

ESSENTIAL NATIONAL HEALTH RESEARCH (ENHR):
AN ESSENTIAL LINK TO EQUITY IN DEVELOPMENT

THAILAND EXPERIENCE

Final Report

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EXECUTIVE SUMMARY

The major milestones for public health have been the Health for All initiatives and the thrust for essential national health research (ENHR) and the link to equity in development. The current report summarizes the analysis of existing secondary data to address how much progress Thailand has done with equity and what was the status of equity, seven years after the ENHR movement. The dimensions of equity under study include equity in health and nutrition (mortality and morbidity of certain diseases and injuries), equity in health resources, changes of lifestyle associated with health risks of different groups, efficiency and quality of services for different groups, affordability and sustainability of health care for different groups. Finally, evidence for the role of research in addressing the inequity issues was also searched.

The study revealed that despite in the deficiency of information classified to reflect the equity in health, health resources, lifestyles, affordability and sustainability, the researchers can still make a lot out of the available information such as the routine Annual Report of the Epidemiological Surveillance and the periodic National Health Examination.

All regions have made good progress in the control of acute diseases and interventions related to mother and child health. In terms of mortality, female fared better than male. The Central region and Bangkok has higher human development index and smaller burden of acute illnesses and malnutrition than their counterparts in other regions while the North and the Northeast had the bigger burden. Most acute infections and some chronic infections such as hepatitis B in 1997 have been reduced from 1990 burden. However, the diseases of lifestyles in 1997 such as diabetes mellitus, HIV/AIDS, overweight, obesity, hypertension and cancer were on a significant rise particularly in Bangkok and the Central region, where western lifestyles have been mostly adopted. The rate for occupational injuries was also highest in the Central region where most of the modern industries are located. In terms of health resources, the indicators about facilities and human resource for health favored Bangkok and the Central region. Despite the more facilities, Bangkok and the Central region still enjoy better facilities due to privatization while the situation of facilities in Northeast and the South in 1997 were worse off than in 1990.

However, it is surprising to see exceptions to the above general conclusion. For example, the rates of some diseases, such as pneumonia and acute diarrhea in 1997 increase from the 1990 rates in all regions. The figure in COPD rate between sexes cannot be explained by the difference in the rates of smoking. Other explanation, such as the sensitivity of the definitions used for COPD must be explored. Third, despite a general reduction in the rate of malarial infection compared in 1997 compared to 1990, the relative high rate of malaria in the Central region (about 2.5 to five times as high as the rates in other regions) deserves special notice. Of special notice is the exceptionally low rate of immunizable diseases in the Northeast where the burden of infections was normally the highest. The explanations for these discrepancies are unclear.

In terms of lifestyle change, the prevalence of regular smokers in 1997 among men did not differ from the rate in 1990. However, there was an alarming rise in the rate of smoking among the women in the North and the Northeast. In Bangkok, where there has been a continuous intensive campaign against smoking in the public, the rates of regular smokers dropped in 1996 in both men and women. This highlights the possible role of NGOs in using research to counteract the efforts to increase smoking. The rate of regular alcohol use in 1996 only increased slightly both men and women. There has been no significant campaign against alcohol use in Thailand.

Most could afford to pay for care both during minor and more severe illnesses. Only less than 5% had to resort welfare or borrow money for services. More people in the poorer regions such as the Northeast sought care from government services. The percentage of

expenditure on health only reduced slightly from the household expenditure during the economic crisis.

With respect to the role of research, the decline in the incidence of HIV infections (demonstrated by the reduction in the HIV rate in the new military conscripts) reflects the power of research in health care. Similarly, the rate of regular use of hard drugs decline in areas where the rate was originally high reflecting the research and intensive campaign. On the other hand, despite tremendous effort in the research on Vaccine for Dengue, the control of the disease still mainly depended on variation in the physical environment and vector control hinged closely to human behavior. In general, the role of research in driving the accountability of health system was not directly apparent.

We suggest that there should be a development of an oversight function and information system oriented towards equity, so that the research system can generate knowledge as an important input in driving accountability of the Thai health system in ensuring equity between regions and population subgroups.

BACKGROUND AND OBJECTIVES

This study is Thailand component of the multi-country study on Essential National Health Research (ENHR): An Essential link to Equity in Development.

The key hypothesis of the Commission Report is to suggest that health research both at the global and country levels is an essential link to equity in development (1-f312). The term "essential national health research" or ENHR have been instrumental in helping countries develop mechanisms to implement research in priority area and use research results for decision making leading to equity in development.

The World Bank Development Report in 1993 maintained that cost-effective intervention for good health could be a good investment for all countries (2-f094).

The WHO Ad Hoc Committee and the Global Forum proposed the "Best Buy" concept in the development of technology and drugs at the global level to reduce the global burden of illness worldwide. The "Best Buy" technology can be selected for use by countries according to needs (3).

The Task Force on ENHR has developed strategies which countries might use to promote research within countries that would allow selections and implementation of cost-effective interventions acceptable to the unique culture and the affordability of health systems within countries (4-f100). In addition to the basic research skills in many disciplines, the Commission for Health Research and Development (COHRED) has defined competencies for countries to implement ENHR. These ENHR competencies are thought to be essential for the health research systems within countries. These competencies are considered to be essential to make health research as an essential link to equity in development. They would help coordinate and enhance the existing research strengths of countries. The key competencies include "promotion and advocacy", "priority setting", "community partnership" and "Research Link to Policy".

Therefore, it is important to see how far the world have achieved the equity in development, equity in health status, equity of access to health care, and change in lifestyle 10 years after the Commission Report. Further, it is important to know whether the degree of achievement in equity differs between countries that are active and are not active in implementing ENHR strategies.

Literature Review

The definition of equity varies depending on what aspects of equity are considered. Mooney (1983) suggested seven possible definitions, all of which are incomplete and need complementary indices. Equity in expenditure per capita and equity of inputs were considered far too simple. Equity of inputs for equal need is biased to health need (5). Equity of access for equal need and equity of utilization for equal need deal with demand and supply of health care, the former is solely supply side whereas the latter is the function of both. Equity in marginal net need is used in prioritizing scarce health resources in conjunction with efficiency but the definition has been seldom used in a systematically. Finally, equity in health is considered useful in reflecting not only the equitable health service system but also the social and economic system of a country (5-f1202).

Some believe that there should be a minimum services for all regardless of the ability or willingness to pay (the basic minimum package 6-f1059, 2-f94). Many argue that the approach has been "unitary and simplistic". There were evidences that people cared more about the serious episode of illnesses of the heads of household than what is included in the basic minimum package and a large proportion of people who became poor in the last three years had serious episodes of illnesses in their household (7-f1201).

A narrow and practical definition of equity is the equality in access to health care between income classes, races, sex or regions, implying also that equality in access will be associated with Income Groups; Ethnic groups and gender. Two data points, one in 1990 and another around 1997, will be ascertained to document changes. The year 1990 was selected based on the year of the release of the Commission Report. The year 1997 was chosen because of the expectation that a more complete data set will be available.

Access to health care can be estimated by a set of indicators of health systems, such as the coverage of immunization, antenatal care and safe delivery. Other indicators include the health expenditure and finances between different population groups, the distribution of health care facilities and human resource for health between various population groups,

However, since it was shown that health services contributed only one quarter of population's health status, other factors must also be considered in assessing equity, the so-called "non-health sectors inputs" to health. These non-health sectors inputs include population, urban rural distribution, literacy rate, education, income and housing (8-f1199) and sanitation.

Unhealthy lifestyles have become prevalent challenging public health intervention (9-f254, 10-f564). Whether these lifestyles differ in the population subgroups deserve an investigation since these unhealthy lifestyles are amendable to prevention through the commitment of the states and other stakeholders. The tracer conditions used for study of these lifestyles include regular smoking, alcohol use, the prevalence of HIVs, the prevalence of prostitutes and other commercial sex workers, and the prevalence of men with multiple sex partners.

There are trade-offs between achieving equity and compromising efficiency, quality and affordability (as proxy of sustainability) of care. It is therefore important to develop indicators for efficiency and affordability. The indicators for quality will require information on structures, processes and outcome of health facilities that are unlikely to be readily available. Therefore, in the present study, quality will be addressed using the clients' perspective: i.e., the perception of technical capacity of various facilities, the average waiting time, and the ability to choose health practitioners.

Finally, to empower countries to develop actions to reduce inequity in health, it is important to identify whether the current research is addressing equity either directly or indirectly and whether countries have research competence and commitment to address the issues related to inequity in health.

Objectives

The Objectives of this study are as follows:

1. To study the change in equity of access to health care, health status, some non-health indicators, and lifestyles between population groups at two point in time, i.e., 1990 and around 1997 in Thailand.
2. To study the change in efficiency of achieving health status as defined by the relationship of health expenditures and mortality and life expectancy among various population subgroups in Thailand.
3. To study and compare the changes in efficiency, affordability, quality and sustainability of the health care system in Thailand.
4. To identify to what extent the current research is addressing equity either directly or indirectly in Thailand.
5. To identify competence and commitment for information and research for addressing the issues related to inequity in health within or outside the responsible agencies.

LIMITATION OF THAILAND STUDY

Since the main methodology of this study is focused on using existing information to study equity in development in aspects stated in the objectives above. The data sets of indicators have been collected by various agencies of a number of ministries and organizations. Some of them are missing, especially the data of the year 1990. Some of data has been collected and report in a format that could not be represent equity among population group. So that, not all indicators of each population group for the year 1990 and/or 1997 have been gathered because of this limitation.

HEALTH EQUITY-RELATED DATASETS AND RESEARCH PROJECTS

Approach and Methodology

On March 22-23, 1999, the workshop on Regional Multi-country Collaborative Workshop on Equity has been held. Seven participants from 5 countries participated the workshop (Dr. Agus Suwandano; Dr. Shawnee Anden; Mr. Abu Yusuf Chaudhury; Dr. Rozita Hussien; Prof.Dr.Chitr Sitti-amorn; Assoc.Prof.Dr.Wattana S. Janjarouen, and Mr.Tanawat Likitkererat, the coordinator of the study). The workshop was designed to:

1. To set up collaborative network of equity study in the region.
2. To discuss the conceptual framework of multi-country study on equity among participating countries.
3. To specify set of indicators which will be used for measurement of equity in term of availability, feasibility of collecting and relevancy of each indicator to equity.

The network of equity study in the region has been established in the workshop. A consensus on common indicator sets to be use to assess equity in health and development (as detailed in Annex A), the conceptual framework and guideline of study among the participating countries have been developed. To acquired the proposed indicators, data collecting methodologies has been proposed as follows:

Document Reviews: The indicators of the various aspects of equity were originally designed to define and compare the status of health, access, behavior and health system factors according to the important population subgroups as defined by geographical locations (urban, peri-urban, rural); Social Class; Income Groups; Ethnic groups and gender. However, the available data have dictated the use of regions as the main source of comparison. Two data points, one in 1990 and another around 1997, will be ascertained to document changes. The year 1990 was selected based on the year of the release of the Commission Report. The year 1997 was chosen because of the expectation that a more complete data set will be available.

Special Studies to fill important gaps: If the documents are not readily available, special efforts have been taken to contact specific agencies for possible internal documents. Some specific survey for the sources of data will also be conducted, e.g. the perceptions of technical competencies of various types of health care facilities by different population groups.

Data Bases: The following data bases will be systematically explored:

- International Organization: UNDP, HDR (Human Development Report), WHO, WB, USAID through contacts with country representatives
- National: MOPH, Ministry of Education, National Statistical Office, National Economic and Social Development Board, Local Government Data Base
- Compilation of national information both published and unpublished reports.
- Medline search
- National Research Data Base: National Research Council, ENHR Focal Point Data Base, Research Institution Report.

The above methodologies were applied to collect data of a specific set of indicators of particular population group to assess equity of health and development among the groups. The proposed population groups has been divided into 2 groups which are:

- Population groups for comparison within countries and
- Population group for comparison across countries

For Thailand component of equity study, only population groups for comparison within countries are taken into account of investigation. The population groups proposed originally were: geographical region: urban, peri-urban, and rural; Socio-economic classes (Professional with university degree, Managerial, skilled workers, non-skill workers, farmers and unemployed); the income groups (highest 20% Income group versus lowest 20% Income groups); the marginalized (ethnic groups, housewives) and gender.

After attempting to apply the methodology of this study by exploring existing secondary data from various sources such as annual report, statistics yearbook, databases, the investigators found that only some indicators have been collected and reported. Some of them were reported as aggregated data. Data separated by the proposed population group seem to be impossible to have. Therefore, the so called "proxy population groups", to were represent the proposed population. The population groups, which finally used in the study, are as follows:

1. Geographical region: 4 Regions which are Northern region, Central region, Southern region, North-Eastern region. This population group is for comparison of equity among geographical region.
2. Age Group: This population group is for comparison equity between various group of age of the people. Age group has been divided into group which are:
 - Children of the age 0 – 14 years old.
 - Teenager of the age of 15 – 24 years old.
 - Adult of the age of 25 – 64 years old.
 - Aging people of the age 65+.
3. Gender: Male and Female.

These basis of separation of population groups have been applied in approaching the existing data from the sources.

Also, if data is not available for the year 1990 or 1997, the available data sets closest to these years have been used in the report.

The percentage of health status in 1997 (or closest date) was calculated using 1990 (or closest date) as the base year. The results represent the progress or the lack of progress made for each of the indicators for the whole country and for each of the regions as possible.

The Northeast has been the poorest region with the worst health status, while the Central region which is closest to Bangkok generally has had the best health status. Since the data for Bangkok is not available for all indicators, and sometimes, the data from Bangkok is grouped with the Central Region, the data from the Central region is used as the basis for comparison with other regions to highlight equity. A comparison of equity between regions was made only for the latest data sets of each indicators.

THE RESULTS

Indicators for Health and Nutrition

1. Expectation of Life at Birth by Sex: The data in 1990 showed that the life expectancy was best in Bangkok Metropolis followed by the Central, South, North and Northeast respectively. The life expectancy data was not systematically gathered for the region. The 1990 data was collated from several sets. Fortunately, according to the new system of death registration, in the year 1998, the number of death can be separated by age group and region. Using life table calculation, life expectancy at birth for male and female in each region can be calculated as the following table:

Region	Both Sex		Male		Female	
	1990	1998	1990	1998	1990	1998
Whole Nation		69.4	66.5	67.0	71.0	72.1
Central		66.6	69.8	63.2	75.2	70.2
Northern		68.5	62.7	66.3	67.7	71.1
North Eastern		70.7	61.1	68.8	65.9	72.8
Southern		73.2	62.9	71.1	67.9	75.6
Bangkok Metropolis			71.1		76.2	

Source : 1990: : Human Resources Planning Division, Office of the National Economic and Social Development Board; **Review of Health Situation in Thailand 1996 Edition**; Report of the Survey of Population Change, National Statistical Office and World Population Prospects, the 1996 Revision, United Nations; 1998 Calculated from Number of Death and Mid-Year Population, Center of Information, Bureau of Policy and Plan, Ministry of Public Health.

