Health Situation Analysis of Thai Population 2010: Implications for Health Education and Health Service Reform

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Background: *Between 1990 and 2010, many national and international factors converged to both beneficially and antagonistically affect people's health and the Thai healthcare system. Moreover, Thailand is moving to aged society and a low birth rates.*
Objective: *To analyze Thailand's health issues for baseline information for changing medical education, services and researches.*
Material and Method: *Information on illness of in-patients, out-patients and casualties came from hospitals nationwide and from hospitals withdrawals from the three health insurance schemes in fiscal 2010. The data included 96% of the population. Research literature was also extensively reviewed. The data were analyzed by age groups and burdensome diseases.*
Results: *Out-patients were treated 326,230,155 times and in-patients 6,880,815 times at Community Hospitals (44%), Provincial Hospitals (22%), Central or University Hospitals (26%) and Private Hospitals (8%). Infants and elderly were the patients most commonly treated in hospital. Among pediatric patients, perinatal disease, intestinal infection, respiratory tract infection, injury and poisoning and teenage pregnancy predominated; while among adults, it was accident, non-communicable and chronic disease.*
Conclusion: *Thailand is faced with the dual burden of infection and non-communicable diseases. Risky behavior and changing social structure are underlined this epidemiological transition. Medical schools and health service systems need to be recalibrated to response proactively to these challenges.*

Keywords: *Burden of illness, Epidemiological transition, Health education reform, Health services reform*

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Emerging diseases (*e.g.*, SARS, Avian influenza [Bird flu], multi- or extensive-drug resistant diseases), re-emerging diseases (*e.g.*, TB, STDs) and complex humanitarian emergencies (from natural disasters, war and terrorism) have overwhelmed the healthcare system, requiring it to adapt and be bolstered and caregivers trained in holistic, integrative approaches to healthcare.

The Faculties of Medicine and the Health Science Consortia of Thailand have their mission to produce medical practitioners, to provide medical services, to conduct researches to solve local health problems, to prevent diseases and to promote health. The faculties fulfill their mission as they continuously supply the healthcare personnel and allied researchers needed to meet the health needs and trends of Thai society. Integral to success is the active fine-tuning of the medical and health sciences curricula in response to changes in demographics, socio-economics and medical knowledge and technology. The health consortia, therefore, work cooperatively with public and private health organizations in order to attain this beneficial outcome for all Thai society.

In the last two decades, the economic development was deviated from agriculture to industrialize country. Many internal and external factors have compelled changes in Thai society such

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as economic globalization, tourism and investment influxes and population structure (*i.e.,* a low birth rate, more elderly). These factors have contributed to a change in the traditional Thai way of life, people has to cope with urbanization, materialism, consumerism and leisure activities.

Both deterioration of the natural environment and rising economic expectations have led to a crisis, motivating working members of families and/or whole families to move from the countryside to urban centers. Moreover, the education system inadvertently promotes the dislocation of people from the country-side to cities. Thus, with surging urbanization, education legislated to the age of eighteen and readily accessible mass media, people are acutely aware of the urban/rural disparity, the developed/under-developed disparity and basic human rights and democratic privilege.

Global developments in sciences and technology have resulted in great benefits and numerous innovations; many of which are copyrighted or patented and therefore expensive and/or with a high risk of incorrect or extrinsic use. Crucially, these innovations have made Thailand dependent on imports and support from outside the country. A case in point is medical technology, which has changed rapidly, owing to an exponential expansion in knowledge and the development of highly accurate, electronic, computer-assisted devices. It is, therefore, compulsory that medical personnel undergo training to increase awareness of the new information, techniques and devices and to improve their capacity and skills. One conspicuous benefit of these changes has been a dramatic decrease in infectious diseases while the downside has been an equally dramatic increase in environmental (urbanization- and/or industry-related), chronic (age-related) and complicated (social-interactionally-related) diseases.

Several socio-political factors have changed in the last two decades which have produced an enormous impact upon healthcare, including: (a) the National Health Act (b) introduction of the Universal Health Care Coverage (c) reforms to the national bureaucracy (d) decentralization of government services (e) developments in the delivery of healthcare (f) adoption of health promotion policy (g) widespread participation in democratic processes (h) movement toward the rule of law in civil society (i) consumer protections (j) integration of traditional Thai health wisdom with modern medicine[1]. Awareness of the fore-going variables helps to inform and equip physicians, public health trainers and health system policy-makers to identify health factors and trends[2,3], in order to make appropriate and timely healthcare decisions, including reforming health services (*e.g.*, screening, treatment, health prevention and promotion) and health education (service system functioning and problem analysis and subsequent training of healthcare service providers) (Fig. 1)[4-6].

Solving any health issue requires that the authors consider the context, the associated factors (past and present) and future knock-on affects. The analytical team then forms a conceptual framework from which to work (Fig. 2)[7].

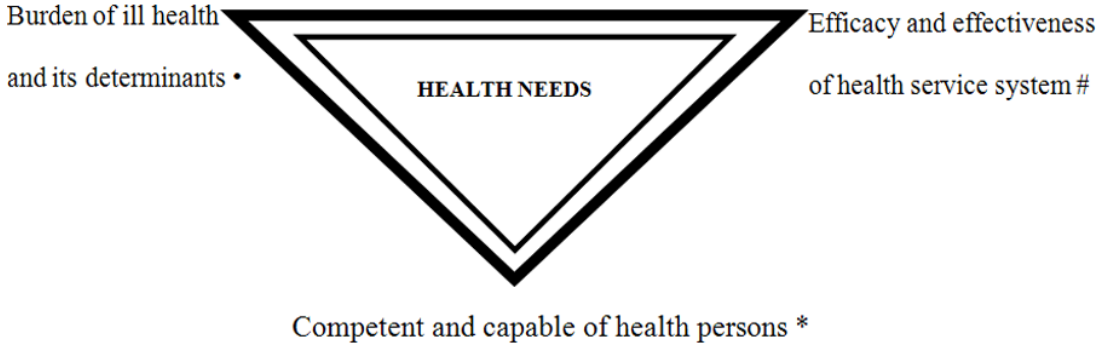

Fig. 1 Components of health needs assessment

• Burden of ill health is a health situation analysis, which enables decision-makers to identify serious health problems and its determinants facing the population

