Health Situation Analysis of Thai Children Aged 1-5 Years in 2010: Implications for Health Education and Health Service Reform

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Background: *To make the world fit for children is a task necessarily involves all organizations working with children. The real health situation will be useful for strategic planning for them.*
Objective: *To emphasize Thailand's health burdens of children between 1 and 5 years in 2010.*
Material and Method: *The authors analyzed the fiscal 2010 data from the three health insurance schemes from hospitals nationwide for information on: out-patient and in-patient visits, common illnesses of Thai children between 1 and 5 years, lengths of stay, hospital charges and deaths. Most (96%) of the population was represented in this data.*
Results: *Respiratory infection was the most common admission (225,183 times) while intestinal infection was the second (83,293 times). Respiratory infection was the second most common for an out-patient visit (7, 387,132 times = 23.6%) after other factors influencing health (17,384,963 times = 55.5%). The most common causes of death were injury and poisoning (178 patients) and respiratory infection (175 patients). Pneumonia required the most budget and resulted in the longest stays. Among accidents, accidental drowning and submersion caused the most deaths.*
Conclusion: *Respiratory infection, pneumonia, intestinal infection, injuries, poisoning and accidental drowning were the most common health burdens among children between 1 and 5 years of age.*

Keywords: *Health burdens, Thai Children, Age 1-5 years, Pre-school, Illness*

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Children represent a nation's future; therefore, investment in children is imperative. Child health is not simply the absence of disease and involves more than just providing access to medical care. Health is integrally linked to development and learning and what happens in early life has implications for life. Child health is shaped by multiple environmental and genetic influences[1]. The special UN goals on a World Fit for Children have been adopted by some 180 nations-including Thailand-of a new agenda for the 21st century. The agenda includes 21 specific goals and targets for the next decade, with a focus on: (a) promoting healthy lives (b) promoting quality education for all (c) protecting children against abuse, exploitation and violence and (d) combating HIV/AIDS[2].

The document's declaration commits leaders to completing the unfinished agenda of the 1990 World Summit for Children and to achieving other goals and objectives, in particular those of the UN Millennium Declaration. It reaffirms leaders' obligation to promote and protect the rights of children, acknowledging the legal standards set by the Convention on the Rights of the Child and its Optional Protocols. All of society is called on to join a global movement to build a World Fit for Children, based on a 10-point rallying call that also forms the core of the "Say Yes for Children" campaign[2].

The Plan of Action sets out three necessary outcomes: the best possible start in life for children, access to a quality basic education including free and compulsory primary education and ample opportunity for children and adolescents to develop their individual capacities. There are strong calls to support families, to eliminate discrimination and to tackle poverty. A wide range of actors and partners are called upon to play

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active roles including children themselves, parents, families and other care givers; local governments; parliamentarians; NGOs; the private sector; religious, spiritual, cultural and indigenous leaders; the mass media; regional and international organizations and people who work with children[2].

As a consequence, it is necessary to review health burdens in order to make action plans and strategies for improving people's and particularly children's health. Enabling and empowering the early childhood group (0-5 years of age) to fulfill their highest potential is a golden opportunity with benefits all around[3].

Objective

The present study focused upon the health burdens of children between 1 and 5 years of age with respect to common diagnoses and causes of admissions and deaths, hospital charges for their illnesses and the length of hospital stays. The authors also studied admissions by region and by the level of hospital.

All these factors provide important information for all health sectors in Thailand for development of strategies and plans to meet the ultimate goals of improving the potential of children's physical, mental and spiritual quality of life as set out in 'A World Fit for Children'.

Material and Method

Following Sutra et al in 'Health situation analysis of Thai population 2010: Implications for health education and health service reform', the authors have focused on the health burdens of children between 1 and 5 years of age with regard to (a) out-patient illnesses (b) in-patient illnesses (c) deaths (d) hospital charges (e) length of hospital stays and (f) admissions by region and by hospital level.

Results

I. The top five reasons for out-patient visits, by primary diagnosis, among 1-5 year-olds were: 1) Z00-Z99 factors influencing health (n = 17,384,963 times = 55.5%); 2) J00-J22, J85-J86 respiratory infections (n = 7,387,132 times = 23.6%); 3) K00-K93, R10-R19 disease of the digestive system (n = 1,154,094 times = 3.7%); 4) L00-L99, R20-R23 disease of the skin and subcutaneous tissue (n = 952,751 times = 3.0%); 5) S00-T98 injury and poisoning (n = 582,506 times = 1.9%) (Fig. 1).

II. The top five admissions by primary diagnosis by health insurance group for 1-5 year-olds were: 1) J00-J22, J40-J47, J85-J86 respiratory infections (225,183 times); 2) A00-A09 intestinal infection (83,293 times); 3) S00-T98 injury and poisoning (26,156 times); 4) K00-K93, R10-R19 disease of the digestive system (24,779 times); 5) A15-A74, B00-B99 other infections (19,243 times) (Fig. 2).

III. Of the total 859 deaths of 1-5 year-olds, the top five causes were: 1) injury and poisoning (178); 2) respiratory infections(175); 3) other infections (108); 4) neoplasm (90); and, 5) diseases of nervous system (72) (Fig. 3).

