

# **Planning and Managing Hong Kong's Future – Applications of Population Census Data**

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## INTRODUCTION

1. It has been established practice to conduct population censuses in Hong Kong<sup>1</sup> at regular intervals. Following the widespread practice of decennial censuses, population censuses were conducted in 1961, 1971, 1981 and 1991. To obtain up-to-date information on the population in between two censuses, by-censuses were conducted in 1966, 1976, 1986 and 1996.

2. A by-census differs from a census in that during a by-census, a complete headcount of the population is not taken but only a large sample of the population is enumerated to obtain their detailed characteristics (for instance, in the 1996 Population By-census, a 1-in-7 sample was used). The size and characteristics of the entire population are then inferred from the sample results in accordance with statistical theory. A by-census also differs from an ordinary sample survey of the population, which may be taken from time to time, in that the sample employed is very big in size and that the contents are basically the same as for a census.

3. In recent censuses in Hong Kong, while all households are covered, there is sub-sampling employed so that for most of the households, only a small number of questions are asked and for the rest of the households (about one-seventh of all households), detailed questions are asked. With such a design, resources required are much less intensive, yet precision of estimates are maintained at an acceptable level.

4. A population census/by-census provides information on the demographic, social and economic characteristics of the population at a point in time and a series of censuses/by-censuses provide information on changes across time. Such information is vital for monitoring the social and economic development of Hong Kong. It also enables the undertaking of research and analysis on the relationships amongst relevant variables and the conduct of evaluation studies on government policies and actions.

5. This paper discusses the areas in which population census data are used, with emphasis on its applications within the Government of the Hong Kong Special Administrative Region to plan and manage Hong Kong's future. Specific

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<sup>1</sup> The Government of the People's Republic of China resumed its exercise of sovereignty over Hong Kong on 1 July 1997. On this date, the Hong Kong Special Administrative Region (HKSAR) was formed under the "One Country, Two Systems" principle. As stipulated in the Basic Law of the HKSAR, the Region would operate with a high degree of autonomy. All references to "Hong Kong" pertaining to the period after 1 July 1997 refer to the HKSAR.

applications of the data derived from the 1996 Population By-census will be focused on. Potential new applications of census data from the 2001 Population Census due to be conducted in March 2001 will also be highlighted. (A list of data topics from the 1996 Population By-census and those proposed to be included in the 2001 Population Census can be found in the Annex).

## **APPLICATIONS OF CENSUS DATA**

### **Intercensal estimates of population and benchmarking**

6. Territory-wide mid-year and end-year population figures are compiled by adjusting latest available population census/by-census results for births, deaths and migration over a period. These population estimates are rolled forward using the component method, on a half-yearly basis, until the next population census/by-census. When results from the next population census/by-census become available, they will be used to benchmark the population figures which have been rolled forward. Any statistical discrepancies found will be subject to careful scrutiny and reconciliation. This process of benchmarking is very important to ensure the accuracy of birth rates, death rates and various health indicators, which are crucial for monitoring the long term demographic development of the population.

### **Population, household and manpower projections**

#### *Population projections*

7. Population census/by-census data also form the basis for compiling population projections. Latest census/by-census results, providing the most accurate information on the size and age-sex structure of the population, are used to form a population base for projection purposes. Following the standard component method, assumptions on future trends of fertility, mortality and migration are then formulated based on past trends and recent developments in the demographic and socio-economic conditions in Hong Kong.

#### *Household projections*

8. Two approaches are used to compile household projections. The first is a “top-down” approach which utilizes the concept of “headship” rate. Characteristics of household heads are only available from census/by-census data

and thus in this approach of compiling household projections, age-specific headship rates (defined as the number of heads in domestic households of a particular age group) are first computed. These age-specific headship rates are then separately projected within the projection horizon. The projected total number of households is then obtained by multiplying these projected rates by the size of the projected population in the corresponding age groups and then summing the product for all age groups.

9. The second approach to household projections is the “bottom-up” approach. The fundamental objective of this approach is to assess future housing needs. Basically, this approach consists of identifying the different segments of the population who have the potential to form new households, e.g. persons marrying for the first time or remarrying would form new households and so would persons divorcing. New migrants into Hong Kong would also bring in new households. It can therefore be seen that “new” housing needs arise mostly from demographic factors. Apart from these “new” housing needs, another broad category of “generated” housing needs is also considered in the exercise. Generated housing needs refer to households which need to be re-housed as a result of the demolition of their former housing units, either due to urban renewal and redevelopment or natural disasters. Lastly, there is a small “negative” housing need component due to the death of single elderlies and the emigration of residents. All of these components are separately projected and then aggregated to arrive at the total housing need, in terms of number of households.