* Competency and capability of health personnel to develop knowledge, skills, commitment, structures, systems and leadership which enable healthful living management

Health service system that will use the best available information regarding the causes and contributing factors of health needs and the most effective and cost- effective interventions in given contexts and populations

The most reliable available health data are from hospital reports of morbidity and mortality of patients served under the public health insurance system, which covers more than 96% of the total population. At present, in Thailand, there are three substantial but distinct public health financing schemes covering the population (1) the Social Security Scheme covers workers in the casual employment sector (2) the Civil Servant Medical Benefits Scheme covers government employees and their dependents while (3) the remaining population is covered by the Universal Coverage (UC) Scheme (*viz.*, the 30-baht program). The main characteristics of these three schemes are summarized in Table 1.

Objective

The authors objective was to analyze the Thai healthcare delivery system in 2010 by using information from the Universal Health Care System, the Social Welfare System, the Civil Service Benefits System and research reports. This information was assessed according to the subclasses of (a) age group (0-12 months, 1-5 years, 6-12 years, 13-18 years, 19-59 years and +60 years) (b) high burden diseases (including cancers, teenage pregnancy, child and adolescent psychiatry, accidents, diabetes and coronary artery disease). The emphasis was to reform the medical curriculum and health service system. These categories of information will also serve as baseline data for future health research.

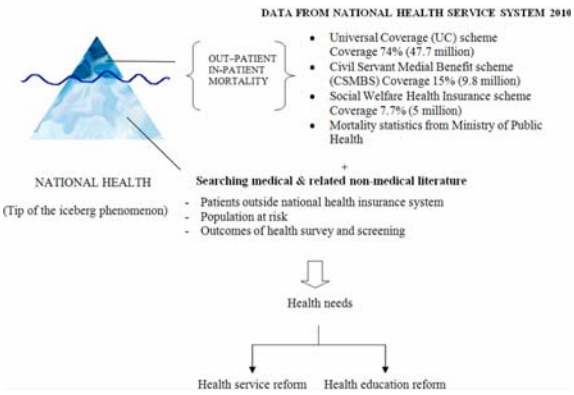

Fig. 2 Conceptual framework for health situation analysis in Thailand

Material and Method

Data included both in- patient and out-patient Medical Expense Forms for the fiscal year 2010 (October 1, 2009 and September 30, 2010) from the National Health Security Office (NHSO) and the Social Security Office, Thailand and in-patient data from the Civil Servant Medical Benefit Scheme from the Computer Control General's Department (Table 2).

Data received analyst team: An analyst team checked data received for accuracy in: (a) overlapping; information; (b) visiting dates; (c) missing items; (d) incorrect coding and (e) correctly dating the fiscal year. The basic statistical analysis of variables, including frequency and interrelationships, were calculated using the SPSS program. After analyzing the data, the research team passed on the primary analysis to ten medical specialists in order to check the face validity of the information. Upon confirmation of face validity, the data were compared to the Ministry of Public Health's Statistics Report 2010 for trend congruence as well as the hospital's mortality reporting for each age and disease group for a comparison with the National Death Registration of the Registry Administration, Ministry

Table 1. Main characteristics of health financing schemes in Thailand in 2010

Scheme	Target population	Coverage in 2010/ population	Source of funds	Payment method
Civil Servant Medical Benefit Scheme (CSMBS) since 1963	Government employees, Retirees and dependents	7.7% 5,015,542	General tax, non-contributory	Fee for service reimbursement
Social Health Insurance* since 1990	Private sector employees	15.1% 9,787,795	Payroll tax tripartite contribution	Capitation and price list payment
UC Scheme since 2002	Remaining population	73.7% 47,710,902	General tax, non-contributory	Capitation for OP and P&P global budget and DRG for IP

Remark: Total Thai population in 2010 was 64.76 million people

Table 2. Information data on in- and out-patients in the Thai National Health Insurance Scheme*

In-Patients	Out-Patients
1. Individual personal code	1. Individual personal code
2. Hospital code	2. Hospital code
3. D/M/Y of birth	3. D/M/Y of birth
4. Sex	4. Sex
5. D/M/Y of admission	5. D/M/Y of out-patient visit
6. D/M/Y of discharge	6. Clinic
7. Discharge status	7. Primary diagnosis (PDX) ICD 10
8. Hospital charge	8. Operations/Procedures/
Procedures (ICD 9 CM)	Non Procedures (ICD 9 CM)
9. Primary diagnosis (PDX) ICD 10	9. Referral hospital
External causes of morbidity (ICD 10)	
10. Secondary diagnosis (SDX) (co-morbidity) (ICD 10)	10. Transfering hospital
Complications (ICD 10)	
11. Operations/Procedures/Non Procedures (ICD 9CM)	
12. Discharge Status and type of Discharge	
13. Cause of death	

* For newborns; the newborn infant summary data was used. Labour and delivery using labour and delivery summary data

of Interior Affairs[8].

Results

Morbidity

Data in 2010 from the UC Scheme indicates that in- vs. out-patients accounted for 5,654,194 admissions vs. 299,317,437 visits. The Civil Servant Medical Benefit Scheme had 707,591 in-patient admissions vs. an unknown number of out-patients visits. By comparison, the Social Security Scheme had 519,029 in-patient admissions vs. 26,912,718 out-patient visits.