IV. The top five hospital charges of 1-5 year-olds were: 1) J18 pneumonia organism unspecified; 2) A09 diarrhea and gastroenteritis of presumed infectious origin; 3) J20 acute bronchitis; 4) J15 bacterial pneumonia not elsewhere classified; and, 5) Q21 congenital malformations of cardiac septa (Table 1).

V. The top five average hospital charges for 1-

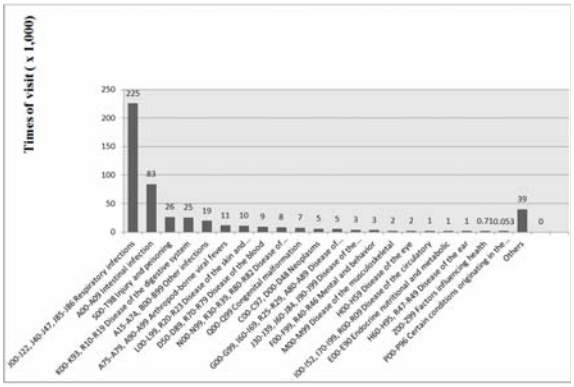

Fig. 1 Number of OPD visits by primary diagnosis in 1-5 year-olds in 2010

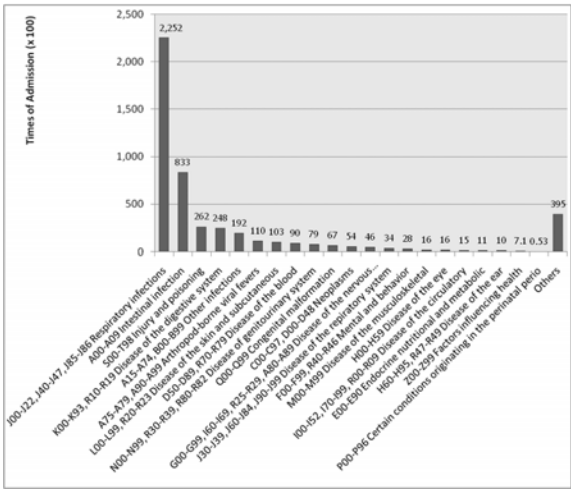

Fig. 2 Number of admissions by primary diagnosis in 1-5 year-olds in 2010

5 year-olds were: 1) Q20 congenital malformations of cardiac chambers and connections; 2) Q21 congenital malformations of cardiac septa; 3) Q25 congenital malformations of great arteries; 4) M30 polyarteritis nodosa and related conditions; and 5) C91 lymphoid leukemia (Table 1).

VI. The top five length of hospital stays for 1-5 year-olds were: 1) J18 pneumonia organism unspecified; 2) A09 diarrhea and gastroenteritis of presumed infectious origin; 3) J20 acute bronchitis; 4) R56 convulsions, not elsewhere classified; and 5) J15 bacterial pneumonia not elsewhere classified (Table 2).

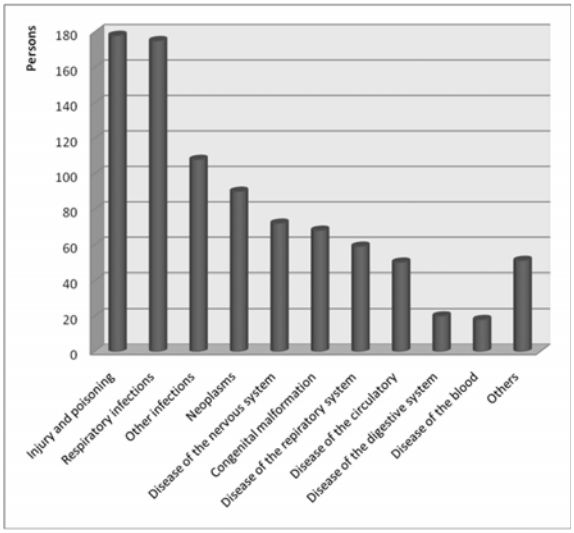

Fig. 3 Causes of death among 1-5 year-olds in 2010

VII. The top five average length of stays for 1-5 year-olds were: 1) F84 pervasive developmental disorders; 2) C91 lymphoid leukemia; 3) J15 bacterial pneumonia not elsewhere classified; 4) J18 pneumonia organism unspecified; and 5) A91 Dengue hemorrhagic fever (Table 2).

VIII. The top five admissions from accidents in 1-5 year-olds were: 1) W00-W19 falls; 2) W20-W49 exposures to inanimate mechanical forces; 3) X40-X49 accidental poisoning by and exposures to noxious substances; 4) Y40-Y84 adverse effects in medical care; and 5) W85-W99, X00-X19 exposures to electric current, fire and heat (Table 3).

Even though the categories W65-W74 accidental drowning and submersion ranked 10th for admissions in this age group (n = 667), they were the top ranked cause of death (n = 74) (Table 3).

