中華人民共和國香港特別行政區政府總部食物及衞生局
Food and Health Bureau, Government Secretariat
The Government of the Hong Kong Special Administrative Region
The People's Republic of China

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4 September 2014

Ms Maisie LAM
Clerk to Subcommittee on Health Protection Scheme
Legislative Council Secretariat
Legislative Council Complex
1, Legislative Council Road
Central

Dear Ms LAM,

Panel on Health Services
Subcommittee on Health Protection Scheme

Follow-up to the meeting on 15 April 2014

Further to our letter of 30 July 2014, the supplementary information requested in your letter of 8 July 2014 is provided at **Annex**.

Yours sincerely,

(Sheung-yuen LEE)
for Secretary for Food and Health

Encl.

c.c.   Dr Hon LEUNG Ka-lau, Chairman

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Supplementary Information Requested by the Meeting of Subcommittee on Health Protection Scheme of the Panel on Health Services on 15 April 2014

Item 1(a)(i) -

In respect of the Thematic Household Survey conducted by the Census and Statistics Department during October 2011 to January 2012, provide supplementary information on the following -

(i)   of the 29 187 persons in the 10 065 enumerated households, the number of persons who were covered by employer-provided and/or individually-purchased private health insurance ("PHI");

Administration's response

       According to the Census and Statistics Department (C&SD), in deriving statistics from the Thematic Household Survey (THS), weighting adjustments are applied to individual data records (with reference to sampling probabilities, response rates, etc.) so that the findings would reflect the actual situation in Hong Kong as a whole and tally with the age-sex distribution of the Hong Kong population.   Given such, it is the ongoing practice of C&SD only to release weighted statistics, instead of sample counts to data users, with a view to ensuring proper interpretation and use of data.   The replies to items 1(a)(i) to (iii) are provided based on the weighted statistics of the THS conducted during October 2011 to January 2012.

2.   Persons covered by private health insurance ("PHI") referred to those entitled to medical benefits provided by employers (except medical benefits for Civil Service and Hospital Authority staff) and / or covered by medical insurance purchased by individuals.   Persons with only medical benefits for Civil Service or Hospital Authority staff, and those who were only covered by critical illness insurance were not included.   At the time of enumeration of THS during October 2011 to January 2012, the estimated total number of persons covered by PHI was 2 793 900.   This included 956 900 persons who were entitled to medical benefits provided by employers/companies in the private sector only, 1 248 300 persons who were covered by medical insurance purchased by individuals only, and 588 700 persons who were entitled to medical benefits provided by

employers/companies in the private sector and covered by medical insurance purchased by individuals concurrently.

Item 1(a)(ii)

(ii)   among these persons who were covered by PHI, the number of persons who had admitted to local hospital for treatment during the 12 months before enumeration; and

Administration's response

3.   Among the 2 793 900 persons in item 1(a)(i) above who were covered by PHI at the time of enumeration, 178 100 persons had been admitted to local hospitals during the 12 months before enumeration[1].

Item 1(a)(iii)

(iii)   among these admissions, the number of admissions the medical expenditure incurred by which was financed by PHI with a breakdown of the healthcare sector involved.

Administration's response

4.   Among the hospital admissions by people covered by PHI as stated in item 1(a)(ii) above, 46% and 54% pertain to private and public hospital admissions respectively[2]. Of the private hospital admissions, 79% had expenditure involved financed fully or partially by PHI. Of the public hospital admissions, 27% had expenditure involved financed fully or partially by PHI.

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[1] In the THS questionnaire, the respondents were asked to provide information about the last and up to the last three admissions to hospitals during the 12 months before enumeration. They were also asked a number of questions to derive whether they were covered by PHI at the time of enumeration. Due to the difference in reference time periods of these two sets of questions, there is a possibility that not all respondents covered by PHI at the time of enumeration were entitled to PHI benefits when they were admitted to hospitals.