10. The actual *demand* for housing is considered to be different from housing needs because economic factors would come into play when, for example, a newly married couple decides whether to fork out additional expenses to acquire (either buy or rent) a housing unit of their own or to continue to live with their in-laws. To arrive at a projected level of housing demand, each component deemed to have a housing need is discounted by a factor known as the Accommodation Generation Rate (AGR). The values of the AGR adopted for the various components are derived from census data, administrative records and dedicated surveys.

#### *Manpower projections*

11. Manpower projections consist of two separate parts: projecting the manpower supply by educational level and projecting manpower requirements by educational level. The projected supply and the projected requirements are then compared to determine the education and training needs of the population.

12. The manpower supply projection is carried out in two major steps. First, a projection of the future population size by age, sex and educational level is compiled, based on past trends and taking into consideration the output of local educational institutes and the educational profile of would-be immigrants and emigrants. Then for a particular level of education, the number of employed persons is taken to be a function of the total number of persons with that level of education in the population and their propensity to work. The latter is measured by the (age-sex specific) labour force participation rate. Overall manpower supply by educational level is finally obtained by aggregating the projected number of employed persons over all age and sex groups.

13. In comparison, the projection of manpower requirements is slightly more complicated. Firstly, the distribution of employed persons by industry is projected with reference to past trends and future direction of economic development. Secondly, the projected employment in each industry group is disaggregated by occupation. This disaggregation is carried out based on predicted changes in the occupational structure within the industries. The projection of employment by occupation is obtained by aggregating the employment level in the same occupational groups over all industries. Then the educational requirement of each occupational group is assessed so as to determine the mix of persons with different levels of education required to be employed in the concerned occupations. Finally, the overall manpower requirements by educational level are derived by aggregating individual requirements over all occupations.

14. Population census/by-census results provide much of the required data needed for making these projections. However, as can be seen above, they are not to be used alone but have to be used alongside statistics from other sources.

### **Small area statistics**

15. In addition to territory-wide figures, small area statistics according to 2 systems of demarcation are also needed for various purposes. The first system is demarcation by District Council districts (altogether 18 District Council districts in Hong Kong), which are further split into some 350 Constituency Areas. The second system is a 4-tier structure : the first tier being Primary Planning Units (9), the second tier being Secondary Planning Units (51), the third tier being Tertiary Planning Units (276) and the bottom tier being Street Blocks (for urban areas) and Village Clusters (for rural areas). There are some 4 600 Street Blocks/Village

Clusters and they are also the building blocks for the system of District Council districts and Constituency Areas.

16. Census/by-census data are particularly useful in terms of provision of small area statistics. This is because for sample surveys which are undertaken from time to time, the sample sizes are limited and cannot support data at an acceptable degree of precision when coming to small area data.

#### *Uses of small area statistics*

#### Elections

17. For the purpose of demarcation of election boundaries, it is necessary to compile population estimates on a street block/village cluster basis. The base year data requirements for compiling estimates and projections at street block/village cluster and TPU level can only be met from population census/by-census results. Other information used in the estimation process include the number of quarters (i.e. housing units), the domestic occupancy rate (i.e. the proportion of quarters occupied by domestic households) and the person-per-occupied-flat ratio (i.e. the average number of persons per occupied quarters). The required data are derived from the Frame of Quarters maintained by the Census and Statistics Department, administrative records of other Government departments and surveys conducted by the Census and Statistics Department.

#### Education planning

18. Small area statistics at the District Council level are particularly useful for planning schools, especially at the kindergarten or primary school level<sup>2</sup>. For young children, it is particularly desirable that they will not have to travel far to attend school. Therefore, when there are shortfalls of primary school places in the territory as a whole, education planners will make reference to estimates of the size of the primary school population at the District Council level to determine in which areas new schools should be located.

#### Transport planning

19. With a population size exceeding 6.5 million but with a land area of only

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<sup>2</sup> Primary education is free and compulsory whereas kindergarten education is not compulsory.

about 1 098 square kilometres, the lack of space in Hong Kong is an important concern. Careful planning and management of transportation is required. Transport modelling is performed based on a system of traffic zones with related population, household, employment, school places and other data so as to determine an optimal network. Statistics on a “traffic zone” basis can be constructed from small area population census/by-census data. Apart from this, detailed population census data are also expected to be used to support various transport studies.

### Social welfare services

20. In the realm of social welfare planning, detailed statistics pertaining to small areas are vital. Such detailed statistics, which can only be obtained from population census/by-census results, can be used to identify various underprivileged groups in the population and let planners know their demographic and socio-economic characteristics. Equipped with such information, the relevant Government departments can then better target their services for these vulnerable groups.

21. Take, for example, single parent (i.e. a single parent with child(ren) aged under 18 living in the same household) families. Results from the 1996 Population By-census indicated there were some 42 000 single parents in Hong Kong as at March 1996. When analyzed by District Council district, many of these single parent families are found to reside in the new towns.