The respective second to fifth ranked cause of death by accidents in this age group were: Y40-Y84 adverse effects in medical care (24); land transport accidents (14); W00-W19 falls (14), W85-W99,X00-X19 exposures to electric current, fire and heat (14); V01-

Table 1. Hospital charges (in Baht) by diagnosis in 1-5 year-olds in 2010

Diagnosis	n	Hospital charge (Bahts)	Mean (Bahts)
J18 Pneumonia organism unspecified	51,640	370,252,872	7,169.9
A09 Diarrhea and gastroenteritis of presumed infectious origin	71,497	190,044,478	2,658.1
J20 Acute bronchitis	48,632	180,582,495	3,713.2
J15 Bacterial pneumonia not elsewhere classified	19,679	128,469,101	6,528.2
Q21 Congenital malformations of cardiac septa	985	111,536,676	113,235.2
R56 Convulsions, not elsewhere classified	33,517	101,866,072	3,039.2
J21 Acute bronchiolitis	21,446	78,388,583	3,655.2
J12 Viral pneumonia not elsewhere classified	9,974	47,669,897	4,779.4
J46 Status asthmaticus	10,153	43,838,706	4,317.8
J02 Acute pharyngitis	16,082	43,472,249	2,703.2
C91 Lymphoid leukemia	1,965	41,895,690	21,321.0
Q20 Congenital malformations of cardiac chambers	224	27,888,209	124,500.9
J11 Influenza virus not identified	6,617	27,793,126	4,200.3
J03 Acute tonsillitis	9,526	27,726,467	2,910.6
Q25 Congenital malformations of great arteries	355	27,590,277	77,719.1
K29 Gastritis and duodenitis	12,778	27,460,476	2,149.0
J06 Acute upper respiratory infections	8,794	25,963,382	2,952.4
J05 Acute obstructive laryngitis [croup] and epiglottitis	6,206	25,099,948	4,044.5
M30 Polyarteritis nodosa and related conditions	452	23,748,691	52,541.4
J45 Asthma	6,107	23,276,703	3,811.5

Table 2. Length of hospital stays (days) by diagnosis in 1-5 year-olds in 2010

Diagnosis	n	Hospital stay (days)	Mean (days)
J18 Pneumonia organism unspecified	51,640	195,531	3.8
A09 Diarrhea and gastroenteritis of presumed infectious origin	71,497	169,346	2.4
J20 Acute bronchitis	48,632	138,880	2.9
R56 Convulsions, not elsewhere classified	33,517	87,885	2.6
J15 Bacterial pneumonia not elsewhere classified	19,679	80,642	4.1
J21 Acute bronchiolitis	21,446	60,507	2.8
J02 Acute pharyngitis	16,082	40,039	2.5
J12 Viral pneumonia not elsewhere classified	9,974	33,354	3.3
J46 Status asthmaticus	10,153	28,132	2.8
J03 Acute tonsillitis	9,526	25,615	2.7
K29 Gastritis and duodenitis	12,778	24,360	1.9
J11 Influenza virus not identified	6,617	21,611	3.3
J06 Acute upper respiratory infections	8,794	20,418	2.3
F84 Pervasive developmental disorders	1,595	20,311	12.7
J05 Acute obstructive laryngitis [croup] and epiglottitis	6,206	17,623	2.8
B34 Viral infection of unspecified site	6,847	17,399	2.5
J45 Asthma	6,107	16,341	2.7
A91 Dengue hemorrhagic fever	4,809	16,183	3.4
C91 Lymphoid leukemia	1,965	15,907	8.1
A90 Dengue fever [classical dengue]	5,226	15,535	3.0

Table 3. Number of admissions by accidents and death in 1-5 year-olds in 2010

	Age group 1-5 years					
	Total		Alive		Death	
	Count	%	Count	%	Count	%
W00-W19 Falls	6,961	100.0	6,947	99.8	14	0.2
W20-W49 Exposure to inanimate mechanical forces	4,971	100.0	4,960	99.8	11	0.2
X40-X49 Accidental poisoning by and exposure to noxious subs	3,151	100.0	3,144	99.8	7	0.2
Y40-Y84 Adverse effects in medical care	2,633	100.0	2,609	99.1	24	0.9
W85-W99,X00-X19 Exposure to electric current, fire and heat	2,335	100.0	2,321	99.4	14	0.6
X20-X29 Contact with venomous animals and plants	1,995	100.0	1,993	99.9	2	0.1
X00-X19 Exposure to fire and heat	1,865	100.0	1,859	99.7	6	0.3
W50-W64 Exposure to animate mechanical forces	1,679	100.0	1,679	100.0	0	0.0
V10-19,V30-V89 Land transport accident	1,474	100.0	1,460	99.1	14	0.9
V20-V29 Motorcycle rider injured in transport accident	1,064	100.0	1,051	98.8	13	1.2
W65-W74 Accidental drowning and submersion	667	100.0	593	88.9	74	11.1
V01-V09 Pedestrian injured in transport accident	609	100.0	596	97.9	13	2.1
W85-W99 Exposure to electric current	470	100.0	462	98.3	8	1.7
X85-Y09 Assault	223	100.0	221	99.1	2	0.9
X60-X84 Intentional self-harm	191	100.0	191	100.0	0	0.0
W75-W84 Other accidental threats to breathing	151	100.0	149	98.7	2	1.3
Y85-Y89 Sequelae of external causes of morbidity and mortality	61	100.0	61	100.0	0	0.0
X33 Victim of lightning	4	100.0	4	100.0	0	0.0

V09 pedestrian injured in transport accidents (13); V20-V29 motorcycle rider injured in transport accidents (13) W20-W49; and, exposures to inanimate mechanical forces (11) (Table 3).