[2] Due to survey limitations, including perceived tendency of some respondents to under-report their hospitalization incidents out of privacy and other considerations, the number of hospital admissions revealed by the THS results is usually much smaller than the corresponding figures revealed by administrative records. Yet this limitation does not affect the current analysis focusing on healthcare utilization pattern, which can be based on breakdown of hospital admission figures in percentage terms. Bearing in mind such technical considerations, there were 213 700 local hospital admissions by people with PHI cover, including 97 900 private hospital admissions and 115 800 public hospital admissions. Of the 97 900 private hospital admissions, 77 000 had expenditure involved financed fully or partially by PHI. Of the 115 800 public hospital admissions, 31 400 had expenditure involved financed fully or partially by PHI.

5.   The tendency of a considerable number of people with PHI to use public hospital services and make insurance claims for the expenditure involved is due to a host of factors, including, though not limited to, the design of PHI products.   For instance, inadequate benefit levels (e.g. for room and board fees) of PHI products, lack of upfront certainty, and availability of daily cash subsidy in the event of using public hospital services (but not private hospitals) in some PHI plans may induce the insured to use public hospital services even though they are covered by PHI.

Item 1(b)(i) -

In respect of the estimated average premium per insured member under HPS Standard Plan worked out by the Consultant as set out in Appendix A to LC Paper No. CB(2)1264/13-14(01),

(i)   provide the premium schedule, with reference to different age groups and health conditions, employed by the Consultant in estimating the indicative HPS premiums;

Administration's response

6.   Under the Health Protection Scheme (HPS), insurers would each set their own age-banded premium schedules for the Standard Plan, which would be published in the public domain for consumer's information. For illustration purpose, the Consultant estimated that the average standard premium of the HPS Standard Plan is around $3,600 in 2012 constant prices, around 9% higher than the average premium of existing individual indemnity hospital insurance products (ward level) in the market ("base premium").   The estimated increase in average standard premium is attributable to the enhanced benefits of the Standard Plan.   For instance, for non-surgical cancer treatments (e.g. chemotherapy, radiotherapy) and advanced diagnostic imaging tests (e.g. Magnetic Resonance Imaging (MRI) examination, Computed Tomography (CT) scan, Positron Emission Tomography (PET) scan), the majority of existing products do not provide coverage for these treatments and tests as a separate benefit item.   These treatments and tests are usually only claimable under the benefit item of "miscellaneous hospital expenses", which under normal circumstances would entail unnecessary hospitalisation and the reimbursement would likely not sufficient for covering the cost of these treatments and tests.

Under the Standard Plan, rather than being covered under "miscellaneous hospital expenses" as in existing individual indemnity hospital insurance products, these treatments and tests will be covered under separate benefit items, subject to respective benefit limits that would provide sufficient coverage for the insured for using these services.

7.　　To enable like-with-like comparison, the Consultant estimated the "base premiums" by assuming that the benefits are likewise set according to ward-level accommodation and with similar claim-to-bill ratio as existing insurance products in the market.　A table comparing the "base premiums" and the indicative HPS standard premiums is given below.

Table 1: "Base premiums" and estimated standard premiums of HPS Standard Plan at 2012 (at 2012 constant prices)

Age group	"Base premium" (ward-level products)	HPS Standard Plan standard premium
0 to 14	$1,100	$1,250
15 to 19	$1,400	$1,500
20 to 24	$1,400	$1,450
25 to 29	$2,200	$2,200
30 to 34	$2,200	$2,200
35 to 39	$3,100	$3,200
40 to 44	$3,150	$3,300
45 to 49	$4,250	$4,750
50 to 54	$4,550	$5,300
55 to 59	$5,450	$6,250
60 to 64	$6,300	$6,900
65 to 69	$7,850	$8,600
70 and over	$9,600	$9,950
Average*	$3,300	$3,600

* Weighted average by the estimated number of insured persons in different age groups.