Out-Patients Department (OPD)

The UC and Social Health Insurance schemes recorded 326,230,155 OPD visits. The rate of OPD visits per 1,000 population was highest for infants attending the Well Child Clinic (at least three times in the first year of life) while the second highest was for persons over 60 years old. The respective OPD visit rate per 1,000 population by age group was 14,911, 8,458, 4,849, 3,096, 3,020, 3,748, 6,587, 10,982, 12,413 and 9,263 for patients between 0-1, 1-5, 6-12, 13-18, 19-24, 25-39, 40-59, 60-69, 70-79 and 80^{+} years of age (Fig. 3 and Table 3).

In-Patients Department (IPD)

In 2010, there were 6,880,815 in-patient admissions: 3,037,677 (44%) at primary care hospitals, 1,520,358 (22%) at secondary care hospitals, 1,812,435 (26%) at tertiary care hospitals and 510,340 (8%) private hospitals (Fig. 4). Most in-patients admissions were in South Thailand (116.3 per 1,000 population), followed by Central (112.9 per 1,000), the North (101.7 per 1,000) and Northeast (98.3 per 1,000) (Fig. 5).

Since most infants have been delivered in hospital, the largest group by age treated in hospital was infants (age 0-1 years) (1,241 times per 1,000 populations). The descending rank was then +80 years, 70-79, 60-69, 1-5, 40-59, 19-24, 25-39, 13-18 and 6-12 years old, respectively. The respective in-hospital treatment rate was 1,241.0, 328.9, 296.6, 189.1, 126.5, 86.6, 85.0, 68.8, 61.6 and 57.0 times per 1,000 populations. These trends indicate that as age rises persons have a growing chance of becoming severe symptomatic.

According to illness by age groups, diseases or causes of death in the elderly demanded more healthcare resources for longer hospital stays and high expense interventions and/or life support (Fig. 3 and Table 3).

The assessment of the frequency of attending the In- vs. the Out-patient Department by age group was done in order to assess the main problems and dimensions for each stage of life. The predominant out-patient health complaints and what cluster of symptoms led to hospital admission were also determined and then categorized by age group in order to estimate the burden of diseases (*i.e.,* cost to the healthcare service

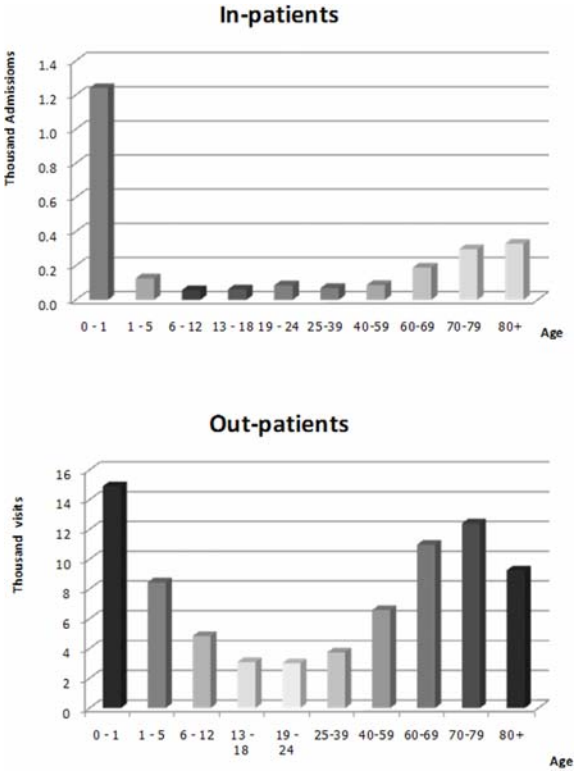

Fig. 3 Rates of in-patient hospital admission and out-patient visits per 1,000 population by age group in 2010

provision system).

Based on information from young outpatients (0-18 years), the top five ailments leading to an out-patient visit included: intestinal infection, respiratory infection, diseases of the digestive system and diseases of the skin and subcutaneous. Injury and poisoning ranked fourth-among individuals 1 year or less and those between 13-18 years (Table 4).

Out-patients among the youth (19-25 years) and working age (25-39 years) consulted the doctor because of intestinal infection, respiratory infection diseases of the digestive system and musculoskeletal system. Injury and poisoning were reported frequently among the youth. Among the older working group (40-59 years) and the elderly (+60), chronic degenerative diseases (*i.e.*, endocrine, nutrition and metabolic diseases; diseases of the circulatory system, diseases of the musculoskeletal system) were the leading causes of illness leading to out-patient clinic visits (Table 4 and 5).

In-patients, for pediatric in-patients by age group revealed that among infants, the normal live birth and diseases related to birth and the perinatal period,

Table 3. Number and rate per 1,000 population of in-patient hospital admissions (IPD) and out-patient visits (OPD) by age group in 2010

Age Group (Years)	0-1	1-5	6-12	13-18	19-24	25-39	40-59	60-69	70-79	80+
IPD										
Population	674,293	3,849,802	5,828,237	5,803,260	6,243,113	15,462,466	17,162,126	3,941,907	2,387,937	1,011,415
Number	836,799	486,845	332,234	357,604	530,456	1,064,061	1,486,435	745,587	708,164	332,630
Rate/1,000	1,241.0	126.5	57.0	61.6	85.0	68.8	86.6	189.1	296.6	328.9
OPD *										
Population	662,944	3,705,493	5,467,740	5,359,908	6,127,326	14,774,494	15,179,702	3,339,864	1,910,618	821,200
Number	9,885,195	31,341,927	26,514,926	16,597,158	18,508,372	55,380,192	99,999,762	36,679,041	23,716,477	7,607,103
Rate/1,000	14,911.1	8,458.2	4,849.3	3,096.5	3,020.6	3,748.4	6,587.7	10,982.2	12,413.0	9,263.4