Compared to other age groups, admissions because of accidental drowning and submersion was highest in 1-5 year-olds, especially under-twos (Fig. 4). Admissions because of other accidents (*i.e.*, exposures to electric current, fire and heat and accidental poisoning by and exposures to noxious substances) were highest in 1-5 year-olds (Fig. 5).

IX. Admissions in each region and at each hospital level among 1-5 year-olds are presented in Tables 4 and 5. The common types of admissions in each system are presented in Table 6.

Discussion

The 10th National Health Development Plan (2007-2011) captured the concepts and philosophy of Thai Health System Development with the principle that "Good Health is the Product of a Good Society"[4]. The vision for the Thai Health System is a resilient system capable of building good health, adequate services, healthful society and quality of life. This in turn is based on the guidance from His Majesty the King that "society will live together in harmony and practice a sufficient economy philosophy"[4]. Several policies should be considered after reviewing the health burdens of the 1-5 year-olds. This article will focus on some major issues as the details of each illness and morbidity in children are presented further on in this special issue.

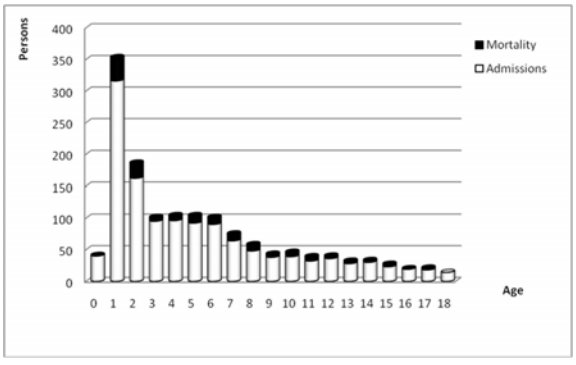

Fig. 4 Admissions by age group of children and adolescents because of accidental drowning (morbidity) and submersion and death (mortality) in 2010

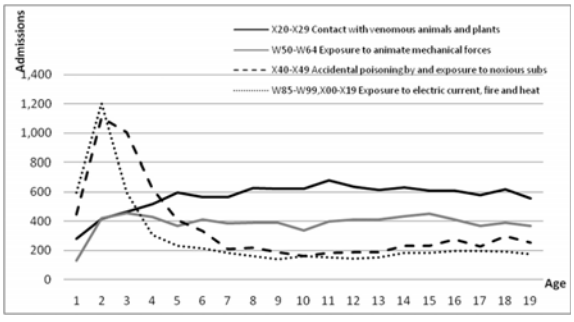

Fig. 5 Number of admissions by age group because of other accidents, 2010

1. Respiratory infection, (a) was the most common cause of admissions for 1-5 year-olds, (b) the second most common cause of out-patient visits and of death, (c) consumed the most budget and (d) resulted in the most lengthy hospital stays. Prevention and control of respiratory tract infection in this age group would be hugely beneficial to the patients and their families and result in significant cost-reductions. Further study is needed concerning the etiology of respiratory infection and pneumonia in this age group in Thailand[5] in order to understand the causative agents and how to better manage the problems. Points to ponder include:

1.1 *Haemophilus influenzae* type b (Hib) is a leading cause of childhood bacterial meningitis, pneumonia and other serious infections. Hib caused ~8.13 million serious illnesses worldwide in 2000 and 371,000 deaths in children between 1 and 59 months of age, of whom 8,100 were HIV-positive and 363,000 HIV-negative[6]. Hib can be completely eliminated through routine vaccinations. In India, Hib vaccine is a cost-effective strategy[7]. Would it not be cost-effective in Thailand as well?

1.2 The long-term sequelae from childhood pneumonia in 1-5 year-olds were systematically reviewed. The meta-analysis revealed that the risk of at least one major sequelae (including, restrictive lung disease, obstructive lung disease, bronchiectasis) was 5.5% among non-hospitalized and 13.6% among hospitalized children. Adenovirus pneumonia was associated with the highest sequelae risk (54.8%) but children hospitalized with no pathogen isolated also had a high risk (17.6%). The most common type of major sequelae was restrictive lung disease (5.4%)[8]. Should this information not be considered when diagnosing an under-five with a respiratory infection, since it consumed the most budget and had the lengthiest stays?

1.3 A randomized, double-blind, placebo-controlled trial on zinc adjunct therapy in children between 6 and 59 months revealed that the supplementation in these children significantly decreased case fatality. The difference in case fatality attributable to the protective effect of zinc therapy was greater among HIV-infected than-uninfected children[9].

