4,000- 5,999	6,000- 7,999	8,000- 9,999	10,000 or more ^a	Bangkok- Thonburi
5. Education						
5.1 Percentage of population who are literate, 1970	82	80	79	83	85	90
5.2 Average number of years of schooling for population 6+, 1970	2.9	3.1	3.0	3.0	3.5	4.6
5.3 Percentage of population 6+ without schooling, 1970	30	27	32	28	23	17
5.4 Percentage of population 6-29 in school, 1970	28	31	34	33	35	46
5.5 Percentage of students in population, 1970	19	21	22	23	24	27
5.6 Students per teacher, 1973	32	32	28	28	28	24
5.7 Students per classroom, 1973	29	30	29	30	30	36
5.8 Average number of years of schooling of teachers, 1973	12.4	12.5	12.6	12.7	12.9	13.2
5.9 Current expenditure on primary education per Capita 1975 (CAO)	513	537	609	621	622	-
5.10 Capital expenditure on primary education per capita, 1975 (CAO)	105	120	170	194	210	-
5.11 Total expenditure on primary education per capita, 1975 (CAO)	618	657	779	815	832	-
5.12 CAO lower primary school enrollment rate, 1975	116	109	104	109	95	-

Table 2.1.3 -- (continued)

Indicator	< 4,000	4,000- 5,999	6,000- 7,999	8,000 9,999	10,000 or more ^a	Bangkok- Thonburi
<u>5. Education</u>						
5.13 CAO upper primary school enrollment rate, 1975	29	31	36	41	42	-
5.14 Secondary school enrollment rate, 1975	14	18	22	24	27	40
<u>6. Health</u>						
6.1 Number of deaths per thousand population 1972	7.5	6.4	6.3	5.5	6.1	6.8
6.2 Infant mortality, 1972	2.7	2.2	2.9	2.0	2.4	3.7
6.3 Number of patients with communicable diseases per thousand population, 1974	2.8	3.1	4.0	5.8	6.7	2.2
6.4 Percentage of deaths from communicable diseases, 1974	3.0	2.7	1.7	1.4	1.3	.8
6.5 Population per Ministry of Public Health hospital, 1973	546,345	435,992	273,433	205,090	153,567	374,010
6.6 Population per hospital, 1973	35,826	20,704	15,412	11,297	7,653	2,272
6.7 Population per hospital bed, 1973	2,075	2,017	1,162	943	358	861
6.8 Population per provincial hospital bed, 1973	2,378	1,777	1,413	1,090	1,009	579
6.9 Population per doctor, 1973	43,133	27,656	15,515	16,768	8,826	1,863
6.10 Population per government doctor, 1973	44,448	30,008	17,907	18,515	9,177	2,033

Table 2.1.3 -- (continued)

Indicator	<4,000	4,000- 5,999	6,000- 7,999	8,000- 9,999	10,000 or more ^a	Bangkok- Thonburi
6. Health						
6.11 Population per nurse, 1973	15,610	9,039	6,396	5,709	2,796	892
6.12 Rural population per first class health center, 1973	188,036	120,365	108,907	149,568	86,642	-
6.13 Rural population per health center, 1973	8,416	6,871	6,631	5,631	6,968	-
6.14 Expenditure on health per capita, 1977	51	53	68	68	72	-
7. Housing						
7.1 Percentage of houses using local materials, 1970	27.3	26.5	29.4	29.0	26.5	5.3
7.2 Percentage of houses using reused materials, 1970	4.0	3.5	3.4	2.6	2.7	2.1
7.3 Percentage of houses owned, 1970	89.0	88.5	87.1	83.1	75.7	49.4
7.4 Percentage of houses with piped water, 1970	4.0	6.1	7.3	8.2	16.4	78.5
7.5 Percentage of households using well water, 1970	83.5	68.9	62.9	60.8	55.0	6.4
7.6 Percentage of houses with electricity, 1970	7.0	11.3	15.4	18.4	32.7	85.9

Table -- (continued)

Indicator	< 4,000	4,000- 5,999	6,000- 7,999	8,000- 9,999	10,000 or more ^a	Bangkok- Thonburi
<u>7. Housing</u>						
7.7 Percentage of houses with toilets, 1970	18.4	23.2	31.4	28.6	44.6	93.6
7.8 Rural population per government- built public well, 1974	551	844	749	650	514	-
7.9 Rural population per otherwise-bilt public well, 1974	138	143	125	263	288	-
7.10 Rural population per public well, 1974	110	123	107	187	184	-
7.11 Percentage of villages with electricity, 1976	9.4	14.8	29.3	31.3	30.1	-
<u>8. Communications</u>						
8.1 Population per registered vehicle, 1969	493	340	190	136	91	91
8.2 Percentage of households with radios, 1970	54.2	65.6	73.7	78.0	81.2	82.8
8.3 Percentage of households with televisions, 1970	2.8	3.6	6.8	9.5	16.7	54.7
8.4 Percentage of households with cars, 1970	2.0	2.6	3.8	4.4	7.3	16.2
8.5 Population per telephone, 1974	1,525	859	609	584	267	29
8.6 Shortest road distance to Bangkok	626	621	478	306	378	0
8.7 Rural road needs per thousand rai of cultivated area, 1977	.58	.69	.57	.66	.63	.11

Table 2.1.3 -- (continued)

Indicator	<4,000	4,000- 5,999	6,000- 7,999	8,000- 9,999	10,000 or more ^a	Bangkok- Thonburi
8. Communications						
8.8 Number of train stops per thousand square kilometers	.44	1.54	1.23	1.68	2.15	13.56
8.9 Kilometers of railway per thousand square kilometers	3.36	10.06	7.32	9.73	14.81	70.37
9. Security						
9.1 Number of crimes per thousand population, 1974	256	574	452	556	408	184
9.2 Percentage of crimes solved, 1974	24	20	27	26	33	55
9.3 Number of police stations per thousand square kilometers	1.24	1.33	1.58	2.04	3.12	36.15
9.4 Population per policeman, 1974	1,043	797	732	630	658	741

a/ Excluding Bangkok-Thonburi

Table 2.1.4

Average Values of Socio-economic Indicators for Changwads Grouped
by Region, Thailand

Indicator	Region				
	Northeast	North	South	Center-East	Bangkok-Thonburi
1. <u>Incom</u>					
1.1 Gross provincial product per capita, 1970	1,782	2,741	3,958	5,005	12,838
1.2 Gross provincial product per capita, 1976	3,225	5,534	7,230	10,712	19,154
1.3 Annual growth rate in gross provincial product per capita, 1970-1976	10.4	12.4	10.6	13.5	6.9
1.4 Government expenditure per capita, 1970	209	258	298	362	-
1.5 Government expenditure per capita, 1976	573	716	915	945	-
1.6 Annual growth rate in government expenditure per capita, 1970-1976	18.3	18.5	20.6	17.3	-
1.7 CAO expenditure per nonmunicipal population, 1974/75	25	29	35	33	-
1.8 Population per government employee, 1970	75	62	32	37	14
2. <u>Degree of Urbanization</u>					
2.1 Percentage of population in municipal areas, 1970	3.7	5.9	10.6	9.5	81.1
2.2 Percentage of households in agriculture, 1970	78.4	69.6	63.1	52.8	6.5
2.3 Percentage of economically active population in agriculture, 1970	91.3	85.6	71.8	71.5	19.9

Table 2.1.4-- (continued)

Indicator	Region				
	Northeast	North	South	Center-East	Bangkok-Thonburi
2. <u>Degree of Urbanization</u>					
2.4 Population per square kilometer, 1976	87	53	76	93	2,935
3. <u>Demographic</u>					
3.1 Average household size, 1970	6.1	5.5	5.5	5.7	6.0
3.2 Median age, 1970	15.2	16.2	16.4	16.6	18.5
3.3 Children ever born alive per 1,000 women, 1970	3,578	3,435	3,223	3,252	2,274
3.4 Number of births per thousand population, 1972	35.0	26.4	35.6	28.7	37.3
3.5 Number of deaths per thousand population, 1972	7.3	6.7	5.8	6.2	6.8
3.6 Infant mortality, 1972	2.6	3.2	1.6	2.6	3.7
3.7 Annual rate of population growth, 1970-1976	3.5	3.2	3.8	3.9	6.7
3.8 Number receiving family-planning service per thousand population, 1972-73	24	26	14	20	6
4. <u>Labor</u>					
4.1 Percentage of population who are economically active, 1970	84	75	71	73	54
4.2 Percentage of economically active population employed, 1970	37	49	77	70	93

Table 2.1.4-- (continued)

Indicator	Region				
	Northeast	North	South	Center-East	Bangkok-Thonburi
5. <u>Education</u>					
5.1 Percentage of population who are literate, 1970	86	74	76	84	90
5.2 Average number of years of schooling for population 6+, 1970	3.1	2.8	2.7	3.2	4.6
5.3 Percentage of population 6+ without schooling, 1970	26	33	38	25	17
5.4 Percentage of population 6-29 in school, 1970	27	31	35	34	46
5.5 Percentage of students in population, 1970	19	20	23	23	27
5.6 Students per teacher, 1973	33	30	28	28	24
5.7 Students per classroom, 1973	29	30	29	30	36
5.8 Average number of years of schooling of teachers, 1973	12.4	12.5	12.6	12.8	13.2
5.9 Current expenditure on primary education per capita, 1975 (CAO)	499	538	691	605	-
5.10 Capital expenditure on primary education per capita, 1975 (CAO)	100	133	194	175	-
5.11 Total expenditure on primary education per capita, 1975 (CAO)	599	671	885	880	-
5.12 CAO lower primary school enrollment rate, 1975	116	107	116	100	-
5.13 CAO upper primary school enrollment rate, 1975	29	29	40	40	-
5.14 Secondary school enrollment rate, 1975	14	16	27	24	40

Table 2.1.4-- (continued)

Indicator	Region				
	Northeast	North	South	Center-East	Bangkok-Thonburi
6. Health					
6.1 Number of deaths per thousand population, 1972	7.3	6.7	5.8	6.2	6.8
6.2 Infant mortality, 1972	2.6	3.2	1.6	2.6	3.7
6.3 Number of patients with communicable diseases per thousand population, 1974	3.2	1.8	4.4	5.9	2.2
6.4 Percentage of deaths from communicable diseases, 1974	2.9	2.4	1.4	1.7	.8
6.5 Population per Ministry of Public Health hospital, 1973	606,176	373,790	227,195	222,558	374,010
6.6 Population per hospital, 1973	33,340	20,819	14,546	11,413	7,653
6.7 Population per hospital bed, 1973	2,188	1,711	946	747	358
6.8 Population per provincial hospital bed, 1973	2,565	1,626	1,296	1,199	579
6.9 Population per doctor, 1973	41,805	18,234	20,131	14,481	1,863
6.10 Population per government doctor, 1973	43,439	19,768	23,737	15,897	2,033
6.11 Population per nurse, 1973	14,720	7,628	6,456	5,031	892
6.12 Rural population per first class health center, 1973	189,704	130,528	94,616	109,215	-
6.13 Rural population per health center, 1973	8,440	7,882	5,297	6,366	-
6.14 Expenditure on health per capita, 1977	17	57	71	73	-
7. Housing					
7.1 Percentage of houses using local materials, 1977	25.5	29.3	34.1	26.1	5.8

Table 2.1.4-- (continued)