* Data available only from UC Scheme and Social Health insurance

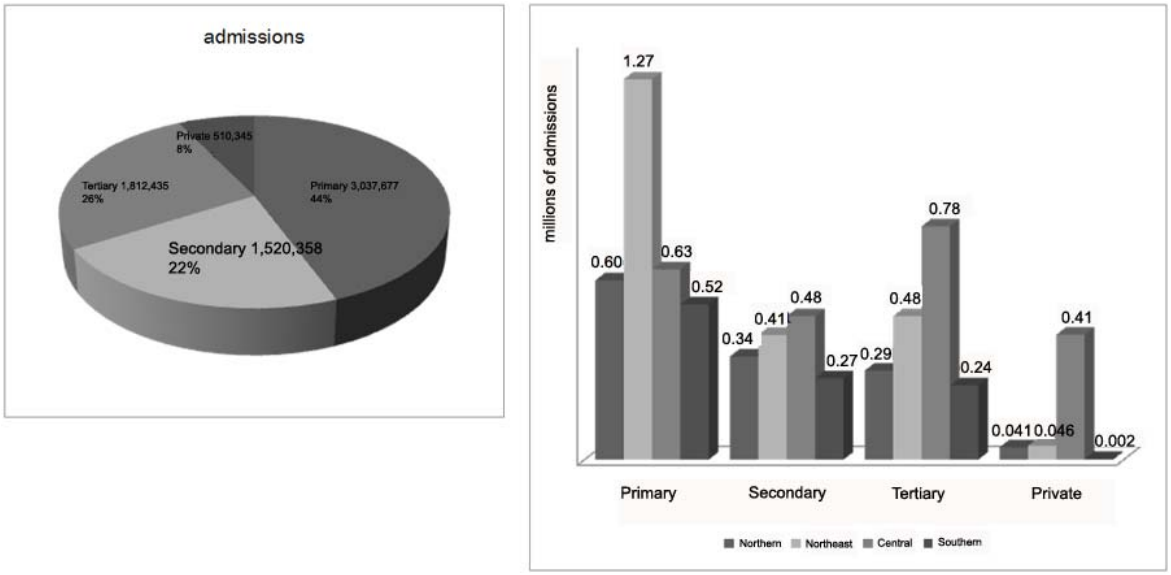

Fig. 4 Number of in-patient hospital admissions by hospital level and region of the country in 2010

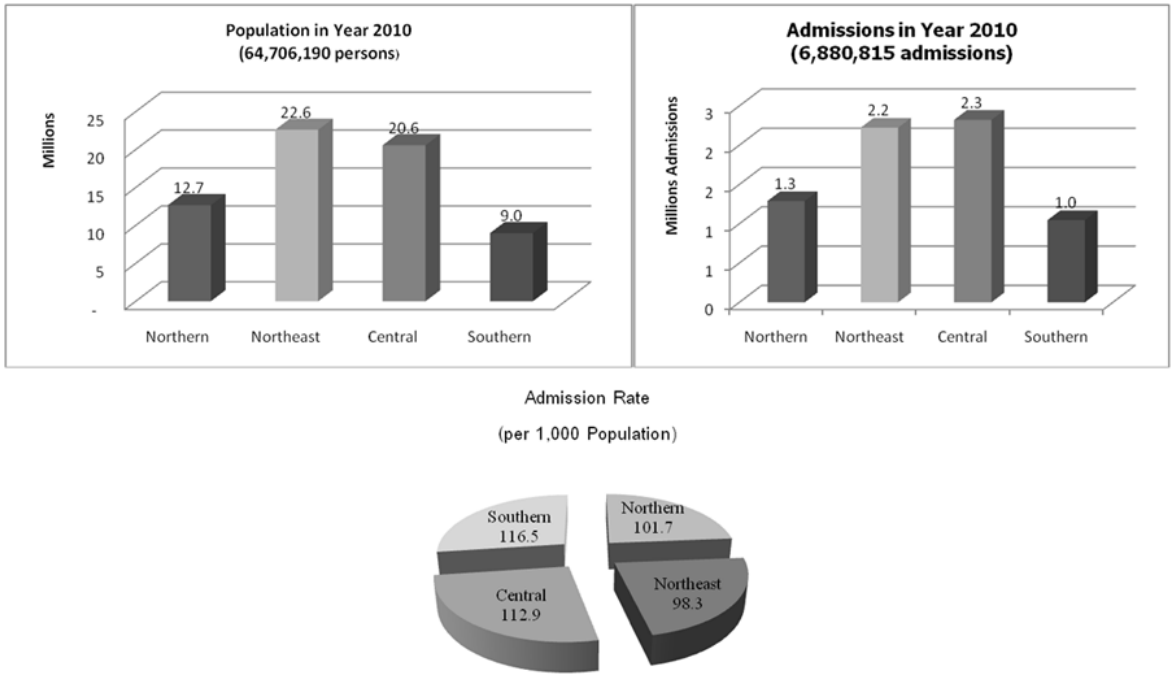

Fig. 5 Number of in-patient hospital admissions and admission rate by region of the country in 2010

i.e., congenital malformations followed by respiratory and intestinal infection, were the leading causes of hospital admission. Among pre-school age children (1-5 years), aside from respiratory and intestinal infection, injury and poisoning, diseases of the digestive system and other infectious were the leading causes. Whereas school-age children (between 6-12 years), respiratory infections was the prominent leading cause of admission, followed by arthropod-borne viral fevers among which dengue fever was the major disease. Intestinal infection was a minor illness in this age group, while injury and poisoning and diseases of the digestive system rank the third and fourth causes of admission.