Region	Male		Female	
	% of Change over 90-98	Change compare to National rate	% of Change over 90-98	Change compare to National rate
Whole Nation	100.75	1.00	101.55	1.00
Central	90.54	0.90	93.35	0.92
Northern	105.74	1.05	105.02	1.03
North Eastern	112.60	1.12	110.47	1.09
Southern	113.04	1.12	111.34	1.10

Life expectancy of Thai people has been raised from 1990 to 1998 in both gender. Otherwise, the increasing rate in male is about half compared to the rate in female. Regional –wise, life expectancy of all region except central region were increased for both sex. The most improved region was southern region followed by north-eastern and northern region. For those three region, life expectancy of male has been slightly more improved than those in female. In central region, the life expectancy was dropped by approximately 10% in male and 8% in female. This might be the effect of changing in life style led by industrialization and urbanization. The result is worth to discuss further.

2. Mortality Rates:

2.1 Infant Mortality Rate: By Region and Gender (per 1,000 Population): The progress made to reduce the infant mortality rates was highest in the Central region which saw the infant mortality in 1996 at 42.17% of the rate in 1990. The magnitude of progress made in reducing the infant mortality was lowest in the Northern region. Thus, in 1997, the infant mortality in the North was 2.4 times that of the Central region. The infant mortality in the South was lower than that in the Northeast.

Age	1990		1996		% of 1990 Burden	1997 Risk Relative to Central Region
	Number	Rate	Number	Rate		
All Regions						
Total	7,694	8.0	5,161	5.2	65.00	1.49
Male	4,507	9.2	2,988	5.8	63.04	
Female	3,187	6.9	2,173	4.5	65.22	
Northern Region						
Total	1,394	8.6	1,340	8.4	97.67	2.40
Male	832	10.0	793	9.7	97.00	
Female	562	7.1	547	7.0	98.59	
North-Eastern						
Total	2,570	8.0	1,785	5.6	70.00	1.60
Male	1,487	8.0	1,010	6.2	77.50	
Female	1,083	6.9	775	5.0	72.46	
Central Region						
Total	2,715	8.3	1,286	3.5	42.17	1.00
Male	1,590	9.5	743	3.9	41.05	
Female	1,125	7.1	543	3.0	42.25	
Southern Region						
Total	1,015	6.9	750	4.9	71.01	1.40
Male	598	8.0	442	5.7	71.25	
Female	417	5.8	308	4.2	72.41	
Bangkok						
Total	1,332	9.6		-		
Male	770	10.7		-		
Female	562	8.4		-		

Source: Public Health Statistics A.D.1992 and A.D 1996, Bureau of National Statistics

2.2 Maternal Mortality Rate: The progress made to reduce the infant mortality rates was highest in the Southern region, i.e. the maternal mortality rate in 1997 at 54.74% of the rate in 1990. This may be because the maternal mortality was highest in the South in 1990 and therefore more progress could be made. **Similar to the case of infant mortality, the magnitude of progress made in reducing the maternal mortality was lowest in the Northern region.** Thus, in 1997, the maternal mortality in the North was 1.34 times that of the Central region. **The health authority in the South could achieve a maternal mortality rate lower than that of the Central region, a clearly significant achievement considering the rate it had in 1990.** It should be explored how much research input has contributed to this phenomenon.

Maternal Mortality Rate By Region (per 100,000 Livebirths)

Region	1990		1996		% of 1990 Burden	1997 Risk Relative to Central Region
	Number	Rate*	Number	Rate		
Whole Kingdom	237	24.67	164	18.2	73.77	1.05
Northern Region	44	25.9	31	24.36	94.05	1.34
North-Eastern Region	94	29.1	61	23.22	79.79	1.14
Central Region	43	12.81	31	8.97	70.02	1.00
Southern Region	67	50.6	45	27.7	54.74	0.78

Source: Public Health Statistics A.D.1992 and A.D 1996, Bureau of National Statistics.

2.3 Under 5 Mortality Rate per 1,000 population: Under five mortality was not systematically collected for all regions. From the information gathered from several source, the rate of mortality under five years old in 1997 was 42.19% of the rate in 1990, indicating **good progress of the health system in Thailand in general**. The under five mortality rate in female is better than the male.

Age	1990		1997		% of 1990 Burden
	Number	Rate	Number	Rate	
All Regions					
Total	12,230	12.8	4,830	5.4	42.19
Male	7,172	14.6	2,630	5.7	39.04
Female	5,065	10.9	2,200	5.0	45.87

Source: Public Health Statistics A.D.1992, Bureau of National Statistics; Center of Information, Bureau of Policy and Plan, Ministry of Public Health.

2.4 Perinatal Mortality Rate: The progress made to reduce the peri-natal mortality rates was highest in the Central region, i.e., the peri-natal mortality in 1997 at 37.25% of the rate in 1990. This may be because the maternal mortality was highest in the Central region in 1990 and therefore more progress could be made. **Progress is generally slow to reduce peri-natal mortality in all other regions**. In 1997, the peri-natal mortality rate in **the North** was 2.1 times that of the Central region.

Peri-natal Mortality Rate: By Region and Gender (per 1,000 Livebirths)

Age	1990		1996		% of 1990 Burden	Relative * Risk versus Central Region
	Number	Rate	Number	Rate		
All Regions						
Total	3,392	3.5	2,323	2.3	65.71	1.2
Male	2,006	4.1	1,420	2.8	68.29	
Female	1,386	3.0	903	1.9	63.33	
Northern Region						
Total	717	4.4	635	4.0	90.91	2.1
Male	453	5.4	295	4.8	88.89	
Female	264	3.3	240	3.1	93.94	

Age	1990		1996		% of 1990 Burden	Relative * Risk versus Central Region
	Number	Rate	Number	Rate		
North-Eastern Region						
Total	631	2.0	647	2.0	100.00	1.05
Male	359	2.2	379	2.3	104.54	
Female	272	1.7	268	1.7	100.00	
Central Region (excl Bkk)						
Total	1,647	5.1	689	1.9	37.25	1
Male	974	5.8	421	2.2	37.93	
Female	675	4.3	268	1.5	34.88	
Southern Region						
Total	395	2.7	352	2.3	85.19	1.2
Male	220	2.9	225	2.9	100.00	
Female	175	2.4	127	1.7	70.83	
Bangkok Metropolis						
Total	870	6.3	-	-		
Male	580	7.1	-	-		
Female	362	5.4	-	-		

Source: Public Health Statistics A.D.1992 and A.D 1996, Bureau of National Statistics; Note: * calculated only for the total population.

2.5 Neo-Natal Mortality: About 3-4 children of every 1000 children died before the age of 28 days in 1990. In 1996, the neonatal mortality improved. Boys had 1.48 chance of death before 28 days compared to girls. The secondary data were not available to warrant any regional comparison.

Number and Rate of Death **per 1000** livebirths under 28 days (Neo-Natal Dates) : By Age and Gender

Age and Gender	1990		1996		% 1996 Rates of 1990 Rate	Rate in Male Relative To Female
	Number	Rate	Number	Rate		
Total	3,392	3.55	2,323	2.46	69.36376	1.48
Male	2,006	4.09	1,420	2.92	71.48765	
Female	1,386	2.98	903	1.97	66.19171	

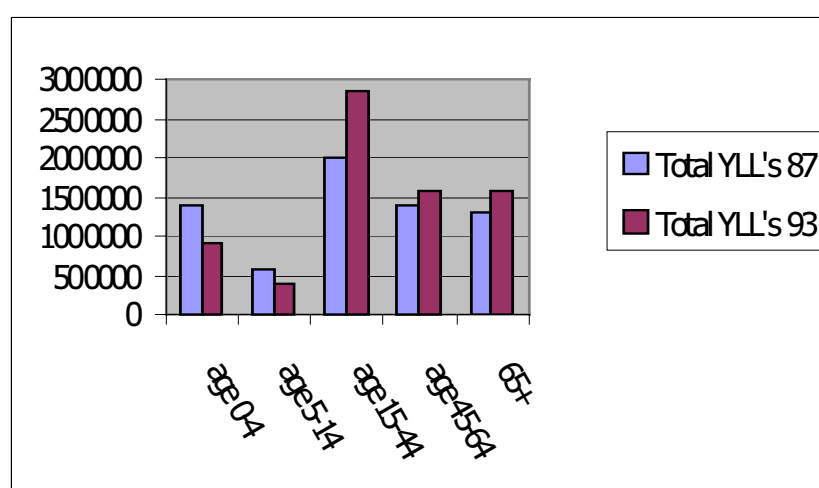
Source: Public Health Statistics A.D.1992 and A.D 1996, Bureau of National Statistics

2.6 Death Under 50 as % of Total Death: In 1990, data were segregated by age groups but not by Region. The percentage of death under 50 in 1996 was higher than in 1990. The result may reflect the increase in the shifting burden of illnesses causing a reduction of death in children such as immunizable disease and increasing mortality in adult such as accidents. In 1996, the percentage of death under 50 in southern region is the worst followed by northern and central region. And the north-eastern region had the best result in percentage of death under 50.

Region	1990		1996		% of 1990 Burden	Relative* Risk versus Central Region
	Number	% of Total	Number	% of Total		
All Regions						
Total	79,051	31.31	117,608	41.10	131.29	
Male	57,540	38.91	86,603	49.19	126.43	
Female	27,503	26.29	31,005	28.16	107.12	
Northern Region						
Total			30,734	43.08		
Male			22,316	51.26		
Female			8,418	30.26		
North-Eastern Region						
Total			35,111	38.39		
Male			25,619	46.36		
Female			9,492	26.23		
Central Region						
Total			40,481	40.57		
Male			30,317	49.34		
Female			10,164	26.52		
Southern Region						
Total			11,282	47.84		
Male			8,351	52.79		
Female			2,931	37.77		

Source: Public Health Statistics A.D.1992 and A.D 1996, Bureau of National Statistics

Total YLL's by Age Group



Source: Buranuj et al 1994.

3. Disease Specific Morbidity Rate: For acute notifiable diseases, the information comes from the Annual Epidemiological Surveillance of the Ministry of Public Health. For chronic diseases, the main source of information is from the reports of the Health Examination Survey conducted by the National Epidemiological Board of Thailand (NEBT) and the Thailand Health Research Institute (THRI).

3.1 Ischemic heart disease age 30 and above: The information is based on standardized history taking and ECG criteria. **For the diseases related to lifestyles, Bangkok seems to have the highest risk and the Northeast lowest.**

Region	1991-92		Risk in Male Relative to Central Region	Risk in Female Relative to Central Region
	Male	Female		
Whole Nation	1.1	1.1	1.22	1.1
Central (exc BKK)	0.9	1.0	1.00	1.0
North	1.1	1.6	1.22	1.6
Northeast	0.8	0.9	0.89	0.9
South	1.2	0.5	1.33	0.5
Bangkok Metropolis	2.6	1.9	2.89	1.9

Source: Report of Thailand Health Examination Survey 1991 and 1996; Data of 1996 was not available

3.2 Diabetes (Age 15 and above): Diabetes mellitus is defined as fasting blood sugar above 126 mg%. For this **disease of lifestyle change, there has been a significant increase in the rate of diabetes in all regions except for the South.** The burden in the North in 1996 was double in five years. **The Central region where good progress made to reduce the infant mortality rates was highest, had almost doubled the burden of diabetes. The people in Bangkok, where western lifestyles have been mostly adopted had the highest rate of diabetes.**

Region	1991		1996	% of 1990 Burden	1997 Risk Relative to Central Region
	Male	Female			
Whole Nation	2.0	2.8	4.0	166.7	0.77
Central (exclude BKK)	2.4	3.3	5.2	182.5	1.00
North	1.1	2.7	5.4	284.2	1.04
Northeast	2.0	2.5	3.5	155.6	0.67
South	2.5	2.8	1.8	67.9	0.35
Bangkok Metropolis			6.1		1.17

Source: Report of Thailand Health Examination Survey 1991 and 1996; Data of 1996 was not classified by sex.

3.3 Hypertension (Age 15 and Above): Hypertension is defined by a rise of systolic above 140 and /or diastolic above 90 mmHg. Like diabetes mellitus, hypertension - **disease of lifestyle change, has been associated with a significant increase in the rate of illnesses.** The burden in 1996 doubled or tripled in five years except for the Central region. **The Central region had a highest burden in 1991 where good progress made to reduce the infant mortality rates had the highest burden of hypertension in 1991.**

Therefore, despite only 26.5% increase of burden in 1996 from 1991, the burden in the Central region **was still the highest.**

Region	1991		1996	% of 1990 Burden	1997 Risk Relative to Central Region
	Male (%)	Female (%)			
Whole Nation	5.2	5.7	10.2	187.16	0.69
Central (exclude BKK)	10.8	12.6	14.8	126.50	1.00
North	3.7	5.0	9.0	206.90	0.61
Northeast	3.2	3.3	7.0	215.38	0.47
South	3.2	2.6	9.1	313.79	0.61
Bangkok Metropolis	8.5	6.1	13.4	183.56	0.91

Source: Report of Thailand Health Examination Survey 1991 and 1996. Data of 1996 was not classified by sex.

3.4 Pneumonia: As discussed earlier, the data for acute illnesses such as pneumonia were taken from the Annual Report of the Epidemiological Surveillance. **It is surprising to see the rates of pneumonia in 1997 increase from the 1990 rates in all regions with the highest rate in the North. The explanation for this is unclear. It may be related to the different criteria for ascertainment of pneumonia.** Except for the North, the rates of pneumonia in 1997 in all regions were similar.

Regions	Rate of Pneumonia/100,000		% of 1990 Burden	1997 Risk Relative to Central Region
	1990	1997		
Whole Nation	171.26	252.92	147.68	1.04
Central	130.65	243.99	186.75	1.00
Northern	155.18	311.93	201.01	1.28
North-Eastern	217.83	246.36	113.09	1.01
Southern	173.13	219.93	127.03	0.90

3.5 COPD: Death from COPD, the Bureau of Policy and Planning, Ministry of Public Health was 0.12 per 100,000 in 1990 and 1.43 per 100,000 in 1997. No breakdown is available for region and sex. However, the report of the National Health Examination in Thailand showed a prevalence of 1-2% in 1991. The COPD in male was highest in Bangkok for male and highest in the North for female. **The figure in COPD rate between sexes cannot be explained by the difference in the rates of smoking. Other explanation, such as the sensitivity of the definitions used for COPD must be explored.**

Percent of cases with Chronic Obstructive Pulmonary Disease (COPD)

Region	1991		Rate in Male Relative to Central Region	Rate in Female Relative to Central Region
	Male	Female		
Whole Nation	1.6	1.3	1.6	1.08
Central (exclude BKK)	1.0	1.2	1.0	1.00
North	1.7	1.6	1.7	1.33
Northeast	1.3	1.3	1.3	1.08
South	2.1	1.2	2.1	1.00

Source: Report of Thailand Health Examination Survey 1991. Data of 1996 was not available.