22. The elderly is another group requiring special attention in any society. Population census/by-census results provide an important source of information on the characteristics of the elderly population. The 1996 Population By-census found that about 10% of the population, or 630 000 persons, were aged 65 and over. As is expected from inherent mortality differences between the genders, there were more female than male elderly persons. Compared with the overall population, proportionally more elderly persons lived in public (i.e. Government) rental housing. When analyzed by District Council district, proportionally more elderly persons lived in the older urban districts in Kowloon.

### Health and hospital services

23. The planning and provision of health and hospital services are the joint responsibility of the Department of Health and the Hospital Authority. Small area

data from population censuses/by-censuses as well as the estimates and projections are used to:

- (a) Compile major health indicators;
- (b) Estimate the number of births in each area by making reference to the number of women in childbearing age groups in the area;
- (c) Estimate the demand for health services from specific target groups (e.g. elderly, infants) for a particular area; and
- (d) Estimate the demand for hospital beds by making reference to age specific hospitalization rates and the projected population size in a particular age group.

In addition to the above, small area and small sub-group data are also used in collaborative studies undertaken in partnership with academics to assess the correlation between mortality and morbidity patterns and socio-economic variables like educational attainment and activity status.

#### Environmental hygiene, leisure and cultural services

24. Population estimates and projections by District Council district, taken together with the standards prescribed by the Hong Kong Planning Standards Guide, are used to monitor and plan the provision of environment hygiene, leisure and cultural facilities and services in each district. For example, planning ratios in respect of sports facilities like badminton courts, basketball courts, soccer pitches, swimming pools and libraries and that pertaining to market stalls are applied to projected population sizes in each district to gauge future provision levels. This then provides planners sufficient lead time to plan and build such facilities.

#### **Small sub-group statistics**

25. Similar to small area statistics, sample surveys undertaken from time to time cannot produce data of sufficient precision in respect of small population sub-groups. Census/by-census is the main source of data for these sub-groups. In terms of application, such data follow much the same vein as small area data described above. While population sub-groups like youth, elderly and female could be simply identified from age and gender, analysis on small sub-groups such as new arrivals to Hong Kong and non-local population can be made by cross-tabulating the demographic and social-economic data collected from the census/by-census. These analyses will facilitate relevant Government departments in

formulating specific policies for these groups in the community. In the 2001 Population Census, detailed characteristics on different ethnic minorities will also be available with the addition of a new question on “ethnicity”.

### **Other applications**

26. There are several major Government or Government-commissioned studies which have made extensive use of population census/by-census results and related projections and estimates mentioned in previous paragraphs, or is doing so at the moment. The first one is “Hong Kong 2030: Vision and Development Strategy Study”. The primary goal of this study is to formulate a broad, long-term, responsive land use-transport-environment strategy to guide long term land use and infrastructural development of Hong Kong. The second is the “Study on Sustainable Development for the 21<sup>st</sup> Century”, which will determine what measures should be taken to help maintain an acceptable environmental quality and safeguard the integrity of Hong Kong’s natural resource base, while at the same time continue to meet development pressures arising from growing social and economic needs. A third one, “Study on the Financing of the Healthcare System in Hong Kong”, was completed in 1999 and it drew heavily on income data from census results. Recommendations made by the consultants who conducted the study are still being considered by the Government.

### **DISSEMINATION OF CENSUS DATA**

27. The value of the data collected from a population census/by-census is greatly enhanced if the data are available quickly, in a format and medium geared to users’ needs and responsive to special requirements that may emerge from time to time. These considerations of timeliness, convenience and flexibility are important in designing an approach for data dissemination.

28. To meet the wide range of needs of different users, data from the 1996 Population By-census were made available in a variety of forms. Publications (in printed form) and tabulations continued to feature prominently on the product list in order to facilitate a wide circulation. A graphic guide was also compiled to provide a visual presentation of the data.

29. Regarding small area statistics, 3 CD-ROM products were released. The first was “TAB on CD-ROM”. This contained 324 commonly used statistical tables containing information on the demographic, household, education, labour

force, housing, internal migration and home moving characteristics of the population for each Tertiary Planning Unit area. Each table is given in two forms: a print file for viewing and printing and a data set form for computation and analysis. The second CD-ROM product was “MAP on CD-ROM”. This product contained a set of digital maps of Hong Kong, in six commonly used map formats. When used with a suitable software, the digital maps in this product can be used for geographical presentation of the statistical data contained in the “TAB on CD-ROM”.

30. The third CD-ROM product was called “Value-added CD-ROM”. This product bundled the 1996 Population By-census results with digital maps in an integrated manner. Information available in this CD-ROM was broadly the same as that in “TAB on CD-ROM” except the geographical variable is more detailed: at Street Block group level.

