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The Philippine management information system for public health programs, vital statistics, mortality and notifiable diseases

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Abstract

Strengthening the information support for decision making has been identified as an important first step toward improving the efficiency, effectiveness, and equitability of the health care system in the Philippines. A Philippine-German Cooperation is in partnership toward developing a need-responsive and cost-effective Health and Management Information System (HAMIS). Four information baskets are being strengthened specifically to address these needs in a cost-effective way: public health information systems, hospital information systems, information systems on economics and financing, information systems on good health care management. BLACKBOX is the management information system for public health programs, vital statistics, mortality and notifiable diseases of the Philippines. It handles and retrieves all data that is being collected by public health workers routinely all over the Philippines. The eventual aim of BLACKBOX is to encourage the development of an information culture in which health managers actively utilise information for rational planning and decision making for a knowledge based health care delivery.

Keywords: Health And Management Information System; Need-responsive; Cost-effective; Philippines; Public health program; Vital statistics; Mortality and morbidity; Computer application; Information utilisation; Rational planning; Decision making

1. The Health and Management Information System (HAMIS)

Strengthening the information support for decision making has been identified as being an important first step toward improving the efficiency, effectiveness and equitability of the health care system in the Philippines [2]. In answer to this need, since July 1989, the Department of Health (DOH) of the Philippines and the German Ministry for Economic Cooperation and Development (BMZ) through its German Agency for Technical Cooperation (GTZ) have been in partnership toward developing a need-responsive and cost-effective health and management information system [2]. This collaborative effort has become known by its acronym HAMIS, which, fittingly, in some Philippine languages means 'smooth', while in others it means 'sweet'.

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The need-responsiveness of HAMIS was arrived at by assessing the:

- need for accurate information, through a survey with health personnel in two provinces;
- comparative information needs, as compared to European and OECD experiences;
- normative information needs, through an economic decision making model and a state-of-the-art statement from public health experts;
- expressed needs for data, information and understanding through case studies on good health care management, which cases were discovered by a proper information system [9].

The cost-effectiveness of HAMIS was ensured through a survey that identified the prioritisation of indicators by some 15 professions involved in decision making for health, and by comparing the sources of data in terms of different criteria of availability and cost [9].

Based thereon, HAMIS has developed and tested certain strategic elements for strengthening the health and management information system in the Philippines. These 'HAMIS Elements' include:

- standardised reporting of routine data on mortality morbidity and public health programs (BLACKBOX holds the routine data on vital statistics, mortality, morbidity, and public health programs of some 30 out of 75 provinces in the country) [9];
- secondary computerisation and simplified presentation of routine data on hospital care (this HOMISBOX system is ready for encoding of the national database of routine hospital statistical reports) [9];
- support for the development of a hospital information system, starting with admissions, discharges, and medical records (this LUCENA system has been replicated for 14 hospitals in 10 provinces) [9];
- development of hitherto neglected financial and material management information systems (this MARAMAG system is ready for replication);
- design of information systems on health financing and health insurance (through a representative household survey, and institutional cost/financing analyses) [9];
- simplified collection and retrieval of cultural, social and economical background data (this BROWNIES system has been implemented in 4 provinces) [9];
- promotion of a simplified community based spot mapping of a seven-indicator health assessment matrix, in the hands of village health workers (the DATABOARD system that was discovered by HAMIS and has become a national program) [9];
- discovering good health care management by means of a nationwide contest, and learning the lessons of, and organizing the winners of the contest in order to influence health management and health policy development. (The 'HAMIS Contest' has become a national event after two such contests held in 1991–92 and 1993–94) [5,9].

This paper shall focus on one such HAMIS Element, which deals with the public health information system, by way of elucidating that information translated into action means the improvement of health management in the Philippines.

