IMPLEMENTING THE UNIVERSAL HEALTH COVERAGE: WHICH SOURCE OF INFORMATION IS MORE RELIABLE?

Vinai Leesmidt[1], Supasit Pannarunothai[2] and Virasakdi Chongsuvivatwong[3]

[1]Khlongkhlung Hospital, Khlong Khlung District, Kamphaeng Phet 62120; [2]Center for Health Equity Monitoring, Faculty of Medicine, Naresuan University, Phitsanulok 65000; [3]Epidemiology Unit, Faculty of Medicine, Prince of Songkla University, Songkhla 90110, Thailand

Abstract. The implementation of universal health coverage needs accurate data on the distribution of health benefit coverage, particularly the uninsured. The national surveys and routine reports are two important sources of information ready for use. This study shows the validation of data from two sources. The data from national household surveys on the medical welfare, the health card and the social security schemes were validated with the routine report data of the Ministry of Public Health (MOPH) and the Social Security Office (SSO) by provinces. There were considerable differences between these data sets. The national survey data gave a 1.5 times higher estimate than the report data of the MOPH and the SSO. Financial implications of using inaccurate data to implement the universal health coverage could be huge, depending on the capitation rate.

INTRODUCTION

Universal health coverage has become one of the most important health policies in Thailand since the victory of the new government early 2001. The first near-majority victory was the result of a brave election campaign to cover all Thai citizens. The government has to merge the existing scattered, fragmented health coverage scheme in order to cover the uninsured population (see appendix). The most crucial questions for policy implementation were: how many were the uninsured, and how much money the government had to raise in order to achieve universal coverage. These questions need basic information on the coverage of various existing insurance schemes. Unfortunately, the existing information on insurance coverage and its relevant information such as the distribution of the coverage was insufficient, inaccurate and, often, inconsistent.

Basically, information used for health planning can be obtained from either survey or routine report, or both. Particularly, the survey data have become more important if the routine reports are inadequate. This problem

Correspondence: Dr Supasit Pannarunothai.
Fax: +66 55 261198; E-mail: supasitp@nu.ac.th,

is very prevalent in the developing and the least-developed countries (Oyoo et al, 1991; Indrayan, 1995). In the same vein, the information about the insurance coverage depends much on the survey data because the data from the report is not complete. However, the survey data are still inconsistent with the report data. So there is a necessity that the data from these two different sources be validated in order to know how much they differ from each other. It is hoped that the result of the data validation will be beneficial for data improvement for future health insurance planning and implementation. This paper aimed to present the methods of data validation and the implications on policy implementation for effective universal health coverage planning and development. These experiences may be learned by other countries attempting the universal coverage policy.

This data validation aimed at identifying the differences between the survey data of the National Statistical Office and the report data of the Ministry of Public Health and the Social Security Office about the insurance coverage under the public medical welfare, health card and social security schemes. Financial implications were estimated if inaccurate data were used for policy implementation.

MATERIALS AND METHODS

Sources of data

There were two major sources of data for validation. The first data set was the National Statistical Office survey on household health and welfare 1999. The second data set was the report data to the Ministry of Public Health (MOPH) and the Social Security Office (SSO), Ministry of Labor and Social Welfare.

The survey was the cross-sectional national data obtained from the 32,724 households in May 1999. Sample households were taken from all provinces in the country as the National Statistical Office (NSO) aimed to represent situation of each province. These households accounted for 94,971 individual members (National Statistical Office, 2000).

The routine reports were also the 1999 data on the entitlement to health coverage of the medical welfare and the voluntary health card schemes under the MOPH (Ministry of Public Health, 1999), and the social security scheme under the SSO. The MOPH reports were compiled from the registration system of individual members in 76 provinces including the Bangkok Metropolitan. This data set has been used by the MOPH to allocate the medical welfare and the health card budget according to the number of cards issued to the target populations in each province since 1999. The SSO report was compiled from the database on the insured workers choosing their main contractors at the annual matching process that the insured exercising their choices. The provider choice data have been used to pay main contractors (hospital with 100 beds or higher) on a capitation basis since 1994. Unfortunately, study could not be carried out for the civil servant medical benefit scheme because database for the scheme was non-existent, even though it was the most expensive scheme compared with others (Tangcharoensathien *et al*, 2001).