I Indicator	Region				
	Northeast	North	South	Center-East	Bangkok-Thonburi
7. Housing					
7.2 Percentage of houses using reused materials, 1970	3.9	3.6	4.3	2.4	2.1
7.3 Percentage of houses owned, 1970	88.0	90.2	85.1	83.6	49.4
7.4 Percentage of houses with piped water, 1970	5.0	5.5	5.3	10.5	78.5
7.5 Percentage of households using well water, 1970	79.5	72.9	83.2	49.2	6.4
7.6 Percentage of houses with electricity, 1970	7.7	11.8	13.5	21.1	85.9
7.7 Percentage of houses with toilets, 1970	18.3	32.3	15.1	35.7	93.6
7.8 Rural population per government-built public well, 1974	582	714	880	615	-
7.9 Rural population per otherwise-built public well, 1974	208	81	112	261	-
7.10 Rural population per public well, 1974	153	73	99	183	-
7.11 Percentage of villages with electricity, 1976	9.0	20.0	15.0	35.1	-
8. Communications					
8.1 Population per registered vehicle, 1969	442	312	206	135	19
8.2 Percentage of households with radios, 1970	56.1	66.2	60.7	82.6	82.8

Table 2.1.4-- (continued)

	Region				
	Northeast	North	South	Center-East	Bangkok-Thonburi
8. Communications					
8.3 Percentage of households with Television 1970	3.8	3.2	3.1	12.0	54.7
8.4 Percentage of households with cars, 1970	2.2	2.8	3.2	4.9	16.2
8.5 Population per telephone, 1974	1,258	897	477	531	29
8.6 Shortest road distance to Bangkok	529	543	1,094	140	0
8.7 Rural road needs per thousand rai of cultivated area, 1977	.54	.79	1.13	.39	.11
8.8 Number of train stops per thousand square kilometers	.74	.52	2.31	1.88	13.56
8.9 Kilometers of railway per thousand square kilometers	5.39	3.62	13.73	11.36	70.37
9. Security					
9.1 Number of crimes per thousand population, 1974	306	405	802	369	184
9.2 Percentage of crimes solved, 1974	23	23	20	33	55
9.3 Number of police stations per thousand square kilometers	1.24	.98	2.55	2.17	36.15
9.4 Population per policeman, 1974	1,113	836	519	750	741

Similarly, in 1976 we find a 26-fold difference between changwads with the highest and lowest gross provincial products per capita, or a 9-fold difference when the five changwads with the highest incomes are excluded. Thus the extent of the disparity in incomes, measured in terms of the range, has increased over this period.

Great variations were also found in the growth rates of gross provincial products per capita between 1970 and 1976, ranging from a minimum of 6.0% per annum in Tak to 18.7% per annum in Singburi. Five changwads had annual growth rates of under 7.5%, fourteen between 7.5 and 10.0%, twenty-five between 10.0 and 12.5%, sixteen between 12.5 and 15.0%, and ten over 15.0%. The annual rate of increase in the gross provincial product does not seem to be obviously related to the region to which a changwad belongs; on average it is 12.4% in the North, 13.5% in the Center-East, 10.4% in the Northeast and 10.6% in the South. Bangkok-Thonburi had a substantially lower growth rate of 6.9% per annum. As can be seen in Table 2.1.3, the annual growth rate of per capita gross provincial product is positively related to the level of per capita gross provincial product itself, ranging from 10.1% in the lowest class to 14.3% in the highest class. This is consistent with the earlier observation that the disparity in per capita gross provincial product is increasing.

When we turn to policy-related indicators, we find

enormous differences in the size of government expenditures per capita across changwads. In fiscal year 1974/75, we observe a great differential between Bangkok-Thonburi and the rest of the changwads. However, this is due in large part to the expenditure on public administration which puts Bangkok-Thonburi in a different category altogether. Even so, a great differential remains with respect to per capita government expenditure across changwads. In Sisaket, the figure is 210 baht, of which 181 baht comes from the central government, while in Singburi it is 1,161 baht, of which 1,078 baht is allocated by the central government. In other words, there is a six-fold difference between the highest and lowest central government expenditures on a per capita basis across changwads, with Bangkok-Thonburi excluded. Again we find that the Changwads receiving low per capita expenditures are mainly in the Northeast and North, while those with high expenditures are concentrated in the South and Center-East. In 1974/75, average government expenditure amounted to 347 baht per head in the Northeast, 438 baht in the North, 528 baht in the South, and 607 baht in the Center-East.

A less direct measure of the involvement of the government in different changwads is given by the number of government employees. There is a great deal of variation across changwads in the figures for population per government employee. For example, in Bangkok-Thonburi there is one government employee for every 14 people, whereas in Kamphaengphet there is only one for every 139

people. The data here include military personnel as well, and this explains the low population per government employee figures in Pattani, Prachuabkhirikhan and Lopburi. In nine changwads, four of them in the North and five in the Northeast, each government employee serves more than one hundred people.

2. Degree of Urbanization With the exception of Bangkok-Thonburi, the rest of Thailand remains extremely rural. Using the percentage of the population living in municipal areas as a measure of the degree of urbanization, the figure was 81% for Bangkok-Thonburi in 1970, while for the next most urbanized changwad, Phuket, it was only 34%. The majority of changwads, all but nineteen of them, have less than 10% of their total population living in municipal areas and as many as 23 of them have less than 5%. Northeastern and Northern changwads have a lower degree of urbanization than Central-Eastern and Southern ones. By 1976, all of Bangkok-Thonburi was classified as urban, but 20 changwads still had under 5% of their population living in municipal areas.

A similar picture can be obtained by looking at the other indicators in this group, such as the percentage of agricultural households or the percentage of the economically active population in agriculture.

If we measure the degree of urbanization in terms of the population density, we find great variations as well, from 9 persons

per square kilometer in Maehongson to 2,935 in Bangkok-Thonburi in 1976. Even without the capital, we find Nonthaburi with 558 persons per square kilometer, Samutsongkram with 482 and Samutprakan with 480. Provinces in the Central region, especially those around Bangkok-Thonburi, are the most densely populated. Only ten changwads have population densities over 200 persons per square kilometer; all but one are in the Central region.

3. Demographic Characteristics: Definite differences in demographic characteristics exist across the changwads. Average household size is lowest in the South and North, and Highest in the Northeast. The range is from 4.9 persons in Yala and Narathiwat to 6.3 in Kalasin and Mahasarakham. The median age reflects roughly the same phenomenon and ranges from 14.5 to 18.5 years; likewise the number of children ever born alive per 1,000 women which ranges from 2,274 in Bangkok-Thonburi to 3,715 in Sakonnakhon. Surprisingly large variations exist in the birth and death rates by changwad. The former has a minimum of 16.7 per thousand in Nonthaburi and a maximum of 40.7 in Nakhonphanom, while the latter goes from 4.8 per thousand in Kamphaengphet to 10.9 per thousand in Nakhonphanom. Eighteen changwads have birth rates higher than 35 per thousand, while ten changwads have below 25 per thousand. Three changwads, all in the Northeast, have death rates of 10 per thousand or higher.

In 1972, the average infant mortality rate was 2.7%. The range was from under .2% in Songkhla to 6.5% in Trat. Seventeen changwads had infant mortality under 2.0% while twenty-three had over 3.0%, of which seven had over 4.0%.

The annual rate of population growth, reflecting not only the birth and death rates, but also changes in the size of the population due to migration, varies a great deal across changwads. Between 1970 and 1976, the population growth rate was under 2% per annum for three changwads, Chiangmai, Lamphun and Lampang; was between 2 and 3% for thirteen changwads; was between 3 and 4% for thirty-four changwads; was over 4% for twenty changwads, and, among these, was over 5% for seven changwads, the highest figures being; as much as 6.6% for Kamphaengphet and 6.7% for Bangkok.

On the side of policy-related indicators, the number of individuals receiving family-planning services was on average 21 per thousand population in 1972-73. This covered 3 changwads in which the figure was under 10 per thousand as well as 11 changwads in which it was over 30 per thousand. The coverage of family-planning services is far from being evenly distributed throughout the country.

4. Labor : Data in this respect are not very satisfactory. The ones used here are taken from the 1970 Population and Housing Census. They show a large degree of variation in the

proportion of the population who are economically active. It is lower in some of the Central and Southern changwads, with a minimum of 54% in Bangkok-Thonburi, and higher in the Northeast than elsewhere, the maximum being 87% in Sisaket. Among the economically active population, the proportion employed varies a great deal and it is strongly negatively correlated with the proportion of the economically active in the total population. The percentage employed ranges from 20% in Mahasarakham to 97% in Samutsongkram.

5. Education: Since the Thai government assumes the responsibility of providing education to the population and made primary education compulsory for all children, we may reasonably expect in this area a smaller degree of inequality across changwads than in others where the government has shown less concern. From this perspective, the disparities which emerge from the data are quite remarkable.

In terms of the percentage of the population who are literate, the range is from 40% in Maehongson to 91% in Kanchanaburi, although most changwads fall in the 80-90% range. All the changwads with literacy rates below 70% are in remote areas in the North and South, and include all four Muslim changwads. It should be pointed out that the literacy rates in the Northeast are high, the lowest figure for the region being 78% in Loei. When we look

at the average number of years of schooling for the population who are six years or older, this ranges from under one year in khonkaen and Yala to over four years in Sisaket and Bangkok-Thonburi. Again the lowest figures are found in the remote changwads of the North and South. The proportion of the population six years of age or older with no schooling describes a similar picture.

Turning to some policy-related variables, we find, first of all, large variations in the enrolment figures. The proportion of the population between six and twenty-nine years of age enrolled in school according to the 1970 Population and Housing Census is 20% in Maehongson compared with 46% in Bangkok-Thonburi. For the majority of changwads the figure is between 25% and 35%; in only four changwads is it over 40%. However, since primary education is meant to be compulsory, it is more revealing to look at enrolment figures at the different levels. These tend to be very high for lower primary schools, reflecting the fact that the government does succeed in getting children into school for approximately four years. Excluding Bangkok-Thonburi, the rural enrolment rates for upper primary school ranges from 20% in Kamphaengphet to 85% in Phuket. For twenty changwads the enrolment rate is under 30%, most of them being in the North and Northeast, while for eleven changwads, all of them in the Center-East and South, the rate is over 50%. Figures for secondary school enrolment show even greater disparities, being under 10% for Kamphaengphet, Sisaket and Buriram and over 40% for

Nonthaburi and Phuket. Again the rates are low for changwads in the North and Northeast, 14% and 16%, and high for those in the Center-East and South, 24% and 27% respectively.

On the other hand, if we look at some indicators which serve more as measures of the quality rather than the quantity of educational services provided, somewhat less variation is observed. The number of students per teacher is lowest, 20 or fewer, in Yala and Maehongson, and highest in Nongkhai and Chiangrai, with 37 and 38 students per teacher, respectively. The number of students per classroom ranges from 20 in Maehongson to 36 in Chiangrai and Bangkok-Thonburi. Students in Bangkok-Thonburi apparently have a large number of teacher relative to the number of students, but are also faced with large classroom sizes. The average number of years of schooling of teachers is remarkably uniform across changwads, the lowest being 12.2 in Maehongson while the highest is 13.2 in Bangkok-Thonburi. Thus there is at least one area in which great equality across changwads has been achieved. School teachers have, on average, completed twelve years of schooling but not more.