2. The Philippine public health information system (BLACKBOX)

BLACKBOX is the management information system for public health programs, vital statistics, mortality and notifiable diseases. It is a computer application developed by HAMIS in and for the Department of Health of the Philippines. The program was written in dBASE/Clipper language, and has 2 modules: one for Public Health Programs (version 5.8), and one for Vital Statistics Mortality and Notifiable Diseases (M&M). BLACKBOX is capable of accessing the data files for any Regional Health Office (RHO) Provincial Health Office (PHO), District or City Health Office (DHO or CHO), Rural Health Unit (RHU, also known as the Municipal Health Office), or Barangay Health Station (BHS) in the country. In descending order, these are the sequential reporting levels in the public health information system structure.

The data files are those collected by the Field Health Services Information System (FHSIS). The

FHSIS is the computerised routine reporting system for Public Health Programs [1]. It was implemented nationwide in April 1990. The Notifiable Disease Module of the FHSIS (HISWK) was implemented in 1992. In the reporting scheme of the FHSIS, the data of the BHS, RHU, and DHO/CHO are encoded and processed at the PHO Computer Station. In return, the PHO is expected to feedback information outputs to the reporting units, and to forward a copy of the data to the RHO. The RHO should also forward a copy of the data to the DOH Central Office [4]. The reporting scheme of the Notifiable Disease module is similar, except that the lowest reporting level is the RHU and not the BHS.

Very often, computerised information systems are actually data systems that tend to focus heavily on database management. This involves collecting, encoding, editing, deleting, backing up and generally assuring the quality and integrity of data [6]. Many such data systems generate information that may be accessible and relevant only to a select group of high level users. These include the programmers, analysts, and other technical persons who have an intimate knowledge of the computer system. Unfortunately, those who have the most need of the information can often be those with the lowest level of computer literacy. Most health managers belong to this category. For people such as these, the computerised system appears to be a BLACKHOLE that sucks in data, but from which hardly any information comes out. This situation might, most aptly, be termed an electronic DINOsaur: Data In, Nothing Out.

BLACKBOX was so named in order to dispel the mystery and mystique of the electronic FHSIS database. It should be a BACKBOX that brings data back to those that produce it. The system is completely menu driven. It allows even a low level user to select from a package of analytic outputs, and to automatically generate health service reports. The outputs can be consolidated for any BHS, RHU, DHO/CHO, PHO, RHO, or even for the entire country. The outputs can also be consolidated for any number of months, quarters, or even for the whole year. The health manager, after all, should not have to be a computer wizard to tap into the health database and make sense of it.

3. Operating BLACKBOX

BLACKBOX operates on the very simple computers found at PHO Computer Stations. These are IBM compatible 286 or 386 systems. To start the program, a single command is entered: BLACKBOX. From then on, all the user has to do is select from a series of menus by manipulating a lightbar, using the cursor keys.

The user first has to indicate the health unit, or aggregate of units, that he would like information on. He does this by selecting the Region, Province, District, RHU, or BHS of choice. This is the 'geographic aggregating sequence' that allows the user to select the most elemental reporting unit, the BHS, or to aggregate units at different reporting levels. Having made his choice, the user is then prompted to indicate the year of reference.

In version 5.8 of BLACKBOX, the user is next presented with the array of public health programs for which the FHSIS collects data. He selects one, and is then prompted to select an analytic output. If the data is reported monthly, the user can specify the number of months and the starting month to aggregate. This is the 'temporal aggregating sequence' that allows the user to indicate the number of months or quarters for which he would like the data to be aggregated, depending on the frequency of data reporting. In a similar manner, the M&M module of BLACKBOX allows the user to select the notifiable disease of interest, as well as the number of weeks and starting week for which he would like the data to be aggregated.

Having processed the data, BLACKBOX then offers to present the output in the form of a table or a graph. The output tables contain just enough information to be appreciated at a glance. Moreover, the tables were designed to be analytic outputs in themselves. The health manager need only exercise his intellect to formulate an interpretation. The graphs were designed to aid and to some degree direct, the interpretation. In the M&M module where the disease of choice may be analyzed for 52 weeks according to age group, the graphs are in the form of time trend series. Accordingly, there is one graph per age group and one for the aggregate.