Data structure and data handling

The unit of analysis of this study was province. Data handling to support provincial

analysis had to be accomplished. The format of the survey data differed from those of report data. The structure of the survey data was an individual record of each member in a household (Table 1) while the report data (at MOPH and SSO) were readily available by province (Table 2). Steps were undertaken to make analysis by province possible:

Firstly, all data sources needed to have the same provincial codes in order to link all data to the same province.

Secondly, collapsed the survey data (94,971 individuals) into 76 provincial data according to provincial code. Created new variables to each individual record according to the insurance status. To get the estimates of how many people were under the existing schemes in each province, the sampling fraction (or weight in Table 1) of each individual record was used to blow up to represent the whole population, then sum the blow up by province (Fig 1).

Thirdly, merged data from different sources according to provincial code.Finally, validated the report and the survey data using double log graph (plotting the report data on the X-axis and the survey data on the Y-axis) in STATA (1999). Presented the discrepancy by descriptive statistics such as means and standard deviation.

RESULTS

The results will be presented in 2 parts. First, the same data from two different sources were validated to establish the discrepancy index. Financial implications were then estimated to flag the warning if inaccurate data were used for implementation.

Data validation

The matched data were validated respectively according to the insurance schemes. The first data validation started with the distribution of insurance coverage under the medical welfare scheme. Fig 2 showed that in most provinces the coverage of the medical welfare lied below the line of identity (if both sources of data had the same value, the scatter plots

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Table 1
Data structure of the survey data.

Record	Cwd[a]	Insurance[b]	Weight[c]
1	10	4	911.73
2	10	3	1,057.71
3	10	1	993.53
4	10	8	112.01
:	:	:	:
30675	71	6	123.94
30676	71	4	106.73
:	:	:	:
94971	76	5	55.22

[a] Cwd = Provincial code
[b] 1 = Civil servant medical benefit scheme
3 = Social security scheme
4 = Medical welfare scheme
5 = Voluntary health card scheme
6 = Private insurance
8 = Uninsured
[c]The sampling fraction or weight was the figure given by the National Statistical Office according to different sampling proportions in urban, semi-urban and rural areas.
Source: National Statistical Office, 1999.

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Table 2
Data structure of the report data.

Record	Cwd	WC	HC	SSS
1	10	780,794	5,427	174,533
2	11	202,435	26,379	636,056
3	12	155,700	97,144	162,991
4	13	116,682	25,242	248,757
:	:	:	:	:
62	77	136,154	21,875	41,431
63	80	637,826	30,597	41,508
:	:	:	:	:
75	95	194,435	18,608	19,160
76	96	328,555	6,158	10,916

Cwd = Provincial code; WC = Welfare card; HC = Health card; SSS = Social security scheme.
Source: Ministry of Public Health, 1999, and the Social Security Office, 1999.

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would lie along this line). The mean of the medical welfare coverage in all provinces was 2.4 below the identity line. It could be either the routine data were over-reported, or the survey data under-reported. However it indicated that the data from the national survey and the report of the MOPH differed from each other.

Table 3 summarized the differences between the survey and report data by type of health benefit schemes. In contrast to the medical welfare scheme, the survey data gave a 5.4 times higher than the MOPH report data for the voluntary health card scheme. Since respondents of the NSO survey may be confused between the medical welfare and the health card schemes, the two schemes were then combined and analysed on the log graph. By this time, the differences became narrower. The survey under-reported about 1.6 times lower than the MOPH data.

The closest variation between two sources

of data was the social security scheme. However, the survey gave the lower estimate, average at 1.5 times lower than the SSO data (Fig 3).

When subcategories of the medical welfare scheme were analysed according to age (0-12, 13-59 and 60 years and above), the elderly gave the narrowest variation (1.4 times) while the working age had the widest variation (10 times). When analysed the variations by region (76 provinces were collapsed to 5 regions, namely: Bangkok, the North, Northeast, Central and South), it was surprising that the disagreement became wider, eg the disagreement of the medical welfare rose from 2.4 to 3.2. On the contrary, the disagreement of the social security scheme when analysed by region gave the opposite direction as when analysed by province. The survey data gave higher estimate than the SSO data. However, if looked at the scatter graph in Fig 4, it was more surprising that the respondents in Bangkok produced a higher disagreement (between the survey and the report) than respondents of other regions.