An examination of government expenditure on primary education per capita shows a great deal of variation across changwads, both for current and capital expenditures. Ignoring Bangkok-Thonburi, current expenditure in 1975 ranged from 391 baht per capita in Chiangrai to 1,450 baht in Phuket, while capital expenditure was

as low as 61 baht per capita in Chiangrai and as high as 755 baht in Ranong. There is, moreover, a strong positive correlation between current and capital expenditures, resulting in a 4.5-fold difference between changwads with the highest and lowest per capita expenditures on primary education.

6. Health: Some indication of the state of health of the population is given by the demographic characteristics earlier described. We have already pointed out the very large variations found in the death rates and infant mortality across changwads. We also look at the number of patients with communicable diseases adjusted for population size. In 1974, there were on average 3.5 cases of communicable diseases for every 1,000 population in the country as a whole. This included nine changwads, mostly in the North, with under one case per thousand population, as well as seventeen changwads with over five cases per thousand population. Five changwads, three in the Central and two in the Southern region, had over ten cases of communicable diseases per thousand population in 1974, the highest being 30 in Trat and 31 in Chantaburi. The death rates from these communicable diseases also show great variations, from under 1% in twelve of the changwads to over 5% in three of them. On the whole, higher death rates from communicable diseases are found in the Northeast than in the Center-East and South. Thus if we measure health in terms of the probability of contracting communicable diseases or of dying from them, we do find large differences among changwads.

On the side of policy-related indicators, many different series are used to give some idea of the provision and adequacy of health services in different changwads. These involve the number of hospitals, health centers, hospital beds, doctors and nurses, adjusted for the size of the population. It is evident that enormous differences also exist in terms of access to health services by the population. It can be argued that population per hospital figures do not say very much, since hospitals vary in terms of their capacity. Nevertheless, we are using them as an indication of how far people have to go to reach a hospital. Ideally we should like to have the average distance people have to travel to reach the nearest hospital. In Bangkok-Thonburi in 1973, there was one hospital for every 2,272 people; in contrast, in ten of the changwads each hospital had to serve over 40,000 people, with eight of them in the Northeast. Since hospitals in changwads with more hospitals relative to the population size, such as Bangkok-Thonburi or Nonthaburi, would be larger and better equipped than in changwads poorly served in terms of the number of hospitals, our measure if anything underestimates the disparity in the degree of accessibility to hospital services.

The rural population rely on health centers rather than hospitals for most of their health services. The numbers of people living in rural areas that health centers in different changwads have to serve vary a great deal, from 43,719 in Phangnga to 618,126

in Kalasin for first-class health centers, and from 2,581 in Trat to 17,416 in Saraburi for all health centers. In nine changwads, each health center has to serve over 10,000 people living in rural areas.

In terms of the number of people per hospital bed, the range is from 102 people per bed in Nonthaburi to 7,635 people per bed in Sisaket in 1973. Nonthaburi does have an exceptionally large number of hospital beds, given its population size. However, there are 19 changwads with more than one bed for every 1,000 people, of which six have more than one bed for every 500 people, all but two of them in the Center-East or South. In contrast, thirteen changwads, eight of them in the Northeast, have fewer than one hospital bed per 3,000 people. Data on population per provincial hospital bed show similar variations across changwads.

Population per doctor and population per nurse figures exhibit similar disparities across changwads. Whereas Bangkok-Thonburi has one doctor per 1,863 population, in Sakonnakhon and Kalasin one doctor has to serve over 70,000 people. Seven changwads have more than one doctor per 10,000 population. The nine changwads with the smallest number of doctors for the population size, fewer than one for every 50,000 people, are all in the Northeast. The range for population per nurse is from 892 people per nurse in Bangkok-Thonburi to 29,775 people per nurse in Sisaket. Northeastern

changwads again tend to have fewer nurses, adjusted for population size, relative to the other regions.

Government expenditure on provincial health services per capita shows correspondingly large variations across changwads. In 1977, the lowest figure was 26 baht per head in Chaiyaphum while the highest was 245 baht per head in Trat. Thirteen changwads received more than 100 baht per head for provincial health services, not one of them in the Northeast.

7. Housing: Some data are available on the housing situation from the 1970 Population and Housing Census. The percentages of houses using local materials and reused materials, although likely to be plagued by definitional difficulties, give some idea of the state of dwellings in different changwads. In Bangkok-Thonburi only 5% of all dwellings used local materials; 64% of those in Maehongson did. The percentage of dwellings using reused materials was small for most changwads, of the order of 2-3%, but was over 5% for eleven of them, and as high as 11% in Maehongson.

In most changwads, the percentage of houses owned is over 80%, with the very highest percentages coming from the Northeast and the North. In three changwads the percentages of houses owned were under 70%, namely 68% in Chonburi, 49% in Bangkok-Thonburi and 44% **Khonkaen**.

The percentage of dwellings with piped water is highest in Bangkok-Thonburi at 78%. There is then an enormous drop so that the next highest figure, for Samutprakan, is a mere 23%. For seven changwads the percentage of household provided with piped water is under 2.5%, and for 22 changwads it is between 2.5 and 5%. In only 16 changwads besides Bangkok-Thonburi do we find more than 10% of households with access to piped water. A similar situation exists with respect to electricity, although the disparities across changwads are somewhat less marked. Five changwads have less than 5% of their houses with electricity, and only five have over 30%. The highest percentage of households with electricity is, not surprisingly, again found in Bangkok-Thonburi with 86%, while Samutprakan, Phuket, Nonthaburi and Chonburi have between 35 and 50%.

Bangkok-Thonburi also has the largest percentage of dwellings with toilets, 94%. In four other changwads, the percentage is over 50%; in contrast, in three changwads in the Northeast and one in the South, it is under 10%.

8. Communications: The information given here does not necessarily have any bearing on the provision of social services by the government as such, but serves to give a more complete picture of disparities across changwads in Thailand.

The radio is important in providing a means of communication; it is widely owned and two-thirds of all households possess

radios. Even in Maehongson with the smallest percentage, 31% of households had radios in 1970. Some of the more remote changwads in the North, Northeast and South are among those with the lowest percentages, under 50%, while the proportion tends to be high, over 80%, for changwads in the Central and Eastern regions.

Apart from Bangkok-Thonburi and the Changwads surrounding it, the proportion of households with televisions is very low, in general under 10%. In 40 changwads the percentage is under 5%. In contrast, 55% of Bangkok-Thonburi households, 32% of Samutprakan and 28% of Nonthaburi have televisions.

Only 4% of all households in Thailand had cars in 1970. The range is from 16% in Bangkok-Thonburi, over 8% in Ranong, Phuket and Chonburi to under 1% in Sisaket and Maehongson.

For the whole kingdom, there is on average one telephone for every 215 persons. Only four changwads, Bangkok-Thonburi, Phuket, Ranong and Chonburi have a higher concentration of telephones than this. Bangkok-Thonburi is an exception in having one telephone for every 29 persons. Changwads in the North and Northeast have relatively few telephones and there are three changwads without them altogether, namely, Maehongson, Krabi and Kamphaengphet.

In terms of policy-related indicators, an attempt has been made to look at the extent of communications services in the form of railways by calculating the number of train stops per square

kilometer and the kilometers of railway per square kilometer.

However, there are 28 changwads with no railway whatsoever and this makes the comparison somewhat difficult.

We also include the shortest road distance to Bangkok as being a measure of the proximity of a changwad to the seat of government and the center of power.

Rural road need in kilometers per thousand rai of cultivated area vary from .06 km. in Nakhonsawan to 7.1 km. in Prachuab-khirkhan and 9.5 km. in Maehongson.

9. Security: This is measured by two series of data, the annual number of crimes per thousand population and the percentage of crimes solved.

The average annual number of crimes per thousand population for the whole country was 390 in 1974. The lowest figure was 106 for Roiet but there were only eleven changwads where the number of crimes was under 200 per thousand population. At the same time there were seven changwads with over 750 crimes annually per thousand population; all except one are in the South.

The percentage of crimes solved varies a great deal across changwads, from under 10% in Nongkhai and Pattani to over 50% in Bangkok-Thonburi and Samutsakhon.

Indicators representing government policy relating to matters of security are the number of police stations per thousand square kilometers and population per policeman. The number of police stations per thousand square kilometers is lowest in Maehongson at .45, compared with Samut Songkram, Nonthaburi and Bangkok-Thonburi with over 10.

In terms of population per policeman, this is low in the Southern changwads as well as Maehongson, Tak and Nan in the North, but much higher in the Northeastern changwads. The range is from one policeman for every 239 people in Ranong to one for every 1,450 people in Roiet.

II.2 Relationships Between Indicators in the Same Categories

Having surveyed the different indicators on their own in order to see the extent of the disparities across changwads in different areas, in this section we look at the relationship between different indicators in the same group. Within each category we examine the classes of descriptive and policy-related indicators separately. As yet we do not look for any relation between descriptive and policy-related indicators.

Many of the indicators are included not because they are different from all the others, but more because they provide another way of describing a given situation. Thus we expect a great deal of

agreement among indicators in the same group.

Tables 2.2.1 to 2.2.9 give the correlation coefficients between indicators in the same category. At this stage we are interested in the two triangular portions of each table which form the correlation matrices for the descriptive and policy-related indicators of each major category. In some of the categories we have too few or no indicators for a given group, so that this particular exercise is not possible.^{5/}

From Table 2.2.1 we observe the high positive correlation, .945, between the per capita gross provincial products of different changwads in the two years for which we have data, 1970 and 1976. The rate of growth of the per capita gross provincial product over this period was negatively correlated with the level of the per capita gross provincial product in 1970, but somewhat positively correlated with that in 1976. However, the growth rate of per capita gross provincial product was much lower for Bangkok

^{5/} In calculating the correlation coefficients, the changwad observations are weighted by the size of the population in 1970. Thus we are treating individuals, rather than changwads, as the units of observation. Each individual belongs to a changwad, and is therefore associated with its characteristics. In other words, he is in a changwad which has certain demographic characteristics, schooling facilities, health facilities, housing conditions, and so on.

Where a correlation coefficient does not involve a certain changwad, such as Bangkok in the case of rural school enrollment, that changwad is excluded from the computation.

than for the rest of the country, 6.9% per annum compared with 12.2%. If Bangkok is omitted, then the correlation between the annual rate of growth for the 1970 to 1976 period with the per capita gross provincial products in 1970 and 1976 would be .184 and .346 respectively. Thus, with the exception of Bangkok, there is a tendency towards increasing disparities in the per capita gross provincial product across provinces.

In terms of policy-related indicators, the negative correlation of - .557 between government expenditure per capita in 1976 and population per government employee is not surprising. The two indicators reflect the same phenomenon to a large extent. There is a strong positive correlation between government expenditure per capita in 1970 and 1976. However, there is a negative correlation between the annual growth rate of per capita government expenditure and the level itself.

The four descriptive indicators of the degree of urbanization are highly correlated, as can be seen in Table 2.2.2. This is as would be expected since the indicators are quite similar, but the result means that we are not relying on the choice of indicators for our conclusions.

Indicators chosen to describe various demographic aspects of the population do not show a high degree of correlation on the whole. The median age is negatively correlated with the

Table 2.2.1

Correlation Matrix for Indicators of the Income Level

	1.1	1.2	1.3	1.4	1.5	1.6	1.7
<u>Indicator</u>							
1.1 Gross provincial product per capita, 1970							
1.2 Gross provincial product per capita, 1976	.945 ^{**}						
1.3 Annual growth rate in gross provincial product per capita, 1970-1976	-.231	.009					
1.4 Government expenditure per capita, 1970	.318 ^{**}	.252 [*]	.146				
1.5 Government expenditure per capita, 1976	.310 ^{**}	.251 [*]	.228	.884 ^{**}			
1.6 Annual growth rate in government expenditure per capita, 1970-1976	-.064	-.052	.022	-.428 ^{**}	-.020		
1.7 CAO expenditure per non-municipal population, 1974-1975	.215	.202	.095	.115	.168	.027	
1.8 Population per government employee, 1970	-.599 ^{**}	-.557 ^{**}	-.044	-.682 ^{**}	-.740 ^{**}	.167	-.173

** Statistically significant at the 1% level.

* Statistically significant at the 5% level.