Each table comes with a 'completion level'. This is the percentage of reporting units read from the database, over the total number of reporting units expected for the specified level of geographic aggregation. Completeness is one component of data accuracy that can be easily programmed. If routine health reports must be taken 'with a grain of salt', the completion level is a measure of how big that grain of salt must be. Consistency is one other component that can be satisfied by cross-checking one report against another. For instance, the number of live births can be compared to the number of pregnant women seen; or, the incidence of diarrhea can be compared to the ratio of deep wells to households. Regular updating is a third important component of data accuracy that depends mostly on the reporting procedure. Regularity can of course be improved by threatening dire consequences if data reports are not submitted on time at specified intervals. It is probably more effective however, to convince the health worker in the field, that coming up with regular reports will 'make a real difference', e.g. in the allocation of health resources.

The BLACKBOX outputs can be directed to screen, printer, or file. The tables are saved in the form of ASCII text files while the graphs are in the form of PCX files. The tables are viewed on a special word processing screen with full editing features. This allows the user to type in his interpretation and, later present the printout as a formal report. Of course, this does not prevent him from altering the figures in the table, but it is an incentive to be honest. In the sense that 'the squeaky wheel gets the grease', the 'bad-looking' report gets to be allocated more resources. Besides, the database is in no way altered, and so anyone who would like to verify the report only has to run BLACKBOX for himself. Another special feature of the BLACKBOX word processor is the ability to split the screen horizontally and to view two tables in juxtaposition. For many health managers this is the most sophisticated method of further analysis that they would ever want or need to do. In contrast to the tables the graphs can only be viewed and not edited. A special feature however, is that several graphs can be viewed sequentially in the form of a 'slide show' by pressing any key after each graph. This is the case when viewing the time trend series by age group in the M&M module.

Finally, in the programming design of BLACKBOX, a special feature is the modular nature of the output tables and graphs. What this means is that a health manager can request more tables and graphs to be programmed, as long as the data elements are present, and the request can be answered in a matter of hours. All that has to be done is to take the 'skeleton program', plug in the new variables and calculations, then recompile the program.

4. Utilizing health information

The health management information system exists, essentially, to answer four very important and pressing questions for the health manager and decision maker.

1. What are our health problems? An important first step in determining the health problems of a given community or population is to look at their mortality and morbidity profile. The mortality and morbidity profile answers the question 'What are people getting sick of? What are they dying of?' It provides a starting point for analyzing the health situation of the community or population.
2. What are we doing about them? Public health programs are interventive strategies designed to address some of the more important health problems of the population. BLACKBOX analyzes the performance of these public health programs. It provides some measure of the extent to which these interventive strategies have been addressing the health needs of the population. It looks at health program performance from different perspectives, and tries to develop a total picture of the activity of the health sector.
3. What else should we do? No interventive strategy can, of course, be perfect. It would be despairing, however, to say that 'so much was done because only so much could be done.' Rather the analyses of health problems and public health program performance should in-

dicate what else needs to be done, and which directions these strategies should take in the future.

4. How best should we manage our health resources to this end? The optimal management of health resources is all the more imperative where economic difficulty is the norm. The scarcity of health resources may be more relative than absolute, in which case wise management may overcome, or at least attenuate, the absolute scarcity of resources. To some extent, a proper interpretation of the BLACKBOX analyses may guide the health manager on how best to manage health resources in order to meet the specific demands of health program intervention.

Following is a case example of utilizing health information primarily on the basis of the BLACKBOX analyses. It is a situational analysis of pulmonary tuberculosis (TB) that tries to answer the four questions mentioned above. These 'Facts and Figures' were submitted to the Secretary of Health as a special report on September 13, 1994. The report was eventually published in at least two of the leading daily newspapers in the Philippines, the Manila Bulletin [3] and the Times Journal [6].