Financial implications

Financial implications of using inaccurate data for implementation of the universal cov-

Rec	Cwd	Ins	Wt
1	10	8	911.73
2	10	4	1,057.71
:	:	:	:
2,000	32	5	1,218.18
:	:	:	:
94,971	96	3	912.85

Create new variables from ins →

Rec	Cwd	WC	HC	SSS	Un	Wt
1	10	0	0	0	1	911.73
2	10	1	0	0	0	1,057.71
:	:	:	:	:	:	:
2,000	32	0	1	0	0	1,218.18
:	:	:	:	:	:	:
94,971	96	0	0	1	0	912.85

Blow up data   (insurance type x wt)

Rec	Cwd	WC	HC	SSS	Un	Wt
1	10	0	0	0	911.73	911.73
2	10	1,057.71	0	0	0	1,057.71
:	:	:	:	:	:	:
2,000	32	0	1,218.18	0	0	1,218.18
:	:	:	:	:	:	:
94,971	96	0	0	912.85	0	912.85

Data processing

Sum   by Cwd

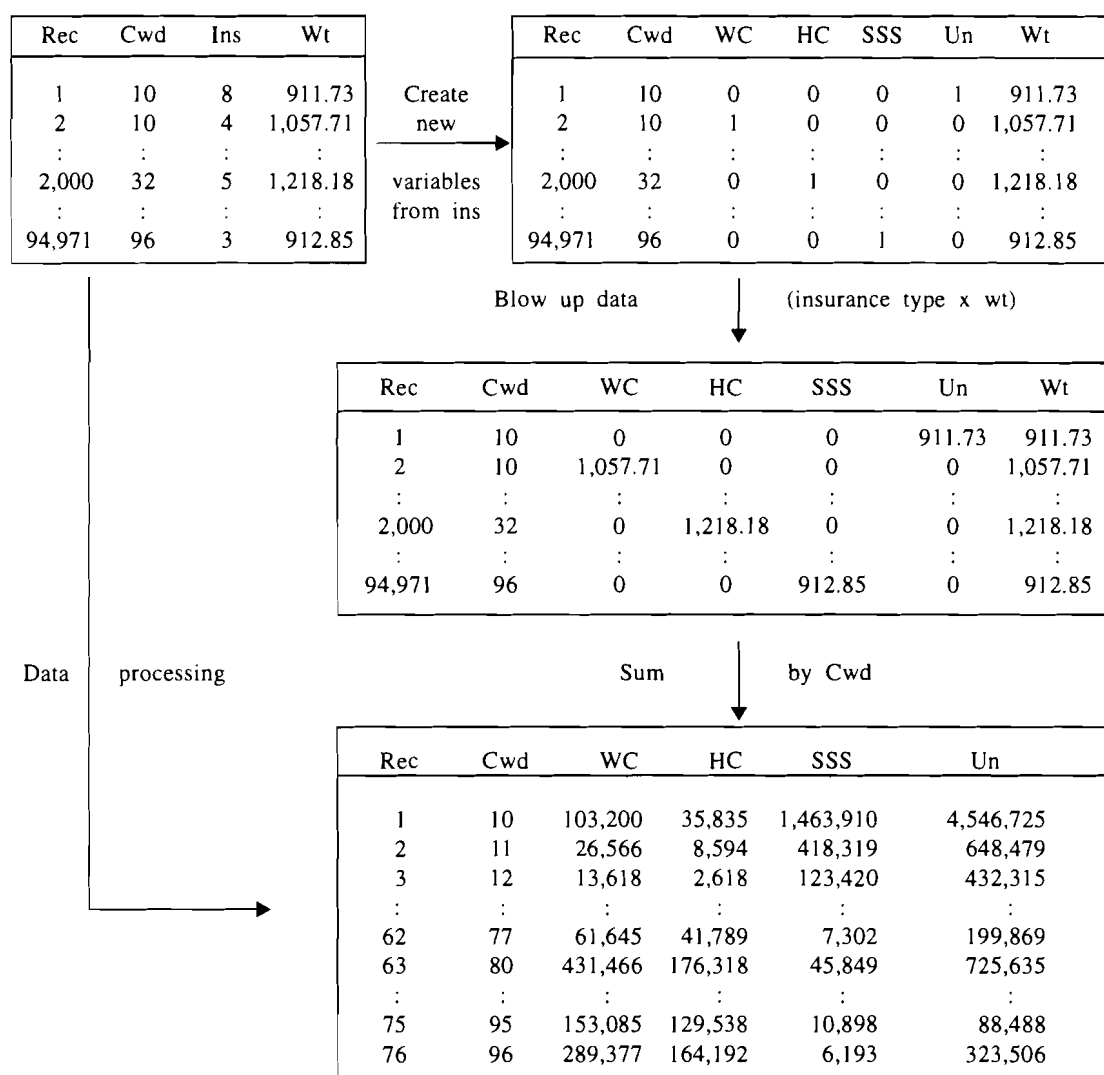| Rec	Cwd	WC	HC	SSS	Un
1	10	103,200	35,835	1,463,910	4,546,725
2	11	26,566	8,594	418,319	648,479
3	12	13,618	2,618	123,420	432,315
:	:	:	:	:	:
62	77	61,645	41,789	7,302	199,869
63	80	431,466	176,318	45,849	725,635
:	:	:	:	:	:
75	95	153,085	129,538	10,898	88,488
76	96	289,377	164,192	6,193	323,506