Table 4. Admissions by primary diagnosis and regions among 1-5 year-olds in 2010

	Region									
	Total		Northern		Northeast		Central		Southern	
	Count	%	Count	%	Count	%	Count	%	Count	%
Total	486,845	100.0	83,439	17.1	166,818	34.3	147,727	30.3	88,861	18.3
Respiratory infections	225,183	100.0	39,101	17.4	81,992	36.4	66,879	29.7	37,211	16.5
Intestinal infection	83,293	100.0	14,778	17.7	27,895	33.5	24,303	29.2	16,317	19.6
Injury and poisoning	26,156	100.0	4,519	17.3	9,153	35.0	7,960	30.4	4,524	17.3
Disease of the digestive system	24,779	100.0	4,495	18.1	7,363	29.7	7,741	31.2	5,180	20.9
Other infectious	19,243	100.0	3,283	17.1	5,558	28.9	5,574	29.0	4,828	25.1
Arthropod-borne viral fevers	10,965	100.0	1,192	10.9	3,768	34.4	2,285	20.8	3,720	33.9
Disease of the skin and subcutaneous	10,279	100.0	1,819	17.7	3,573	34.8	2,611	25.4	2,276	22.1
Disease of the blood	8,974	100.0	1,815	20.2	3,358	37.4	2,634	29.4	1,167	13.0
Disease of genitourinary system	7,911	100.0	1,480	18.7	2,135	27.0	2,509	31.7	1,787	22.6
Congenital malformation	6,700	100.0	1,003	15.0	1,767	26.4	3,156	47.1	774	11.6
Neoplasms	5,421	100.0	690	12.7	1,459	26.9	2,538	46.8	734	13.5
Disease of the nervous system	4,635	100.0	925	20.0	1,347	29.1	1,634	35.3	729	15.7
Disease of the respiratory system	3,432	100.0	584	17.0	738	21.5	1,126	32.8	984	28.7
Mental and behavior	2,799	100.0	539	19.3	101	3.6	2,123	75.8	36	1.3
Disease of the musculoskeletal	1,631	100.0	291	17.8	473	29.0	608	37.3	259	15.9
Disease of the eye	1,567	100.0	257	16.4	413	26.4	590	37.7	307	19.6
Disease of the circulatory	1,470	100.0	226	15.4	459	31.2	507	34.5	278	18.9
Endocrine nutritional and metabolic	1,121	100.0	200	17.8	412	36.8	367	32.7	142	12.7
Disease of the ear	1,046	100.0	176	16.8	211	20.2	374	35.8	285	27.2
Factors influencing health	710	100.0	122	17.2	252	35.5	256	36.1	80	11.3
Certain condition originating in the perinatal period	53	100.0	11	20.8	15	28.3	21	39.6	6	11.3
Others	39,477	100.0	5,933	15.0	14,376	36.4	11,931	30.2	7,237	18.3

Table 5. Admissions by primary diagnosis and hospital levels among 1-5 year-olds in 2010

	Hospital levels									
	Total		Primary		Secondary		Tertiary		Private	
	Count	%	Count	%	Count	%	Count	%	Count	%
Total	486,845	100.0	285,265	58.6	94,009	19.3	93,305	19.2	14,266	2.9
Respiratory infections	225,183	100.0	149,136	66.2	39,919	17.7	29,004	12.9	7,124	3.2
Intestinal infection	83,293	100.0	52,474	63.0	16,646	20.0	11,782	14.1	2,391	2.9
Injury and poisoning	26,156	100.0	9,931	38.0	7,864	30.1	7,655	29.3	706	2.7
Disease of the digestive system	24,779	100.0	12,362	49.9	5,590	22.6	6,102	24.6	725	2.9
Other infections	19,243	100.0	11,638	60.5	3,532	18.4	3,404	17.7	669	3.5
Arthropod-borne viral fevers	10,965	100.0	6,969	63.6	2,096	19.1	1,689	15.4	211	1.9
Disease of the skin and subcutaneous tissue	10,279	100.0	5,999	58.4	2,121	20.6	1,952	19.0	207	2.0
Disease of the blood	8,974	100.0	1,970	22.0	2,924	32.6	3,893	43.4	187	2.1
Disease of genitourinary system	7,911	100.0	2,939	37.2	2,065	26.1	2,660	33.6	247	3.1
Congenital malformation	6,700	100.0	226	3.4	704	10.5	5,566	83.1	204	3.0
Neoplasms	5,421	100.0	162	3.0	354	6.5	4,886	90.1	19	0.4
Disease of the nervous system	4,635	100.0	1,347	29.1	1,033	22.3	2,143	46.2	112	2.4
Disease of the respiratory system	3,432	100.0	1,331	38.8	772	22.5	1,271	37.0	58	1.7
Mental and behavior	2,799	100.0	139	5.0	31	1.1	2,626	93.8	3	0.1
Disease of the musculoskeletal	1,631	100.0	385	23.6	410	25.1	800	49.0	36	2.2
Disease of the eye	1,567	100.0	421	26.9	336	21.4	771	49.2	39	2.5
Disease of the circulatory	1,470	100.0	598	40.7	293	19.9	545	37.1	34	2.3
Endocrine nutritional and metabolic	1,121	100.0	588	52.5	104	9.3	337	30.1	92	8.2
Disease of the ear	1,046	100.0	448	42.8	223	21.3	338	32.3	37	3.5
Factors influencing health	710	100.0	142	20.0	233	32.8	320	45.1	15	2.1
Certain condition originating in the perinatal period	53	100.0	6	11.3	11	20.8	35	66.0	1	1.9
Others	39,477	100.0	26,054	66.0	6,748	17.1	5,526	14.0	1,149	2.9

Table 6. Common (over 1,000) admissions in each system among 1-5 year-olds in 2010