> "Pulmonary tuberculosis (TB) continues to be one of the most important causes of illness and death in the Philippines. In 1992 and 1993, TB was the fourth leading cause of death, comprising 6% of all deaths in both years. This is based on the BLACKBOX analysis of data collected from the Field Health Services Information System (FHSIS) of Region 10 (Northern Mindanao).
>
> "The top three causes of death in 1992 and 1993 were pneumonia (18% of all deaths in 1992, 15% in 1993), vascular disease (10% of all deaths in 1992, 11% in 1993), and accidents (9% of all deaths in 1992, 8% in 1993)."

The foregoing paragraphs of the 'Facts and Figures' report were based on data for 1992 and '93. Fig. 1 shows the data for 1993. Similar data was obtained for 1992.

The report continued,

> "About 1% of the total population 15 years and older were identified to have TB. This was true for both 1992 and 1993."

This part of the report was based on the data in Figs. 2 and 3 for 1993 as well as the corresponding figures for 1992.

> "All identified cases of TB were subsequently placed under treatment: 2/3 on short course chemotherapy (SCC) and 1/3 on standard regimen (SR). SCC consists of rifampicin, isoniazid and pyrazinamide taken over a period of 6 months. SR consists of streptomycin and isoniazid over a period of up to 12 months. SCC was highly effective, with 97% sputum conversion after the first 2 months of treatment. This means that 9 out of 10 TB patients were no longer infective 2 months after starting treatment on SCC. Moreover, 50% of patients on SCC complete the treatment within the year.

HAMIS

REGION : Region 10 Northern Mindanao
LEVEL : Regional Health Office
VITAL STATISTICS : Mortality
TABLE : Proportionate mortality ratio.

CAUSE OF DEATH	NO. OF DEATHS	PMR (%)
Accidents	885	8.41
Cancer	562	5.34
Diabetes	191	1.82
Diarrhea	173	1.64
Diphtheria	43	0.41
Hypertension	597	5.68
Influenza	7	0.07
Kidney disease	177	1.68
Leprosy	11	0.10
Liver dis. & cir	250	2.38
Malaria	56	0.53
Measles	88	0.84
Meningitis	61	0.58
Whooping cough	12	0.11
Pneumonia	1585	15.07
Poliomyelitis	1	0.01
Schistosomiasis	34	0.32
Septicemia	279	2.65
TB, Meningitis	38	0.36
TB, Pulmonary	669	6.36
TB, Other forms	99	0.94
Tetanus	28	0.27
Vascular disease	1158	11.01
Unknown	577	5.49
Other causes	2938	27.93
TOTAL	10519	100.0

Data were consolidated for 12 months starting January 1, 1993.
The denominator used was the total number of deaths.

Completion Level of Reports:

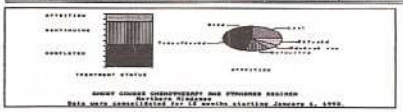
January	.....	91 of	131	reports in (70%)
February	.....	100 of	131	reports in (76%)
March	.....	92 of	131	reports in (70%)
April	.....	92 of	131	reports in (70%)
May	.....	100 of	131	reports in (76%)
June	.....	97 of	131	reports in (74%)
July	.....	91 of	131	reports in (69%)
August	.....	97 of	131	reports in (74%)
September	.....	85 of	131	reports in (65%)
October	.....	92 of	131	reports in (70%)
November	.....	75 of	131	reports in (57%)
December	.....	87 of	131	reports in (66%)
TOTAL	.....	1099 of	1572	reports in (70%)

Fig. 1. BLACKBOX report of the proportionate mortality ratios (PMRs) of notifiable causes of death, in region 10 (Northern Mindanao) of the Philippines, comprising 7 out of 75 provinces, aggregated for the whole year of 1993.

HAMIS

REGION : Region 10 Northern Mindanao
LEVEL : Regional Health Office
PROGRAM : National Tuberculosis Program
TABLE : Number and percentage of selected indicators for both short course chemotherapy (SCC) and standard regimen (SR).