3.6 Acute Diarrhea (including dysentery): Like pneumonia, the data for acute diarrhea were taken from the Annual Report of the Epidemiological Surveillance. **It is surprising to see the rates of pneumonia in 1997 increase from the 1990 rates in all regions with the highest rate in the Central region. The explanation for this is unclear.** It might be related to a change in factors associated with diarrhea such as food habit. The rates of acute diarrhea in 1997 was highest in the central region. The northeast had the lowest acute diarrhea rates, which is most likely related to the environmental factors in the Northeast associated with diarrhea.

Regions	Rate of Acute Diarrhea/100,000 population			
	1990	1997	% Of 1990 Burden	1997 Risk Relative to Central Region
Whole Nation	1,293	1,718	132.86	0.74
Central	1,236	2,335	188.91	1.00
Northern	1,451	1,993	137.35	0.85
North-Eastern	1,147	1,606	140.02	0.69
Southern	1,607	2,118	131.80	0.91

Source: Annual Epidemiological Surveillance Report

3.7 Dysentery: **Unlike pneumonia and acute diarrhea, there was a significant in the progress made in reducing the burden of dysentery. The rates of dysentery in 1997 was about 35 to 50% of the rates in 1990 in all regions. The rate of dysentery in the North and the Northeast is about three times that of the Central Region.** This data, together with the data about acute diarrhea, showed a shift in the causes of diarrhea between 1990 to 1997.

Regions	Rate of Dysentery/100,000 population			
	1990	1997	% Of 1990 Burden	1997 Risk Relative to Central Region
Whole Nation	155.85	77.88	49.97	2.12
Central	96.62	36.82	38.11	1.00
Northern	187.24	100.94	53.91	2.74
North-Eastern	207.39	116.63	56.24	3.17
Southern	119.04	41.64	34.98	1.13

Source: Annual Epidemiological Surveillance Report

3.8 Hepatitis B: Data from the Annual Epidemiological Surveillance suggested that all regions made good progress with respect to the control of hepatitis B infection. **The rates of hepatitis B in 1997 was about 16 to 60% of those in 1990 in all regions. The rate of dysentery in the North and the Northeast is about three times that of the Central Region.** This data, together with the data about acute diarrhea, showed a shift in the causes of diarrhea between 1990 to 1997.

Region	Hepatitis B By Region (rate per 100,000)			
	1990	1997	% Of 1990 Burden	1997 Risk Relative to Central Region
Central Region	2046 (15.96)	691 (3.51)	22.0	1.00
North Region	490 (4.45)	321 (2.87)	64.5	0.82
North-Eastern	430 (2.17)	233 (0.95)	43.8	0.27
South Region	196 (2.81)	125 (1.09)	38.8	0.31
Greater Bangkok	1616 (29.13)	511 (4.79)	16.4	1.36

Source : Annual epidemiological surveillance report 1990 and 1997

3.9 HIV/AIDS, STDs: There is a drastic reduction of STDs reported cases. **The North made the greatest progress in curbing the STD infections, with the 1997 rate only 9% that of the 1990.** This demonstrates the success of the attempt of the Action and Research in coping with the sexually transmitted diseases and in promoting the universal condom use policy to deal with the epidemic of HIV infection. Thus, despite a rise in the prevalence people infected with HIV and AIDS in all regions, the incidence of new infection (demonstrated by the prevalence in the military conscript) declined. The rise in the rates of HIV and AIDS reflected the consequences of earlier epidemics of HIV infection which affected mostly the commercial sex workers and the intravenous drug users. The prevalence of AIDS was highest in the North where the epidemic of HIV was most severe.

Regions	Rate of STDs/100,000 population			
	1990	1997	% of 1990 Burden	1997 Risk Relative to Central Region
Whole Nation	195.7	32.1	16.4	0.38
Central	324.8	84.6	26.1	1.00
Northern	203.8	19.0	9.3	0.22
North-Eastern	37.5	15.7	41.8	0.19
Southern	291.1	25.8	88.6	0.30

Source : Annual epidemiological surveillance report 1990 and 1997

HIV positive Rate by Subgroups for whole nation

Group	1990		1996	
	Male	Female	Male	Female
Whole Country (per 100,000)	0.387	0.08	51.2	12.85
Military conscripts (%) Or Incidence Rate	2.1		1.9	
Direct CSWs (%)	9.30		28.17	
Indirect CSWs (%)	1.20		10.14	
Male STDs (%)	2.80		8.00	
IVDU (%)	31.40		40.00	
ANC (%)	0.00		1.82	
Blood Donors (%)	0.40		0.57	

Source: Army Health Research Institute

The Rate per 100,000 of AIDS by Region: 1993 and 1997

Region	1993	1997	% of 1993 Burden	Risk Relative to Central Region
Bangkok Metropolis	11.86	41.58	350.6	0.84
Central	3.61	49.59	1373.7	1.00
Northern	32.07	75.49	235.4	1.52
North Eastern	22.01	18.14	82.4	0.37
Southern	4.37	30.47	697.3	0.61
Whole Kingdom	11.58	40.68	351.3	0.82

Source : Calculated from the report of the Key Statistic of Thailand 1999 (Special Edition), National Statistical Office; 1993 data was from the Annual Epidemiological Surveillance Report 1997.

3.10 Malaria: Like all other infections, there was a decline in the rate of malaria in all regions. The rates of malaria in 1997 was about 9 to 42% of those in 1990 in all regions. **What is surprising is the relative highest rate of malaria in the Central region which was about 2.5 to five times as high as the rates in other regions.**

Region	Rate of Malaria/10,000 population			
	1990	1997	% of 1990 Burden	1997 Risk Relative to Central Region
Whole Nation	19.57	3.21	16	0.38
Central	32.48	8.46	26	1.00
Northern	20.38	1.90	9	0.22
North-Eastern	3.75	1.57	42	0.19
Southern	29.11	2.58	9	0.30

Source : Annual epidemiological surveillance report 1990 and 1997

3.11 Dengue Hemorrhagic Fever: Unlike other infections, there was both a rise and a variation in the decline in the rate of Dengue infection in all regions. The rates of Dengue in the Central region in 1997 was 234% of the rate in 1990. The South had the greatest reduction in the rate of infection in 1997 (only 21% of the rate in 1990). **While the world is waiting for research on Vaccine for Dengue, the control of the disease depended on variation in the physical environment and vector control hinged closely to human behavior.**

Regions	Rate of Dengue Hemorrhagic/100,000 population			
	1990	1997	% of 1990 Burden from	1997 Risk Relative to Central Region
Whole Nation	163.3	147.0	90	0.59
Central	106.5	249.1	234	1.00
Northern	162.1	132.4	82	0.53
North-Eastern	148.0	154.1	104	0.62
Southern	354.6	74.2	21	0.30

Source: Report of the Annual Epidemiological Surveillance and calculated rate from denominator of population profile.

3.12 Cancer: The information for cancer is not readily available in the Report of National Health Examination Survey, due obviously to the difficulty in diagnosis and verification of cancer using physical examination and simple laboratory test. The secondary data from the National Cancer Institute did not classify cancer according to the regions. The only information available for the two points in time (1990 and 1997) was the rate of lung cancer among men and women. **The rate of lung cancer, which is related to lifestyle, increased by 3.5 to 4 fold in 1997 compared to 1990.**

Regions	Rate of Cancer/100,000			
	1990		1997	
	Male	Female	Male	Female
Whole Nation (All cancer)			52.9	35.0
Whole Nation (Lung cancer)	3.25	0.71	11.3	2.9

Source: Calculated from the number of cases reported to the National Cancer Institute

Rate of Lung Cancer

Rate	1990		1997	
	Male	Female	Male	Female
Rate/100,000	3.25	0.71	11.3	2.9
% of 1990 Burden			347.7%	408.5%

Source: Calculated from the number of cases reported to the National Cancer Institute

3.13 Immunizable disease: Like other infection, the rate of immunizable diseases in 1997 declined in all regions compared to the rate in 1990.

Regions	Rate of Immunizable Disease/10,000 population			
	1990	1997	% Of 1990 Burden	1997 Risk Relative to Central Region
Whole Nation	216.2	97.6	0.45	0.49
Central	409.2	200.1	0.49	1.00
Northern	198.3	148.4	0.75	0.74
North-Eastern	57.8	17.6	0.30	0.09
Southern	186.8	121.6	0.65	0.61

Source: Report of the Annual Epidemiological Surveillance.

3.14 Accident: Death rates per 100,000 population due to traffic accident were also on the rise from 1990 and 1996. Many more males have become accident victims compared to females. The rate of accident death is male has been more than four times that of female but the rate of rise seems to be equivalent between both sexes.

Death Rate due to Traffic Accident

Gender	1990	1996	1996/1990
Male	24	47	1.96
Female	4.9	9.8	2.00

Source: Bureau of Planning, Ministry of Health, 1996

3.15 Occupational disease and Injuries : The results of silicosis surveillance in 1993 by the Department of Health showed an average chest X-ray positive in 6.4% of 2,157 workers examined. Most (83%) of these workers are male. There is no reason to believe that male and female workers given the same exposure will have a different rate of abnormal X-ray. **In 1997, the rate of occupational**

injuries was highest in the central region, where most modern industries were located.

Occupational Rate By Region in 1997

Region	Rates per 100,000 population	1997 Risk Relative to Central Region
Whole Nation	9.8	0.40
Central	24.6	1.00
Northern	15.9	0.65
North-Eastern	2.4	0.97
Southern	1.2	0.04

Source: Report of the Annual Epidemiological Surveillance.

4. Nutrition

4.1 Obesity: The information on obesity was available only from the National Health Examination Survey in 1990. **The result indicated that Bangkok and the Central regions had the highest rate of overweight and obesity which is associated with sedentary lifestyles and change of food habits.**

Region	1991 Obesity and Over Weight		Risk of Obesity and Over Weight in Male Relative to Central Region	Risk of Obesity in female Relative to Central Region
	Male	Female		
Central	16.2	29.8	1.00	1.00
North	9.6	20.2	0.59	0.68
Northeast	11.7	20.0	0.72	0.67
South	13.2	25.7	0.81	0.86
Bangkok	21.9	35.6	1.35	1.19

Source: The Report of the National Health Examination Survey 1991.

4.2 Under Weight at Birth: About 10% and 8% of the Thai population were born with a low birth weight in 1990 and 1996 respectively. The variation between regions was modest.

Regions	% of Under Weight Birth		% of Burden in 1990	1996 Risk Relative to Central Region
	1990	1996		
Central	9.2	8.3	90.2	1.00
Northern	11.4	9.3	81.6	1.12
North-Eastern	10.3	8.0	77.7	0.96
Southern	9.2	7.6	82.6	0.92

Source : Bureau of Planning, Ministry of Health, 1996

4.3 Malnutrition below Age 20 (All Degree) Using the Modified Gomez (below 5 year) and Percentile 10 as criteria for classification of malnutrition, .

Region	% Burden of 1991-92	1991-92 Risk Relative to the Central Region
Central	121.58	1.00
Northern	105.26	1.10
North-Eastern	156.16	1.58
Southern	127.23	1.25
Bangkok	59.36	0.42

Source : Calculated from the data provided in the Report of the Health Examination Survey B.E. 1991;

4.4 Micro-nutrient Malnutrition (Iodine Deficiency) The rate in 1998 is 42.38% of the rate in 1990

Regions	% of Iodine Deficiency	
	1990	1996
Whole Nation	16.78	7.12

Source : Department of Health, MOPH 1996.

Health Sector Indicators

1. Coverage of Some Care

1.1 Immunization : The only available data set is in the year 1997. Coverage of BCG and DPT3 are more than 90% in all region while coverage of Hepatitis B vaccine is approximately 90% in Northern and North Eastern region, and 85% in Central and Southern region. Surprisingly, despite being the region which gains the most public health resources compared to its counterpart, the Central region has the least coverage in vaccine immunization among all region. The result should be investigate further to figure out the cause.

Percentage of Coverage of Some Vaccine Immunization

Region	BCG		Hepatitis B		DPT3	
	1997	Relative to Central	1997	Relative to Central	1997	Relative to Central
Whole Kingdom	96.95	1.06	88.47	1.03	92.51	1.00
Central	91.73	1.00	86.11	1.00	92.94	1.00
Northern	99.75	1.09	90.82	1.05	94.31	1.01
North Eastern	98.85	1.08	90.65	1.05	93.70	1.01
Southern	97.87	1.07	85.16	0.99	87.78	0.94

2. Facilities (Hospitals and Beds)

2.1 Hospital: The ratio of population per hospital shows that a hospital in Bangkok had to provide services to more people than ones in other regions both private and public hospital. A public hospital in Bangkok had to cover 2-3 times of population more than one in other regions. On the other hand, A private hospital in Bangkok served less people than others. Consider changing in the ratio of population per hospital, only public hospital in Bangkok has increased in the ratio that means a public hospital in Bangkok had to serve more people in 1997 than

1990 regarding to increasing in population. For other region else, the ratio has been improved from 1990 to 1997.

Population to Hospital Ratio (1,000 population per hospital)

Region	Public		Private		Total	
	1990	1997	1990	1997	1990	1997
Bangkok Metropolis	173.34	180.97	110.94	92.81	67.65	61.35
Central Region	67.48	55.44	200.33	103.32	50.48	36.08
Northern Region	67.45	55.34	354.64	174.67	56.67	42.02
North Eastern Region	80.93	69.86	734.41	479.29	72.90	60.98
Southern Region	56.90	50.36	222.27	196.51	45.30	40.08
Whole Kingdom	74.57	64.39	276.00	169.61	58.71	46.67

Changing in Population to Hospital Ratio

Region	Public		Private		Total	
	% of 1990	Ratio Relative to Central	% of 1990	Ratio Relative to Central	% of 1990	Ratio Relative to Central
Bangkok Metropolis	104.40	1.27	83.66	1.62	90.69	1.27
Central Region	82.16	1.00	51.57	1.00	71.48	1.00
Northern Region	82.05	1.00	49.25	0.96	74.16	1.04
North Eastern Region	86.32	1.05	65.26	1.27	83.64	1.17
Southern Region	88.50	1.08	88.41	1.71	88.48	1.24
Whole Kingdom	86.35	1.05	61.46	1.19	79.50	1.11

2.2 Beds : The worst scenario in term of population per bed was for the North Eastern region and the best case was for Bangkok, despite the similarity in population to hospital ratio. Public hospitals in Bangkok mostly are large-scaled hospital while ones in the North Eastern region are mostly community hospitals with much less beds. Both type of hospitals in all region, except public hospital in Bangkok, enjoy improving in population to bed ratio. The ratio of all region except Bangkok have decreased range from 28%-48% from the year 1990 to 1997 while the ratio of Bangkok has slightly increased.