8.　　To recap briefly the methodology used by the Consultant (which was provided in detail vide Appendix A of LC Paper No. CB(2)1264/13-14(01)), the "base premiums" are estimated by the Consultant with reference to local market data and overseas experience. Parameters for estimating the "base premiums" include the uptake, claims

frequency, average billed size, expense loading[3], etc. After estimating the "base premiums", the Consultant assesses the price impacts by age group of the product design features of HPS Standard Plan vis-à-vis common features of existing individual indemnity hospital insurance products. The assessment makes use of age-specific inputs as far as possible, such as age-specific claims data in the local market. The Consultant then applies the price impacts to the "base premiums" in order to obtain the illustrative standard premiums of HPS Standard Plan by age group.

9.   Both the "base premiums" and indicative premiums pertain to standard premiums applicable to insured persons with standard health risks. Under the HPS, insured persons assessed by insurers to have sub-standard risk, i.e. less healthy than average, may be charged a premium loading up to a maximum of 200% of standard premium, which makes the payable premium equivalent to three times standard premium.

Item 1(b)(ii) -

(ii)   set out the formula and the calculations to arrive at the estimation on, and explain the significant difference between, the impact brought about by the component of "coverage of pre-existing conditions" on the premiums to be paid by insured persons with standard-risk and high-risk respectively under HPS as set out in Table 2 of Appendix A and item (b) under the first paragraph of Appendix B. According to the Administration, the impact of covering pre-existing conditions for all current members was to increase the average standard premium by approximately 5%, whereas the cost of a member of High Risk Pool ("HRP") was assumed to be six times higher than that of an average risk person primarily due to the coverage of pre-existing conditions;

Administration's response

10.   Both the actuarial analyses in the estimation of standard premium of the HPS Standard Plan and the cost of a member of the High Risk Pool (HRP) include the effects of covering pre-existing conditions, but the context involved is different.

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[3] Expense loading refers to the amount of insurer expenses (including commissions and broker fees, profit margins, direct expenses and indirect overhead expenses) as a percentage of the amount of premium.

11.   In estimating the average standard premium of the HPS Standard Plan, the price impact of covering pre-existing condition (i.e. +5% in Table 2 of Appendix A of LC Paper No. CB(2)1264/13-14(01)) refers to that arises from enrollment of migrants who have pre-existing conditions excluded from coverage in their existing insurance policies.   Under the migration arrangement proposed by the Consultant, such migrants may either opt for maintaining these case-based exclusions without re-underwriting by the insurers, or removing such exclusions subject to re-underwriting by the insurers.   According to the Consultant, the former case does not affect standard premiums as no extra claims cost is incurred. Yet in the latter case, extra claims cost would arise.   If the insurers decide to finance the cost by increasing the overall premium level, instead of charging premium loading on individual migrants, the standard premiums may become higher.   Since the reaction of the insurers is somewhat uncertain depending on the market situation, for the sake of prudence, the Consultant assumes that the insurers would raise the overall standard premium to finance the extra claims cost, and estimates that the increase required would average at 5%.   The premium increase is estimated through the actuarial model developed by the Consultant, which takes into account factors such as the health condition of those with individual indemnity hospital insurance as revealed by the results of the THS and the claims experience in the local health insurance market as revealed by the claims database of the Hong Kong Federation of Insurers.   The magnitude of the estimated increase is broadly consistent with the supporting evidence revealed by the results of the industry survey and consumer survey conducted by the Consultant, which reflect that around 10% of existing individual indemnity hospital insurance policies have case-based exclusions of pre-existing conditions.   It is likely that not all the migrants with pre-existing conditions excluded in the existing policies would choose to remove their case-based exclusions, and that not all the insurers would choose to finance the extra claims cost through increasing standard premium instead of charging premium loading on individual migrants.

12.   As for migrants who were classified as standard risks when underwritten for the existing policies, they would not be subject to re-underwriting for existing benefits when migrating to the HPS irrespective of whether their health conditions have deteriorated over time. This however would not result in any upward pressure on the HPS standard premium compared to premiums of existing policies because any extra claims cost associated with pre-existing conditions developed after

the inception of the existing policies would have already been reflected in the premiums of the existing policies.   As for new subscribers of the HPS who will be underwritten by insurers, the claims cost of covering their pre-existing conditions will be financed by premium loading and hence there is no cost implication on the standard premium.