OVERALL (SCC + SR)	No.	%
Carryover patients	7006	
New patients	8798	
TOTAL (patients)	15804	Reference
Completed treatment	6926	43.82%
Died	306	1.94%
Transferred out	715	4.52%
Defaulted	300	1.90%
Adverse reaction	139	0.88%
Refused	213	1.35%
Lost	521	3.30%
TOTAL (premature discharges)	2194	13.88%
TOTAL (treatment completions + premature discharges)	9120	57.71%
TOTAL (continuing treatment)	6684	42.29%



Data were consolidated for 12 months starting January 1, 1993.
The "reference" figure was the denominator used to compute for the percentage figures in the table.

Completion Level of Reports:

January	901 of	1095	reports in	(82%)
February	901 of	1095	reports in	(82%)
March	893 of	1095	reports in	(82%)
April	868 of	1095	reports in	(79%)
May	882 of	1095	reports in	(81%)
June	876 of	1095	reports in	(80%)
July	882 of	1095	reports in	(81%)
August	886 of	1095	reports in	(81%)
September	888 of	1095	reports in	(81%)
October	880 of	1095	reports in	(80%)
November	873 of	1095	reports in	(80%)
December	855 of	1095	reports in	(78%)
TOTAL	10585 of	13140	reports in	(81%)

Fig. 2. BLACKBOX report showing the number of TB patients identified and treated with short course chemotherapy (SCC, consisting of isoniazid, rifampicin, and pyrazinamide) and standard regimen (SR, consisting of isoniazid and streptomycin) in Region 10 of the Philippines, aggregated for the whole year of 1993.

On the other hand, it was observed that the drop-out rate was twice as high for SR (12% in 1992 and 11% in 1993) as it was for SCC (7% in 1992 and 6% in 1993)."

The foregoing paragraph in the report was based on the data in Figs. 4 and 5 for 1993, and corresponding data for 1992.

"Based on the cost calculations of the TB Control Service, SCC costs approximately P 500.00 (i.e. about US $19.00) per patient, per course. This amounts to only P 3.00 per day over 6 months. On the other hand, SR costs around P 700.00 per patient per course. These cost projections are based on wholesale procurement of drugs. The Community Drug Insurance Program of the DOH could be one means by which community organisations in particular, could benefit from volume procurement of drugs. This approach is being spearheaded by the Community Health Service.

"*TB is definitely still a major public health* problem. The difficulties do not seem insurmountable, however. Short course chemotherapy especially, appears to be a cost-effective solution to invest in."

It is interesting that prior to the 'Facts and Figures' report on TB, the policy of the DOH was to cover only about 70% of TB cases with SCC, in the belief that SR was the cheaper treatment modality. The report has made it possible for the TB Control Program managers to more strongly consider covering a much greater percentage of TB patients with the more cost-effective treatment modality, namely SCC.

5. The next steps

The eventual aim of BLACKBOX is to encourage the development of an information culture in which health managers actively utilise information for rational planning and decision making. One step toward this direction could be to develop a

HAMIS

REGION : Region 10 Northern Mindanao
LEVEL : Regional Health Office
VITAL STATISTICS : Population
TABLE : Population by Age and Sex

AGE GROUP	MALE	FEMALE	TOTAL
Less than 1 year	26163	25420	51583
1 - 4 years	107488	103230	210718
5 - 6 years	46217	43457	89674
7 - 14 years	151895	144992	296887
15 - 49 years	321852	322318	644170
50 - 64 years	56955	58324	115279
65 years and over	22801	406509	429310
T O T A L	733371	1104250	1837621

Number of Married Couples of Reproductive Age (MCRA) 296447

Data were consolidated for 1993.

Completion Level of Reports:

1993	313 of	799	reports in	(39%)
TOTAL	313 of	799	reports in	(39%)

Fig. 3. BLACKBOX report of the population by age and sex in Region 10 of the Philippines, for the year 1993.