Population to Bed Ratio (population per bed)

Region	Public		Private		Total	
	1990	1997	1990	1997	1990	1997
Bangkok Metropolis	406.52	413.96	1,387.78	735.52	314.42	264.88
Central Region	750.90	396.90	5,576.70	4,508.41	661.79	364.79
Northern Region	857.48	550.10	7,120.33	2,013.07	765.32	432.04
North Eastern Region	1,404.81	906.80	18,777.41	6,704.52	1,307.03	798.76
Southern Region	815.40	593.96	7,141.33	3,287.23	731.84	503.06
Whole Kingdom	848.22	559.85	5,691.80	2,535.90	738.21	458.60

Changing in Population to Bed Ratio

Region	Public		Private		Total	
	% of 1990	Ratio Relative to Central	% of 1990	Ratio Relative to Central	% of 1990	Ratio Relative to Central
Bangkok Metropolis	101.83	1.93	53.00	0.66	84.25	1.53
Central Region	52.86	1.00	80.84	1.00	55.12	1.00
Northern Region	64.15	1.21	28.27	0.35	56.45	1.02
North Eastern Region	64.55	1.22	35.71	0.44	61.11	1.11
Southern Region	72.84	1.38	46.03	0.57	68.74	1.25
Whole Kingdom	66.00	1.25	44.55	0.55	62.12	1.13

3. Equity in Finance and Human Resources

3.1 Population Coverage, Payment Mechanisms, and Benefits of the Various Insurance Schemes : There is about 2/3 of the population that have no any insurance in health covered. The biggest covered group is Low Income/Elderly. And the Civil Servants has the most benefit than other groups.

Scheme	Population covered	Payment	Benefits (Bahts)
Civil Servants	5.8 millions	Fees for Service	1,781
Social Security	8.8 millions	Capitation	712
WCF	8.8 millions	Fees for Service	96
Health Card	5.0 millions	Capitation	190
Low Income/Elderly	14.6 millions	Global Budget	225
Primary School Kids	5.5 millions	Capitation	30
Total Covered	40.5 millions		
Not Covered	19.5 millions		

3.2 Human Resources for Health : The same as population to bed ratio, the population to health care personnel ratio of only Bangkok went worse from 1990 to 1997, only population to dentist in Bangkok ratio has been slightly improved (less than 1%). Despite un-improving situation, Bangkok still enjoy the least population to health care personnel ratio much more than other regions. The best region in improving in population to health care personnel is the Central region. But there is an interesting point that the population to nurse ratio in the Northern region has been improving dramatically, from 1384 people to 1 nurse in 1990 to 591 people to 1 nurse in 1997.

Population to Human Resources for Health Ratio by Region (Population/Number of personnel)

Region	Physician		Dentist		Pharmacist		Nurse	
	1990	1997	1990	1997	1990	1997	1990	1997
Greater Bangkok	862.0	931.53	4,426.9	4,384.59	2,049.9	2,542.66	318.2	406.50
Central	8,352.3	4,399.3	43,608.3	20,757.89	36,526.6	11,910.86	1,384.2	591.28
Northern	6,455.5	5,376.9	46,583.9	28,086.86	27,553.4	14,766.94	1,331.1	164.53
North Eastern	11,535.2	9,772.3	67,675.6	44,803.66	47,896.0	30,087.13	2,236.3	1,189.87
Southern	6,311.2	5,335.8	34,032.4	32,487.90	29,760.5	15,891.52	1,066.4	666.09
Total	4,497.4	3,664.8	24,640.4	17,786.21	13,702.4	10,220.86	1,115.1	439.28

Source: Annual Public Health Resource Report 1990 and 1997

Changing in Population to Health Care Personnel Ratio

Region	Physician		Dentist		Pharmacist		Nurse	
	% of 1990	Ratio Relative to Central	% of 1990	Ratio Relative to Central	% of 1990	Ratio Relative to Central	% of 1990	Ratio Relative to Central
Greater Bangkok	108.07	2.05	99.04	2.08	124.04	3.80	127.76	2.99
Central	52.67	1.00	47.60	1.00	32.61	1.00	42.72	1.00
Northern	83.29	1.58	60.29	1.27	53.59	1.64	12.36	0.29
North Eastern	84.72	1.61	66.20	1.39	62.82	1.93	53.21	1.25
Southern	84.54	1.61	95.46	2.01	53.40	1.64	62.46	1.46
Total	81.49	1.55	72.18	1.52	74.59	2.29	39.39	0.92

Non-Health Input to Health Indicators

Population and Household: The Thai population increased from 56.3 to 60.0 millions from 1990 to 1997. Except for Bangkok, the number of people per household in 1998 were about the same as those in 1990 for all regions. The number of people per household in Bangkok was only 63% of that in 1990 (i.e., fewer than five people versus more than seven people per household). The density of people per household can have an implication of the occurrence of diseases resulting from common risk factors and lifestyles.

The number of people per household: comparing the situation in 1998 with that in 1990 and between central and other regions.

Region	Number of People per Household		% 1998 person per household of 1990 base year	Ratio of People per Household compared to Central Region
	1990	1998		
Greater Bangkok	7.162344	4.531383	63.26677	1.20
Central Region	3.802736	3.761325	98.91102	1.00
Northern	4.613489	4.208142	91.21388	1.12
North Eastern	4.049637	3.92107	96.82522	1.04
Southern	4.095802	3.764534	91.91201	1.00

Source : Report of the 1990 Household Socio-Economic Survey and Preliminary Report of the 1998 Household Socio-Economic Survey, National Statistical Office

Life Style Indicators

1. The Prevalence of Regular Smokers: The percentage of smokers in Population of More Than 10 year-old by gender and residence 1991 and 1997 were taken from the report of the National Health examination Survey. Most regions did not show any reduction in the rate of regular smoker in men except for Bangkok. **Also except and the Central region, the rate of regular smokers in female showed an alarming increase: 67% in the Northeast and 50% in the North. The prevalence of regular smokers in 1996 in Bangkok was 80% and 60% of the rate in 1990 for male and for female respectively. In Bangkok, there has been a continuous intensive campaign against smoking in the public highlighting the role of activists in using research to counteract the advertisement efforts.** The rate of regular smoking in the Northeast and the South was 15% and 22% higher than the rates of regular smoker in the Central region respectively.

Change in Smoking Rate among Male, comparing 1996 with 1990 and between Regions

Region	Male 1991	Male 1996	% 1996 rate of 1991 Rate	Ratio of 1996 Rate Relative to Central Region
North Eastern	44.9	48.5	108.02	1.22
Central	39.6	39.8	100.51	1.00
Northern	39.9	42.3	106.01	1.06
Southern	45.8	45.8	100.00	1.15
Bangkok Metropolis	35.9	28.8	80.22	0.72

Change in Smoking Rate among Female, comparing 1996 with 1990 and between Regions

Region	Female 1991	Female 1996	% 1996 rate of 1991 Rate	Ratio of 1996 Rate Relative to Central Region
North Eastern	1.2	1.8	150.0	0.67
Central	4.3	2.7	62.8	1.00
Northern	6.5	10.9	167.7	4.04
Southern	4.1	4.6	112.2	1.70
Bangkok Metropolis	7.4	4.4	59.5	1.63

2. The Prevalence of Regular Alcohol Use: The information on the prevalence of regular alcohol use was not classified by regions. There was a slight increase of regular alcohol use (0-12%) in the municipal and non municipal area. Those in municipal area had a higher rate of regular alcohol consumption (from 1.5 to 2 times of those in the non municipal area)

The rates of those who drink alcohol every day per 1000 population by region (Health information Division, Bureau of Health Policy and Planning 1996;

Region	1991		1996	
	Male	Female	Male	Female
Nationwide	82	71	89	73
Municipal Area	111	123	116	138
Non-Municipal area	77	64	83	64

Source: Report of the Health and Welfare Survey 1991 and 1996, National Statistical Office

The comparison of the rates of Male who drink alcohol every day per 1000 population by region (Health information Division, Bureau of Health Policy and Planning 1996;

Area	Male 1991	Male 1996	% of 1996 rate of 1991 Rate	Rate Relative to Non-Municipal Area
Nationwide	82	89	108.54	1.07
Municipal Area	111	116	104.50	1.40
Non-Municipal area	77	83	107.79	1.00

Source: Report of the Health and Welfare Survey 1991 and 1996, National Statistical Office

The rates of Female who drink alcohol every day per 1000 population by region (Health information Division, Bureau of Health Policy and Planning 1996;

Area	Female 1991	Female 1996	% of 1996 rate of 1991 Rate	Rate Relative to Non-Municipal Area
Nationwide	71	73	102.82	1.14
Municipal Area	123	138	112.20	2.16
Non-Municipal area	64	64	100.00	1.00

Source: Report of the Health and Welfare Survey 1991 and 1996, National Statistical Office

There are other sources information on alcohol consumption, classified by sex and region. However, the definitions of consumption are unclear and therefore not included in the comparison.

3. Regular Use of Hard Drugs: The prevalence of the use of hard drugs in 1994 declined significantly in places where the prevalence was originally high (i.e., in the Central areas). Despite some improvement, the rate of decline in the North was slower than in the Central region. In 1994, the rate in the North was about fifty per cent that of the Central region despite the fact that the rate in 1990 was higher in the Central region. Research efforts and authoritative actions focussed in the high risk areas probably contributed to

such a decline in the Central region. The prevalence of use of hard drugs in the Northeast was low both in 1992 and 1994.

Prevalence of Regular Use of either Heroin, Stimulants and other Hard Drug per 100,000

Region	1992	1994	% of 1996 rate of 1991 Rate	Rate Relative to the Central Region
Nationwide	77.3	82.2	106.34	1.39
Central	141.9	59.0	41.58	1.00
North	103.14	88.4	85.71	1.50
Northeast	8.7	9.1	104.60	0.15
South	58.65	48.3	82.35	0.82

Source: Statistical Data Bank and Information Dissemination Division, National Statistical Office, the Number of Population at year 1990 and 1997 were used for calculation of the rate in 1992 and 1994 respectively (i.e., 1992 figure slightly overestimated and 1994 figure slightly underestimated)

- Multiple Sex Partners: The prevalence of men with multiple sex partners (between 15 to 26%) was higher in municipal areas than in the non-municipal area (between 6% to 13%), particularly in Bangkok and in the South.

The Prevalence of Men (%) with Multiple Sex Partners:

Region	Municipal Area	Non-Municipal Area	Rate in Municipal Area Relative to the Central Region	Rate in Non Municipal Area Relative to the Central Region
Nationwide	20.0	8.5	1.32	0.64
Central	15.1	13.2	1.00	1.00
North	16.5	6.2	1.09	0.47
Northeast	16.7	9.6	1.11	0.73
South	22.7	5.8	1.50	0.44
Bangkok	26.3		1.74	

Source: Report of Health Examination Survey 1996

Human Development Indicators

- Human Development Index (HDI) in 1990: As expected, the Human Development Index was highest in Bangkok and the Central region and lowest in the Northeast and the North. Also, the HDI was higher in the municipal area compared to the non-municipal area in the same region.

Region	HDI
Whole Nation	0.699
Greater Bangkok	0.967
Central	0.826
Southern	0.633
Northern	0.566
North Eastern	0.403

Urban vs. Rural	HDI
Urban Area	
Northern	0.8920
Central	0.8721
North Eastern	0.8458
Southern	0.8059
Rural Area	
Northern	0.6225
Central	0.6133
North Eastern	0.5629
Southern	0.5176

Region	GDP	HDI
North Eastern	4,622	0.370
Northern	6,952	0.886
Southern	7,197	0.941
Central	7,298	0.963
Greater Bangkok	7,441	0.995
Total	7,278	0.959

OTHER INDICATORS

1. Efficiency Indicators

1.1 Expenditure on Health as the Percentage of GDP

Country	Total % of GDP	% Expenditure on Health by Government	% Expenditure on Health by People
Malaysia	3.4	2.7	0.8
Thailand	5.9	1.6	4.3
China	4.0	2.8	1.2
India	4.3	1.6	2.7

1.2 Expenditure per IMR and Expenditure per Life Expectancy: The National Health Expenditure account showed that in 1992 prices (real prices), the health expenditure was 4.5% GDP 10 years ago compared to 5.9% in 1992 (Hsiao 1993). Despite very rapid economic development, the health sector has grown faster than economic sector. The per capita cost almost triple (Hsiao 1993; New data on the National Health Account is available but at the moment but the results are conflicting). However, the government expenditure has remained fairly constant or increased slightly. Most of the money spent come from the private health post. Therefore, Thailand is spending more on health and the spending largely came from the individuals in household and the rate of increase is faster than the 6% enviable increase in income. What do we produce? Malaysia spent 3.5% per capita income of GDP on health. Philippines, Indonesia, China, Sri Lanka, India spent less for health care. In terms of outcome, Thailand is not that favorable. The question is whether the resources are allocated and used favorably. Is the money spent wisely under the present structure of health care in Thailand today.

The Efficiency of Thai Health System (data from 25, 31)

Country	GDP (US\$ 1992)	IMR/1000	Life Expectancy 1995
China	1950	44 (1992)	69
India	1230	82 (1992)	62
The Philippines	2550	44 (1992)	66
Thailand	5950	37 (1992)	69.0
Sir Lanka	2850	18 (1992)	73
Malaysia	7790	13 (1992)	71

The cost of treatment per outpatient visit and per in-patient admission: With respect to productivity or technical efficiency, the average cost for out-patient and in-patient admission vary between schemes and between the public and private hospitals. For in-patient treatment, the average cost of medical expenditure per admission was 1558 bahts for the health card-holder in 1993) and 9981 bahts for the civil servant in 1994, i.e., there is a six fold difference. If the facilities and the services for the different schemes are treating similar diseases, why should there be a cost difference?