Among adolescents (between 13-18 years),

Table 4. Top five reasons of out-patient visits (OPD) and primary diagnosis (ICD 10) of children, adolescents and youths by age group in 2010

Age group (Years)	1	2	3	4	5
0-1	Z00-Z99 Factors influencing health	A00-A09 Intestinal infection	J00-J47 Respiratory infections	K00-K93 Diseases of the digestive system	L00-L99 Diseases of the skin and subcutaneous
n	6,874,018	1,598,028	232,311	224,004	196,485
%	(69.5)	(16.2)	(2.4)	(2.3)	(2.0)
1-5	Z00-Z99 Factors influencing health	J00-J47 Respiratory infections	K00-K93 Diseases of the digestive system	L00-L99 Diseases of the skin and subcutaneous	S00-T98 Injury and poisoning
n	17,384,962	7,387,132	1,154,094	952,751	582,506
%	(55.5)	(23.6)	(3.7)	(3.0)	(1.9)
6-12	Z00-Z99 Factors influencing health	J00-J47 Respiratory infections	K00-K93 Diseases of the digestive system	L00-L99 Diseases of the skin and subcutaneous	S00-T98 Injury and poisoning
n	12,551,331	5,491,678	2,413,856	873,084	865,046
%	(47.3)	(20.7)	(9.1)	(3.3)	(3.3)
13-18	Z00-Z99 Factors influencing health	J00-J47 Respiratory infections	K00-K93 Diseases of the digestive system	S00-T98 Injury and poisoning	V01-Y98 External causes of morbidity & mortality
n	8,158,221	2,019,064	1,393,769	877,459	650,885
%	(49.2)	(12.2)	(8.4)	(5.3)	(3.9)
19-25	Z00-Z99 Factors influencing health	J00-J99 Diseases of the respiratory system	K00-K93 Diseases of the digestive system	R00-R99 Symptoms, signs and abnormal clinical and laboratory	S00-T98 Injury and poisoning
n	8,783,240	2,092,827	1,321,059	1,011,398	814,781
%	(47.5)	(11.3)	(7.1)	(5.5)	(4.4)

Table 5. Top five reasons of out-patient visits (OPD) and primary diagnosis (ICD 10) of adult and elderly patients by age group in 2010

Age group(Years)	1	2	3	4	5
25-39	Z00-Z99 Factors influencing health	J00-J99 Diseases of the respiratory system	M00-M99 Diseases of the musculoskeletal system	K00-K93 Diseases of the digestive system	R00-R99 Symptoms, signs and abnormal clinical and laboratory
n	23,970,333	6,111,538	3,609,504	3,462,649	3,289,723
%	(43.3)	(11.0)	(6.5)	(6.3)	(5.9)
40-59	Z00-Z99 Factors influencing health	E00-E90 Endocrine, nutritional and metabolic diseases	I00-I99 Diseases of the circulatory system	M00-M99 Diseases of the musculoskeletal system	R00-R99 Symptoms, signs and abnormal clinical and laboratory
n	39,436,368	8,625,485	8,373,666	8,075,520	6,277,136
%	(39.4)	(8.6)	(8.4)	(8.1)	(6.3)
60-69	Z00-Z99 Factors influencing health	I00-I99 Diseases of the circulatory system	E00-E90 Endocrine, nutritional and metabolic	M00-M99 Diseases of the musculoskeletal diseases	R00-R99 Symptoms, signs and abnormal clinical and system aboratory
n	11,903,510	5,256,714	4,620,709	3,062,996	2,467,749
%	(32.5)	(14.3)	(12.6)	(8.4)	(6.7)
70-79	Z00-Z99 Factors influencing health	I00-I99 Diseases of the circulatory system	E00-E90 Endocrine, nutritional and metabolic diseases	M00-M99 Diseases of the musculoskeletal system	R00-R99 Symptoms, signs and abnormal clinical and laboratory
n	7,007,253	4,016,896	2,506,109	1,975,816	1,928,180
%	(29.5)	(16.9)	(10.6)	(8.3)	(8.1)
80+	Z00-Z99 Factors influencing health	I00-I99 Diseases of the circulatory system	R00-R99 Symptoms, signs and abnormal clinical and laboratory	M00-M99 Diseases of the musculoskeletal system	E00-E90 Endocrine, nutritional and metabolic diseases
n	2,215,757	1,387,248	757,271	575,551	540,699
%	(29.1)	(18.2)	(10.0)	(7.6)	(7.1)

Table 6. Top five causes of in-patient admissions (IPD) and primary diagnosis (ICD 10) in children, adolescents and youths by age group in 2010

Age group(Years)	1	2	3	4	5
0-1	Z00-Z99 Factors influencing health	P00-P96 Certain conditions originating in the perinatal period	J00-J47 Respiratory infections	A00-A09 Intestinal infection	Q00-Q99 Congenital malformations
n	390,933	249,761	87,421	43,371	146,23
%	(46.7)	(29.8)	(10.4)	(5.2)	(1.7)
1-5	J00-J47 Respiratory infections	A00-A09 Intestinal infection	S00-T98 Injury and poisoning	K00-K93 Diseases of the digestive system	A15-B99 Other infectious
n	225,183	83,293	26,156	24,779	19,243
%	(46.3)	(17.1)	(5.4)	(5.1)	(4.0)
6-12	J00-J47 Respiratory infections	A75-A99 Arthropod-borne viral fevers	S00-T98 Injury and poisoning	K00-K93 Diseases of the digestive system	A00-A09 Intestinal infection
n	71,684	49,104	37,484	36,888	34,170
%	(21.6)	(14.8)	(11.3)	(11.1)	(10.3)
13-18	O00-O99 Pregnancy	S00-T98 Injury and poisoning	A75-A99 Arthropod -borne viral fevers	K00-K93 Diseases of the digestive system	J00-J47 Respiratory infections
n	73,030	57,225	53,325	37,215	24,668
%	(20.4)	(16.0)	(14.9)	(10.4)	(6.9)
19-25	O00-O99 Pregnancy	S00-T98 Injury and poisoning	A00-B99 Certain infectious and parasitic diseases	K00-K93 Diseases of the digestive system	J00-J99 Diseases of the respiratory system
n	231,611	70,481	67,609	37,484	28,889
%	(43.7)	(13.3)	(12.7)	(7.1)	(5.4)

teenage pregnancy and delivery was the major cause of admission followed by injury and poisoning. These two entities are major emerging public health problems that need immediate intervention at the national level.

The incidence of other diseases: Arthropod borne viral fever, diseases of the digestive system and respiratory infection were similar to the school-age children (Table 6).