HAMIS

REGION : Region 10 Northern Mindanao
LEVEL : Regional Health Office
PROGRAM : National Tuberculosis Program
TABLE : Number and percentage of selected indicators for short course chemotherapy (SCC).

SHORT COURSE CHEMOTHERAPY (SCC)	No.	%
Carryover patients	3979	
New patients	6642	
TOTAL (patients)	10621	Reference
Completed treatment	5329	50.17%
Died	197	1.85%
Transferred out	390	3.67%
Defaulted	163	1.53%
Adverse reaction	77	0.72%
Refused	109	1.03%
Lost	253	2.38%
TOTAL (premature discharges)	1189	11.19%
TOTAL (treatment completions + premature discharges)	6518	61.37%
TOTAL (continuing treatment)	4103	38.63%

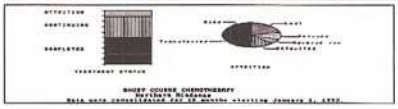


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Fig. 4. BLACKBOX report showing the number of TB patients identified and treated with short course chemotherapy (SCC, consisting of isoniazid, rifampicin, and pyrazinamide), in Region 10 of the Philippines, aggregated for the whole year of 1993.

Geographic Information System (GIS) that depicts the health indicators spread out on a map. The geographic spread of health indicators tends to have greater appeal especially with political decision makers. It would also be a useful tool for rapidly assessing the spread of certain indicators within and across boundaries of health administration.

Information based quality assurance conferences that deal with this data in the context of other information systems, and that try to cross-fertilise data, information, understanding and knowledge, are an important next step to convert data into deeds. Currently we are testing different kinds of provincial clarification and consensus conferences that present results of health and management information systems, analyse data and information on 'avoidable deaths and diseases' as the centrepiece, present minireasearches that are discussed with invited and involved speakers, and that lead to a strategic plan on how to convert information into implementation. Social processes are thus linked to information systems.

Probably the most important, and quite urgent, next step would be to develop an 'expert system' that uses the indicators to interpret the many data and to select and comment on those that are relevant to improving health management, as well as to develop scenarios for health planning and decision making. Most likely this will take the form of a systematised situational analysis based on a reading of the BLACKBOX outputs, plus other relevant information sources. It will transcend mere data orientation by engineering the broader body of knowledge of good health care managers that understand the interaction between

HAMIS

REGION : Region 10 Northern Mindanao
LEVEL : Regional Health Office
PROGRAM : National Tuberculosis Program
TABLE : Number and percentage of selected indicators for standard regimen (SR).

STANDARD REGIMEN (SR)	No.	%
Carryover patients	3027	
New patients	2156	
TOTAL (patients)	5183	Reference
Completed treatment	1597	30.81%
Died	109	2.10%
Transferred out	325	6.27%
Defaulted	137	2.64%
Adverse reaction	62	1.20%
Refused	104	2.01%
Lost	268	5.17%
TOTAL (premature discharges)	1005	19.39%
TOTAL (treatment completions + premature discharges)	2602	50.20%
TOTAL (continuing treatment)	2581	49.80%

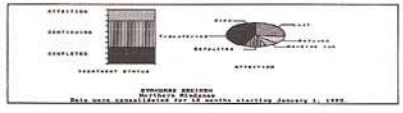

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Fig. 5. BLACKBOX report showing the number of TB pateints identified and treated with standard regimen (SR, consisting of isoniazid, and streptomycin), in Region 10 of the Philippines, aggregated for the whole year of 1993.

data, information understanding, knowledge, decisions and deeds. Such a systematised situational analysis, as much as possible, should answer, at least the four important questions, namely: What are our health problems? What are we doing about them? What else should we do? How best should we manage our health resources to this end?

Routine health data will probably never be good enough to satisfy the requirements, especially of those in the academe. But especially where the health and the lives of people are concerned, perhaps it may be good to bear in mind that 'it is always better to be roughly correct than to be precisely wrong' [8].

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