Estimated Medical Expenditure on Out-Patient (OPD) and In-Patients (IPD) for the various insurance schemes:

Scheme	Public Facilities		Private Facilities	
	Per OPD	Per IPD	Per OPD	Per IPD
Care for Low Income/Aged (1993)	58	2,746	Irrelevant	Irrelevant
Civil Servant (1994)	463	9,981	Not allowed	12,128
Social Security (1994)	140	4,260	373	10,244
Health Card (1993)	60	1,558	Irrelevant	Irrelevant

Quality Indicators

With respect to quality, when we spend money and organize the delivery of services, we have to ensure the best quality within the existing resources and organizational arrangement. At the moment, there are efforts to ensure the quality of hospital care through the hospital accreditation scheme. This has been created and undertaken by a consortium of stakeholders, consisting of Ministry of Public Health, professional councils and associations, private hospital association and mass media. This was supported by funds from the national research promotion fund and HSRI. Thirty-five hospitals both public and private in many parts of the country formed a core group. The programs consist of three parts: the internal quality improvement, the development of standards and guidelines and external evaluation. First, the participating hospitals have developed their quality improvement team. Quality consultants go to the hospitals and interact with the members of the hospital quality improvement team. Second, the professional organizations help develop standards and guidelines. For quality of medical services there are two requirements for the guidelines: i.e., the management and professional practices. The professional practice guideline and critical pathways are more difficult to develop. It remains to be seen whether this is the right methods. Third is the external evaluation for hospital accreditation based on the Kalayanamitra or friends-helping-friends principle unique for the local culture.

The indicators for the technical quality will require information on structures, processes and outcome of health facilities that are unlikely to be readily available. Therefore, many will address **quality** using the clients' perspective: i.e., the perception of technical capacity of various facilities, the average waiting time, and the ability to choose health practitioners. Most of the consumers complained about waiting time, 'poor services, the apathy of the providers and possible discrimination in the government services. High prices and possibly poor medical services have been raised for many of the private hospitals.

About 60% of Thailand expenditure is on drugs. People go to pharmacists and get their drug directly or they receive drugs from physicians and from hospital. The drug use in the hospitals and the community are being reviewed by a systematic approach through the support of the WHO country budget.

The Committee of national drug list was a subcommittee of national drug committee. The Subcommittee has 23 expert working groups (the concepts and methodology of over 300 specialists, pharmacists, nurses, and administrators) to help them to develop a reasonable essential drug list. The list has been developed based on a basic need of the people, reliable scientific data on efficacy and safety, cost, sensitivity of anti-microbial, availability and patient compliance. This was replaced by a two tier system, devised by the working groups on anti-microbial. The first tier is judged by the adequacy of information, efficacy and safety score (1 for excellence, 0.9 for good, 0.8 for fair). These scores are multiplied to form a esi score. The score was multiplied by cost per treatment per day from the market. Factors on compliance was also considered. The final score give rise to the cost of drugs in bahts per treatment. These form the basis for group judgement by the expert. Many people like the methods. Others use expert opinions. The process is not perfect and everyone is learning.

The remarkable thing is that experts are thinking along the same line and should be able to reduce wasteful practice and maximize the benefit to the people.

Another ongoing program is the program on the quality of services and accreditation. This has been created and undertaken by a consortium of stakeholders, consisting of Ministry of Public Health, professional councils and association, private hospital association and mass media. This was supported by funds from the national research promotion fund and HSRI. Thirty-five hospitals both public and private in many parts of the country formed a core group. The programs consists of three parts: the internal quality improvement, the development of standards and guidelines and external evaluation. First, the participating hospitals have developed their quality improvement team. Quality consultants go to the hospitals and interact with the members of the hospital quality improvement team. Second, the professional organizations help develop standards and guidelines. For quality of medical services there are two requirements for the guidelines: i.e., the management and professional practices. The professional practice guideline and critical pathways are more difficult to develop. It remains to be seen whether this is the right methods. Third is the external evaluation for hospital accreditation based on the Kalayanamitra or friends-helping-friends principle unique for the local culture.

Beside the use of drugs, we spend money and loans for procurement of equipment. We must be certain that this will not be a non-productive investment. Valid information must form the basis of policy decisions both for individual patients and population. Patients must be reassured that they will receive the best possible care possible. Emphasis has to be given on the elements of trust, responsibility, quality, cost control, transparency, ethics, morality, quality assurance mechanisms, self-evaluation and improvement, professional standards, external accreditation. There are items that cost money but are cost effective. Common sense does not apply. Evidence is needed. Morality must be uphold. TA is very important and is a know-how by itself. It must stand to the scientific test for validity. Science is universal. Health and quality of life is value laden. We must be able to combine and balance the two side.

Affordability Indicators and Sustainability Indicators

Most household in Thailand spent 2-3% of their household expenditure for health. The per cent of spending on health declined slightly in 1998 possibly due to the economic crisis. Most resorted to self treatment by purchasing medicines from drugstores when afflicted with mild illnesses. Only less than 10% used traditional medicine or refrained from any treatment. When affected by major illness, most used the government services and could pay for the services or were covered by an insurance scheme. Fewer than 2-3% reported that they were either on welfare or had to borrow money for care.

1. Percentage of Expenditure on Health versus Household Expenditure

Region	% of Household		Household Expenditure		Expenditure on Medical Care		% of Expenditure on Medical Care per Household Expenditure	
	1990	1998	1990	1998	1990	1998	1990	1998
Whole Kingdom	100	100	65,244	129,828	2,220	3,504	3.40	2.70
Greater Bangkok	14.9	17.4	124,284	250,992	4,620	7,104	3.72	2.83
Central	17.6	19.3	67,920	135,576	1,992	4,032	2.93	2.97
Northern	21.9	19.8	54,264	100,212	1,752	2,844	3.23	2.84
North Eastern	32.7	30.9	54,624	90,408	1,632	2,076	2.99	2.30
Southern	12.9	12.6	61,920	121,488	2,100	3,012	3.39	2.48

Source: Report of the 1990 Household Socio-Economic Survey and Preliminary Report of the 1998 Household Socio-Economic Survey, National Statistical Office

Comparison between % Health Expenditure of Household Expenditure in 1998 and 1990

Region	% Health Expenditure of Household Expenditure		% in 1998 of 1990 base year	1998 %Health Expenditure Relative to Central Region
	1990	1998		
Whole Kingdom	3.40	2.70	79.41	0.95
Greater Bangkok	3.72	2.83	76.08	1.00
Central	2.93	2.97	101.37	1.05
Northern	3.23	2.84	87.93	1.00
North Eastern	2.99	2.30	76.92	0.81
Southern	3.39	2.48	73.16	0.88

2. Self care behavior of people with minor illnesses: Percentage of People with different behavior

Region	No Drug	Traditional Medicine	Drugstores	Rate of Drug for Self Care Relative to Central Region
Whole Kingdom	6.82	3.16	37.40	1.11
Greater Bangkok	11.9	3.40	45.70	1.35
Central	6.83	1.69	33.73	1.00
Northern	5.15	4.99	34.67	1.03
North Eastern	6.61	3.29	39.06	1.16
Southern	3.58	2.53	34.97	1.04

Source: Report of Health Examination Survey 1996

3. Choice of Health Services if Needed: Number and use of different types of Health Facilities according to the type of illnesses by people could indicate whether there is a decentralization of care and whether people have faith in the local health services. Most of the public facilities are subsidized and therefore not sustainable for expensive care. Most private facilities will require out-of-pocket payment. An increase use of the local government indicates more decentralization and could improve efficiency. An increase in the use of private facilities by those who could pay will free resources for the under-privileged. Sustainability will also be more possible if people resort to more preventive care and health promotion including the development of facilities to promote healthy lifestyles.

Region	Traditional Healers	Public Facilities	Private Facilities	Rate of Use of Private Facilities Relative to Central Region
Whole Kingdom	1.94	64.64	29.94	0.88
Greater Bangkok	1.60	41.20	47.40	1.39
Central	1.54	51.46	34.11	1.00
Northern	2.02	78.01	33.92	0.99
North Eastern	2.01	73.60	14.61	0.43
Southern	2.69	69.71	38.68	1.13

Source: Report of Health Examination Survey 1996

4. The Source of Finance for Health Expenditure: Thai people mostly paid for health services by themselves or relative especially in Bangkok and Central Region. Insurance system has covered about 31% of payment. Almost 2% of payment in the North Eastern region came from borrowing.

Region	Welfare	Borrow	Insured	Self or Relative	Rate of Self Payment Relative to Central Region
Whole Kingdom	1.72	1.10	31.44	65.74	0.89
Greater Bangkok	1.00	0.20	21.70	77.10	1.05
Central	3.33	1.01	22.08	73.58	1.00
Northern	1.03	1.02	35.22	62.73	0.85
North Eastern	1.18	1.78	37.14	59.90	0.81
Southern	2.00	0.51	38.14	59.35	0.81

Source: Report of Health Examination Survey 1996

Recommendation of Further Study

After exploring existing databases, the investigator found that the lack of information for measuring equity is the major problem. The available data is mostly aggregated data while data needed to measure status of equity in health and health care of various group of population has to be segregated by specific population group. The only category of population group that can be taken into account up to now is regional population group. The standard of grouping the regions is the other issues that has to be sort out. Some agencies separate the whole country into 4 regions while others use 6 regions. Some extract the data of Bangkok metropolis out of the central region. All of these problems could affect examining equity in health and health care.

To solve the problems, some mechanism in the national health information system have to be established to provide sufficient information. The information has to come up from the origin. It has to be digitized into electronic form. Information technology will be the major player to do so.

From the investigator's experience, at the district level, health centers have been requested to collect data according to needs of various agencies. As far as the investigator see, the data from health centers could determine equity in health of the people in that area to some extent. Unfortunately, when the data has been sent to the provincial level and finally to the national level, the detailed information has lost at some point in the information flow. So that if the national health information system could be re-engineered to capture the lost information and provide more complete information that would benefit equity study enormously.

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Annex A

List of Required Indicators

I. Health Indicators:	II. Health Sector Indicators	II. Health Sector Indicators
1 Life expectancy	1. Access, coverage and facilities	2. Equity in finance and human resources
- Life expectancy at birth, Total	1.1 % with access to health care	2.1 Finance by group
- Life expectancy at birth, Male	1.2 Coverage rate of some care	- Per capita health care expenditure
- Life expectancy at birth, Female	- Immunization	capita subsidy for low income
2. Mortality rates	BCG	- Per capita Subsidy for special facilities
- Infant mortality rate	DPT3	- Per capita Subsidy to service
- Maternal mortality rate	OPV3	e.g. ,immunisation , ANC , MCH,
- Under 5 mortality rate	Measles	FP , and emergency care
- Perinatal mortality rate	Tetanus toxiod 2	- Per capita expenditure by
3. Death under 50 as % of total	Tuberoulousis	social insurance
4. Disease specific morbidity rate	- Antenatal care	- Per capita Expenditure by Voluntary
- Ishaemic (coronary) heart disease	- Family planning	insurance groups
- Cardiovascular disease	- Safe delivery of MCH program	2.2 Human Resource for Health /100000
- Hypertension	- Ishaemic (coronary) heart disease	population by geographical locations
- Acute respiratory infection	- Cardiovascular disease	- Physicians
- Pneumonia	- Hypertension	% physicians in private sector,
- Tuberculosis	- Acute respiratory infection	% in public sector
- COPD	- Tuberculosis	% in dual sector
- Diarrhoea (including dysentery)	- Pneumonia	- Nurses
- Hepatitis B	- COPD	% nurses in private sector,
- HIV/AIDS, STDs	- Diarrhoea (including dysentery)	% in public sector
- Malaria	- Hepatitis B	% in dual sector
- Dengue hemorrhagic fever	- HIV/AIDS, STDs	- Pharmacist
- Prematurity	- Malaria	% pharmacists in private sector,
- Cancer	- Dengue hemorrhagic fever	% in public sector
- Immunizable disease	- Prematurity	% in dual sector
- Accident and Occupational injuries	- Cancer	- Nurse practitioners
Work related	- Immunizable disease	% nurse practitioners in private sector,
Non-work related	- Emergency care, trauma and injury	% in public sector
- Occupational disease	1.3 Facilities (publics & private)/100,000	% in dual sector
5. Nutrition	- Hospital or health facilities	
- Obesity	- No. of bed	
- Under weight birth	- Primary health care	
- Protein Malnutrition	- Drugstores	
- Micronutrient Mulnutrition	- 1st medical care	
Iodine	- 2nd medical care	
Vitamin A	- 3rd medical care	
	- Community or village health center	

III. Non-Health Sector Indicators	VI. Efficiency Indicator	VIII. Affordability Indicators
1. Population	1. Expenditure on health expressed as the the percentage of GDP spent on health in 1990 and around 1997	1. Subsidy
- Growth Rate by groups		2. Social Insurance
- % Urban Populartion		3. Voluntary Insurance
- Literacy rate by groups	- percentage of GDP spent by the Government of Health on various type of services:	4. Fees- for - Services
- % People who finish compulsory education by groups	- For PHC , Secondary Care, Tertiary Care	5. % of expenditure on health vs. household expenditure
- % People over poverty line		IX. Sustainability Indicators
- % People under poverty line		1. Number of health facilities belong to:
		- Central government
2. Household	- For Preventive, promotive , treatment, rehabilitation	- Local government
- Household size by population group		- Private sector
- % of household with housing	- Percentage of GDP spent by the people either through insurance or out-of-pocket payment	2. Use of health facilities by population groups for
- % of household with sanitation		out - patient care
- % of household with electricity		- Central government
- % of household with clean water	2. Expenditure per IMR of population groups	- Local government
IV. Life Style Indicators	3. Expenditure per life expectancy by population groups	- Community facilities (e.g. cooperative, drugstores)
1. The prevalence regular smokers by relevant groups	VII. Quality Indicator	- Private facilities
2. The pevalence of regular alcoholic use by relevant groups	- Perception of technical quality of public versus private service by population groups	- Local drugstores
3. The prevalence of regular use of either heroine, stimulants and other hard drugs by relevant groups	- Average waiting time of public versus private facilities by population groups	- Private clinics
4. The prevalence CSW in reproductive by groups	- Ability to choose practitioners in public and private facilities by population groups	- Private hospitals
5. The prevalence of men with multiple sex sex partners by groups		3. Use of health facilities by population groups for in-patient care
		- Central government
		- Local government
		- Community facilities
		- Private facilities
V. Human Development		
1. HDI by groups		
2. Other Indicators		

Annex B

Health Equity-Related Datasets

Health Indicators

1. Life Expectancy at Birth by Region in 1997:

Region	Both Sex		Male		Female	
	1990	1998	1990	1998	1990	1998
Whole Nation		69.4	66.5	67.0	71.0	72.1
Central		66.6	69.8	63.2	75.2	70.2
Northern		68.5	62.7	66.3	67.7	71.1
North Eastern		70.7	61.1	68.8	65.9	72.8
Southern		73.2	62.9	71.1	67.9	75.6

Source : Calculated from Number of Death and Mid-Year Population, Center of Information, Bureau of Policy and Plan, Ministry of Public Health.