	Age group (admitted) 1-5 years of age					
	Total		Alive		Death	
	Count	%	Count	%	Count	%
Arthropod-borne viral fevers						
A90-A99 Arthropod-borne viral fevers and viral hemorrhagic fevers	10,201	100.0	10,189	99.9	12	0.1
Respiratory infections						
J09-J18 Influenza and pneumonia	89,995	100.0	89,833	99.8	162	0.2
J20-J22 Other acute lower respiratory infections	70,146	100.0	70,143	100.0	3	0.0
J00-J06 Acute upper respiratory infections	44,791	100.0	44,788	100.0	3	0.0
J40-J47 Chronic lower respiratory diseases	20,214	100.0	20,211	100.0	3	0.0
Disease of the respiratory system						
J95-J99 Other diseases of the respiratory system	1,362	100.0	1,339	98.3	23	1.7
J30-J39 Other diseases of upper respiratory tract	1,322	100.0	1,321	99.9	1	0.1
Disease of the digestive system						
K20-K31 Diseases of esophagus, stomach and duodenum	13,796	100.0	13,795	100.0	1	0.0
K00-K14 Diseases of oral cavity, salivary glands and jaws	2,351	100.0	2,350	100.0	1	0.0
K40-K46 Hernia	2,123	100.0	2,123	100.0	0	0.0
R10-R19 Symptoms and signs involving the digestive system	1,784	100.0	1,784	100.0	0	0.0
K50-K52 Non-infective enteritis and colitis	1,503	100.0	1,502	99.9	1	0.1
K55-K63 Other diseases of intestines	1,473	100.0	1,469	99.7	4	0.3
K35-K38 Diseases of appendix	1,160	100.0	1,159	99.9	1	0.1
Intestinal infection						
A00-A09 Intestinal infectious diseases	83,293	100.0	83,279	100.0	14	0.0
Other infectious						
B25-B34 Other viral diseases	7,259	100.0	7,257	100.0	2	0.0
B00-B09 Viral infections characterized by skin and mucous membrane	6,257	100.0	6,255	100.0	2	0.0
A30-A49 Other bacterial diseases	4,291	100.0	4,204	98.0	87	2.0
Disease of the blood						
D55-D59 Hemolytic anemias	6,595	100.0	6,592	100.0	3	0.0

Table 6. Cont.

	Age group (admitted) 1-5 years of age					
	Total		Alive		Death	
	Count	%	Count	%	Count	%
Disease of genitourinary system						
N30-N39 Other diseases of urinary system	2,950	100.0	2,948	99.9	2	0.1
N40-N1 Diseases of male genital organs	2,458	100.0	2,458	100.0	0	0.0
N10-N16 Renal tubulo-interstitial diseases	1,201	100.0	1,201	100.0	0	0.0
Disease of the nervous system						
G40-G47 Episodic and paroxysmal disorders	3,174	100.0	3,169	99.8	5	0.2
Disease of the skin and subcutaneous tissue						
L00-L08 Infections of the skin and subcutaneous tissue	7,762	100.0	7,762	100.0	0	0.0
L50-L54 Urticaria and erythema	1,432	100.0	1,432	100.0	0	0.0
Neoplasms						
C81-C96 Malignant neoplasms, stated or presumed	2,727	100.0	2,679	98.2	48	1.8
Injury and poisoning						
S00-S09 Injuries to the head	6,048	100.0	6,003	99.3	45	0.7
T51-T65 Toxic effects of substances chiefly	3,385	100.0	3,376	99.7	9	0.3
S40-S49 Injuries to the shoulder and upper arm	2,365	100.0	2,365	100.0	0	0.0
T20-T32 Burns and corrosions	2,084	100.0	2,077	99.7	7	0.3
T66-T78 Other and unspecified effects of external causes	2,026	100.0	1,941	95.8	85	4.2
S60-S69 Injuries to the wrist and hand	1,624	100.0	1,624	100.0	0	0.0
T15-T19 Effects of foreign body entering through	1,619	100.0	1,613	99.6	6	0.4
S50-S59 Injuries to the elbow and forearm	1,424	100.0	1,424	100.0	0	0.0
T36-T50 Poisoning by drugs, medicaments and biological	1,412	100.0	1,412	100.0	0	0.0
S90-S99 Injuries to the ankle and foot	1,411	100.0	1,411	100.0	0	0.0
Mental and behavior						
F80-F89 Disorders of psychological development	2,506	100.0	2,506	100.0	0	0.0
Congenital malformation						
Q20-Q28 Congenital malformations of the circulatory system	1,849	100.0	1,792	96.9	57	3.1
Others						
R50-R69 General symptoms and signs	38,561	100.0	38,555	100.0	6	0.0

Since pneumonia is the second leading cause of death among 1-5 year-olds, would zinc adjunct therapy be beneficial for these children?

1.4 A prospective, observational study of children under 18 in Thailand on pandemic influenza A (H1N1) in 2009-2010 (1 year) revealed a total of 83 admitted cases with the highest attack rates among 1-5 year-olds (48.2%). Early therapy with oseltamivir in severely ill patients (without waiting for laboratory confirmation for diagnosis) will save patients from severe complications[10]. Since influenza and pneumonia cause the highest number of deaths (Table 6), is it not important to set guidelines for a nationwide strategy for pandemics (such as H1N1) in 1-5 year-olds.