13.   In estimating the cost factor of a member of the HRP, the cost impact of covering pre-existing condition (item (b) under the first paragraph of Appendix B of LC Paper No. CB(2)1264/13-14(01)) refers to that arises from enrollment of high-risk people who would be transferred to the HRP, including mainly those who are currently uninsured and have pre-existing conditions.   After making reference to local market data and overseas experience, the Consultant assumes that the average claims cost of the HRP members would be six times that of other standard-risk people under the HPS.   Since the extra claims cost are to be financed by the premium loading paid by HRP members (at 200%) and Government injection to fill the funding gap, the standard premium of the HPS Standard Plan would be unaffected.

Item 1(b)(iii) -

(iii) set out the formula and the calculations to arrive the estimation that covering endoscopy and colonoscopy through packaged pricing in ambulatory settings would decrease the average standard HPS premium by approximately 12%; and

Administration's response

14.   The price impact due to coverage of endoscopy (including colonoscopy) through packaged pricing in ambulatory setting ($400 or 12% of "base premium" at $3,300) is derived by comparing the estimated portions of standard premium to pay for the coverage of endoscopy between the HPS Standard Plan and an existing comparable individual indemnity hospital insurance product.   Calculation of this premium portion can be broadly expressed by the following formulae that applies to each age group and gender group:

$$= \frac{\text{Claims cost per insured person}}{(1+ \text{Conversion factor for standard premium}) \times (1-\text{Expense loading})}$$

15.   Claims cost per insured person is a function of claims frequency, average billed size and claim-to-bill ratio.   The Consultant estimates that the claims cost per insured person at all ages for coverage of endoscopy is about $560 for HPS Standard Plan, lower than that of $790 for comparable individual indemnity hospital insurance product in the current market. The lower claims cost per insured person in the case of HPS Standard Plan is mainly due to a higher use of more cost-effective[4] ambulatory procedures with packaged pricing to substitute for unnecessary hospital admissions (it is assumed that the percentage of endoscopy performed under an in-patient setting would decrease from the current 70% to 15% under the HPS)[5].   Such cost savings is expected to outweigh the cost increases due to a higher claims frequency (an estimated 35% increase under the HPS) as greater demand would be generated by coverage of ambulatory procedures under the HPS, and the cost increases due to a higher claims-to-bill ratio (from the current 89% to 100% as it is assumed that the full cost of ambulatory procedures would be covered under the HPS).

16.   As the estimation is oriented towards standard premium paid by relatively healthy insured people, it is necessary to apply a conversion factor that discounts the effect of less healthy insured people in the risk pool who have higher claims cost and would be charged with premium loading.   After considering the morbidity risk and the proportion of less healthy insured people in the insured population, the conversion factor is assumed to be 3% on average.   The second adjustment factor is the expense loading, which is applied to convert cost into price.   The Consultant assumes the average loading to be 43%, after making reference to the then known expense loading ratio of the individual health insurance market when the consultancy was conducted.

17.   After the corresponding estimates for all age groups are summed up, the price impact due to coverage of endoscopy through packaged pricing under ambulatory setting is calculated as follows –

$$= \frac{\$790}{(1+3\%) \times (1-43\%)} - \frac{\$560}{(1+3\%) \times (1-43\%)}$$

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[4] According to the estimate of the Consultant, in 2010, the average cost of the procedure "colonoscopy with removal of tumor, polyp or lesion" performed under an ambulatory setting was around $8,600. The average cost was around $19,100 for those who stayed overnight in a hospital (general ward level).
[5] As a benchmark, the Consultant's analysis of Australian Hospital statistics shows that only 10% of endoscopy were performed as in-patient overnight procedures in 2010-11.

$$= \quad \$1,350 - \$950$$

$$= \quad \$400 \text{ (or 12\% of "base premium" at \$3,300)}$$

Item 1(b)(iv) -

(iv) *provide another set of figures on the estimated impact of HPS on premiums in the individual market to cater for the scenario where the insurer loading for expenses, profit and commissions was not included in the calculations.*

Administration's response

18.   If expense loading is not included in the calculation, the premium schedule provided in item 1(b)(i) will be reduced by 43% on average, with reduction varying by age group. The reduced standard premiums are shown in the following table.