Livebirth : By Region

Region	Total			Male			Female		
	1990	1996	1997	1990	1996	1997	1990	1996	1997
Bangkok Metropolis	139,005	147,959	145,711	71,917	76,729	75,327	67,088	71,230	70,384
Central	186,574	356,916	198,891	96,134	184,641	102,046	90,440	172,275	96,835
Northern	162,256	146,685	127,220	83,272	75,355	65,123	78,984	71,330	62,097
North Eastern	321,406	299,345	262,600	164,791	153,598	135,173	156,615	145,747	127,427
Southern	146,996	141,172	162,182	74,896	72,608	83,247	72,100	68,564	78,935
Whole Kingdom	956,237	944,118	897,604	491,010	486,202	461,916	465,227	457,916	435,688

Source: Public Health Statistics A.D.1992, A.D.1996 and A.D 1997, Bureau of National Statistics

2. Mortality Rate

2.1 Infant Mortality: Number and Rate per 1,000 livebirths: By Region and Gender

Region	1990		1996		% of 1990 Burden	1997 Risk Relative to Central Region
	Number	Rate	Number	Rate		
All Regions						
Total	7,694	8.0	5,161	5.2	65.00	1.49
Male	4,507	9.2	2,988	5.8	63.04	
Female	3,187	6.9	2,173	4.5	65.22	
Northern Region						
Total	1,394	8.6	1,340	8.4	97.67	2.40
Male	832	10.0	793	9.7	97.00	
Female	562	7.1	547	7.0	98.59	
North-Eastern Region						
Total	2,570	8.0	1,785	5.6	70.00	1.60
Male	1,487	8.0	1,010	6.2	77.50	

Region	1990		1996		% of 1990 Burden	1997 Risk Relative to Central Region
	Number	Rate	Number	Rate		
Female	1,083	6.9	775	5.0	72.46	
Central Region (excl Bkk)						
Total	2,715	8.3	1,286	3.5	42.17	1.00
Male	1,590	9.5	743	3.9	41.05	
Female	1,125	7.1	543	3.0	42.25	
Southern Region						
Total	1,015	6.9	750	4.9	71.01	1.40
Male	598	8.0	442	5.7	71.25	
Female	417	5.8	308	4.2	72.41	
Bangkok Metropolis						
Total	1,332	9.6		-		
Male	770	10.7		-		
Female	562	8.4		-		

Source: Public Health Statistics A.D.1992 and A.D 1996, Bureau of National Statistics

2.2 Maternal Mortality Rate

- Maternal Mortality: Number and Rate per 100,000 livebirths: By Region

Age	1990		1996		% of 1990 Burden	1997 Risk Relative to Central Region
	Number	Rate	Number	Rate		
All Regions	237	24.78	164	17.37	70.09	1.59
Northern Region	44	27.12	31	21.13	77.93	1.77
North-Eastern Region	94	29.25	61	20.38	69.68	1.58
Central Region (excl Bkk)	32	17.15	27	7.56	44.11	1.00
Southern Region	67	45.58	45	31.88	69.94	1.59
Bangkok Metropolis	11	7.91	4	2.70	34.16	0.77

Source: Public Health Statistics A.D.1992 and A.D 1996, Bureau of National Statistics

- Percentage of Maternal Mortality Rate : By Age Group

Age	1990		1996	
	Number	Percent	Number	Percent
all age	237	100.0	164	100.0
Under 15	-	-	-	-
15-19	23	9.7	9	5.5
20-24	55	23.2	16	9.8
25-29	41	17.3	27	16.5
30-34	38	16.0	24	14.6
35-39	36	15.2	26	15.8
40-44	26	11.0	20	12.2

Age	1990		1996	
	Number	Percent	Number	Percent
45-49	11	4.7	9	5.5
50 and over	1	0.4	1	0.6
Unknown	6	2.5	32	19.5

Source: Public Health Statistics A.D.1992 and A.D 1996, Bureau of National Statistics

2.3 Under 5 Mortality Rate

Age	1990		1997		% of 1990 Burden	1997 Risk Relative to Central Region
	Number	Rate	Number	Rate		
All Regions						
Total	12,230	12.8	4,830	5.4	42.19	
Male	7,172	14.6	2,630	5.7	39.04	
Female	5,065	10.9	2,200	5.0	45.87	
Northern Region						
Total			992	7.8		
Male			525	8.1		
Female			467	7.5		
North-Eastern Region						
Total			1,508	5.7		
Male			860	6.4		
Female			648	5.1		
Central Region						
Total			1,589			
Male			860	4.8		
Female			729	4.4		
Southern Region						
Total			741	4.6		
Male			385	4.6		
Female			356	4.5		

Source: Public Health Statistics A.D.1992, Bureau of National Statistics; Center of Information, Bureau of Policy and Plan, Ministry of Public Health.

2.4 Perinatal Mortality Rate

- Peri-natal Mortality: Number and Rate per 1,000 livebirths: By Region and Gender

Region	1990		1996		% of 1990 Burden	Relative* Risk versus Central Region
	Number	Rate				
All Regions						
Total	3,392	3.5	2,323	2.3	65.71	1.2
Male	2,006	4.1	1,420	2.8	68.29	

Region	1990		1996		% of 1990 Burden	Relative* Risk versus Central Region
	Number	Rate				
Female	1,386	3.0	903	1.9	63.33	
Northern Region						
Total	717	4.4	635	4.0	90.91	2.1
Male	453	5.4	295	4.8	88.89	
Female	264	3.3	240	3.1	93.94	
North-Eastern Region						
Total	631	2.0	647	2.0	100.00	1.05
Male	359	2.2	379	2.3	104.54	
Female	272	1.7	268	1.7	100.00	
Central Region (excl Bkk)						
Total	1,647	5.1	689	1.9	37.25	1
Male	974	5.8	421	2.2	37.93	
Female	675	4.3	268	1.5	34.88	
Southern Region						
Total	395	2.7	352	2.3	85.19	1.2
Male	220	2.9	225	2.9	100.00	
Female	175	2.4	127	1.7	70.83	
Bangkok Metropolis						
Total	870	6.3	-	-		
Male	580	7.1	-	-		
Female	362	5.4	-	-		

Source: Public Health Statistics A.D.1992 and A.D 1996, Bureau of National Statistics

- Percentage of Peri-natal Mortality : By Age and Gender

Age	1990		1996	
	Number	Percent	Number	Percent
Under 28 days				
Total	3,392	100.0	2,323	100.0
Male	2,006	59.1	1,420	61.1
Female	1,386	40.9	903	38.9
Under 1 day				
Total	424	12.5	186	8.0
Male	242	7.1	109	4.7
Female	182	5.4	77	3.3
1				
Total	733	21.6	524	22.6
Male	449	13.2	328	14.1
Female	284	8.4	196	8.4
2				

Age	1990		1996	
	Number	Percent	Number	Percent
Total	382	11.3	264	11.4
Male	230	6.8	176	7.6
Female	152	4.5	88	3.8
3				
Total	255	7.5	210	9.0
Male	159	4.4	119	5.1
Female	106	3.1	91	3.9
4				
Total	208	6.1	126	5.4
Male	125	3.7	82	3.5
Female	83	2.4	44	1.9
5				
Total	156	4.6	112	4.8
Male	105	3.1	79	3.4
Female	51	1.5	33	1.4
6				
Total	123	3.6	105	4.5
Male	69	3	63	2.7
Female	54	1.6	42	1.8
7-13				
Total	551	16.2	408	17.6
Male	333	9.8	241	10.4
Female	218	6.4	167	7.2
14-20				
Total	345	10.2	235	10.1
Male	182	5.4	139	6.0
Female	163	4.8	96	4.1
21-27				
Total	215	6.4	153	6.6
Male	122	3.6	84	3.6
Female	93	2.8	69	3.0

Source: Public Health Statistics A.D.1992 and A.D 1996, Bureau of National Statistics

2.5 Neo-Natal Mortality Rate

Number and Rate of Death **per 1000** livebirths under 28 days (Neo-Natal Dates) : By Age and Gender

Gender	1990		1996		% 1996 Rates of 1990 Rate	Rate in Male Relative To Female
	Number	Rate	Number	Rate		
Total	3,392	3.55	2,323	2.46	69.36376	1.48
Male	2,006	4.09	1,420	2.92	71.48765	
Female	1,386	2.98	903	1.97	66.19171	

Source: Public Health Statistics A.D.1992 and A.D 1996, Bureau of National Statistics

3. Death Under 50 as % of Total

Region	1990		1996		% of 1990 Burden	Relative* Risk versus Central Region
	Number	% of Total	Number	% of Total		
All Regions						
Total	79,051	31.31	117,608	41.10	131.29	
Male	57,540	38.91	86,603	49.19	126.43	
Female	27,503	26.29	31,005	28.16	107.12	
Northern Region						
Total			30,734	43.08		
Male			22,316	51.26		
Female			8,418	30.26		
North-Eastern Region						
Total			35,111	38.39		
Male			25,619	46.36		
Female			9,492	26.23		
Central Region						
Total			40,481	40.57		
Male			30,317	49.34		
Female			10,164	26.52		
Southern Region						
Total			11,282	47.84		
Male			8,351	52.79		
Female			2,931	37.77		

Source: Public Health Statistics A.D.1992 and A.D 1996, Bureau of National Statistics

4. Disease Specific Morbidity Rate

4.1 Ishaemic (coronary) heart disease age 30 and above based on history and ECG criteria

Region	1991-92		1996
	Male	Female	
Whole Nation	1.1	1.1	
Central (exclude BKK)	0.9	1.0	
North	1.1	1.6	
Northeast	0.8	0.9	
South	1.2	0.5	
Bangkok	2.6	1.9	

Source: Report of Thailand Health Examination Survey 1991 and 1996; Data of 1996 was not available

4.2 Diabetes (Age 15 and above) is defined as fasting blood sugar above 126 mg%

Region	1991		1996	% of 1990 Burden	1997 Risk Relative to Central Region
	Male	Female			
Whole Nation	2.0	2.8	4.0	166.7	0.77
Central (exclude BKK)	2.4	3.3	5.2	182.5	1.00
North	1.1	2.7	5.4	284.2	1.04
Northeast	2.0	2.5	3.5	155.6	0.67
South	2.5	2.8	1.8	67.9	0.35
Bangkok			6.1		

Source: Report of Thailand Health Examination Survey 1991 and 1996; Data of 1996 was not classified by sex.

4.3 Hypertension (Age 15 and Above): Hypertension is defined by a rise of systolic above 140 and /or diastolic above 90 mmHg

Region	1991		1996	% of 1990 Burden	1997 Risk Relative to Central Region
	Male (%)	Female (%)			
Whole Nation	5.2	5.7	10.2	187.16	0.69
Central (exclude BKK)	10.8	12.6	14.8	126.50	1.00
North	3.7	5.0	9.0	206.90	0.61
Northeast	3.2	3.3	7.0	215.38	0.47
South	3.2	2.6	9.1	313.79	0.61
Bangkok	8.5	6.1	13.4	183.56	0.91

Source: Report of Thailand Health Examination Survey 1991 and 1996. Data of 1996 was not classified by sex.

4.4 Pneumonia

Age	Central		Northern		North-Eastern		Southern	
	1990	1997	1990	1997	1990	1997	1990	1997
Under 28 days	296	395	191	382	382	400	147	209
1-11 months	5,382	7,976	2,986	7,715	9,042	13,283	3,519	6,539
1+	4,146	5,971	2,577	6,554	8,166	13,114	2,088	5,322
2+	2,356	3,534	1,705	4,428	4,928	7,907	1,094	3,138
3+	1,626	2,087	1,138	2,419	3,063	4,445	738	1,693
4+	941	1,338	663	1,397	1,789	2,659	385	1,083
5+	996	821	619	779	1,552	1,698	417	617

Age	Central		Northern		North-Eastern		Southern	
	1990	1997	1990	1997	1990	1997	1990	1997
6+	612	576	429	468	1,372	1,271	264	401
7-9	1,254	1,012	944	893	2,807	2,265	615	668
10-14	758	792	567	671	1,510	1,515	371	439
15-24	718	897	492	676	875	1,027	281	509
25-34	741	1,339	662	1,285	964	1,552	348	672
35-44	650	1,029	596	1,198	994	1,282	275	532
45-54	607	815	656	990	969	1,535	277	464
55-64	907	1,257	967	1,619	1,431	2,235	488	767
65+	1,425	3,195	1,215	3,374	1,587	3,978	743	2,140
Unknown	48	32	17	1	39	1	10	2
Total	23,463	33,066	16,424	34,849	41,470	60,167	12,060	25,195

Source : Annual epidemiological surveillance report 1990 and 1997

- 4.5 COPD : Death from COPD, the Bureau of Policy and Planning, Ministry of Public Health was 0.12 per 100,000 in 1990 and 1.43 per 100,000 in 1997. No breakdown is available for region and sex.

Percent of cases with Chronic Obstructive Pulmonary Disease (COPD)

Region	1991		1996
	Male	Female	
Whole Nation	1.6	1.3	
Central (exclude BKK)	1.0	1.2	
North	1.7	1.6	
Northeast	1.3	1.3	
South	2.1	1.2	

Source: Report of Thailand Health Examination Survey 1991 and 1996. Data of 1996 was not available.