1.5 Pneumonia (one form of pneumococcal disease) cause almost 1 in 5 deaths in 1-5 year-olds worldwide, which is more than 1.6 million children each year. Pneumococcal disease is preventable by vaccination, which is crucial since antibiotic resistance is a growing problem worldwide. Pneumococcal conjugate vaccines (PCVs)-comprising pneumococcal polysaccharides conjugated to a protein carrier-not only induce antibodies but also prime the immune system for protective memory response. These vaccines (a) provide protection in children under 2 years of age, (b) generate long-term protection (highly specific IgG antibodies), (c) engender population immunity (indirect protection of non-immunized individuals) and (d) have demonstrated effectiveness in regions that have incorporated them into the national immunization schedules[11]. Notwithstanding the high price of PCVs in Thailand, would it be cost-effective in Thailand? And, if so, how can it be implemented?

2. The authors' data showed that intestinal infection (a) was the second most common cause of admissions, diarrhea and gastroenteritis of presumed infectious origin and (b) ranked second for hospital charges and lengthy stays. Some points should be further investigated.

2.1 Should rotavirus immunization be given to all newborns in Thailand or not?

Rotaviruses (RVs) are the leading cause of severe gastroenteritis in infants and 1-5 year-olds worldwide and the cause of approximately half a million deaths each year. The impact of the disease on families and society (increased healthcare costs, lost productivity, psychosocial trauma) is significant and the incidence of gastroenteritis (RVGE) is similar both in industrialized and developing nations. Virtually all children will be infected by RVs before the age of 5 years with the highest incidence between 6-24 months and the greatest risk for severe disease under 12 months. Hygienic-sanitary measures do not limit the spread of this infection; therefore, vaccination seems the only effective means of reducing the burden of the disease as well as human and economic costs[12]. A literature review on the economics of rotavirus immunization for developing nations revealed that a total immunization program would be cost-effective albeit unaffordable at present. It is recommended that more research on a less costly rotavirus immunization be conducted[13]. In Thailand, rotavirus vaccination could reduce gastroenteritis in children but the price, if used as part of the national immunization program should be below USD 10 per dose[14].

2.2 Persistent diarrhea is still an important challenge for the pediatrician. Acute diarrhea may be caused by a variety of agents; *viz.*, bacterial, viral and protozoal pathogens. The top priority in treatment of diarrhea is replacement of fluid and lost electrolytes, particularly at the acute stage and under certain circumstances eradication of the enteropathogenic agent. Treatment of persistent diarrhea should focus on prevention and management of food intolerance and malnutrition. Moreover, essential measures for the reduction of diarrheal morbidity and mortality rates 1-5 year-olds should include: promotion of breastfeeding, adequate interventions in the treatment of acute diarrhea episodes, introduction of safe dietary strategies for prevention of malnutrition and improvements in sanitation and hygiene conditions, including sewage and clean water[15]. Hand-washing before preparing food (even with water alone) is particularly necessary to prevent childhood diarrhea[16].

Health education and promotion should be strengthened nationwide. Such strategies might decrease the burdens both from intestinal and respiratory infection that consume a very high proportion of the budget. For example, even though it is inappropriate to prescribe antibiotics for acute respiratory infections, this is done at more than 50% of ambulatory practices[17,18].

3. Despite a decline in the mortality rate in 1-5 year-olds (Sutra et al), the change is not impressive (11.7 per 1,000 live births in 2002 to 9.8/1,000 live births in 2010). Injury and poisoning constituted the highest cause of death in 1-5 year-olds (Fig. 3) and ranked as the third highest cause of admissions in 1-5 year-olds in 2010 (Fig. 3, 2). Accidental drowning and submersion accounted for the highest cause of death in admissions with accidents in 1-5 year-olds. Compared with other age groups, these accounted for the highest admissions

and deaths (Table 3, Fig. 4). Table 3 shows the high rates of accidents in this age group, especially falls, exposures to inanimate mechanical forces, accidental poisoning by and exposure to noxious substances, adverse effects in medical care, exposures to electric current, fire and heat.

3.1 Childhood drowning is a leading cause of mortality from injury[19]. In 2000, nearly 450,000 people drowned worldwide, accounting for 9% of the global injury-related death, with over half of them being children between 0 and 14 years of age[20]. Drowning is also the leading cause of death among children (1-4 years) in several European countries[21]. Providing first aid training courses in cardiopulmonary resuscitation in remote villages and the installation of safety barriers such as fences next to water networks in close proximity to residential areas are potentially useful for the prevention of childhood drowning in rural areas[22]. For drowning prevention and control programs, the focus should be on "close and constant" supervision and safety education including the use of buoyancy vests[22].

3.2 Many injuries are preventable with "close and constant" supervision and safety education. A health promotion approach is particularly useful for injury prevention because it specifically facilitates both behavioral and environmental changes. In injury prevention perhaps more than with other health problems there is a strong need for community support; *e.g.*, convenient access to reasonably priced safety products has been repeatedly described as a necessary component of injury prevention programs focused on such issues as car safety seatbelt use, bicycle helmet use and home safety for children[23].