31. The CD-ROM products provide users with an easy-to-read presentation of the major socio-economic data of the population in specified areas. Such information facilitates users in gaining better understanding of the general population profile in a certain district and can be a useful tool for users in both the public and private sectors. To the government, the information provided therein can be used for making all sorts of territorial planning such as planning of schools, playgrounds as mentioned earlier. As for the business sector, the data can be used for assessing market potential and making new investment plans e.g. in selecting premises for opening up new businesses such as supermarkets, retail outlets of various products and perhaps child care establishments. The CD-ROM form of dissemination has greatly enhanced the speed, ease and user-friendliness of the data extraction and analysis processes. The previously large volume of paper outputs that might take a long time to peruse can now be mastered easily by the clicking of a few buttons.

32. The wide-spread use of the Internet has prompted a new means to disseminate census results. Last year, the Census and Statistics Department (C&SD) worked together with the Lands Department and two commercial firms to put the small area statistics from the 1996 Population By-census together with data from several sources on a Hong Kong digital map (address of the web site: <http://www.centamap.com/>). Detailed statistics at Street Block level on variables like population size, education attainment, working population, household size, median household income and median household rent are presented therein. This product, “Community Map on Internet”, well demonstrates the synergy of several

data sources, and is now in popular use by government officials, businessmen and members of the general public. With several layers of data upon a map base, reference to and application of statistical, non-statistical and spatial information are synergised for effective and convenient use.

33. While statistical data on the population and on other subjects have already featured for some time in C&SD's Web Site (address : <http://www.info.gov.hk/censtatd/>), the above move represents a significant step forward in the exploitation of the Internet for data dissemination. It is expected that similar, if not more, activities will take place when the 2001 Population Census data become available.

34. Apart from the standard outputs, additional services are also available to cater for the needs of specific users, particularly researchers who may be interested in performing more detailed analyses on special topics. Self-help tabulation services and tailor-made services are available to users in order that the benefits of data, which are costly to produce and have in the main been paid for by the community at large, are eventually well used by everyone in the community who find some use of them.

### **Concluding Remarks**

35. With the enhanced statistical literacy of the general population and the increased ease in gaining access to the Census data, it is envisaged that there will be much wider use of such data in the years to come. More importantly, these data will not be seen merely as huge volumes of figures but as useful tools that can facilitate planning and policy formulation. User groups will also become more varied. Apart from the public sector which often is equipped with the statistical expertise to tap on the large pool of data available, the business community and in fact, the general public at large will also be making more frequent reference to the available data. All these actions would echo and interact, bringing the level of data utilization to higher heights. Meanwhile, the advancement in information technology will play a facilitation role and provide the key to opening up a new horizon in the application of Census data.

36. The next population census will be conducted in March 2001. Logistically, it will be an immense operation, involving the employment of some 22 000 temporary field workers. Results are expected to be available in stages until mid 2002. As this is going to be the first population census in the new

century, results therefrom will be awaited by all parties, both within and outside the Government, who will use the data to help build a better Hong Kong in the new millennium.

ANNEX / ...

**Data topics included in the 1996 Population By-census and those proposed to be included in the 2001 Population Census**

<i>Data topics</i>	<i>Whether included in the 1996 Population By-census</i>	<i>Whether proposed to be included in the 2001 Population Census</i>
Year and month of birth	√	√
Sex	√	√
Relationship to head of household	√	√
Whether a usual member of the household	√	√
Whereabouts on census reference night	√	√
Marital status	√	√
School attendance	√	√
Educational attainment – Highest level attained and highest level completed	√ (highest level attained only)	√
Field of education	√	√
Place of study	√	√
Mode of transport to place of study	X	√
Place of birth	√	√
Nationality – first nationality and second nationality	√	√ (first nationality only)
Usual language	√	√
Ability to speak other languages/dialects	√	√
Previous district of residence	√	x
Duration of residence in present district	√	x
Duration of residence in Hong Kong	√	√
Permanent address 5 years ago	√	√
Activity status	√	√
Industry	√	√
Occupation	√	√

<i>Data topics</i>	<i>Whether included in the 1996 Population By-census</i>	<i>Whether proposed to be included in the 2001 Population Census</i>
Earnings from main employment	√	√
Earnings from other employment	√	√
Other cash income	√	√
Whether have secondary employment	√	√
Place of work	√	√
Mode of transport to place of work	X	√
Type of quarters	√	√
Occupancy of quarters	√	√
Number of households in quarters (derived)	√	√
Number of occupants in quarters (derived)	√	√
Type of accommodation	√	√
Tenure of accommodation	√	√
Rent	√	√
Mortgage re-payment	X	√
Number of bedrooms	X	√
Number of living rooms	X	√
Number of bathrooms/toilets	X	√
Availability of kitchen	X	√
Type of household	√	√
Household size (derived)	√	√
Household composition (derived)	√	√
Household income (derived)	√	√