Fig 1–Handling of data from the National Statistical Office for validation.

erage were illustrated. To achieve universal coverage, the uninsured population was the target to be brought under the umbrella of the universal health insurance. Therefore the degree of financial implication varied according to the number of the uninsured and the capitation rate for health benefit coverage.

The number and percentage coverage of the insurance schemes estimated from the national survey and the routine reports were shown in Table 4. It was assumed that the number of the uninsured was also 1.5 times higher in the survey data than in the reports (since the survey produced lower coverage of benefit schemes, the uninsured therefore tended to be overestimated, 1.5 times was used for the least difference). If 24.8 million uninsured was used to estimate the additional budget to achieve universal coverage, the budgets would vary from 6.8 billion baht to 37.2 billion depending on the capitation rate (Table 5). However, if the number of the uninsured was 1.5 times lower than the survey figure, the range of the additional budget was narrower (from 4.5 billion to 24.8 billion baht).

Table 3
Summary results of the validation of insurance schemes.

	No.	Direction	Mean	SD	Min-Max
By schemes					
Medical welfare	76	Low[a]	2.37	1.84	0.82-13.32
Health card	76	High	5.40	2.95	0.30-14.10
Medical welfare + health card	76	Low	1.58	1.73	0.27-11.56
Social security	76	Low	1.54	1.17	0.12-6.71
Medical welfare by age group					
0-12	76	Low	3.19	4.86	0.80-30.30
13-59	76	Low	9.95	23.07	0.60-179.0
60+	76	Low	1.36	0.81	0.62-6.43
By region					
Medical welfare	5	Low	3.21	2.87	1.53-8.28
Social security	5	High	2.33	3.43	0.68-8.46

[a]The survey was lower than the routine report.

Table 4
Insurance coverage distribution 1999.

Type of insurance	Survey		Report	
	Population	Percentage	Population	Percentage
Social security scheme	4,319,083	7.00	4,079,128	6.61
Medical welfare	13,990,560	22.67	23,181,057	37.57
Health card	11,094,440	17.98	2,305,154	3.76
CSMBS	5,485,784	8.89		
Private insurance	834,806	1.35	32,139,342	52.09
Other	1,057,858	1.71	(CSMBS+Private	(CSMBS+Private
Uninsured	24,808,433	40.21	Insurance+Other	Insurance+Other+
Blank	113,616	0.18	+Uninsured)	Uninsured)
Total	61,704,581	100	61,704,581	100

Source: National Statistical Office 1999, Ministry of Public Health 1999, Social Security Office, 1999.

Table 5
Scenarios of financial implication for universal health insurance financing.

Per capitation (Baht)	Survey		Expected[a]		Discrepancy	
	Uninsured (million)	Budget (million)	Uninsured (million)	Budget (million)	Uninsured (million)	Budget (million)
273[b]	24.8	6,770	16.5	4,505	8.3	2,266
1,197[c]	24.8	29,686	16.5	19,751	8.3	9,935
1,500[d]	24.8	37,200	16.5	24,750	8.3	12,450