Table 2: Estimated standard premiums of HPS Standard Plan before and after expense loading as at 2012 (at 2012 constant prices)

Age group	HPS Standard Plan standard premium (before expense loading)	HPS Standard Plan standard premium (after expense loading)
0 to 14	$600	$1,250
15 to 19	$750	$1,500
20 to 24	$750	$1,450
25 to 29	$1,200	$2,200
30 to 34	$1,150	$2,200
35 to 39	$1,750	$3,200
40 to 44	$1,800	$3,300
45 to 49	$2,650	$4,750
50 to 54	$2,900	$5,300
55 to 59	$3,750	$6,250
60 to 64	$4,500	$6,900
65 to 69	$6,150	$8,600
70 and over	$7,150	$9,950
Average*	$2,050	$3,600

* Weighted average by the estimated number of insured persons in different age groups.

Provide, in the form of a table similar to Table 1 in Appendix B, the respective expected cost of operating HRP, as well as the corresponding estimated cost to the Government for financing HRP, for the period of 2016 to 2040 when the proposed entry age limit for guaranteed acceptance with a premium loading cap of 200% was set at 40, 45, 50, 55, 60 or 65.

Administration's response

19.   The proposed entry age limit of 40 for guaranteed acceptance with a premium loading cap of 200% would be effective starting from the second year of implementation of the HPS.   The entry age limit is meant to encourage people to enroll when they are still young and healthy.   If the entry age limit is raised, the effectiveness of the measure will be undermined as people will tend to defer enrolling in the HPS.   In consequence, it is expected that more people would join the HPS with their health condition already deteriorated after the first year, and more of them are expected to be transferred to the HRP.   As a result, both the membership of the HRP and the public funding support required are expected to be higher under a higher entry age limit.

20.   Table 3 below provides the Consultant's estimates of the HRP membership and public funding support required if the entry age limit for guaranteed acceptance is raised from the proposed level of 40 to 45, 50, 55, 60 and 65.

Table 3: Membership and cost of the HRP by entry age limit (from 2016-2040)(at 2012 constant prices)

Guaranteed acceptance age limit starting from second year of implementation	40	45	50	55	60	65
(1) Administration cost ($ billion) (12.5% of claims costs)	2.0	2.1	2.4	2.8	3.4	4.6
(2) Claims cost ($ billion)	15.8	17.0	19.3	22.4	26.9	36.7
(3) = (1) + (2) Total operating cost ($ billion)	17.8	19.1	21.7	25.2	30.3	41.3
(4) Premiums collected ($ billion) (3x standard risk)	13.5	14.5	16.4	18.8	22.3	29.4
(5) = (3) – (4) Cost to Government ($ billion)	4.3	4.6	5.3	6.4	8.0	11.9
No. of members in 2016 (as % of total population insured by individual indemnity hospital insurance (IHIP))	69 800 (3.6%)	69 800 (3.6%)	69 800 (3.6%)	69 800 (3.6%)	69 800 (3.6%)	69 800 (3.6%)
No. of members in 2040 (as % of total population insured by IHIP)	10 900 (0.5%)	12 400 (0.6%)	15 600 (0.7%)	20 000 (0.9%)	24 900 (1.2%)	30 800 (1.4%)
Average annual no. of members (as % of total population insured by IHIP)	24 000 (1.2%)	25 400 (1.2%)	27 800 (1.3%)	30 400 (1.5%)	33 800 (1.6%)	40 200 (1.9%)
Total cost per member per annum ($)	29,700	30,000	31,300	33,100	35,800	41,100
Cost to Government per member per annum ($)	7,200	7,200	7,600	8,400	9,500	11,800