4. Regional issues: In the past, regional and provincial data were incomplete and fluctuated widely. It is generally acknowledged that infants have lower birth weights and infant mortality (IMR) is higher, in the highland areas in the North. In the three southernmost provinces, sex, culture, religion and language impact the provision of and access to primary health care services. One solution being promoted by the Ministry of Public Health is to upgrade the quality of services provided by local midwives. Given the low baseline of under-five mortality (U5MR: 12.8/1,000 live births in 1990), the reduction in child mortality by two-thirds by 2015 (to 4.3/1,000 live births) was not feasible. MDG Plus targets have therefore been set to reduce the IMR to 15/1,000 live births by 2006 and to reduce by half (between 2005 and 2015) the U5MR in highland areas of northern and southernmost provinces[24].

4.1 Economic crisis after disasters such as flooding and drought and/or economic and political difficulties nowadays significantly affect people's, especially children's health.

5. Several problems remain, *viz.*, diseases of the digestive system, other infections, arthropod-borne viral infection, disease of the blood (especially thalassemia which accounted for 6,064 of 6,595 admissions for hemolytic anemias in 1-5 year-olds in 2010), diseases of genitourinary system, congenital malformation, neoplasms, disease of nervous system and mental and behavior disorders.

5.1. Concerning mental health, early identification of developmental disorders is critical to the well-being of children and their families and is an integral function of the primary care system and an appropriate responsibility of all pediatric healthcare professionals. Developmental surveillance should be a component of every preventive care unit. Standardized developmental screening tools should be administered regularly at the 9-, 18- and 30-month visits. Since early identification of developmental problems leads to further developmental and medical evaluation, diagnosis and treatment, including early developmental intervention[25], should this not be a nationwide practice in Thailand?

After having investigated admissions by primary diagnosis in each region, at each hospital level and common admissions in each system, the authors recommend these data be considered in the context of curricular planning for medical and health science students at both the undergraduate and graduate levels. Moreover, these data should prove beneficial for all ministries and organizations involved in making a World Fit for Children and in achieving the Millennium Development Goals' targets in the year 2015[24].

Study limitations

As cited in Sutra et al in 'Health situation analysis of Thai population 2010: Implications for health education and health reform'.

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Potential conflicts of interest

None.

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การวิเคราะห์สถานการณ์สุขภาพของเด็กไทยอายุ 1-5 ปี ในปีงบประมาณ พ.ศ. 2553 เพื่อเป็นข้อมูลในการปรับปรุงการศึกษาและบริการสุขภาพ

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***ภูมิหลัง**: การสร้างโลกที่เหมาะสมสำหรับเด็กเป็นงานสำคัญที่ผู้เกี่ยวข้องทุกส่วนจะต้องมีการวางแผนและปฏิบัติการร่วมกัน ข้อมูลสถานการณ์จริงที่เกี่ยวข้องกับภาวะสุขภาพเด็กจะมีประโยชน์สำคัญเพื่อการนี้*

***วัตถุประสงค์**: เน้นการศึกษาปัญหาสุขภาพของเด็กไทยอายุ 1-5 ปี จากข้อมูลภาวะสุขภาพปีงบประมาณ พ.ศ. 2553*

***วัสดุและวิธีการ**: วิเคราะห์ข้อมูลสภาวะสุขภาพจากโครงการประกันสุขภาพทั้ง 3 ระบบ ในปีงบประมาณ พ.ศ. 2553 ในเด็กไทย โดยศึกษาความเจ็บป่วยในผู้ป่วยเด็กที่แผนกผู้ป่วยนอก ผู้ป่วยที่นอนรักษาตัวในโรงพยาบาล ข้อมูลการเสียชีวิต ค่าใช้จ่ายในการรักษาในโรงพยาบาล ระยะเวลานอนในโรงพยาบาล ตลอดจนศึกษาการเจ็บป่วยที่พบบ่อยในผู้ป่วยเด็กอายุ 1-5 ปี ซึ่งข้อมูลนี้ครอบคลุมร้อยละ 96 ของประชากร*

***ผลการศึกษา**: การติดเชื้อทางเดินหายใจเป็นโรคที่รับเข้ารักษาตัวในโรงพยาบาลบ่อยที่สุด (225,183 ครั้ง) ขณะที่การติดเชื้อที่ลำไส้รับไว้เป็นอันดับสอง (83,293 ครั้ง) การติดเชื้อทางเดินหายใจเป็นการวินิจฉัยที่แผนกผู้ป่วยนอกเป็นลำดับสอง (7,387,132 ครั้ง คิดเป็นร้อยละ 23.6) รองจากปัจจัยต่างๆ ที่มีผลต่อสถานะสุขภาพและการรับบริการสุขภาพ (17,384,963 ครั้ง คิดเป็น ร้อยละ 55.5) ส่วนสาเหตุการตายอันดับแรก คือ จากการบาดเจ็บและการเป็นพิษ (178 คน) จากการติดเชื้อทางเดินหายใจเป็นอันดับสอง (175 คน) ปอดบวมเป็นโรคที่ใช้เงินและมีระยะเวลานอนในโรงพยาบาลมากที่สุด ในการเสียชีวิตจากอุบัติเหตุการจมน้ำเป็นสาเหตุการตายสูงสุด*

***สรุป**: การติดเชื้อทางเดินหายใจ ปอดบวม การติดเชื้อที่ลำไส้ การบาดเจ็บ การเป็นพิษ และการจมน้ำจากอุบัติเหตุเป็นปัญหาสุขภาพสำคัญของเด็กไทยอายุ 1-5 ปี*