Table 2.2.2

Correlation Matrix for Indicators of the Degree of Urbanization

	2.1	2.2	2.3
<u>Indicator</u>			
2.1 Percentage of population in municipal areas, 1970			
2.2 Percentage of households in agriculture, 1970	-.887**		
2.3 Percentage of economically active population in agriculture, 1970	-.904**	.951**	
2.4 Population per square kilometer, 1976	.984**	-.840**	-.861**

** Statistically significant at the 1% level.

Table 2.2.3
Correlation Matrix for Demographic Indicators

	3.1	3.2	3.3	3.4	3.5	3.6	3.7
<u>Indicator</u>							
3.1 Average household size, 1970							
3.2 Median age, 1970	-.444 ^{**}						
3.3 Children ever born alive per 1,000 women, 1970	.145	-.842 ^{**}					
3.4 Number of births per thousand population, 1972	.538 ^{**}	-.179	-.075				
3.5 Number of deaths per thousand population, 1972	.208	-.041	.138	.207			
3.6 Infant mortality, 1972	-.009	.297 [*]	-.176	-.142	.386 ^{**}		
3.7 Annual rate of population growth, 1970-1976	.284 [*]	.296 [*]	-.595 ^{**}	.486 ^{**}	-.124	.055	
3.8 Number receiving family-planning service per thousand population, 1972-1973	-.011	-.478 ^{**}	.589 ^{**}	-.272 [*]	.121	.135	-.433 ^{**}

** Statistically significant at the 1% level.

* Statistically significant at the 5% level.

Table 2.2.4

Correlation Matrix for Indicators of Labor

		4.1
<u>Indicator</u>		
4.1 Percentage of population who are economically active, 1970		
4.2 Percentage of economically active population employed, 1970		-.848 ^{**}

** Statistically significant at the 1% level,

Table 2.2.5

Correlation Matrix for Indicators of Education

	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8
<u>Indicator</u>								
5.1 Percentage of population who are literate, 1970	.							
5.2 Average number of years of schooling for population 6+, 1970	.472**	.						
5.3 Percentage of population 6+ without schooling, 1970	-.503**	-.846**	.					
5.4 Percentage of population 6-29 in school, 1970	.185	.490**	-.172	.				
5.5 Percentage of students in population, 1970	.244*	.450**	-.166	.906**	.			
5.6 Students per teacher, 1973	.010	-.263*	.089	-.649**	-.572**	.		
5.7 Students per classroom, 1973	.231	.387**	-.168	.509**	.499**	.126	.	
5.8 Average number of years of schooling of teachers, 1973	.277*	.444**	-.194	.834**	.789**	-.695**	.419**	.
5.9 Current expenditure on on primary education per capita, 1975 (CAO)	-.237*	-.117	.156	.462**	.443**	-.778**	-.579**	.445**

Table 2.2.5 -- (continued)

	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	5.10	5.11	5.12	5.13
<u>Indicator</u>													
5.10 Capital expenditure on primary education per capita, 1975 (CAO)	-.220	-.057	.083	.369**	.451**	-.630**	-.469**	.386**	.856**				
5.11 Total expenditure on primary education per capita, 1975 (CAO)	-.239*	-.098	.133	.442**	.462**	-.747**	-.557**	.438**	.979**	.943**			
5.12 CAO lower primary school enrolment rate, 1975	.046	-.170	.121	-.507**	-.292*	.453**	-.010	-.589**	-.105	-.087	-.102		
5.13 CAO upper primary school enrolment rate, 1975	.117	.044	.002	.636**	.673**	-.561**	-.207	.618**	.707**	.599**	.690**	-.278*	
5.14 Secondary school enrolment rate, 1975	.256*	.444**	-.178	.920**	.870**	-.709**	.362**	.823**	.565**	.425**	.530**	-.448**	.722**

** Statistically significant at the 1% level.

* Statistically significant at the 5% level.

Table 2.2.6

Correlation Matrix for Indicators of Health

	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8
<u>Indicator</u>								
6.1 Number of deaths per thousand population, 1972								
6.2 Infant mortality, 1972	.386**							
6.3 Number of patients with communicable diseases per thousand population, 1974	-.083	-.024						
6.4 Percentage of deaths from communicable diseases, 1974	-.012	-.044	-.274*					
6.5 Population per Ministry of Public Health hospital, 1973	.080	-.313**	-.230	.244*				
6.6 Population per hospital, 1973	.350**	-.176	-.187	.418**	.559**			
6.7 Population per hospital bed, 1973	.189	-.293*	-.201	.198	.710**	.631**		
6.8 Population per provincial hospital bed, 1973	.208	-.294**	-.167	.225	.710**	.649**	.848**	
6.9 Population per doctor, 1973	.353**	-.232	-.248*	.424**	.613**	.842**	.784**	.744**

Table 2.2.6 -- (continued)

	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	6.10	6.11	6.12	6.13
<u>Indicator</u>													
6.10 Population per government doctor, 1973	.317**	-.242*	-.261*	.447**	.612**	.812**	.783**	.742**	.989**				
6.11 Population per nurse, 1973	.281*	-.299*	-.199	.366**	.710**	.824**	.834**	.844**	.881**	.875**			
6.12 Rural population per first-class health center, 1973	.122	-.063	-.132	.141	.224	.372**	.223	.088	.455**	.464**	.302*		
6.13 Rural population per health center, 1973	.034	-.037	-.333**	.536**	.446**	.323**	.210	.249*	.308**	.322*	.281*	.191	
6.14 Expenditure on health per capita, 1977	-.059	.152	.384**	-.129	-.377**	-.279*	-.282*	-.340**	-.339**	-.335**	-.277*	-.267*	-.355**

** Statistically significant at the 1% level.

* Statistically significant at the 5% level.

Table 2.2.7

Correlation Matrix for Indicators of Housing

	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8
<u>Indicators</u>								
7.1 Percentage of houses using local materials, 1970								
7.2 Percentage of houses using reused materials, 1970	.745**							
7.3 Percentage of houses owned, 1970	.551**	.319**						
7.4 Percentage of houses with piped water, 1970	-.655**	-.369**	-.796**					
7.5 Percentage of households using well water, 1970	.566**	.487**	.628**	-.748**				
7.6 Percentage of houses with electricity, 1970	-.637**	-.400**	-.800**	.979**	-.767**			
7.7 Percentage of houses with toilets, 1970	-.554**	-.366**	-.707**	.878**	-.755**	.916**		
7.8 Rural population per government-built public well, 1974	-.089	-.193	-.130	.219	-.524**	.361**	.367**	
7.9 Rural population per other-wise-built public well, 1974	-.132	-.316**	-.131	.424**	-.510**	.424**	.348**	.212

Table 2.2.7 -- (continued)

	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	7.10
<u>Indicators</u>										
7.10 Rural population per public well, 1974	-.092	-.208	-.157	.354 **	-.594 **	.378 **	.320 **	.704 **	.663 **	
7.11 Percentage of villages with electricity, 1976	-.111	-.371 **	-.143	.410 **	-.422 **	.690 **	.733 **	.255 *	.307 **	.139

** Statistically significant at the 1% level.

* Statistically significant at the 5% level.

Table 2.2.8

Correlation Matrix for Indicators of Communications

	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8
<u>Indicator</u>								
8.1 Population per registered vehicle, 1969								
8.2 Percentage of households with radios, 1970	-.696**							
8.3 Percentage of households with televisions, 1970	-.467**	.567**						
8.4 Percentage of households with cars, 1970	-.559**	.598**	.951**					
8.5 Population per telephone, 1974	.079	-.023	-.091	-.086				
8.6 Shortest road distance to Bangkok	.308**	-.677**	-.550**	-.503**	.012			
8.7 Rural road needs per thousand rai of cultivated area, 1977	.217	-.229	-.251*	-.177	.041	.331**		
8.8 Number of train stops per thousand square kilometers	-.417**	.460**	.902**	.868**	-.091	-.388**	-.214	
8.9 Kilometers of railway per thousand square kilometers	-.414**	.452**	.875**	.839**	-.100	-.375**	.978**	.995**

** Statistically significant at the 1% level.

* Statistically significant at the 5% level.

Table 2.2.9

Correlation Matrix for Indicators of Security

	9.1	9.2	9.3
<u>Indicator</u>			
9.1 Number of crimes per thousand population, 1974			
9.2 Percentage of crimes solved, 1974	-.534 ^{**}		
9.3 Number of police stations per thousand sq. km.	-.279 [*]	.700 ^{**}	
9.4 Population per policeman, 1974	-.324 ^{**}	-.013	-.251 [*]

^{**} Statistically significant at the 1% level.

^{*} Statistically significant at the 5% level.

household size, and also with the number of children ever born alive per 1,000 women. Average household size is positively correlated with the birth rate. Infant mortality and the death rate have a positive correlation with each other.

The negative relationship between the two labor indicators reflect the fact that rural areas have a larger proportion of the population who are economically active, but, among the economically active population, the percentage employed is lower in rural communities.

Of the education indicators the first three in some sense describe the existing level of schooling; they are quite highly correlated, as would be existing level of schooling; they are quite highly correlated, as would be expected. In terms of policy-related indicators, the proportion of the population 6-29 years of age in school and the proportion of students in the population measure more or less the same thing; this is confirmed by a correlation coefficient between them of .906. In changwads where the enrolment ratio is large, the student-teacher ratio tends to be low; such changwads are thus better off in both respects. However, the classroom sizes for them also tend to be large.

We have already commented on the fact that there is relatively little variation in the number of years of schooling of teachers across changwads, so that there is an example of an area

where a relatively greater degree of equality across changwads appears to have been achieved. In fact, what variation there is in this indicator is related to variations in the other indicators. The more-qualified teachers tend to be in changwads where the enrolment ratio is high and where the student-teacher ratio is low, as indicated by correlation coefficients of .834 with the proportion of the population 6-29 years of age in school, .823 with the secondary school enrolment rates and -.695 with the student-teacher ratio.

The size of government expenditure on primary education per head is positively correlated with the upper primary and secondary school enrolment rates. The enrolment rates at the lower primary level is negatively correlated with the rates at the upper primary and secondary levels, reflecting the fact that in those changwads in which opportunities beyond the first four years of schooling are less favorable, the repetition rates during those four years are also greater.

The various indicators of the availability of health services, namely population per hospital, population per hospital bed, population per doctor, population per nurse, and rural population per health center show a strong positive correlation among them, which is to be expected since the provision of one of them tends to go hand in hand with the others. Per capita expenditure on health services consistently shows a positive correlation with the existing

level of health services; those changwads in which health personnel and facilities have to be shared by a larger number of people tend to receive a lower expenditure on health on a per capita basis.

Turning to some indicators of living conditions, the results are as would be expected. Changwads in which a larger proportion of houses use local or reused materials tend to have a higher proportion of houses owned, to be less likely to have piped water and thus to rely more heavily on well water, to be less likely to use electricity or to have toilets. Having piped water, electricity and toilets in large part go together.