[a] = uninsured of expected numbers is 1.5 lower than the survey data.
[b] = per capitation of medical welfare scheme.
[c] = per capitation agreed by the Bureau of Budget.
[d] = per capitation of the universal coverage proposed by the working group.
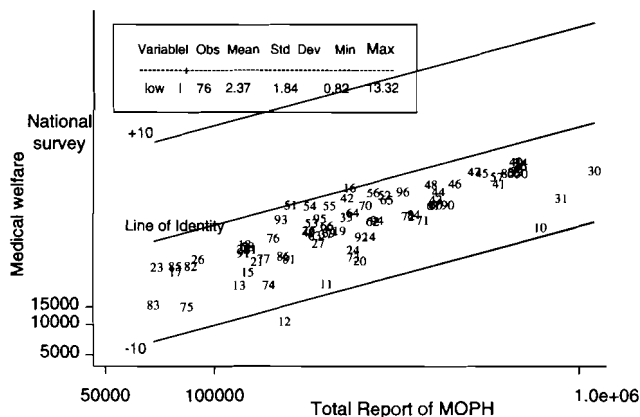
Fig 2–Validation of log of total insurance coverage of the medical welfare scheme.
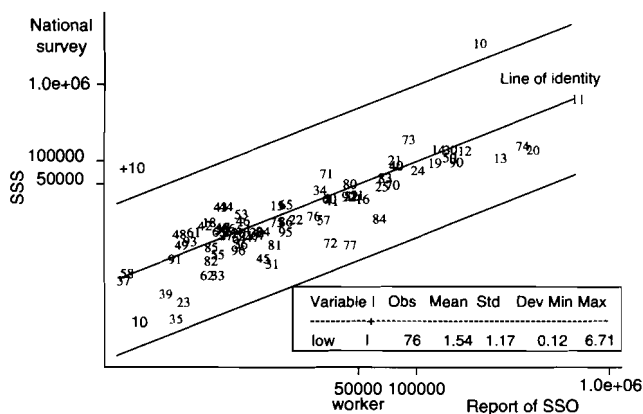

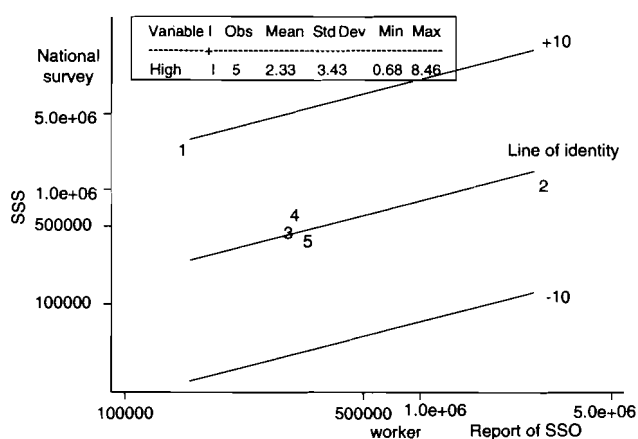Fig 3–Validation of log of total insurance coverage of the social security scheme.

Fig 4–Validation of log of insurance coverage of the social security scheme by region.

Three scenarios of different per capitation rates were used. The lowest capitation rate (273 baht as for the medical welfare scheme in 2001) produced a discrepancy of 2.3 billion baht between the survey and the expected figures. If the capitation rate increased to 1,197 baht as agreed by the Bureau of Budget at the meeting chaired by the Prime Minister on 17 March 2001 (Ministry of Public Health, 2001), the discrepancy would be 9.9 billion baht. If the capitation rate was 1,500 baht as recommended by the Working Group of the Health Systems Research Institute (2001), the additional budget varied from 24.8 billion to 37.2 billion, or with the discrepancy of 12.5 billion baht.

Inaccuracies of the target population affected the financing of both health care providers and the government. If the expected data was used for universal health insurance implementation, it may create financial problem to the services facilities and hospitals, because there would be some degree of under-reporting leading to financial inadequacy. But if the survey data were used, it would be the great burden for the government to raise the subsidy. Therefore, it was important for the government to obtain more accurate data on the population coverage before implementing the universal health insurance policy. Moreover, it was as well important to justify the optimal level for per capitation rate that would bring about the most efficient resource use in order to meet the real health needs.

DISCUSSION

To consider the data validation of the medical welfare scheme in Fig 2, it was found that most of the insurance coverage distribution was below the identity line. It might be either the result of under-report of the national survey or over-report of the MOPH. It was more likely to be under-reported because the respondents who responded to the questionnaires did not know exactly what types of insurance their household members were entitled to. In addition, misclassification was very likely between the medical welfare and the

voluntary health card as both respondents and interviewer had little knowledge on the rapidly changing policy of the MOPH. The reason to support the over-reporting of MOPH system because the numbers of the coverage of the medical welfare were used for budget allocation of the scheme, therefore, most provinces tended to report the maximum number of the target group to maximize the budget allocation. While the process of issuing the welfare card was slow, therefore the reported data were higher and people who had received the welfare cards were lower than the target.