21.   Generally speaking, the higher the entry age limit, the higher the HRP membership and the more public funding required for the projection horizon from 2016 to 2040.   The total cost per member per annum would rise as the entry age limit goes up, since deferred enrollment under a higher entry age limit would have an impact on the average age of HRP members and their health conditions.   This factor, together with a higher average HRP membership during the projection horizon, will increase the total operating cost of the HRP and the amount of public funding support required.   As regards the HRP membership in the first year of implementation of the HPS (2016), despite the fact that a higher entry age limit for guaranteed acceptance will undermine the "run for cover" effect in the first year of HPS's operation, it is assumed that the HRP membership will remain unchanged.   This is due to the Consultant's assumption that the behaviour of high-risk individuals will not be affected by the change in entry age limit, i.e. they will join the HRP in the first year and will not defer enrollment irrespective of the level of entry age limit starting from the second year.   This assumption leans on the conservative side and is adopted for the sake of prudence, since the amount of public funding support required under such assumption should be higher than the case where high-risk individuals defer enrollment to later years.

Item (d)(i) -

In respect of the Administration's stance that it was necessary to adopt the proposed Minimum Requirements approach in order to provide enhanced quality and certainty of insurance protection to consumers,

(i)   engage the insurance sector to analyze the market data and provide a statistical summary on the coverage and benefit levels, and the utilization of the existing individual-based ward-level indemnity hospital insurance products in the local market; and

Administration's response

22.   In the process of formulating recommendations for implementing the HPS, we have closely engaged the insurance industry.   In conducting the Consultancy Study on Health Protection Scheme, the Hong Kong Federation of Insurers (HKFI) and insurance companies had provided generous support to the Consultant in surveying the local health insurance market, including providing relevant claims data (such as type of operation, level of accommodation, length of stay, claims and bills size, etc.), market

information and statistics (such as demographics of insured members, features and benefits of existing market products, market premium, distribution channels, etc.) for developing the HPS proposal. The HKFI also shared with us a summary of their survey of existing indemnity insurance plans as compared with the HPS Standard Plan.

23.   We have also closely liaised with the insurance industry through various platforms, such as meetings of the Working Group and Consultative Group on HPS at which the Consultant had regularly reported its findings and recommendations to members for discussion, as well as liaison group meetings with representatives of the HKFI. The industry has rendered valuable suggestions and comments to us at these meetings and on other occasions, which we have duly considered and incorporated in our recommendations as appropriate. We welcome any further information, suggestion or proposal from the industry on matters relating to the implementation of the HPS.

Item (d)(ii) -

(ii)   conduct a study to assess the willingness of consumers to purchase or migrate to the HPS Standard Plan if the average standard premium of which, as estimated by the Consultant, was around $3,600 in 2012 constant dollar and subject to a potential range of variation between -8% and +45%.

Administration's response

24.   In formulating the Minimum Requirements approach for the HPS, the Consultant had conducted a viability assessment that considers willingness-to-pay of consumers as well as its interaction with other major factors at work, including the cost to insurers; value of the consumer protection features of the HPS to insured persons; availability of utilization and cost control measures (e.g. encouraging use of ambulatory procedures, 30% co-insurance for advanced diagnostic imaging tests, measures to enhance transparency of private healthcare services and premium) to combat moral hazard and check against medical inflation, etc. The estimated range of variation in indicative average standard premium of the HPS Standard Plan, which is between -8% and +45% to the main scenario of $3,600 per annum (at 2012 constant prices), is part of the result of this assessment exercise. As regards the variation in premium estimation, the

key driver is how well the HPS is able to contain moral hazards on the use of advanced diagnostic imaging tests.   It is assumed in the main scenario ($3,600) that per-person usage of advanced diagnostic imaging services will be consistent with the Organisation for Economic Co-operation and Development (OECD) average.   In the scenario with a premium variation of +45%, it is assumed that per-person usage of these services will be consistent with that of the United States, which illustrates a scenario with little or no control over abuse in usage.   It is for this reason that a 30% co-insurance is proposed for the use of such services under the HPS to better manage the cost involved.