In terms of the building of public wells, there is a positive correlation in terms of the rural population per well of those which are built by the government and built otherwise.

Among indicators of communications, there is a positive correlation between the percentages of households with radios, televisions and cars. In particular, to the extent that they are both measures of relatively great affluence, the correlation coefficient is .951 for the percentages of households possessing cars and televisions. The correlation between population per telephone and these first indicators is very weak, although always in the direction expected. The two measures of the availability of train services are positively correlated, in the sense that there are more train stops in those changwads with more kilometers of railway for a given land area.

Being further away from Bangkok, in terms of road distance, is associated with less good access to train services. It also means a relatively greater need for rural roads, given the changwad's area under cultivation.

In terms of measures of security we do not have much in the way of data. Changwads with higher crime rates tend to have a lower percentage of crimes solved. The number of police stations per thousand square kilometers is negatively correlated with population per policeman, as would be expected.

II.3 Relationships Between Indicators Belonging to Different Categories

Having seen that indicators within the same group of a given category tend to be related, in this section we examine indicators in different categories to see what association there is between them. One indicator is chosen from each of the descriptive and policy-related group of each category of indicators. Table 2.3.1 gives the correlation matrices for the indicators belonging to the two groups.

The correlation coefficients tend to be quite high. The correlation matrix of descriptive indicators offers a characterization of the changwads. A changwad which has a large per capita gross provincial product tends to have a high percentage of its population in municipal areas, to have an older population and to have a high

proportion of its economically active population employed. Its population has had relatively more formal education. The death rate from communicable diseases tends to be low. A higher proportion of its houses is served with electricity and a higher proportion of households has cars. Finally, a higher percentage of crimes committed is solved compared with other changwads. Thus being well-off in one respect generally means being well-off in other respects as well.

The correlation matrix for policy-related indicators shows that government expenditures allocated to different changwads typically move together. Thus changwads which have large overall expenditures per capita have large education and health expenditures per capita. They also have more police stations, as well as a larger number of train stops, given the land area of the changwad. However, they have fewer people receiving family-planning services for their population size and also fewer public wells in relation to their rural population.

II.4 Relationship Between Indicators and Gross Provincial Product Per Capita

In this section we test the hypothesis that there is a definite positive association between the availability of various types of social services and the level of income of a changwad, as measured by its per capita gross provincial product.

Table 2.3.1

Correlation Matrices for Selected Indicators from Different Categories

	1.2	2.1	3.2	4.2	5.2	6.4	7.6	8.4
<u>Descriptive</u>								
1.2 Gross provincial product per capita, 1976								
2.1 Percentage of population in municipal area, 1970	.647**							
3.2 Median age, 1970	.590**	.682**						
4.2 Percentage of economically active population employed, 1970	.628**	.616**	.758**					
5.2 Average number of years of schooling for population 6+, 1970	.410**	.582**	.372**	.242*				
6.4 Percentage of deaths from communicable diseases, 1974	-.358**	-.387**	-.525**	-.517**	-.257*			
7.6 Percentage of houses with electricity, 1970	.755**	.972**	.721**	.677**	.584**	-.433**		
8.4 Percentage of households with cars, 1970	.733**	.943**	.690**	.684**	.559**	-.417**	.974**	
9.2 Percentage of crimes solved, 1974	.527**	.671**	.498**	.406**	.427**	-.390**	.699**	.664

Table 2.3.1 -- (continued)

Indicator	1.4	3.8	5.10	6.12	7.10	8.7
<u>Policy-Related</u>						
1.4 Government expenditure per capita, 1976						
3.8 Number receiving family-planning service per thousand population, 1972-73	-.071					
5.10 Expenditure on primary education per capita, 1975 (CAO)	.576**	-.134				
6.12 Expenditure on health per capita, 1977	.331**	.154	.552**			
7.10 Rural population per public well, 1974	-.070	-.109	.150	-.113		
8.7 Number of train stops per thousand square kilometers	.304**	-.542**	.079	.032	-.020	
9.3 Number of police stations per thousand square kilometers	.249*	-.517**	.412**	.116	-.009	.926**

** Statistically significant at the 1% level.

* Statistically significant at the 5% level.

Table 2.4.1 gives the correlation coefficients between the various indicators and the gross provincial products per capita in 1970 and in 1976, as well as the annual growth rate of the product between the two years.

It can be seen that there is a strong positive correlation between the per capita gross provincial product and the degree of urbanization of a changwad. The four indicators of the level of urbanization give similar conclusions.

Demographic factors do not give such clear results. Gross provincial product per capita is strongly positively correlated with the median age and negatively correlated with the number of children ever born alive per 1,000 women. But it is unclear why so little effect shows up with average household size. A high gross provincial product per capita is weakly associated with a high birth rate, a low death rate, high infant mortality and a high rate of population growth. In terms of policy-related indicators, a high gross provincial product is associated with a smaller proportion of the population receiving family-planning services. Thus it seems that greater efforts in terms of family planning are being made in some of the poorer changwads.

The high negative correlation between gross provincial product per capita and the percentage of the population who are economically active reflects the fact that these indicators are positively and negatively associated with the degree of urbanization respectively.

The same explanation applies to the observation that the percentage of the economically active population who are employed is positively related to the degree of urbanization.

Changwads with high gross provincial products tend to be those whose population have had more schooling. More importantly, they have higher enrollment rates at the upper primary and secondary levels, smaller student-teacher ratios and better-qualified teachers, although they have larger classroom sizes. They also have higher per capita expenditures on primary **education**.

The correlation coefficients between gross provincial product per capita and the health indicators show that, relative to population size, changwads with higher per capita incomes have more hospitals, hospital beds, doctors and nurses. They also have higher infant mortality and possibly a larger rate of communicable diseases, but that, among **patients** with communicable diseases, they experience lower death rates. There is a positive correlation between gross provincial product per capita and government expenditures on health per capita.

In terms of housing indicators, high-income changwads are associated with larger percentages of houses with piped water, electricity and toilets, and smaller percentages of houses using local or reused materials, houses using well water and houses owned. An encouraging result is that the number of public wells relative to the size of the rural population is negatively correlated with the income

Table 2.4.1

Correlation Coefficients Between Indicators and Gross Provincial Product Per Capita

Category	Indicator	GPP/capita 1970	GPP/capita 1976	Annual growth rate in GPP/capita 1970-1976
1. Income:				
1.1	Gross provincial product per capita, 1970	1.000	.945**	-.321
1.2	Gross provincial product per capita, 1976	.945**	1.000	.009
1.3	Annual growth rate in gross provincial product per capita, 1970-1976	-.231	.009	1.000
1.4	Government expenditure per capita, 1970	.318**	.252*	.146
1.5	Government expenditure per capita, 1976	.310**	.251*	.228
1.6	Annual growth rate in government expenditure per capita, 1970-1976	-.064	-.052	.022
1.7	CAO expenditure per nonmunicipal population, 1974/75	.215	.202	.095
1.8	Population per government employee, 1970	-.599**	-.557**	-.044
2. Degree of Urbanization				
2.1	Percentage of population in municipal areas, 1970	.837**	.647**	-.423**
2.2	Percentage of households in agriculture, 1970	-.894**	-.794**	.227
2.3	Percentage of economically active population in agriculture, 1970	-.888**	-.779**	.259*
2.4	Population per square kilometer, 1976	.788**	.596**	-.429**

Table 2.4.1 -- (continued)

Category	Indicator	GPP/capita 1970	GPP/capita 1976	Annual growth rate in GPP/capita 1970-1976
3.	<u>Demographic:</u>			
3.1	Average household size, 1970	.050	-.005	-.332**
3.2	Median age, 1970	.655**	.590**	-.063
3.3	Children ever born alive per 1,000 women, 1970	-.813**	-.683**	.290*
3.4	Number of births per thousand population, 1972	.098	-.041	-.434**
3.5	Number of deaths per thousand population, 1972	-.204	-.247*	-.036
3.6	Infant mortality, 1972	.193	.133	-.065
3.7	Annual rate of population growth, 1970-1976	.636**	.518**	-.322**
3.8	Number receiving family-planning service per thousand population, 1972-73	-.424**	-.332**	.228
4.	<u>Labor:</u>			
4.1	Percentage of Population who are economically active, 1970	-.829**	-.734**	.189
4.2	Percentage of economically active population employed, 1970	.675**	.628**	-.019
5.	<u>Education:</u>			
5.1	Percentage of population who are literate, 1970	.249*	.204	-.123

Table 2.4.1--- (continued)

Category	Indicator	GPP/capita 1970	GPP/capita 1976	Annual growth rate in GPP/capita 1970-1976
5.	<u>Education:</u>			
5.2	Average number of years of schooling for population 6+, 1970	.497**	.410**	-.130
5.3	Percentage of population 6+ without schooling, 1970	-.203	-.187	-.079
5.4	Percentage of population 6-29 in school, 1970	.779**	.657**	-.234*
5.5	Percentage of students in population, 1970	.796**	.711**	-.178
5.6	Students per teacher, 1973	-.583**	.528**	.032
5.7	Students per classroom, 1973	.511**	.395**	-.372**
5.8	Average number of years of schooling of teachers, 1973	.783**	.702**	-.225
5.9	Current expenditure on primary education per capita, 1975 (CAO)	.389**	.309**	.063
5.10	Capital expenditure on primary education per capita, 1975 (CAO)	.443**	.367**	.140
5.11	Total expenditure on primary education per capita, 1975 (CAO)	.424**	.342**	.095
5.12	CAO lower primary school enrolment rate, 1975	-.359**	-.384**	-.286*
5.13	CAO upper primary school enrolment rate, 1975	.476**	.442**	.116
5.14	Secondary school enrolment rate, 1975	.725**	.627**	-.152

Table 2.4.1 -- (continued)

Category	Indicator	GPP/capita 1970	GPP/capita 1976	Annual Growth Rate in GPP/capita 1970-1976
6.	<u>Health</u>			
6.1	Number of deaths per thousand population, 1972	-.204	-.247*	-.036
6.2	Infant mortality, 1972	.193	.133	-.065
6.3	Number of patients with communicable diseases per thousand population, 1974	.021	.054	.056
6.4	Percentage of deaths from communicable diseases, 1974	-.381**	-.358**	-.056
6.5	Population per Ministry of Public Health hospital, 1973	-.359**	-.372**	-.049
6.6	Population per hospital, 1973	-.637**	-.605**	-.007
6.7	Population per hospital bed, 1973	-.424**	-.415**	.018
6.8	Population per provincial hospital bed, 1973	-.518**	-.469**	.041
6.9	Population per doctor, 1973	-.616**	-.568**	.052
6.10	Population per government doctor, 1973	-.634**	-.584**	.053
6.11	Population per nurse, 1973	-.619**	-.577**	.035
6.12	Rural population per first-class health center, 1973	-.281*	-.249*	-.032
6.13	Rural population per health center, 1973	-.106	-.085	-.159
6.14	Expenditure on health per capita, 1977	.219	.156	.043

Table 2.4.1 -- (continued)