- 4.6 Diarrhea (including dysentery)

Acute Diarrhea : By Age Group and Region

Age	Central		Northern		North-Eastern		Southern	
	1990	1997	1990	1997	1990	1997	1990	1997
Under 28 days	2370	2148	1,347	1612	1,302	1233	735	593
1-11 months	38,813	49,375	25,638	33,552	32,526	48,565	19,090	24,193
1+	25,043	35,113	19,314	31,084	27,880	44,330	13,241	20,885
2+	10,926	16,167	9,418	16,068	13,160	20,096	6,801	11,397
3+	6,555	9,086	5,562	8,976	7,147	10,706	4,125	6,525
4+	3,982	6,052	3,586	6,014	4,448	6,861	2,708	4,541
5+	4,118	4,615	2,917	4,259	3,686	5,285	2,378	3,470
6+	2,876	3,788	2,399	3,459	8,465	4,298	2,047	2,870
7-9	8,005	9,143	5,955	7,349	8,515	3,575	5,292	6,990
10-14	9,630	12,787	6,504	9,547	9,548	13,254	6,140	8,682
15-24	27,457	38,755	13,641	15,386	17,812	24,217	11,642	17,407
25-34	30,824	45,047	19,323	22,446	24,230	36,778	13,220	20,537
35-44	17,998	30,306	12,709	21,262	19,035	32,744	8,254	15,167

Age	Central		Northern		North-Eastern		Southern	
	1990	1997	1990	1997	1990	1997	1990	1997
45-54	12717	18537	9,540	14079	16,309	26665	6,146	9036
55-64	11940	16812	10,437	14676	16,448	24156	6,049	8423
65+	13,364	20554	10,930	13013	16,668	28229	6,324	9914
Unknown	371	178	295	16	176	-	110	21

Source : Annual epidemiological surveillance report 1990 and 1996

Dysentery : By Age Group and Region

Age	Central		Northern		North-Eastern		Southern	
	1990	1997	1990	1997	1990	1996	1990	1996
Under 28 days	58	22	46	46	74	36	12	8
1-11 months	2,608	1472	1,936	1484	4,619	4,333	853	668
1+	1,933	877	1,834	1324	4,869	3,620	705	476
2+	1,198	565	1,230	1010	3,731	2,222	435	309
3+	686	320	842	605	2,003	1,275	324	190
4+	432	222	523	383	1,174	682	234	119
5+	346	124	373	288	870	512	175	76
6+	275	95	297	221	765	322	167	63
7-9	612	187	718	383	1,722	598	416	130
10-14	663	234	793	492	1,656	729	445	137
15-24	1,939	638	2,144	964	3,219	1,375	976	256
25-34	2,465	998	3,261	1730	4,651	2,525	1,282	444
35-44	1,565	757	2,174	1611	3,538	2,255	821	327
45-54	1,054	467	1,470	938	2,989	1,821	454	181
55-64	984	415	1,582	958	2,745	1,551	522	175
65+	912	465	1,327	975	2,478	1,563	460	159
Unknown	16	4	35	3	21	-	11	2

Source : Annual epidemiological surveillance report 1990 and 1997

4.7 Hepatitis B

By Age Group and Gender

Age	Total		Male		Female	
	1990	1997	1990	1997	1990	1997
0-27 days	4	2	2	1	2	1
-11 months	14	13	5	8	9	5
1-	14	6	8	6	6	0
2-	12	2	6	1	6	1
3-	10	2		1	5	1
4-	6	2	4	2	2	0
5-	10	7	5	4	5	3
6-	11	7	4	3	7	4
7-9	38	20	25	8	13	12

Age	Total		Male		Female	
	1990	1997	1990	1997	1990	1997
10-14	76	48	35	27	41	21
15-24	1,333	406	376	149	657	257
25-34	1,162	441	275	187	887	254
35-44	283	211	127	129	156	82
45-54	89	99	64	61	25	38
55-64	68	67	40	42	28	25
65+	26	30	9	17	17	13
Unknown	6	7	2	1	4	6
Total	3162	1370	992	647	2170	723
Rate/100,000	5.6	2.25	3.52	2.29	7.14	2.37

Source : Annual epidemiological surveillance report 1990 and 1997

By Region

Region	1990	1997
Central Region	2046	691
North Region	490	321
North-Eastern Region	430	233
South Region	196	125
Greater Bangkok	1616	511

Source : Annual epidemiological surveillance report 1990 and 1997

- 4.8 HIV/AIDS, STDs : There is a drastic reduction of STDs reported cases, which demonstrated an effort of the Action and Research section of the Government in coping with the sexually transmitted diseases.

Sexually Transmitted Diseases: By Age Group and Region

Age	Central		Northern		North-Eastern		Southern	
	1990	1997	1990	1997	1990	1997	1990	1997
Under 28 days	195	25	47	3	42	5	44	3
1-11 months	49	12	24	4	29	10	12	6
1+	19	11	6	3	8	4	9	-
2+	15	6	10	2	5	15	3	3
3+	20	10	10	-	6	6	9	4
4+	19	5	14	4	1	10	4	2
5+	19	8	16	4	6	7	11	5
6+	20	6	15	-	9	13	4	1
7-9	33	11	20	4	12	14	18	6
10-14	544	43	247	18	35	27	216	15
15-24	35,016	3481	11,792	443	3,639	835	12,826	564
25-34	19,164	4833	7,717	844	2,700	1139	6,115	820
35-44	3,399	2318	1,827	643	640	748	1,073	394
45-54	745	654	436	198	189	273	216	97

Age	Central		Northern		North-Eastern		Southern	
	1990	1997	1990	1997	1990	1997	1990	1997
55-64	232	196	138	72	72	113	92	48
65+	92	84	55	41	32	52	39	44
Unknown	70	18	32	-	8	-	12	-

Source : Annual epidemiological surveillance report 1990 and 1997

Number of AIDS by Age Group: 1984 – 1997

Age Group	1984-1996	1997
0-4	3359	1003
5-9	1067	161
10-14	18	14
15-19	786	240
20-24	8,770	2,729
25-29	18,867	7,188
30-34	14,806	6,103
35-39	9,175	3,519
40-44	4,495	1,953
45-49	2,331	881
50-54	1,161	402
55-59	846	259
60+	1,000	285
Unknown	66	4
Total	65,847	24,741

Source : Key Statistic of Thailand 1999 (Special Edition), National Statistical Office

Number of AIDS by Region : 1984 - 1998

Region	1984-1996	1997
Bangkok Metropolis	6,479	2,331
Central	16,410	7,034
Northern	28,708	9,128
North Eastern	9,759	3,827
Southern	4,491	2,421
Whole Kingdom	65,847	24,741

Source : Key Statistic of Thailand 1999 (Special Edition), National Statistical Office

4.9 Malaria: By Age Group and Region

Age	Central		Northern		North-Eastern		Southern	
	1990	1997	1990	1997	1990	1997	1990	1997
Under 28 days	3	5	-	6	2	2	3	-
1-11 months	238	119	154	173	29	14	75	80
1+	428	181	237	270	68	10	121	123
2+	528	270	268	303	105	12	194	161

Age	Central		Northern		North-Eastern		Southern	
	1990	1997	1990	1997	1990	1997	1990	1997
3+	657	327	313	322	90	21	199	149
4+	586	348	292	371	102	19	208	168
5+	692	346	310	329	135	23	253	160
6+	670	349	339	288	149	38	290	169
7-9	2,267	1,215	990	1,115	525	98	849	598
10-14	4,983	2,950	1,812	2,069	1,004	269	1,371	1,092
15-24	26,954	6,514	7,354	4,142	3,582	872	4,085	2,109
25-34	22,618	6,521	6,036	3,732	3,193	1,073	2,966	2,116
35-44	9,212	4,496	2,520	2,503	1,367	638	1,344	1,282
45-54	3,436	2,272	967	1,122	605	312	703	650
55-64	1,363	1,180	503	618	304	181	398	356
65+	472	622	183	421	177	97	217	284
Unknown	60	22	27	-	16	-	13	-

Source : Annual epidemiological surveillance report 1990 and 1997

4.10 Dengue hemorrhagic fever: By Age Group and Region

Age	Central		Northern		North-Eastern		Southern	
	1990	1997	1990	1997	1990	1997	1990	1997
Under 28 days	5	29	1	12	8	14	-	3
1-11 months	521	759	235	148	278	409	376	113
1+	442	691	205	181	410	506	413	156
2+	660	1,040	368	316	897	954	620	258
3+	1,099	1,426	700	449	1,550	1,518	1,073	311
4+	1,230	1,829	957	641	1,976	2,141	1,298	381
5+	1,621	2,119	1,176	753	2,583	2,632	1,721	426
6+	1,657	2,406	1,490	949	3,128	3,054	2,132	407
7-9	5,215	7,513	4,777	3,208	9,854	9,981	6,222	1,378
10-14	5,164	10,611	4,727	4,338	7,595	9,338	6,700	1,508
15-24	1,440	5,242	1,517	2,051	840	1,457	2,936	543
25-34	357	131	879	1,137	109	19	1,073	192
35-44	79	471	465	968	41	73	386	68
45-54	18	125	168	359	21	34	158	26
55-64	13	39	112	210	11	22	63	12
65+	12	53	22	142	30	19	28	12
Unknown	33	37	17	2	19	0	24	1

Source : Annual epidemiological surveillance report 1990 and 1997

4.11 Cancer

Regions	Rate of Cancer/100,000			
	1990		1997	
	Male	Female	Male	Female
Whole Nation (All cancer)			52.9	35.0
Whole Nation (Lung cancer)	3.25	0.71	11.3	2.9
Central				
Northern				
North-Eastern				
Southern				

Source: Calculated from the number of cases reported to the National Cancer Institute

Rate of Lung Cancer

	1990		1997	
	Male	Female	Male	Female
Rate/100,000	3.25	0.71	11.3	2.9
% of 1990 Burden			347.7%	408.5%

4.12 Immunizable disease

Age	Central		Northern		North-Eastern		Southern	
	1990	1997	1990	1997	1990	1997	1990	1997
Under 28 days	3	5	-	6	2	2	3	0
1-11 months	238	113	154	173	29	14	75	80
1+	428	181	237	270	68	10	121	123
2+	528	270	268	303	105	12	194	161
3+	657	327	313	322	90	21	199	149
4+	586	348	292	371	120	19	208	168
5+	692	346	310	329	135	23	253	160
6+	670	349	339	288	149	38	290	169
7-9	2,267	1,215	990	1,115	525	98	849	598
10-14	4,983	2,950	1,812	2,069	1,004	269	1,371	1,092
15-24	26,954	6,514	7,354	4,142	3,582	872	4,085	2,109
25-34	22,618	6,521	6,036	3,732	3,193	1,073	2,966	2,116
35-44	9,212	4,496	2,520	2,503	1,367	638	1,344	1,282
45-54	3,436	2,272	967	1,122	605	312	703	650
55-64	1,363	1,180	3	618	304	181	398	356
65+	472	622	183	421	177	97	217	284
Unknown	60	22	27	0	16	0	13	1

Source : Annual epidemiological surveillance report 1990 and 1997

- 4.13 Accident and Occupational Injuries : The results of silicosis surveillance in 1993 by the Department of Health showed an average chest X-ray positive in 6.4% of 2,157 workers examined. Most (83%) of these workers are male. There is no reason to believe that male and female workers given the same exposure will have a different rate of abnormal X-ray.

Death rates per 100,000 population due to traffic accident were also on the rise from 1990 and 1996. Many more males have become accident victims compared to females. The rate of accident death in males has been more than four times that of females but the rate of rise seems to be equivalent between both sexes.

Death Rate due to Traffic Accident

Sex	Death Rate in 1990	Death Rate in 1996	Death 1996/Death 1990
Male	24	47	1.96
Female	4.9	9.8	2.00

Source: Bureau of Planning, Ministry of Health, 1996

- 4.14 Occupational disease : By Age Group and Region

Age	Central		Northern		North-Eastern		Southern	
	1990	1996	1990	1996	1990	1996	1990	1996
Under 28 days		-		-		-		-
1-11 months		10		3		4		2
1+		29		11		9		2
2+		31		14		10		3
3+		28		12		8		4
4+		12		3		5		-
5+		7		3		3		-
6+		6		4		2		-
7-9		45		21		14		4
10-14		75		32		16		5
15-24		694		350		117		24
25-34		933		525		130		22
35-44		758		462		90		14
45-54		437		268		51		7
55-64		237		146		29		1
65+		104		54		20		4
Unknown		1		1		-		-

Source : Annual epidemiological surveillance report 1990 and 1996

5. Nutrition

5.1 Obesity

Age groups	1991 (Percentage)
20-29	20.4
30-39	10.07

Age groups	1991 (Percentage)
40-49	14.2
50-59	13.95
60+	5.7

Source : Health System Research Institute

Region	1990 Male Obesity and Over Weight	1990 Female Obesity and Over Weight	Risk of Obesity and Over Weight in Male Relative to Central Region	Risk of Obesity in female Relative to Central Region
Central	16.2	29.8	1.00	1.00
North	9.6	20.2	0.59	0.68
Northeast	11.7	20.0	0.72	0.67
South	13.2	25.7	0.81	0.86
Bangkok	21.9	35.6	1.35	1.19

5.2 Under Weight Birth: By Region

Regions	% of Under Weight Birth	
	1990	1996
Central	9.2	8.3
Northern	11.4	9.3
North-Eastern	10.3	8.0
Southern	9.2	7.6
Eastern	10.1	8.6

Source : Bureau of Planning, Ministry of Health, 1996

5.3 Malnutrition below Age 20 (All Degree) using the Modified Gomez (below 5 year) and Percentile 10 as criteria for classification of malnutrition.

Region	% Malnutrition (all degree)		
	1991-92		1996*
	Male	Female	
Whole Nation			8.4
Central	12.2	20.7	20
Northern	19.9	21.9	22
North-Eastern	19.7	20.9	31.7
Southern	19.3	20.0	25
Bangkok	15.4	12.9	8.4

Source : Report of the Health Examination Survey B.E. 1991; and B.E. 1996 * represent the rate of the people in non-municipality.

5.4 Micro-nutrient Malnutrition (Iodine Deficiency) The rate in 1998 is 42.38% of the rate in 1990

Regions	% of Iodine Deficiency	
	1990	1996
Whole Nation	16.78	7.12

Source : Department of Health, MOPH 1996.