The pattern for the health card coverage was the opposite of the medical welfare scheme. It might be the effect of over-report of the national survey because of misclassification between the health card and the medical welfare card. In other way, it might be the under-report of the MOPH. But the under-report was unlikely because the process of health card issuance was checked by the report of the banking system. The transactions through the bank account were used for allocating budget subsidy. Therefore, the national survey was more likely to be over-reported.

Two reasons to explain why the routine report of social security insurance was very close to the survey were as follows. The routine data were derived from the pay role system. The contributions paid by employees, employers and the government were collected monthly to the social security fund. Furthermore, all social security members had to register with the main contractor for their entitlement, therefore the report of the SSO was more accurate and more reliable than the MOPH's medical and health card schemes.

When the medical welfare distribution was combined with the health card scheme, the pattern of the coverage shifted, and came closer to the identity line. It could be that the effect of misclassification between the health card and the medical welfare card had cancelled each other. The mean of the difference changed from 2.2 lower for the medical welfare and 4.9 higher for the health card to be 1.6 lower the

identity line, very close to the social security scheme.

Within the medical welfare insurance, there were several sub-groups from age-related (children and the elderly), income-related (the low income), social characteristics (the veteran, community and religious leaders) and disability-related (the handicapped). If re-categorized the medical welfare into three main groups according to their age (0-12 years, 13-59 years and 60 years and over), children and the elderly were straightforward for their eligibility, therefore the disagreement of both information sources was narrow. The working age group produced the highest variation between the survey and report data. Issuance of the medical welfare card for the working age had to rely on income means testing, which was more difficult than calculating the age.

Comparing the distributions of medical welfare, and social security schemes by region and by province, the medical welfare by region produced a higher discrepancy but with the same directions as those of provincial distribution. However, the social security scheme produced results with different directions when analysed by province and by region. This was because the analysis by region gave equal weight to the 5 regions, while analysis by province gave equal weight for 76 provinces. So the result by region was biased in favor of Bangkok but not for the result by province.

Conclusions and recommendations

From the results of the data validation above, some conclusions could be drawn as follows:

- It is evident that there were considerable differences between the survey data of the National Statistical Office and the report data of the Ministry of Public Health and the Social Security Office.

- The differences varied according to the insurance types of which the medical welfare and voluntary health card had higher variations than the social security insurance.

- The national survey data had a tendency to be over-reported, on average 1.5 times over

the report data.

- Misclassification between medical welfare and voluntary health card led to the variation of the distributions in different age groups and regions of the country.

The followings were recommendations for the implementation of universal health coverage policy:

- It would be dangerous if the universal health coverage policy would be set up and implemented by using single source of data either the survey or the report data,

- It would be crucial that the data from various sources and be validated before finally used,

- It would be necessary to improve the data quality before using them for the implementation of universal coverage policy to reduce errors and weaknesses of the existing data.

- Routine data are a necessity for the proper monitoring system such as financial audit of the policy, however survey data are also helpful for confirmation of the reliability of the data.

Appendix

In 1999, the Health and Welfare survey of the National Statistical Office showed that the civil servant medical benefit scheme which was financed by taxation as a fringe benefit for government employees covered about 9% of the total population. The compulsory social security scheme for employees in formal private sectors covered about 7% of the total population. The MOPH had introduced the low income card scheme to cover the poor, the elderly, children under 12 years old, the handicapped, community and religious leaders about 23% of the total population. The voluntary health card scheme of the MOPH covered family who purchased the health card annually about 18% of the total population. Because 40% of the population were left uncovered, therefore the new government proposed the universal coverage policy. This policy aimed to cover all populations in informal sectors by consolidating previous MOPH's schemes (see Table).

Schemes before 2001	% of total population	From 2001 onwards
Civil servant medical benefit scheme	9	Same target
Social security scheme	7	Same target
Formal sector employees	16	Same
Low income card scheme	23	
Voluntary health card scheme	18	The new
Private health insurance	1	universal
Others	2	coverage
Uncovered	40	scheme
The informal sectors	84	
Grand total (61,704,581 pop)	100	Totally covered

Source: Analysis on the Health and Welfare Survey, 1999.

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