Category	Indicator	GPP/capita 1970	GPP/capita 1976	Annual Growth Rate in GPP/capita, 1970-1976
7.	<u>Housing</u>			
7.1	Percentage of houses using local materials, 1970	-.489**	-.373**	.235*
7.2	Percentage of houses using reused materials, 1970	-.381**	-.355**	.048
7.3	Percentage of houses owned, 1970	-.717**	-.584**	.344**
7.4	Percentage of houses with piped water, 1970	.836**	.657**	-.402**
7.5	Percentage of households using well water, 1970	-.688**	-.597**	.204
7.6	Percentage of houses with electricity, 1970	.897**	.755**	-.320**
7.7	Percentage of houses with toilets, 1970	.800**	.695**	-.162
7.8	Rural population per government-built public well, 1974	.137	.140	.062
7.9	Rural population per otherwise-built public well, 1974	.419**	.497**	.292*
7.10	Rural population per public well, 1974	.321**	.358**	.041
7.11	Percentage of villages with electricity, 1976	.437**	.510**	.330**
8.	<u>Communication:</u>			
8.1	Population per registered vehicle, 1976	-.493**	-.468**	-.047
8.2	Percentage of households with radios, 1970	.587**	.579**	.097
8.3	Percentage of households with televisions, 1970	.848**	.706**	-.346**

Table 2.4.1 -- (continued)

Category	Indicator	GPP/capita 1970	GPP/capita 1976	Annual Growth Rate in GPP/capita, 1970-1976
8.	<u>Communication:</u>			
8.4	Percentage of households with cars, 1970	.875 **	.733 **	-.280 *
8.5	Population per telephone, 1974	-.056	-.044	.070
8.6	Shortest road distance to Bangkok	-.441 **	-.403 **	.099
8.7	Rural road needs per thousand rai of cultivated area, 1977	-.036	-.009	.155
8.8	Number of train stops per thousand square kilometers	.740 **	.537 **	-.455 **
8.9	Kilometers of railway per thousand square kilometers	.721 **	.521 **	-.450 **
9.	<u>Security:</u>			
9.1	Number of crimes per thousand population, 1974	-.126	-.068	.213
9.2	Percentage of crimes solved, 1974	.633 **	.527 **	-.366 **
9.3	Number of police stations per thousand square kilometers	.811 **	.633 **	.399 **
9.4	Population per policeman, 1974	-.357 **	-.332 **	-.094

** Statistically significant at the 1% level.
* Statistically significant at the 5% level.

level of the changwad, although this effect is weaker for government-built public wells than for wells otherwise built.

Changwads with high per capita gross provincial products tend to have more radios, televisions, cars and telephones given their population size, as well as more train stops and kilometers of railway, given their land areas. It should be noted that being nearer to Bangkok is associated with a larger per capita gross provincial product.

Better-off changwads tend to have fewer crimes per thousand population, although the correlation is weak, and a higher percentage of crimes solved. They are associated with more police stations for a given land area and more policemen for a given population size.

Table 2.1.3 already present above, which gives the average values of the indicators for changwads grouped by the level of their gross provincial product per capita in 1976, gives the most convincing evidence for the assertion that changwads with high per capita gross provincial products are also better-off when various socio-economic indicators are used as the criteria. The table is useful not only because it establishes the correlation between income and the current state of health, education and so on, as well as the provision and availability of social services, but also because it gives some idea of the magnitudes of the variations in the indicators across different levels of income. With the exception of Bangkok, which is treated separately, each of the income classes contains a fair number of

changwads, so that the results are not unduly affected by peculiarities of individual changwads. It is also easy to see that the correlations already reported are not simply due to the weight of Bangkok and its special characteristics; the tendencies found exist independently of what happens in Bangkok.

Table 2.4.2 gives a list of the changwads belonging to the different classes of per capita gross provincial product, and indicates their geographical distribution and population weights.

To attempt to briefly indicate what it means to be in a low-income or a high-income changwad, we consider the group of changwads with per capita gross provincial product under 4,000 baht in 1976, and the group in which the figure is over 10,000 baht, excluding Bangkok. The low-income changwads consist of thirteen from the North-east, two from the North, one from the South and none from the Center-East; the high-income changwads consist of five from the Center-East, three from the South and none from the North or Northeast. The average gross provincial product per capita in the low-income group was 3,119 baht in 1976 compared to 22,073 baht in the high-income group; the growth rate of per capita gross provincial product between 1970 and 1976 was 10% per annum compared with 14%; government expenditure per capita in 1976 was 565 baht compared with 929; the CAO expenditure per rural population is 25 baht compared with 40; each government employee serves 60 people on average compared with 27; 4% of the population live in municipal areas compared with 14%; 92% of the

Table 2.4.2

Changwads Classified by Gross Provincial Product per Capita in 1976

Gross Provincial Product per Capita, 1976

	< 4,000	4,000-5,999	6,000-7,999	8,000-9,999	10,000 or more	Bangkok
<u>Number of Changwads</u>	16	15	22	8	8	2
Northeast	13	2	0	0	0	
North	2	8	6	0	0	
South	1	3	6	1	3	
Center-East	0	2	10	7	5	
<u>Percentage of Population</u>	34	19	24	7	6	10
<u>List of Changwads</u>						
Northeast	Kalasin	Nakhonratchasima				
	Khonkaen	Nongkhai				
	Chaiyaphum					
	Nakhonphanom					
	Buriram					
	Mahasarakham					
	Roiet					
	Loei					
	Sisaket					
	Sakonnakhon					
	Surin					
	Ubonratchathani					
	Udonthani					

Table 2.4.2 -- (continued)

	< 4,000	4,000-5999	6,000-7,999	8,000-9,999	10,000 or more	Bangkok
North	Chiangrai Nan	Kamphaengphet Phichit Phitsanulok Phrae Maehongson Lamphun Uttaradit Uthaithani	Chiangmai Tak Nakhonsawan Phetchabun Lampang Sukhothai			
South	Pattani	Nakhonsithammarat Phattalung Narathiwat	Chumphon Suratthani Krabi Trang Satun Yala	Songkhla	Ranong Phangnga Phuket	
Center-East		Prachinburi Samutsongkram	Chantaburi Chachoengsao Chainat Nakhonnayok Nakhonpathom Ayutthaya Phetchaburi Ratchaburi Suphanburi Angthong	Kanchanaburi Trat Pathumthani Rayong Lopburi Samutsakhon Singburi	Chonburi Nonthaburi Prachuabkhirikhan Samutprakan Saraburi	

working population are in the agricultural sector compared with 59%; the number of children ever born alive per 1,000 women is 3,553 compared with 3,114; the birth rate is 34 per thousand compared with 29; the death rate is 8 per thousand compared with 6; 82% of the population are economically active compared with 68%, and 37% of the economically active population are employed compared with 81%; the average number of years of schooling of the population six and older is 2.9 compared with 3.5; 28% of the population 6 to 29 years of age are in school compared with 35%; the rural upper primary and secondary school enrolment rates are 29% and 14% compared with 42% and 27%; the student-teacher ratio is 32 compared with 28; expenditure on primary education per head is 618 baht compared with 832; the death rate from communicable diseases is 3.0% compared with 1.3%; each hospital serves nearly 36,000 people compared with 8,000; there are over 2,000 people for every hospital bed compared with 360; each doctor takes care of over 43,000 people compared with 9,000; government expenditure on health amounts to 51 baht per head compared with 72; 4% of houses have access to piped water compared with 16%, while 84% of households use well water compared with 55%; only 7% of houses have electricity compared with 33%; 18% of houses have toilets compared with 45%; 54% of households have radios compared with 81%; 3% have televisions compared with 17%; 2% have cars compared with 7%; there is one telephone for every 1,500 people compared with 260; there are 4 kilometers of railway per thousand square kilometers compared with 15; 24% of crimes are solved compared with 33%, although there are only 265 crimes per thousand

population compared with 408; there is one policeman for over 1,000 people compared with 650; and, finally, the changwads are on average 626 kilometers from Bangkok compared with 378.

II.5 Relationship Between Indicators and the Degree of Urbanization

In Table 2.5.1 we present the correlation coefficients between the various indicators and three indicators of the degree of urbanization: the percentage of the population in municipal areas, the percentage of households in agriculture and the percentage of the economically active population in agriculture. We wish to test the hypothesis that the provision of social services in a changwad is related to its level of urbanization.

We have already established that the level of urbanization is positively correlated with gross provincial product per capita, and that the correlations between the indicators of the degree of urbanization themselves are strongly positive. Thus it comes as no surprise that what was said about the association between gross provincial product per capita and the various indicators also holds true for the degree of urbanization and these same indicators. In almost all instances the signs and magnitudes of the correlation coefficients are very similar in the two cases, as is evident from a comparison of Tables 2.4.1 and 2.5.1.

II.6 Relationship Between Descriptive and Policy-Related Indicators

In this section we look, where possible, at the two groups of indicators within each category, namely descriptive and policy-related ones. The hypothesis being tested is that government action, so far as we can determine from our data, is not such as would tend to reduce disparities across changwads as characterised by the descriptive indicators.

For this we look again at Tables 2.2.1 to 2.2.9, but this time at the matrix of correlation coefficients between descriptive and policy-related indicators.

Table 2.2.1 in effect gives an overall picture of the situation. The descriptive indicators are the gross provincial products per capita in 1970 and 1976, and the growth rate between the two years. If the government is interested in trying to reduce the disparities in the gross provincial product per capita, it may be expected to concentrate its efforts in the less well-off changwads; this would then show up as a higher level of government expenditure per capita. But the positive correlation coefficient between gross provincial product per capita and government expenditure per capita, and the negative one between the former and population per government employee show that the situation is otherwise.

In terms of demographic aspects we can say that greater

Table 2.5.1

Correlation Coefficients Between Indicators and the Degree of Urbanization

Category	Indicator	% of population in municipal areas, 1970	% of households in agriculture, 1970	% of EAP in agriculture, 1970
<u>1. Income:</u>				
1.1	Gross provincial product per capita, 1970	.837 **	-.894 **	-.888 **
1.2	Gross provincial product per capita, 1976	.647 **	-.794 **	-.779 **
1.3	Annual growth rate in gross provincial product per capita, 1970-1976	-.423 **	.227	.259 *
1.4	Government expenditure per capita, 1970	.468 **	-.435 **	-.397 **
1.5	Government expenditure per capita, 1976	.565 **	-.518 **	-.512 **
1.6	Annual growth rate in government expenditure per capita, 1970-1976	.033	.029	-.046
1.7	CAO expenditure per non-municipal population, 1974/75	.139	-.214	-.211
1.8	Population per government employee, 1970	-.561 **	.712 **	.679 **
<u>2. Degree of Urbanization:</u>				
2.1	Percentage of population in municipal areas, 1970	1.000	-.887 **	-.904 **
2.2	Percentage of households in agriculture 1970	-.887 **	1.000	.951 **

Table 2.5.1 ---(continued)

Category	Indicator	% of population in municipal areas, 1970	% of households in agriculture, 1970	% of EAP in agriculture, 1970
<u>2. Degree of Urbanization:</u>				
	2.3 Percentage of economically active population in agriculture, 1970	-.904 ^{**}	.951 ^{**}	1.000
	2.4 Population per square kilometer, 1976	.984 ^{**}	-.840 ^{**}	-.861 ^{**}
<u>3. Demographic:</u>				
	3.1 Average household size, 1970	.121	.115	.053
	3.2 Median age, 1970	.682 ^{**}	-.783 ^{**}	-.768 ^{**}
	3.3 Children ever born alive per 1,000 women, 1970	-.893 ^{**}	.898 ^{**}	.901 ^{**}
	3.4 Number of births per thousand population, 1972	.269 [*]	-.002	-.066
	3.5 Number of deaths per thousand population, 1972	-.043	.170	.191
	3.6 Infant mortality, 1972	.281 [*]	-.265 [*]	-.173
	3.7 Annual rate of population growth, 1970-1976	.696 ^{**}	-.557 ^{**}	-.594 ^{**}
	3.8 Number receiving family-planning service per thousand population, 1972-73	-.509 ^{**}	.478 ^{**}	.511 ^{**}
<u>4. Labor:</u>				
	4.1 Percentage of population who are economically active, 1970	-.826 ^{**}	.936 ^{**}	.896 ^{**}

