For discussion **FCR(2000-01)60**
on 5 January 2001

ITEM FOR FINANCE COMMITTEE

CAPITAL WORKS RESERVE FUND
HEAD 710 – COMPUTERISATION
Department of Health
New Subhead "Public Health Information System"

Members are invited to approve the creation of a new commitment of $78,356,000 for the development of a Public Health Information System in the Department of Health.

PROBLEM

The Department of Health (DH) lacks a comprehensive computerised information base to support evidence-based decision making in health policy, resource allocation and provision of health services.

PROPOSAL

2. The Director of Health, with the support of the Secretary for Health and Welfare and in consultation with the Director of Information Technology Services, proposes to create a new commitment of $78,356,000 for the development of a Public Health Information System (PHIS). The PHIS is a computerised information system which integrates local health information from multiple sources into a common, structured format to enable information sharing, data analysis, and ad hoc queries and reporting in a timely and efficient manner.

JUSTIFICATION

The Existing Practice and Its Problems

3. A wide spectrum of health related information (such as information on the population's mortality, hospitalization, disease incidence/prevalence, lifestyle behaviours, related economic and social factors, health care expenditures,

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the availability/accessibility/utilisation of health services, and the effectiveness and efficiency of interventions) is needed as a rational basis for health policy formulation and health services provision. At present, part of this information is collected by a wide range of institutions, including government bureaux and departments, academic institutions, health care organisations and other health care professionals. There is no data standard, and data are stored in different modes from primitive paper records to sophisticated networked database systems.

4. The present practice has a number of drawbacks. For example, there is a lack of regular and systematic collation, analysis and dissemination of data stored in multiple sources. Data availability, accessibility and sharing is limited. Much of the data, therefore, has not been utilised to the fullest extent to achieve the potential health gains for the community. Also, the sharing of data among different parties sometimes involve transfer of physical copies and re-entering of data, which are inefficient and liable to human errors. In addition, there are important data gaps which are not being comprehensively collected by any party in the community.

The Proposed System

5. The absence of a comprehensive public health database has hampered the Government's ability to assess the community's health status and needs, prevent and control diseases, monitor resources allocated to health care providers and evaluate health services. We therefore propose to equip DH with a computerised information system, namely, the PHIS, that collects, standardises and integrates data from diverse sources into a data warehouse configuration. We plan to collect the following five broad categories of data through the PHIS -

(a) demographic profile, such as population and household demographic statistics;

(b) population fertility and mortality experience;

(c) population morbidity pattern, including data collected from our disease surveillance system; statistics on hospital in-patient admissions and discharges, prevalence of selected non-communicable diseases and information on lifestyle and behavioral risk factors;

(d) health services availability, accessibility, utilisation and quality, including statistics on health care manpower, hospital beds, waiting time of patients, utilisation rates, screening programmes, immunisation coverage and patient satisfaction; and

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(e) environmental profile, such as statistics on the physical and socio-economic environment, including data on air quality, water quality, food surveillance, employment rate, income level and family structure.

6. DH will identify gaps in health information and conduct regular surveys to capture corresponding data on, for example, prevalence of chronic diseases, prevalence of behavioral and other disease-risk factors, and accessibility and utilisation of health services.

7. The PHIS will enable DH and relevant parties to enhance efficiency and contribute towards improving the health of the population, through -

(a) <u>improved data comprehensiveness, availability, accessibility and quality</u>

With the PHIS integrating all relevant data sources into a central repository, there will be improvement in data comprehensiveness, availability, accessibility and quality. Gaps in health information will be identified and action taken to capture such information. Data will be transferred within the system through Internet and Intranet technology where possible, minimising the need for transfer of physical copies and data re-entry.

Users including the general public will be able to access information on line and within minutes, saving time and effort. At present DH is only capable of handling some 200 data enquiries per month. With PHIS, some 1 100 concurrent users can access information in the system round the clock.

(b) <u>improved data analysis</u>

The PHIS will offer a variety of analytical tools for more complex and in-depth analyses which are currently either very labour-intensive or not practicable. These include identification of patterns, trends and associations in the data, and exploration of problems along multiple dimensions/perspectives. For example, it takes up to one man-month to perform the routine analyses and reporting of the annual summary of notifiable infectious diseases. With the PHIS, the process can be shortened to within days.

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The PHIS will facilitate the monitoring of trends and patterns of communicable diseases and chronic diseases, and their risk factors. Its automated alert system will quickly draw attention to issues that merit investigation and intervention. This will ensure timely responses to unusual events/disease outbreaks.

For example, the system can continuously monitor trends in the notification rates of communicable diseases so that prompt investigation and control actions can be initiated in response to an upsurge in disease incidence. The system will also monitor and warn of any change in the trend of the strains of virus isolates or the emergence of a virulent strain, and facilitate monitoring of the population's immunity level against vaccine preventable diseases. This will enable early remedial actions to be taken to prevent outbreaks of vaccine preventable diseases. DH estimates that there will be an increase of regular analyses and reports by 60% from 500 to 800 per annum.