The leading cause of hospital admission among youths (between 19-25 years) and young adults (between 25-39 years) was similar to adolescents; with pregnancy, injury and poisoning being the major health problems, followed by systemic infections and diseases of the respiratory and digestive systems.

For older adults (between 40-59 years), diseases of the digestive system are the main health problem followed by certain infectious disease. Neoplasms is the third cause of admission follow by injury, poisoning and diseases of genitourinary system.

In persons 60 years and over, the most common health problems that require hospital admission are chronic degenerative diseases of multi-organs, *i.e.,* of the respiratory, circulatory, digestive and genitourinary system (Table 6 and 7). Diseases of these organs system will be analyzed and presented elsewhere in the subsequent papers in this special issue of the Journal of Medical Association of Thailand (Table 7).

Mortality

Statistics on Causes of Deaths were analyzed from the civil registration database of the Bureau of Registration Administration, Ministry of Interior, after the coding for underlying cause of death was done under ICD-10 basis by the Bureau of Policy and Strategy, Ministry of Public Health.

The comparison of the number of in-hospital deaths and the mortality rate per 100,000 population was done for each age group; as recorded by Public Health Insurance schemes and at the Ministry of Public Health. 471,194 deaths were registered in 2010, 32% (132,512) of all deaths occurred in hospital. 74% of infants died in hospital while 71% of elderly died at home as shown in Table 8. The overall national mortality rate was 6.4/1,000 population. The infant mortality rate was 7.0/1,000 live births while the rate for children under 5 was 9.8/1,000 live births (Table 8).

The top five causes of in-hospital death were investigated and compared by age groups as shown in Table 9. Diseases of respiratory system were the most common denominator.

Health expenditures

Hospital charges (in Thai baht) sent for reimbursement was used to represent the health expenditure for each disease. The resulting figure was not always the same as the amount public insurance schemes paid back to the hospital. The top five hospital charges and causes of admission were shown in Table 10.

Length of hospital stay is another indicator of national health expenditures. Avoiding hospital admission means having hospital beds available for critically ill persons. The top five lengths of hospital stay were analyzed by age and found it correlated with hospital expenditures as shown in Table 11.

Discussion

The present study aimed to identify the burden of ill health (diseases) among Thais and its determinants. The plan was to use all available health information in Thailand in order to reform the medical curriculum and health service system. The data sources included outpatient data and the inpatient discharge forms which every hospital must submit for reimbursement from any one of the three schemes of public health insurance, which cover 96% of the population. The data of both outpatient and inpatient comprises: demographics and diagnosis, type of hospital, hospital charges, length of stay and mortality. These data allowed an analysis by the 21 disease groups as per the International Classification of Disease version 10 (ICD 10).

Information presented in the present study included: (a) morbidity of outpatients and inpatients; (b) in-hospital mortality and death registration with the Ministry of Interior Affairs; (c) hospital charges for inpatients; and (d) length of hospital stay. These data demonstrated that when people get sick and need medical assistance, only disease information and related health data were available for analysis. The determination of overall lifestyle issues was not available. Moreover, people seeking medical help from private clinics or hospitals are not included in the Public Insurance Schemes so their data are also not included in the analysis. Overall, then, based on surveys, hospital reports, insurance and mortality data, the information at hand represents only a fraction of the reality as the tip of the iceberg (Fig. 2). Clearly, better more integrative reporting is needed for more responsive development of national healthcare policy and healthcare personnel training.

Notwithstanding limitations, the authors analyzed all the available data using subgroup classi-

Table 7. Top five causes of in-patient admissions (IPD) and primary diagnosis (ICD 10) in adult and elderly patients by age group in 2010

Age group(Years)	1	2	3	4	5
25-39	O00-O99 Pregnancy	A00-B99 Certain infectious and parasitic diseases	S00-T98 Injury and poisoning	K00-K93 Diseases of the digestive system	J00-J99 Diseases of the respiratory system
n	311,585	143,718	133,954	101,763	64,841
%	(29.3)	(13.5)	(12.6)	(9.6)	(6.1)
40-59	K00-K93 Diseases of the digestive system	A00-B99 Certain infectious and parasitic diseases	C00-D48 Neoplasms	S00-T98 Injury and poisoning	N00-N99 Diseases of the genitourinary system
n	185,139	173,230	171,436	150,952	149,121
%	(12.5)	(11.7)	(11.5)	(10.2)	(10.0)
60-69	I00-I99 Diseases of the circulatory system	J00-J99 Diseases of the respiratory system	K00-K93 Diseases of the digestive system	C00-D48 Neoplasms	A00-B99 Certain infectious and parasitic diseases
n	99,291	83,282	79,911	75,332	72,255
%	(13.3)	(11.2)	(10.7)	(10.1)	(9.7)
70-79	I00-I99 Diseases of the circulatory system	J00-J99 Diseases of the respiratory system	K00-K93 Diseases of the digestive system	A00-B99 Certain infectious and parasitic diseases	N00-N99 Diseases of the genitourinary system
n	107,066	104,621	70,122	68,415	60,180
%	(15.1)	(14.8)	(9.9)	(9.7)	(8.5)
80 +	J00-J99 Diseases of the respiratory system	I00-I99 Diseases of the circulatory system	A00-B99 Certain infectious and parasitic diseases	K00-K93 Diseases of the digestive system	N00-N99 Diseases of the genitourinary system
n	60,271	56,022	35,123	32,020	30,529
%	(18.1)	(16.8)	(10.6)	(9.6)	(9.2)

Table 8. The number of hospital deaths comparing with mortality statistics and rate per 100,000 population and their ratio by age groups and regions, 2010