Table 2.5.1 -- (continued)

Category,	Indicator	% of population in municipal arease, 1970	% of households in agriculture 1970	% of EAP in agriculture 1970
4. Labor:				
4.2	Percentage of economically active population employed, 1970	.616**	-.811**	-.764**
5. Education:				
5.1	Percentage of population who are literate, 1970	.255*	-.164	-.237*
5.2	Average number of years of schooling for population 6+, 1970	.582**	-.489**	-.539**
5.3	Percentage of population 6+ without schooling, 1970	-.234*	.170	.227
5.4	Percentage of population 6-29 in school, 1970	.827**	-.887**	-.883**
5.5	Percentage of students in population, 1970	.754**	-.830**	-.835**
5.6	Students per teacher, 1973	-.582**	.685**	.685**
5.7	Students per classroom, 1973	.599**	-.493**	.550**
5.8	Average number of years of schooling of teacher, 1973	.760**	-.863**	-.847**
5.9	Current expenditure on primary education per capita, 1975 (CAO)	.581**	-.506**	-.423**
5.10	Capital expenditure on primary education per capita, 1975 (CAO)	.569**	-.503**	-.395**

Table 2.5.1 -- (continued)

Category	Indicator	% of population in municipal areas, 1970	% of households in agriculture 1970	% of EAP in agriculture 1970
<u>5. Education:</u>				
	5.11 Total expenditure on primary education per capita (CAO)	.597**	-.523**	-.427**
	5.12 CAO lower primary school enrolment rate, 1975	-.382**	.585**	.534**
	5.13 CAO upper primary school enrolment rate, 1975	.520**	-.564**	-.578**
	5.14 Secondary school enrolment rate, 1975	.748**	-.814**	-.843**
<u>6. Health:</u>				
	6.1 Number of deaths per thousand population, 1972	-.043	.170	.191
	6.2 Infant mortality, 1972	.281*	-.265*	-.173
	6.3 Number of patients with communicable diseases per thousand population, 1974	-.041	-.097	-.064
	6.4 Percentage of deaths from communicable diseases, 1974	-.387**	.463**	.470**
	6.5 Population per Ministry of Public Health hospital, 1973	-.228	.417**	.373**
	6.6 Population per hospital, 1973	-.557**	.763**	.720**
	6.7 Population per hospital bed, 1973	-.361**	.524**	.489**
	6.8 Population per provincial hospital bed, 1973	-.489**	.603**	.570**
	6.9 Population per doctor, 1973	-.563**	.736**	.695**

Table 2.5.1 -- (continued)

Category	Indicator	% of population in municipal areas, 1970	% of households in agriculture 1970	% of EAP in agriculture 1970
<u>6. Health:</u>				
	6.10 Population per government doctor, 1973	-.588**	.745**	.709**
	6.11 Population per nurse, 1973	-.543**	.726**	.685**
	6.12 Rural population per first-class health center, 1973	-.355**	.384**	.329**
	6.13 Rural population per health center, 1973	-.313**	.226	.238*
	6.14 Expenditure on health per capita, 1977	.303**	-.310**	-.132
<u>7. Housing:</u>				
	7.1 Percentage of houses using local materials, 1970	-.635**	.502**	.555**
	7.2 Percentage of houses using reused materials, 1970	-.351**	.402**	.429**
	7.3 Percentage of houses owned, 1970	-.781**	.750**	.748**
	7.4 Percentage of houses with piped water, 197-	.986**	-.874**	-.885**
	7.5 Percentage of households using well water, 1970	-.712**	.778**	.757**
	7.6 Percentage of houses with electricity, 1970	.972**	-.939**	-.941**
	7.7 Percentage of houses with toilets, 1970	.865**	-.895**	-.868**
	7.8 Rural population per government-built public well, 1974	.254**	-.429**	-.409**

Table 2.5.1 -- (continued)

Category	Indicator	% of population in municipal areas, 1970	% of households in agriculture 1970	% of EAP in agriculture 1970
7. Housing:				
7.9	Rural population per otherwise-built public well, 1974	.304**	-.421**	-.387**
7.10	Rural population per public well, 1974	.318**	-.439**	-.412**
7.11	Percentage of villages with electricity, 1976	.436**	-.707**	-.576**
8. Communications:				
8.1	Population per registered vehicle, 1969	-.422**	.568**	.541**
8.2	Percentage of households with radios, 1970	.461**	-.673**	-.637**
8.3	Percentage of households with televisions, 1970	.954**	-.713**	-.925**
8.4	Percentage of households with cars, 1970	.943**	-.915**	-.915**
8.5	Population per telephone, 1974	-.064	.096	.087
8.6	Shortest road distance to Bangkok	-.397**	.468**	.429**
8.7	Rural road needs per thousand rai of cultivated area, 1977	-.159	.104	.131
8.8	Number of train stops per thousand square kilo kilometers	.928**	-.812**	-.814**
8.9	Kilometers of railway per thousand square kilometers	.900**	-.739**	-.823**

Table 2.5.1 -- (continued)

Category	Indicator	% of population in municipal areas, 1970 .	% of households in agriculture 1970	% of EAP in agriculture 1970
9. Security:				
9.1	Number of crimes per thousand population, 1974	-.224	.189	.150
9.2	Percentage of crimes solved, 1974	.671**	-.699**	-.688**
9.3	Number of police stations per thousand square	.983**	-.873**	-.894**
9.4	Population per policeman, 1974	-.281**	.423**	.398**

** Statistically significant at the 1% level.
 * Statistically significant at the 5% level.

family-planning efforts are made in changwads with lower median age, that is, where the population is younger, and where there is a larger number of children ever born alive per 1,000 women. Thus if we use these two indicators to represent a changwad's needs for family-planning services, then the government action is in the right direction. However, we should be reminded that the demographic indicators are not all in agreement with each other so that we also find, for example, that more family-planning service is provided in changwads with lower birth rates.

With respect to education indicators, if we use the average number of years of schooling for the population six years of age or older to represent the descriptive group, we find that changwads with higher existing levels of schooling tend also to have higher enrolment ratios, lower student-teacher ratios and better-qualified teachers, although they also have smaller government expenditures on primary education per capita, and larger classroom sizes. Smaller expenditures, however, can be explained by the lower rural enrolment rates at the lower primary level, probably reflecting lower repetition rates. The rural upper primary and secondary school enrolment rates tend to be higher in those changwads which already have a higher average level of educational attainment. Thus government action concerning education does not appear to be in a direction that would reduce disparities across changwads in the present average levels of educational attainment.

Health expenditures per capita are naturally related to the number of hospitals, hospital beds, doctors and nurses for a given population size. It is quite telling that the death rate from communicable diseases is positively correlated with population per hospital, per hospital bed, per doctor and per nurse. Moreover, it is negatively associated with health expenditures per capita in 1977. Thus government action concerning health expenditures is far from likely to reduce the disparities across changwads in the provision of health services.

We do not have much information on government action with respect to various aspects of housing. But more public wells are built, both by the government and otherwise, in changwads whose population relies more heavily on well water and less on piped water.

In terms of communications, more services, measured in terms of the number of train stops and kilometers of railway for a given land area, are provided in changwads which are better off, that is those with higher percentages of households with radios, televisions, cars and telephones. Changwads which are nearer to Bangkok also tend to be better provided with railway services.

With respect to security matters, we find that in changwads with high crime rates the number of police stations for a given land area is small but so is the size of the population per policeman. A higher percentage of crimes solved is associated with more police

stations for a given land area and a larger number of policemen for a given population size.

II.7 Conclusion

We have examined some indicators reflecting the living conditions and availability of social services of the Thai population, with the changwad as the unit of observation. We conclude that there are very great disparities across changwads in the standards of living of the population, as measured by indicators of income, education, health, housing, communications and security, as well as in the provision of the corresponding social services by the government.

Indicators in each category are divided into two groups, descriptive and policy-related ones. Indicators in a category belonging to the same group are highly correlated, since they measure in large part the same phenomenon. We find that indicators in different categories are correlated such that a changwad which is badly off in one respect tends also to be badly off in other respects; that the degree of urbanization is a good yardstick of the level of well-being of the population and the accessibility to social services; that the richer changwads, as measured by gross provincial product per capita, are precisely those which are more urbanized and have better social services; and, finally, that the pattern of government spending at present cannot be expected to reduce the disparities in the different areas across changwads, since already well-off changwads tend also to

to receive more from the government, given their population size.

Regional disparities in income and other measures of the standards of living of people have received a great deal of attention, and emphasis in planning is correspondingly given to regional development. In looking at economic and social indicators at the changwad level, it may be tempting at first to arrive at a similar conclusion. It is evident that on the whole Northeastern and Northern changwads are not as well-off as Central and Southern ones. But regional disparities in large part are a reflection of the urban-rural disparity. The more urbanized a changwad, the higher its income, the better its standard of living and the better its provision of social services to the population. It would be a mistake, in the attempt to reduce disparities in general, to concentrate on the regional dimension instead of the urban-rural one. Incorrectly identifying the source of the problem may lead to government measures which will reduce regional disparities at the expense of increasing the urban-rural disparities within each region.

III. What Can be Done?

The large disparities across changwads in the availability of social services to the population which we have commented upon indicate that there is great potential for improving the standards of living of people in general and, more importantly, of evening out the distribution of material well-being of the population through measures

which would tend to equalize the distribution of social services among people.

What emerges from our work in the previous section is that it is not possible to judge the extent of the problem of providing social services from figures involving averages for the whole country. While it may appear appalling that there is at present so little of a particular service when we look at the national average, the actual problem may not even begin to be reflected in this. The whole kingdom figure, however bad it looks, may only seem as favorable as it does because of what is taking place in a few changwads, perhaps only Bangkok. Moreover, even if the average figure for the whole country appears reasonable, it may still mask serious problems at the changwad level.

In this section we take as our starting point some of the specific stated targets to be achieved during the Fourth National Economic and Social Development Plan period, 1977-1981, and ask the question of what it would mean to restate the targets at the changwad rather than the national level.

III.1 Idle Promises?

The Fourth Plan repeatedly declares that one of its major objectives is to reduce the disparities in income and the standards of living between the rich and the poor, between the urban and rural

populations. In several places it commits itself to quantitative targets which will be achieved during the period of the plan. We shall look at a few of these clearly-stated targets from two points of view. First, we wish to ascertain the reasonableness of the targets, where we take these at their face value. Second, we ask the question of what it would mean if the targets were to be met at the changwad, rather than the national, level. The choice of targets is dictated by the necessity of having to have targets which are clearly quantified in the Plan and which involve indicators for which we have sufficient information to make the necessary calculations. The understanding is that what we do here is simply an exercise designed to illustrate the difficulties of achieving the stated targets.

There are two areas in which the above requirements are met for some of the indicators, housing and health. We shall treat these in turn.