25.   In considering willingness-to-pay of consumers, the Consultant had made reference to local and overseas market experiences, and had conducted a consumer market survey through household interview to gauge market response.   The consumer survey was conducted from May to August 2013, targeting middle-income individuals who were considered more likely to subscribe to HPS products.   The survey was responded by about 1 100 households and about 2 000 individuals.   When conducting the interview, the interviewers first explained to the respondents the HPS proposal as a whole as well as the key features of the illustrative HPS Standard Plan.   The respondents were then shown the indicative standard premium rates of their age group for testing willingness-to-buy.   As the objective of the survey was to test consumer willingness-to-pay/migrate to the HPS Standard Plan, the interview focused on the main scenario of $3,600 without testing response to other possible scenarios of premium variation.

26.   The response to the key features of the HPS Standard Plan was generally positive and broadly similar between the insured and uninsured respondents.   The survey results showed that about 70% of the respondents, with or without cover of indemnity hospital insurance, indicated that they were willing to consider purchasing or migrating to the illustrative HPS Standard Plan.   A number of features were considered attractive by more than half of the respondents, including guaranteed renewal for life, coverage of chemotherapy and radiotherapy, coverage of procedures conducted in hospital day centres or clinics, Government regulation of product design, and coverage of advanced diagnostic imaging tests.   Price sensitivity of respondents was tested with regard to certain features of the HPS, including coverage of advanced diagnostic imaging tests (subject to 30% co-insurance) and coverage of chemotherapy and

radiotherapy.   The result shows that about 60% of respondents (assuming their existing cover did not include advanced diagnostic imaging tests) were willing to pay an additional 15% of premium to cover advanced diagnostic imaging tests, and about 74% of respondents (assuming their existing cover did not include chemotherapy and radiotherapy) were willing to pay an additional 10% of premium to cover chemotherapy and radiotherapy.

Item 2 -

In the context of discussing the commissioned study on healthcare manpower planning and projection, the Administration was requested to provide an algorithm for the medical manpower projection model to take into account factors such as adjustments in Government subvention to the Hospital Authority, distribution of manpower resources among the seven hospital clusters, fluctuation in healthcare service utilization, and the elasticity of medical manpower supply in the private market.

Administration's response

27.   Please refer to **Appendix** (English version only) for detailed explanation provided by the University of Hong Kong.

Food and Health Bureau
September 2014

Healthcare Manpower

Planning and Projection

Response to the request from the Sub-committee on
HPS under the LegCo Health Service Panel

The Sub-committee on HPS under the LegCo Health Services Panel has asked us to follow up on a request made by Dr Leung Ka-lau, Sub-committee chairman, at its last meeting in April 2014. The request is as follows:

> *"In the context of discussing the commissioned study on healthcare manpower planning and projection, the Administration was requested to provide an algorithm for the medical manpower projection model to take into account factors such as adjustments in Government subvention to the Hospital Authority, distribution of manpower resource among the seven hospital clusters, fluctuation in healthcare service utilization, and the elasticity of medical manpower supply in the private market."*

In the following sections, the impacts of the mentioned four adjustments:

1. Government subvention to the Hospital Authority
2. Distribution of manpower resource among the seven hospital clusters
3. Frustration in healthcare service utilization
4. The elasticity of medical manpower supply in the private market

to the manpower supply and demand projection are presented.

Adjustment 1: Government subvention to the Hospital Authority

Under the scenario "Government subvention to the Hospital Authority", it is reasonable to assume that the "subvention" refers to an increase, or decrease, in HA budget on staff expenditure. The additional/reduced subvention enhances/depresses HA competitiveness to hire professionals from existing human resources market. On the other hand, assuming HA, FHB and EDB are well coordinated in their policy intent, EDB would correspondingly adjust the subvention adjustment by increasing/decreasing student intake. We denote by ΔF_1 as the number of professionals 'pulled' from private market, and ΔF_2 as the student intake increased due the subvention adjustment