Age (years)	Hospital deaths/Regions						Mortality statistics		Ratio
	Northern	Northeast	Central	Southern	Total	Rate	Total	Rate	
0-1*	577	1,196	1,444	769	3,986	591.1	5,366	704.3	0.74
1-5**	150	252	325	162	889	23.1	2,116	52.9	0.42
6-12	119	255	280	158	812	13.9	2,382	40.1	0.34
13-18	273	487	507	225	1,492	25.7	4,834	82.0	0.31
19-25	418	606	913	373	2,310	37.0	8,344	125.5	0.28
26-59	10,404	10,900	22,978	5,002	49,284	153.8	130,657	399.8	0.38
60+	16,268	14,816	34,889	7,766	73,739	931.8	257,495	2,980.8	0.29
Total	28,209	28,512	61,336	14,455	132,512	212.5	411,194	636.9	0.32

* Infant mortality: in-hospital 5.9/1,000 live births Whole-country 7.0/1,000 live births
** Under 5 mortality: in-hospital 7.3/1,000 live births Whole-country 9.8/1,000 live births

fications by age (*i.e.*, newborns, infants, pre-schoolers and school-children, adolescents, young adults, middle age adults and the elderly). The rationale for doing subgroup analysis was based on evidence of differences in many factors regarding health problems, exposure risks, the national expectation of good health, medical services and healthcare providers.

The specific health problems, *i.e.*, pneumonitis, teenage pregnancy, motor vehicle accidents, neoplasms and geriatric disease were also extensively reviewed and analyzed.

To be able to identify the burden of ill health among Thais, specialists from each field were invited (including neonatologists, pediatricians, internists, ophthalmologists etc.) to work together with the research team. Data from specific age groups, diseases and information from the extensive literature review by medical specialist is described in this collection of papers.

The structure of population of Thailand now reflects an aging population. The proportion of aging females (over against males) has increased due to an increased life expectancy (Fig. 6). With population of 64.76 millions, only 761,929 infants were born in 2010. The birth rate was 13.01 per 1,000 populations which was falling as compared to 16.86 in 2000. The mortality rate among infants and children under 5 both in-hospital deaths and registrations was only 7 and 9.8 per 1,000 live births, respectively. The reported infant mortality rate in 2007 was 16.3 per 1,000 live births (Mahidol Population Gazette 2007) and in children under five in 2002 it was 11.7 per 1,000 live births (Public Health Statistics, MOPH). These rates reflect better health education, better health care.

Thailand has been entering into the stage of epidemiological transition; the morbidity and mortality data of the present study confirm that the country continues to grapple with the old paradigm of infectious and communicable diseases, *i.e.*, respiratory infection and digestive system maladies, arthropod-borne virus infections and HIV. While the incidence and mortality of non-communicable diseases due to lifestyles and behavior, accidents and virulence (including motorcycles accidents, assault), heart diseases, endocrine diseases and musculoskeletal diseases are increasing as demonstrated. Thai society is now also faced with ailments of the elderly which require an understanding of geriatric physiology in order to provide appropriate care[9-11].

Other than the dual burden of infectious and non-communicable diseases, the health system and medical personnel also face: the expectations of patients, complex and dynamic situation and changing trends. In the 10th National Health Development Plan (2007-2011), the vision was for a people-centered approach within economic self-sufficiency, as articulated by His Majesty the King. This plan set strategies for building up the healthcare system, for strengthening the community and preparing the nation for the burgeoning number of senior citizens. Medical schools and their curricula need to be recalibrated in order to respond proactively to these transitions in strategies.

Medical and health science students need to be equipped with medical knowledge and skills, plus an understanding of the healthcare system and health

Table 9. Top five causes of in-hospital mortality and primary diagnosis (ICD 10) by age group in 2010

Age group(Years)	1	2	3	4	5
0-18	P00-P96 Certain condition originating in the perinatal period	S00-T98 Injury and poisoning	Q00-Q99 Congenital malformation	J00-J22, J40-J47, J85-J86 Respiratory infections	A15-A74, B00-B99 Other infectious
n	2,403	1,043	874	653	526
%	(33.4)	(14.5)	(12.2)	(9.1)	(7.3)
19-59	A00-B99 Certain infectious and parasitic diseases	C00-D48 Neoplasms	I00-I99 Diseases of the circulatory system	S00-T98 Injury and poisoning	J00-J99 Diseases of the respiratory system
n	11,354	9,366	8,776	5,891	5,393
%	(22.0)	(18.1)	(17.0)	(11.4)	(10.4)
60+	I00-I99 Diseases of the circulatory system	J00-J99 Diseases of the respiratory system	C00-D48 Neoplasms	A00-B99 Certain infectious and parasitic diseases	K00-K93 Diseases of the digestive system
n	18,299	15,559	11,355	10,280	5,101
%	(24.8)	(21.1)	(15.4)	(14.0)	(6.9)

Table 10. Top five hospital charges (bahts) and primary diagnosis (ICD 10) by age group in 2010

Age group(Years)	1	2	3	4	5
0-18	P00-P96 Certain condition originating in the perinatal period	J00-J22, J40-J47, J85-J86 Respiratory infections	S00-T98 Injury and poisoning	Q00-Q99 Congenital malformation	K00-K93, R10-R19 Disease of the digestive system
Sum	2,398,521,542	2,018,629,219	1,307,749,798	1,028,285,505	722,592,478
Mean	9,601.0	4,936.1	10,544.0	38,281.7	6,831.2
19-59	S00-T98 Injury and poisoning	C00-D48 Neoplasms	I00-I99 Diseases of the circulatory system	K00-K93 Diseases of the digestive system	O00-O99 Pregnancy
Sum	6,682,814,117	6,145,258,134	4,837,054,087	4,504,757,450	3,842,284,189
Mean	18,804.3	28,772.9	29,056.6	13,887.0	6,791.5
60+	I00-I99 Diseases of the circulatory system	C00-D48 Neoplasms	J00-J99 Diseases of the respiratory system	K00-K93 Diseases of the digestive system	H00-H59 Diseases of the eye
Sum	7,163,605,831	4,327,924,362	4,300,939,355	2,914,448,863	2,405,285,739
Mean	27,302.5	30,084.1	17,330.3	16,008.8	18,026.6