Health Sector Indicators

1. Access, Coverage and Facilities

1.1 Coverage Rate of Some Care

Percentage of Coverage of Immunization by Vaccine

Region	BCG		Hepatitis B		DPT3	
	1990	1997	1990	1997	1990	1997
Whole Kingdom		96.95		88.47		92.51
Central		91.73		86.11		92.94
Northern		99.75		90.82		94.31
North Eastern		98.85		90.65		93.70
Southern		97.87		85.16		87.78

1.2 Facilities

1.2.1 Hospital or Health Facilities

Number of Hospitals by Region

Region	Public		Private		Total	
	1990	1997	1990	1997	1990	1997
Bangkok Metropolis	32	40	50	78	82	118
Central Region	190	246	64	132	254	378
Northern Region	163	202	31	64	194	266
North Eastern Region	245	295	27	43	272	338
Southern Region	125	160	32	41	157	201
Whole Kingdom	755	943	204	358	959	1,301

Source: Annual Public Health Resource Report 1990 and 1997

Hospital per Bed Ratio (population per hospital)

Region	Public		Private		Total	
	1990	1997	1990	1997	1990	1997

Region	Public		Private		Total	
	1990	1997	1990	1997	1990	1997
Bangkok Metropolis	173,341.78	180,973.75	110,938.74	92,807.05	67,645.57	61,347.03
Central Region	67,478.11	55,438.75	200,325.64	103,317.67	50,475.75	36,079.19
Northern Region	67,446.58	55,339.46	354,638.45	174,665.17	56,669.03	42,024.70
North Eastern Region	80,934.45	69,863.33	734,405.22	479,294.95	72,900.52	60,975.39
Southern Region	56,902.10	50,356.25	222,273.81	196,512.20	45,304.22	40,084.58
Whole Kingdom	74,573.87	64,392.51	275,996.43	169,614.91	58,710.40	46,673.43

Source: Annual Public Health Resource Report 1990 and 1997

1.2.2 Number of Bed

Number of Beds by Region

Region	Public		Private		Total	
	1990	1997	1990	1997	1990	1997
Greater Bangkok	13,645	17,487	3,997	9,842	17,642	27,329
Central Region	17,074	34,361	2,299	3,025	19,373	37,386
Northern Region	12,821	20,321	1,544	5,553	14,365	25,874
North Eastern Region	14,115	22,728	1,056	3,074	15,171	25,802
Southern Region	8,723	13,565	996	2,451	9,719	16,016
Whole Kingdom	66,378	108,462	9,892	23,945	76,270	132,407

Source: Annual Public Health Resource Report 1990 and 1997

Population to Bed Ratio (population per bed)

Region	Public		Private		Total	
	1990	1997	1990	1997	1990	1997
Greater Bangkok	13,645	17,487	3,997	9,842	17,642	27,329
Central Region	17,074	34,361	2,299	3,025	19,373	37,386
Northern Region	12,821	20,321	1,544	5,553	14,365	25,874
North Eastern Region	14,115	22,728	1,056	3,074	15,171	25,802
Southern Region	8,723	13,565	996	2,451	9,719	16,016
Whole Kingdom	66,378	108,462	9,892	23,945	76,270	132,407

Source: Annual Public Health Resource Report 1990 and 1997

2. Equity in Finance and Human Resources

2.1 Finance by Group : Population Coverage, Payment Mechanisms, and Benefits of the Various Insurance Schemes

Scheme	Population covered	Payment	Benefits (Bahts)
Civil Servants	5.8 millions	Fees for Service	1,781
Social Security	8.8 millions	Capitation	712
WCF	8.8 millions	Fees for Service	96
Health Card	5.0 millions	Capitation	190
Low Income/Elderly	14.6 millions	Global Budget	225
Primary School Kids	5.5 millions	Capitation	30

Scheme	Population covered	Payment	Benefits (Bahts)
Total Covered	40.5 millions		
Not Covered	19.5 millions		

2.2 Human Resources for Health

Number of Human Resources for Health by Region

Region	Physician		Dentist		Pharmacist		Nurse	
	1990	1997	1990	1997	1990	1997	1990	1997
Greater Bangkok	6,435	7,771	1,253	1,651	2,706	2,847	17,434	17,808
Central	1,535	3,100	294	657	351	1,145	9,262	23,065
Northern	1,703	2,079	236	398	399	757	8,259	67,941
North Eastern	1,719	2,109	293	460	414	685	8,867	17,321
Southern	1,127	1,510	209	248	239	507	6,670	12,096
Total	12,519	16,569	2,285	3,414	4,109	5,941	50,492	13,508

Source: Annual Public Health Resource Report 1990 and 1997

Population to Human Resources for Health Ratio by Region (Population/Number of personnel)

Region	Physician		Dentist		Pharmacist		Nurse	
	1990	1997	1990	1997	1990	1997	1990	1997
Greater Bangkok	862.0	931.53	4,426.9	4,384.59	2,049.9	2,542.66	318.2	406.50
Central	8,352.3	4,399.3	43,608.3	20,757.89	36,526.6	11,910.86	1,384.2	591.28
Northern	6,455.5	5,376.9	46,583.9	28,086.86	27,553.4	14,766.94	1,331.1	164.53
North Eastern	11,535.2	9,772.3	67,675.6	44,803.66	47,896.0	30,087.13	2,236.3	1,189.87
Southern	6,311.2	5,335.8	34,032.4	32,487.90	29,760.5	15,891.52	1,066.4	666.09
Total	4,497.4	3,664.8	24,640.4	17,786.21	13,702.4	10,220.86	1,115.1	439.28

Source: Annual Public Health Resource Report 1990 and 1997

Non-Health Input to Health Indicators

1. Population

Number of Population from Registration Record by Sex and Region

Region	Total		Male		Female	
	1990	1997	1990	1997	1990	1997
Bangkok Metropolis	5,546,937	7,238,950	2,770,895	3,482,976	2,776,042	3,755,974
Central Region	12,820,841	13,637,933	6,408,264	6,748,919	6,412,577	6,889,014
Northern Region	10,993,792	11,178,571	5,513,089	5,643,038	5,480,703	5,535,533
North Eastern Region	19,828,941	20,609,683	9,926,909	10,380,895	9,902,092	10,228,788
Southern Region	7,112,762	8,057,000	3,562,045	4,034,051	3,550,717	4,022,949
Whole Kingdom	56,303,272	60,722,137	28,181,202	30,289,879	28,122,071	30,432,258

Source: Key Report of Migration Survey 1997 and Statistic of Thailand 1999 (Special Edition), National Statistical Office; Department of Registration, Ministry of Interior;

2. Household

Region	1990	1998
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Region	1990	1998
Whole Kingdom	13,746,582	16,327,700
Greater Bangkok	2,272,877	2,841,020
Central Region	2,564,493	3,151,246
Northern	2,891,022	3,232,885
North Eastern	4,298,036	5,045,259
Southern	1,720,154	2,057,290

Source : Report of the 1990 Household Socio-Economic Survey and Preliminary Report of the 1998 Household Socio-Economic Survey, National Statistical Office

Life Style Indicators

1. The Prevalence of Regular Smokers

The Percentage of Smoker in Population of More Than 10 year-old by Gender and Habitat 1991

Type of Smoking	Municipality		Non-Municipality	
	Male	Female	Male	Female
Used to smoke	35.7	5.6	41.3	4.6
Quitted	12.2	3.3	10.3	1.2
Never smoke	52.1	91.1	48.4	94.2

Source : Health Examination Survey 1991-1992 and , Health System Research Institute

The Percentage of Smoker in Population of More Than 10 year-old by Gender and Habitat 1991

Region	Municipality		Non-Municipality	
	Male	Female	Male	Female
North Eastern	35.9	1.7	44.1	1.8
Central	36.0	6.1	37.9	6.4
Northern	36.6	6.9	32.1	9.3
Southern	39.4	3.9	38.6	5.0
Bangkok	35.2	9.3	-	-

Source : Health Examination Survey 1991-1992 and , Health System Research Institute

The Percentage of Smoker by Gender and Sampling Region, Weighted by Population in Municipality and Non-Municipality

Sampling Region	Total (%)	Male	Female
Bangkok Metropolis	1.7	44.1	1.8
Central	6.1	37.9	6.4
Northern	6.9	32.1	9.3
North Eastern	3.9	38.6	5.0
Southern			
Total	9.3	-	-

Source : Health Examination Survey 1991-1992 and , Health System Research Institute

2. The Prevalence of Regular Alcohol Use

The Percentage of Smoker in Population of More Than 10 year-old by Gender and Habitat in 1991

Type of Alcohol Use	Municipality		Non-Municipality	
	Male	Female	Male	Female
	1991	1991	1991	1991
Frequently	8.8	1.8	6.7	0.8
Sometimes	30.2	18.8	34.8	16.1
Quitted	9.7	6.4	9.9	6.1
Never	51.3	73.0	48.6	77.0

Source : The 1st National Health Examination Survey 1991 – 1992, Health System Research Institute

The Percentage of Smoker in Population of More Than 10 year-old by Gender and Habitat in 1991

Region	Municipality		Non-Municipality	
	Male	Female	Male	Female
	1991	1991	1991	1991
North Eastern	7.7	0.9	5.4	0.3
Central	9.0	2.9	10.4	1.9
Northern	9.4	0.8	6.1	1.1
Southern	8.1	0.6	7.3	0.6
Bangkok	11.3	3.1	-	-

Source : The 1st National Health Examination Survey 1991 – 1992, Health System Research Institute

3. The Prevalence of Regular Use of either Heroin, Stimulants and other Hard Drug There are other sources information on alcohol consumption, classified by sex and region. However, the definitions of consumption are unclear and therefore not included in the comparison.

The Prevalence of Regular Use of either Heroin, Stimulants and other Hard Drug per 100,000

Region	1992	1994	% of 1996 rate of 1991 Rate	Rate Relative to the Central Region
Nationwide	77.3	82.2	106.34	1.39
Central	141.9	59.0	41.58	1.00
North	103.14	88.4	85.71	1.50
Northeast	8.7	9.1	104.60	0.15
South	58.65	48.3	82.35	0.82

Source: Statistical Data Bank and Information Dissemination Division, National Statistical Office, the Number of Population at year 1990 and 1997 were used for calculation of the rate in 1992 and 1994 respectively (i.e., 1992 figure slightly overestimated and 1994 figure slightly underestimated)

4. The Prevalence of Men (%) with Multiple Sex Partners

Region	Municipal Area	Non-Municipal Area	Rate in Municipal Area Relative to the Central Region	Rate in Non Municipal Area Relative to the Central Region
Nationwide	20.0	8.5	1.32	0.64
Central	15.1	13.2	1.00	1.00
North	16.5	6.2	1.09	0.47
Northeast	16.7	9.6	1.11	0.73
South	22.7	5.8	1.50	0.44
Bangkok	26.3		1.74	

Source: Report of Health Examination Survey 1996, Bureau of Health Policy and Planning 1996;

Human Development Indicators

1. Human Development Index (HDI)

Region	HDI
Total	0.699
Greater Bangkok	0.967
Central	0.826
Southern	0.633
Northern	0.566
North Eastern	0.403

Urban vs. Rural	HDI
Urban Area	
Northern	0.8920
Central	0.8721
North Eastern	0.8458
Southern	0.8059
Rural Area	
Northern	0.6225
Central	0.6133
North Eastern	0.5629
Southern	0.5176

Region	GRP	HDI
North Eastern	4,622	0.370
Northern	6,952	0.886
Southern	7,197	0.941
Central	7,298	0.963
Greater Bangkok	7,441	0.995
Total	7,278	0.959

Efficiency Indicators

1. Expenditure on Health as the Percentage of GDP

Country	Total % of GDP	% Expenditure on Health by Government	% Expenditure on Health by People
Malaysia	3.4	2.7	0.8
Thailand	5.9	1.6	4.3
China	4.0	2.8	1.2
India	4.3	1.6	2.7

2. Expenditure per IMR and Expenditure per Life Expectancy

The Efficiency of Thai Health System (data from 15, 21)

Country	GDP (US\$ 1992)	IMR/1000	Life Expectancy 1995
China	1950	44 (1992)	69
India	1230	82 (1992)	62
The Philippines	2550	44 (1992)	66
Thailand	5950	37 (1992)	69.0
Sri Lanka	2850	18 (1992)	73
Malaysia	7790	13 (1992)	71

3. The cost of treatment per outpatient visit and per in-patient admission: Estimated Medical Expenditure on Out-Patient (OPD) and In-Patients (IPD) for the various insurance schemes:

Scheme	Public Facilities		Private Facilities	
	Per OPD	Per IPD	Per OPD	Per IPD
Care for Low Income/Aged (1993)	58	2,746	Irrelevant	Irrelevant
Civil Servant (1994)	463	9,981	Not allowed	12,128
Social Security (1994)	140	4,260	373	10,244
Health Card (1993)	60	1,558	Irrelevant	Irrelevant

Affordability Indicators

1. % of Expenditure on Health versus Household Expenditure

Region	% of Household		Household Expenditure		Expenditure on Medical Care		% of Expenditure on Medical Care per Household Expenditure	
	1990	1998	1990	1998	1990	1998	1990	1998
Whole Kingdom	100	100	65,244	129,828	2,220	3,504	3.40	2.70
Greater Bangkok	14.9	17.4	124,284	250,992	4,620	7,104	3.72	2.83

Region	% of Household		Household Expenditure		Expenditure on Medical Care		% of Expenditure on Medical Care per Household Expenditure	
	1990	1998	1990	1998	1990	1998	1990	1998
Central	17.6	19.3	67,920	135,576	1,992	4,032	2.93	2.97
Northern	21.9	19.8	54,264	100,212	1,752	2,844	3.23	2.84
North Eastern	32.7	30.9	54,624	90,408	1,632	2,076	2.99	2.30
Southern	12.9	12.6	61,920	121,488	2,100	3,012	3.39	2.48

Source: Report of the 1990 Household Socio-Economic Survey and Preliminary Report of the 1998 Household Socio-Economic Survey, National Statistical Office

Comparison between % Health Expenditure of Household Expenditure in 1998 and 1990 and

Region	% Health Expenditure of Household Expenditure		% in 1998 of 1990 base year	1998 %Health Expenditure Relative to Central Region
	1990	1998		
Whole Kingdom	3.40	2.70	79.41	0.95
Greater Bangkok	3.72	2.83	76.08	1.00
Central	2.93	2.97	101.37	1.05
Northern	3.23	2.84	87.93	1.00
North Eastern	2.99	2.30	76.92	0.81
Southern	3.39	2.48	73.16	0.88

Sustainability Indicators

1. Percent of People with different behavior

Region	No Drug	Traditional Medicine	Drugstores	Rate of Drug for Self Care Relative to Central Region
Whole Kingdom	6.82	3.16	37.40	1.11
Greater Bangkok	11.9	3.40	45.70	1.35
Central	6.83	1.69	33.73	1.00
Northern	5.15	4.99	34.67	1.03
North Eastern	6.61	3.29	39.06	1.16
Southern	3.58	2.53	34.97	1.04

Source: Report of Health Examination Survey 1996

2. Choice of Health Services if Needed: Number and use of different types of Health Facilities according to the type of illnesses.

Region	Traditional Healers	Public Facilities	Private Facilities	Rate of Use of Private Facilities Relative to Central Region
Whole Kingdom	1.94	64.64	29.94	0.88

Region	Traditional Healers	Public Facilities	Private Facilities	Rate of Use of Private Facilities Relative to Central Region
Greater Bangkok	1.60	41.20	47.40	1.39
Central	1.54	51.46	34.11	1.00
Northern	2.02	78.01	33.92	0.99
North Eastern	2.01	73.60	14.61	0.43
Southern	2.69	69.71	38.68	1.13

Source: Report of Health Examination Survey 1996

3. The Source of Finance for Health Expenditure:

Region	Welfare	Borrow	Insured	Self or Relative	Rate of Self Payment Relative to Central Region
Whole Kingdom	1.72	1.10	31.44	65.74	0.89
Greater Bangkok	1.00	0.20	21.70	77.1	1.05
Central	3.33	1.01	22.08	73.58	1.00
Northern	1.03	1.02	35.22	62.73	0.85
North Eastern	1.18	1.78	37.14	59.90	0.81
Southern	2.00	0.51	38.14	59.35	0.81

Source: Report of Health Examination Survey 1996