1. Some Promises Concerning Housing

The Fourth Plan has as one of its targets an increase in the provision of "clean water" or 25% of the total population, instead of 14% as is the case at present. It may be thought that the expression "clean water" is ambiguous in terms of what is meant by it exactly. In fact the proportion of households reported in the 1970 Population and Housing Census as using piped water was 13%. Thus it is clear that what the Fourth Plan refers to as clean water is piped water.^{6/}

^{6/} The Fourth Five-Year Plan, Op. Cit., p. 250

Expansion in the provision of piped water will be necessary even without the plan target because of population increase. If we use the population projections of the Fourth Plan itself, we can work out the size of the population to be provided with piped water during the period of the Plan, both due to the growth in population and to the planned increase in coverage from 14% to 25% of the total population.^{7/}

The size of the Thai population in 1976 was 42.960 million. The population projected for 1981 is 48.179 million. To ensure that at least 14% of the total population in 1981 will have piped water requires that the service be expanded to include another 730,660 people; to increase the proportion served from 14% to 25% would mean providing for an additional 5.300 million. Thus altogether 6.030 million more people will have piped water by 1981, where the increase will take place over five years. This is slightly more than the total number of people who have the use of piped water at present. Thus the feasibility of the target must certainly be questioned.

The situation appears even more discouraging when we examine the data by changwad. There is only one, Bangkok-Thonburi, which already satisfies the projected target; all the other changwads have fewer than 25% of their households provided with piped water at the present time. If the target were to be modified so as to be met at the

^{7/} All projected population figures are taken from Ibid., p. 101.

changwad level, instead of just in the aggregate, then it is estimated that another 1.696 million more people would be involved, a 28% increase over the already high target of 6.030 million.

Turning now from water to electricity, the Fourth Plan estimates that it will increase the size of the population served by electricity by 11% per year.^{8/} Starting from a base of 20% of the total population in 1976, and taking into account population growth, this implies that 30% of the population in 1981 will have the use of electricity. Population increase alone will mean that 1.044 million more people will have to be taken into account, while the target of increasing the proportion of the population served from 20% to 30% involves another 4.842 million. Thus altogether 5.886 million people will have to be provided with electricity over the five-year period of the Plan. This number is more than two-thirds of the population with the use of electricity at the present time.

To meet the target for electricity use at the changwad, rather than the national level would mean bringing up to the target most of the changwads. At present only five changwads, Bangkok-Thonburi, Samutprakan, Phuket, Nonthaburi and Chonburi have electricity provided to at least 30% of their population. To ensure that at least 30% of the population in all changwads shall have use of electricity would increase the population target by another 1.795 million people,

^{8/} Ibid., p. 153.

a 30% addition to what would be required to meet the target at the national level.

Considering that the Fourth Plan is attempting to achieve in its five-year period, in terms of the provision of piped water and electricity, nearly as much as what has been accomplished in the past altogether, and more if concerns about disparities across changwads are taken into account, and considering that the task becomes increasingly more difficult since more remote areas will have to be covered, one is forced to question the seriousness of the Fourth Plan with regard to its stated objectives in the area of the provision of piped water and electricity to the population.

2. Some Promises Concerning Health Services

A great deal is said in the Fourth Plan concerning the planned improvement in the provision of health services to the population in general, and the reduction in the disparities of these services between urban and rural areas in particular.

It is pointed out in the Plan document that a large gap exists in terms of health services provided to the rural, as compared to the urban, population. The Plan cites the following statistics to give weight to this statement: in urban areas there is 1 hospital bed for every 150 people, compared with 900 in rural areas; and in urban areas there is 1 doctor for every 1,621 people, compared with 30,863

Some Provisions Concerning Health Services

in rural areas. It also compares the situation in the capital with

the rest of Thailand: in Bangkok the ratio of doctor : nurse : hospital

bed is 1 : 2.8 : 6, in contrast with the rest of the country where it

is 1 : 3.1 : 24.^{9/}

Given this dismal situation, the Fourth Plan sets the follow-

ing specific targets. In urban areas the ratio of doctor : hospital

bed : population should be 1 : 14.0 : 1,639 while in rural areas it

should be 1 : 30.3 : 18,700. Taking into account also the objective

of having one nurse for every 2,900 people in both urban and rural

areas implies the following: in urban areas there should be one doctor

for every 1,639, one nurse for every 2,900 and one hospital bed for

every 117 people; in rural areas there should be one doctor for every

18,700, one nurse for every 2,900 and one hospital bed for every 617

people.^{10/}

Using these targets we calculate the requirements for doctors,

nurses and hospital beds for the year 1981 under the initial assump-

tion that the same proportion of the total population will be in urban

areas then as in 1970. In 1981, when the size of the population is

expected to be 48.179 million, the urban population will reach 6.377

million and the rural population 41.802 million. To satisfy the

objectives of the Fourth Plan, it will be necessary to have 6,126

^{9/} Ibid., p. 244.

^{10/} Ibid., pp. 249 and 248.

doctors, 16,613 nurses and 122,257 hospital beds in 1981. Our estimates are that in 1973 there were 3,599 doctors, 8,598 nurses and 31,156 government hospital beds. Using the Plan figures indicating that there is one hospital bed per 150 population in urban areas and one per 900 population in rural areas would indicate that close to one-half of all hospital beds are in government hospitals, or 31,156 out of 63,514. Thus it will be necessary to produce 2,527 doctors, 8,015 nurses and 58,743 hospital beds between 1973 and 1981 in order to meet the target. If it is further assumed that new hospital beds will be forthcoming from the private sector in the same proportion as historically, then the government would have to come up with 28,816 hospital beds. This means that, between 1973 and 1981, 316 doctors, 1,002 nurses and 3,602 government hospital beds will have to be produced each year, if it is assumed that the private sector will provide 29,927 hospital beds altogether over the same period.

To compound the problem further, it is expected that economic development with the accompanying process of urbanization will lead to a considerably more rapid growth of the urban population compared with the rural population. The Fourth Plan projection gives an estimate of 10,212 million for the urban and 37.967 million for the rural population in 1981. If we use these population figures, the Plan appears to be even more ambitious since there are to be more doctors and more hospital beds relative to the size of population in urban than in rural areas. In this case the number of doctors required in 1981

would be 8,261 and the number of hospital beds 148.817. Thus it will be necessary to produce 4,662 doctors and 85,303 hospital beds between 1973 and 1981, or 583 doctors and 10,663 hospital beds per year.

However, when we look at the planned expansion in the production of health services, we encounter some serious discrepancies. The production of doctors is expected to increase from 385 per year before the Plan period to 500 per year.^{11/} Even if this increase in production materializes, we shall still be over 1,000 doctors short of the Plan target. With respect to hospital beds, the government plans to provide 13,092 new ones over the Plan period, so that it is evidently relying on the private sector to provide the remaining 72,211, which represent 85% of the total requirement. In this case the proportion of government hospital beds in the total will decline from 49% to 30%.

Even if the problems of production were to be overcome, the problem of distribution remains. Distribution poses a problem in two ways. Firstly, insofar as some changwads have more of a certain health facility than is envisaged in the Plan, and which cannot be transferred out of the changwad easily, to bring all the changwads up to the standard stipulated in the Plan would require more of that facility, since some of it is keeping up the national average without helping to satisfy the requirement at the changwad level. Secondly, only if newly created facilities are conscientiously directed to

^{11/} Ibid., p. 244.

changwads which have the greatest need for them can the Plan targets be met at the changwad level. Looking at data at the changwad level is useful in that it shows that this problem is close to insurmountable. For purposes of illustration we assume that the growth rates of the urban and rural populations of each changwad are the same as the corresponding national rates. The population figures projected for the year 1981 are then used to calculate the requirements for doctors, nurses and hospital beds for each changwad in 1981. We find, for example, that whereas Nakhonsawan now has 22 doctors and 68 nurses, it will need 128 doctors and 353 nurses by 1981, representing an increase of 482% and 419% respectively over the eight-year period. Kalasin will need 50 new doctors and 219 nurses in addition to the existing 8 doctors and 37 nurses, increases of 625% and 592% respectively. The problem of producing enough nurses and doctors in the aggregate may be trivial when compared with that of persuading these to go to the right places, if it is considered desirable to have the Plan targets met at the changwad level.

In conclusion, the stated objectives of the Fourth Plan concerning health services are shown to be unrealistic in many respects. Firstly, the implied production figures are not likely to be achieved. Where the Plan gives an estimate of the production envisaged for the period it falls far short of the target. To argue that the private sector can and will provide the remainder is merely wishful thinking. Secondly, the changwads which are lagging in terms of health

facilities will not be able to catch up unless the government can come up with a scheme which will deter health personnel from going to the better-off changwads in favour of the poorer, more remote, rural changwads. Unless it can do this, the disparity between urban and rural areas in terms of health services is likely to persist or even widen.

IV. Conclusion

This paper examines a few economic and social indicators for Thailand in which the changwad is the unit of observation. It concludes that very great disparities exist in these indicators across the different changwads; that indicators in the same major category tend to move together; that indicators in different categories are positively correlated; that the indicators are highly correlated with the level of gross provincial product per capita and with the degree of urbanization; and that the pattern of government expenditures on various categories of social services is not such as would tend to reduce the existing disparities across changwads.

Although the Fourth National Economic and Social Development Plan apparently recognizes the fact that great economic and social disparities exist across different population groups, notably between the urban and rural populations, an examination of some of the objectives of the Plan forces one to question whether the planners consider their task to be that of planning or daydreaming

Firstly, data which would be helpful in a study of the present state of affairs and in planning for the future are very difficult to obtain and are sometimes of doubtful quality. Thus any serious attempt to reduce inequality must be preceded by a much greater effort than at present to collect the information necessary for decision making. Secondly, the Plan is unrealistic in terms of its objectives at the aggregate level. It is difficult to believe that the targets stated in the Plan can be met. This suggests that existing development priorities are such that the provision of social services such as education, health, piped water and electricity have not been allocated sufficient funds to meet even the Plan's modest objectives, judged by what has taken place historically. Thus to provide enough of these services to satisfy the targets stated in the Plan would require that priorities be set in such a way that the provision of some minimal level of social services is given greater importance. Thirdly, the study shows up the difficult distributional problems; even if certain objectives can be met at the national level, great effort will be required in order to have them satisfied at the changwad level.

Finally, we must still remember that the Fourth Plan itself does not even attempt to bring the standard of social services in rural areas up to that in urban areas. For example, targets for doctors and hospital beds for a given population size are still much lower in rural areas, even though the population is already more dispersed there. Even in this form, the Fourth Plan is seen to be very ambitious if it

is to be satisfied even at the changwad level. It will take much more to achieve some semblance of equality in social services at the amphur, tambon or muban level.

The study draws attention to the whole question of planning and what this is meant to achieve. Without deliberate planning and resetting of national priorities, it is clear that the whole government bureaucracy tends to follow the line of least resistance. Development funds earmarked for the provision of social services thus continue to flow into urban areas which also happen to be high-income areas. The reduction of economic and social disparities requires a radical change in attitude among government officials, a conscious shift in emphasis which will focus efforts and funds on the poorer rural areas. For disparities across provinces to be reduced, government expenditures at the provincial level on a per capita basis must be higher for the poorer changwads. Therefore they would have to be negatively correlated with the level of per capita gross provincial product, not positively correlated as is currently the case. Thus the problem comes down to a single question: does the political will exist to reverse the past trend. Only if the existing tendency to treat the rural population as second-class citizens is deliberately set aside and a conscious policy is instituted which will attempt to improve the conditions of the rural people will the dreams of the Fourth Plan become more of a reality.

Given the very great economic and social disparities which exist in Thailand today, in particular between urban and rural areas, it is urgently required that greater emphasis be placed on improving the conditions of the rural population if the disparities are to be kept from widening further.

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