(c) <u>enhanced partnership for health</u>

Effective intervention programmes for health promotion often involve a multi-sectoral approach. Through a network of collaborators, the PHIS will enhance collaboration in health information collection, sharing and application among collaborators in different sectors and promote partnership for health.

(d) <u>formulation of evidence-based public health policy</u>

Supported by the PHIS, our capability in assessing the health status and health needs of the population, preventing and controlling diseases, promoting health of the population, conducting health research and effective use of resources will be enhanced.

Information on the health status of the population will facilitate the formulation of evidence-based public health policy, and the setting of appropriate and realistic targets for monitoring and evaluating intervention programmes.

With information on the health determinants and the relationship between disease prevalence and other variables, such as smoking habits and dietary patterns, it will be possible to identify and properly target intervention programmes to the high risk groups.

FINANCIAL IMPLICATIONS

Non-recurrent Cost

8. The total non-recurrent cost for implementing PHIS is $85,565,000. The breakdown of the costs and cash flow are as follows -

		2000-01 $'000	2001-02 $'000	2002-03 $'000	2003-04 $'000	Total $'000
Non-recurrent expenditure						
(a)	Implementation services	910	17,305	20,858	3,528	42,601
(b)	Computer hardware, software and network equipment	0	4,258	15,649	176	20,083
(c)	Site preparation	0	210	6,930	0	7,140
(d)	Miscellaneous	0	449	771	189	1,409
(e)	Contingencies	91	2,222	4,421	389	7,123
	Sub-total	**1,001**	**24,444**	**48,629**	**4,282**	**78,356**
Non-recurrent staff cost						
(f)	DH staff cost	99	1,845	2,802	575	5,321
(g)	ITSD[(1)] staff cost	309	937	321	321	1,888
	Sub-total	**408**	**2,782**	**3,123**	**896**	**7,209**
	Total	**1,409**	**27,226**	**51,752**	**5,178**	**85,565**

Of these, items (f) and (g) will be met by the relevant departments through redeployment of existing resources.

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(1) Information Technology Services Department

9. With regard to paragraph 8(a), the cost of $42,601,000 is for the acquisition of professional services to support the tendering exercise, system development and implementation. These include project management, system implementation, data warehouse construction as well as data standardisation consultancy and data conversion services.

10. With regard to paragraph 8(b), the cost of $20,083,000 is for the acquisition of computer hardware, software, network equipment, data communication lines as well as facilities for disaster recovery (DR).

11. With regard to paragraph 8(c), the cost of $7,140,000 is for site preparation (e.g. setting up the primary computer centre and the DR computer centre, installation of nodes, data ports, power points) and cabling work required for the installation of computer equipment.

12. With regard to paragraph 8(d), the cost of $1,409,000 is for training users of the new system, acquisition of start-up consumables and other miscellaneous items required during implementation.

13. With regard to paragraph 8(e), the sum of $7,123,000 represents a 10% contingency on the cost items set out in paragraphs 8(a) to (d).

14. With regard to paragraph 8(f), the cost of $5,321,000 represents 44.4 man-months of DH staff cost. These include 2.3 man-months of Consultant, 10.7 man-months of Senior Medical and Health Officer, 11.6 man-months of Medical and Health Officer, 6.3 man-months of Senior Statistician and 13.5 man-months of Scientific Officer (Medical) required to support the tendering process and system implementation. DH will meet the staffing requirements by redeployment of existing resources.

15. With regard to paragraph 8(g), the cost of $1,888,000 represents the staff resources required in ITSD, which include five man-months of Chief Systems Manager and seven man-months of Senior Systems Manager for provision of information technology advice during the tendering process and system implementation. ITSD will meet the staffing requirements by redeployment of existing resources.

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Recurrent Cost

16. The estimated recurrent expenditure for maintaining and supporting PHIS is $15,762,000 per year upon full implementation. The cost breakdown is as follows -

		2002-03 $'000	**2003-04** $'000	**2004-05 onwards** $'000
(a)	System and technical support services	1,166	3,973	4,438
(b)	Maintenance of hardware, software and network equipment	1,083	4,099	4,248
(c)	Miscellaneous	78	78	78
	Sub-total	**2,327**	**8,150**	**8,764**
(d)	DH staff cost	1,833	6,263	6,998
	Total	**4,160**	**14,413**	**15,762**

17. With regard to paragraph 16(a), the sum of $4,438,000 is for outsourcing the on-going technical support services for system, network and database administration as well as the support services for system management and system disaster recovery.

18. With regard to paragraph 16(b), the expenditure of $4,248,000 is for the maintenance of hardware, software and networking equipment as well as rental of communication lines.