Suppose S is the amount of subvention to HA staff expenditure; ΔS is the amount of change on HA subvention (i.e. $\Delta S > 0$ if subvention is increased and $\Delta S < 0$ if the subvention is decreased); x is the current salary of a professional, Δx is the salary adjustment rate (i.e. the salary of professional increases from x to $x' = x(1+\Delta x)$), $F = \frac{S}{x}$ is the current number of professionals, the number of professionals induced due to the subvention adjustment is:

$$\Delta F = \frac{S + \Delta S}{x(1 + \Delta x)} - F$$

$$= \frac{\Delta S - S\Delta x}{x(1 + \Delta x)}$$

Let $g(x')$ be the number of professionals pulled from private market as the salary of HA professional is adjusted to x', i.e. $\Delta F_1 = g(x')$, the student intake is increased by:

$$\Delta F_2 = \frac{\Delta S - S\Delta x}{x(1 + \Delta x)} - g(x^{'})$$

Within the utilisation-based framework, ΔF_1 acts as a force pulling professionals (as well as patients) from private to public and would not induce demand to overall healthcare system. Therefore, the supply projection *S* and the demand projection *D* are adjusted as:

$$S^{'} = S + \frac{\Delta S - S\Delta x}{x(1 + \Delta x)} - g(x^{'})$$

$$D^{'} = D + \frac{\Delta S - S\Delta x}{x(1 + \Delta x)} - g(x^{'})$$

Adjustment 2: Distribution of manpower resource among the seven hospital clusters

As commissioned by the FHB, the HKU project is to populate and run a population level health care macro manpower model overall for the SAR categorized into 11 statutorily defined professional groups (doctors, nurses, dentists, Chinese medicine practitioners, pharmacists, chiropractors, optometrists, occupational and physical therapists, medical laboratory technologists, and radiographers). The project uses utilisation volume from the public, private and social welfare sectors to proxy demand and professional supply volumes as provided by the Department of Health Manpower Surveys and confirmed by local employers to quantify the population level demand supply gap. While, the distribution of healthcare professionals between HA clusters at the meso level and movement between the public, private and social welfare sectors is no doubt an important aspect vis-à-vis the sector-specific labour markets, moderating this distribution is outside of the focus and scope of this commissioned project.

Adjustment 3: Fluctuation in healthcare service utilization

The fluctuation in healthcare service utilisation due to major events such as SARS or service delivery model reform (i.e. the reform of general outpatient setting of HA between 2004 and 2005) is adjusted for in the model by data filtering. For example, as the general outpatient service was transferred from the Department of Health to Hospital Authority at 2004, the HA general outpatient utilization data before 2005 is omitted in the demand projection.

Fluctuations induced by major events are regarded as data uncertainty. Historical data (healthcare utilisation) with low fluctuation rates lead to more reliable projections, and vice versa. Given that the reliability of the data is not known, adjustment for fluctuation (i.e., by using a sensitivity analysis to project many possible outcomes) aims to estimate the range of possible projections induced by the fluctuation (or changes in healthcare demand). In the sensitivity analysis, the projection is computed by omitting a portion of historical data where the omitted data is regarded as unreliable. All projection trials converge to a locus when historical data is reliable. Alternatively, the high

diversity amongst the trials reflects high fluctuation in the data and reduces the reliability of the estimate.

Adjustment 4: The elasticity of medical manpower supply in the private market

In HKU model, doctor demand in private outpatient setting is expressed as:

$$Number\ of\ FTE\ private\ doctor\ (F_{private})$$
$$= Number\ of\ private\ general\ outpatient\ visits\ (V_{private})$$
$$\times Number\ of\ FTE\ doctor\ per\ visit\ (\alpha_{private})$$

<div align="right">Eq. 1</div>

We denote by c as flexible unfilled capacity of a FTE doctor, the doctor demand projection adjusted for the elasticity of medical manpower supply in the private market is expressed as:

$$F_{private} = V_{private} \times \alpha_{private} \times (1 - c)$$

<div align="right">Eq. 2</div>