Table 11. Top five number of duration of hospital stay (days) of IPD and primary diagnosis (ICD 10) by age group in 2010

Age group(Years)	1	2	3	4	5
0-18	P00-P96 Certain condition originating in the perinatal period	J00-J22, J40-J47, J85-J86 Respiratory infections	Z00-Z99 Factors influencing health	A00-A09 Intestinal infection	S00-T98 Injury and poisoning
Sum	1,391,252	1,319,190	1,009,041	429,481	418,988
Mean	5.6	3.2	2.5	2.4	3.4
19-59	S00-T98 Injury, poisoning and certain other consequences of	A00-B99 Certain infectious and parasitic diseases	O00-O99 Pregnancy, childbirth and the puerperium	C00-D48 Neoplasms	K00-K93 Diseases of the digestive system
Sum	1,782,909	1,634,972	1,607,819	1,421,810	1,264,744
Mean	5.0	4.3	2.8	6.7	3.9
60+	J00-J99 Diseases of the respiratory system	I00-I99 Diseases of the circulatory system	C00-D48 Neoplasms	K00-K93 Diseases of the digestive system	A00-B99 Certain infectious and parasitic diseases
Sum	1,496,062	1,470,301	1,100,054	881,470	830,140
Mean	6.0	5.6	7.6	4.8	4.7

Fig. 6 Comparing population transition in Thailand between 2000 and 2010
(Source: Population and Housing Census, National Statistic Office)

in communities. They should be skilled in evidence-based medicine[12], communication, professionalism/ethics, health economics and implementing effective health interventions (including health promotion, disease prevention, treatment and rehabilitation). Training must include chronic diseases, health issues for adolescents and geriatrics and palliative and end-of-life care[13-15].

Study limitations

In the present study, the authors analyzed data from primary to tertiary care hospitals throughout the country; therefore, the reliability and validity of the results depended on correct medical diagnosis and coding. Each of the public health insurance schemes did audits of both the OPD and IPD of every hospital and they found a 10% to 20% error in diagnostics and coding. During the analysis process, the authors asked medical experts in each field to validate the raw data. Caution should therefore be exercised when extrapolating the results.

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Potential conflicts of interest

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การวิเคราะห์สุขภาพของคนไทยในปี พ.ศ. 2553: เพื่อการปรับเปลี่ยนระบบการฝึกอบรมและระบบการให้บริการทางการแพทย์

สุมิตร สุตรา, อรุณ จิรวัฒน์กุล, พิเชษฐ์ ลีละพันธ์เมธา, สมนึก ศิริสุวรรณ, ยุพา ถาวรพิทักษ์, แก้วใจ เทพสุธรรมรัตน์

ภูมิหลัง: *ในสองทศวรรษที่ผ่านมาได้เกิดการเปลี่ยนแปลงอย่างมากในสังคมไทย ทั้งปัจจัยภายนอกและภายในซึ่งมีผลต่อสุขภาพของประชาชนและระบบสุขภาพของประเทศไทย นอกจากนั้นประเทศไทยยังเข้าสู่ยุคของผู้สูงอายุและเด็กเกิดน้อยลงมาก*

วัตถุประสงค์: *เพื่อวิเคราะห์ปัญหาและความต้องการด้านสุขภาพของคนไทยเพื่อปรับเปลี่ยนกระบวนการเรียนการสอน การให้บริการด้านสุขภาพและเป็นข้อมูลพื้นฐานของการวิจัย*

วัสดุและวิธีการ: *โครงการวิจัยได้ใช้ข้อมูลสองส่วน ส่วนแรกอาศัยข้อมูลการเจ็บป่วยทั้งของผู้ป่วยนอก ผู้ป่วยใน และผู้ที่เสียชีวิตในโรงพยาบาล โดยใช้ข้อมูลที่โรงพยาบาลส่งเบิกจ่ายจากสามระบบประกันสุขภาพ ในปีงบประมาณ พ.ศ. 2553 ซึ่งครอบคลุมประชากร ร้อยละ 96 ของประชากรทั้งประเทศ ข้อมูลส่วนที่สองคือข้อมูลจากรายงานการวิจัยจากการทบทวนวารสารงานวิจัย และวิเคราะห์ข้อมูลทั้งสองส่วนตามกลุ่มอายุและภาระโรคที่สำคัญ*

ผลการศึกษา: *ข้อมูลผู้ป่วยนอกที่มารับการรักษาทั้งสิ้น 326,230,155 ครั้ง และผู้ป่วยใน 6,880,815 ครั้ง จากโรงพยาบาลชุมชน 44% โรงพยาบาลจังหวัด 22% โรงพยาบาลศูนย์และมหาวิทยาลัย 26% และโรงพยาบาลเอกชน 8% ผู้ป่วยวัยทารกและผู้ป่วยสูงอายุมาใช้บริการมากที่สุด ในผู้ป่วยเด็ก ภาระโรคที่สำคัญคือ โรคที่เกิดในภาวะปริกำเนิด โรคติดเชื้อทางเดินหายใจและทางเดินอาหาร อุบัติเหตุ การตั้งครรภ์ในวัยรุ่น ในผู้ใหญ่คือ อุบัติเหตุ โรคไม่ติดต่อและการเจ็บป่วยเรื้อรัง*

สรุป: *ประเทศไทยต้องเผชิญกับภาระโรคสองด้านทั้งจากการเจ็บป่วยเนื่องจากโรคติดต่อ และไม่ติดต่อ การเพิ่มขึ้นของโรคจากพฤติกรรมเสี่ยงและการเปลี่ยนแปลงสังคมโครงสร้างมีผู้สูงอายุมากขึ้นนั้น เป็นสาเหตุของการเปลี่ยนแปลงทางระบาดวิทยาของการเจ็บป่วย การปรับเปลี่ยนระบบการฝึกอบรม รวมทั้งระบบสุขภาพเพื่อให้เท่าทันกับการเปลี่ยนแปลงนี้มีความจำเป็นอย่างยิ่ง*