19. With regard to paragraph 16(c), the expenditure of $78,000 is for the purchase of consumable items such as printing toners and back-up tapes.

20. With regard to paragraph 16(d), the sum of $6,998,000 represents 72 man-months of DH staff cost. These include one Senior Medical and Health Officer, one Medical and Health Officer and two Scientific Officer (Medical) posts to be created in 2002-03 and two additional Scientific Officer (Medical) posts in 2003-04. Since a total outsourcing approach is adopted for on-going support service of PHIS, no ITSD recurrent resources will be required.

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Cost and Benefit Analysis

21. To achieve the same functions and output without PHIS, we estimate that the required staff cost would be $30.8 million per year representing one man-month of Consultant, 24 man-months of Senior Medical and Health Officer, 47 man-months of Medical and Health Officer, 106 man-months of Scientific Officer (Medical), three man-months of Senior Statistician, 13 man-months of Statistician, 96 man-months of Statistical Officer I, 195 man-months of Statistical Officer II and 43 man-months of Assistant Clerical Officer. Separately, with PHIS the reports that should have been printed will be made available on the web. The savings in printing and postage costs amount to $1.5 million per year.

22. We have carried out a cost and benefit analysis applicable to computer projects as shown in the Enclosure. The analysis shows that the proposed system will achieve annual notional savings of $16.6 million, and will break even in year 2008-09. Moreover, significant non-monetary benefits will accrue from the more effective and evidence-based decision making in health policy, resource allocation and provision of health services and programmes, which will contribute towards improvement to the health of the population.

Encl.

Implementation Plan

23. We plan to implement the proposed system in three phases after the tendering process which will take about nine months. Phase one covers establishment of a data warehouse and construction of communication network at the DH Headquarters, and migration of data systems currently maintained by the DH Statistics Unit. Phase two covers networking with selected DH services/units and major non-DH users (including the Hospital Authority, Census and Statistics Department and Immigration Department). Phase three covers networking with all other PHIS users and the provision of access of PHIS web-site to the general public. The implementation timetable is as follows -

		Target completion date		
	Activity	**Phase 1**	**Phase 2**	**Phase 3**
(a)	Site preparation, system development	February 2002	September 2002	January 2003
(b)	Data conversion and migration, system testing and user training	June 2002	February 2003	August 2003
(c)	Live run	June 2002	February 2003	August 2003
(d)	System nursing	December 2002	August 2003	February 2004

/**BACKGROUND** .....

BACKGROUND INFORMATION

24. The establishment of the PHIS is one of the initiatives in the Chief Executive's 1998 Policy Address. A feasibility study (FS) to assess the technical viability and resource implications of implementing the PHIS was completed in July 2000. The FS recommends that the best approach of implementing the system is to develop a data warehouse and an information network with design to safeguard system security and data confidentiality.

25. On 13 November 2000, we consulted the Legislative Council Panel on Health Services on the proposed system. Members generally supported the proposal.

Health and Welfare Bureau
December 2000

Enclosure to FCR(2000-01)60

Cost-benefit Analysis of the Public Health Information System (at 2000-01 price)

		2000-01 $'000	2001-02 $'000	2002-03 $'000	2003-04 $'000	2004-05 $'000	2005-06 $'000	2006-07 $'000	2007-08 $'000	2008-09 $'000	TOTAL $'000
I. COST											
Non-recurrent											
Expenditure		1,001	24,444	48,629	4,282	-	-	-	-	-	**78,356**
Staff cost		408	2,782	3,123	896	-	-	-	-	-	**7,209**
	Sub-total	1,409	27,226	51,752	5,178	-	-	-	-	-	**85,565**

Recurrent											
Expenditure		-	-	2,327	8,150	8,764	8,764	8,764	8,764	8,764	**54,297**
Staff cost		-	-	1,833	6,263	6,998	6,998	6,998	6,998	6,998	**43,086**
	Sub-total	-	-	4,160	14,413	15,762	15,762	15,762	15,762	15,762	**97,383**
	Total cost	**1,409**	**27,226**	**55,912**	**19,591**	**15,762**	**15,762**	**15,762**	**15,762**	**15,762**	**182,948**
II. BENEFIT											
Staff cost avoidance		-	-	8,074	27,581	30,817	30,817	30,817	30,817	30,817	**189,740**
Other cost avoidance		-	-	-	-	1,503	1,503	1,503	1,503	1,503	**7,515**

Total benefit	**-**	**-**	**8,074**	**27,581**	**32,320**	**32,320**	**32,320**	**32,320**	**32,320**	**197,255**
III. NET COST/BENEFIT	(1,409)	(27,226)	(47,838)	7,990	16,558	16,558	16,558	16,558	16,558	**14,307**
IV. CUMULATIVE COST/BENEFIT	(1,409)	(28,635)	(76,473)	(68,483)	(51,925)	(35,367)	(18,809)	(2,251)	**14,307**	