

## **A Brief Introduction to the Population By-Census 2006 - Macao, China -**

Macao is a Special Administrative Region of the People's Republic of China, a tiny city with less than 30 sq km in surface area, is home to about half a million people. Similar to many other countries, Macao conducts a by-census between two population censuses; By-census 2006 was the second operation alike, while the first round was implemented in 1996.

In 2002, Macao Government's concession of the gaming licence to 3 casino operators has induced rapid developments in gaming and tourism-related sectors; as a result, number of visitor arrivals attained a new record of 22 millions in 2006, corresponding to 44 times of its population. In addition, the fast growing economy attracts migrants, investors and other people to look for investment or employment opportunity in Macao, bringing an upsurge in the population and changes of its demographic characteristics. Consequently, By-census 2006 provided the best opportunity to obtain the latest situation regarding the demographic, social and economic aspects of the population.

Population by-census is also known as a "mini census", to the extent that the preparations needed are identical to those of a population census, while population census covers all or a vast majority of the persons, by-census usually selects a fraction of the population by sampling. In other words, the distinction lies in the size of coverage. With regard to the Macao's By-census 2006, the following provides a summary account of the principal changes from Census 2001.

### **1. SAMPLE SIZE**

Different from Census 2001 that was a full coverage of all individuals staying in Macao during the census reference moment, By-census 2006 was a sample survey comprising about one-fifth of the living quarters, i.e. 40,000 housing units, selected by sampling.

### **2. INTRODUCTION OF NEW TOPICS IN THE QUESTIONNAIRE**

Similar to Census 2001, By-census 2006 used questionnaire to collect household data and housing conditions of the units selected, namely age, gender, place of birth, marital status, educational attainment, economic activity status, occupation, status in employment, type and tenure of housing unit, monthly value of rent or mortgage payment, etc. Taking into account that the by-census operation is a sample survey, of which the results will be derived by extrapolation; therefore, only the long-form questionnaire is used in data collection.

For the questionnaire used in By-census 2006, new topics were introduced to keep up with the latest social and economic changes to Macao and its population; the main focal points were centred in the following topics:

- a) Possession of IT equipment and Internet usage – Quantity and type of IT equipment possessed by household, the locations and purposes of using the Internet, etc.;
- b) Transport and hour commuting to work – Quantity and type of motor vehicles owned by the household; location where the automobile was parked at night, for the employed household members, the hour of day and mode of transport when commuting to work;
- c) Time-Use – Duration and type of activity an individual spent the leisure time for the past 7 days;
- d) Persons with disability – Type(s) of disability affecting the daily normal activities of an individual, reason(s) for not using public services designated for those with disability.

Prior to the implementation of the above-mentioned topics, these questions had been tested in the By-census Pilot Survey held in August 2005, comprising a sample size of about 4,000 housing units.

### 3. IMPROVEMENTS IN THE OPERATION PROCEDURES

Apart from the modifications of the questionnaire, adjustments were made to the operation procedures that targeted at effective supervision of work progress and ensuring data quality.

#### 3.1 *Extension of Data Collection Period*

In view of using long-form questionnaire in collecting data, the length of data collection period was extended from 10 days in Census 2001 to 13 days in By-census 2006. The extra days provided an opportunity for the enumerators, mostly university students, to build up confidence and practical experience at the initial stage of data collection; for the team leaders, they would have ample time to evaluate the overall performance of the enumerators.

#### 3.2 *Self-completion of Questionnaire*

In Census 2001, about one-fifth of the housing units were selected to complete the long-form questionnaire, of which the visiting enumerator had to conduct face-to-face interview with every member of a household. Since By-census 2006 used only long-form questionnaire, a different approach was taken to encourage self-enumeration, i.e. the household would complete the long-form prior to the enumerator's visit. This approach would minimize the inconvenience brought to the household when the enumerator had to collect information from every member with the traditional face-to-face interview.

The long-form was sent to the housing units selected in advance, for those households that chose self-enumeration, the visiting enumerator would have a quick logical check among the core data

before collecting the questionnaire from the household. Otherwise, the households could wait for the visiting enumerator who would assist them to complete the form. In general, the new approach was well-received by the households, about one-fourth chose self-enumeration.

#### 4. APPLICATION OF INFORMATION TECHNOLOGY

Encouraged by the successful application of Information Technology (IT) in Census 2001 and its rapid developments in the past years, IT was used to a wider extent in By-census 2006. For instance, each of the 5 Enumeration Centres were equipped with a By-census control system developed in-house, which was liaised with barcode readers, scanner and Internet service. Such setup provided effective assessment of daily progress, scanning completed questionnaires, transmitting images to and from the Main Office, downloading appointments with households, etc.

##### 4.1 *Monitoring Daily Progress*

Barcode reader provided an effective recording of an enumerator's daily progress, including visit results to the housing units assigned, number of questionnaires completed, etc. This reporting method was essential to monitor the flow and progress of an enumerator and the Enumeration Centre as a whole.

##### 4.2 *Scanning and Transmitting Images*

In Census 2001, data capturing by OCR was centralized in the Main Office after gathering the questionnaires from different Enumeration Centres; however, the arrangement caused severe congestion in the Main Office when the forms continued to flow in.

Taking advantage of the speed, reliability and affordability of broadband transmission in recent years, a better alternative was arranged for By-census 2006, of which the forms would be scanned in the respective Enumeration Centre and the images would be sent to the Main Office using broadband transmission. After data validation, an error list would be automatically sent to the Enumeration Centre for follow-up verifications upon receipt of the error list, the enumerators could confirm the doubts with the households as soon as possible, reducing the time lapse between data validation and data reconfirmation, minimizing the disturbance to the household in memory recall of the data previously given.

##### 4.3 *Effective and Better Communication Channels*

Similar to Census 2001, a By-census 2006 Hotline was setup to attend the enquiries of the households, appointment making and scheduling, confirming enumerator's identification with the household, etc., last by not least, online data collection when necessary.

The 18-line by-census Hotline, using the CATI system as the backbone, was equipped with

conventional programmes developed in-house; furthermore, the system was enhanced with an additional function of sending SMS (short message service) to the enumerators' mobile phones, keeping them well-informed with important messages such as urgent appointments with households, latest weather conditions, etc.

In conclusion, the application of IT in population census and by-census is an effective way to minimize cost, errors, time and human resources. More importantly, streamline the efficiency of the different phases of the operation; therefore, it is conceivable that IT will play a more essential role in the upcoming census round.

## 5. PRELIMINARY RESULTS OF BY-CENSUS 2006

The following highlights the preliminary results of Macao's By-census 2006 released in December 2006.

### ✧ *Population increased by 15% over the past five years*

Resident population of Macao reached 502 000 in August 2006, up by 21.2% compared with the 1996 By-census and increased by 15.4% over Census 2001. In the first 5-year period (1996 – 2001), population growth was modest that averaged 1.95% per annum; however, population growth accelerated to an average of 2.90% per annum in the last 5-year period (2002 – 2006).

### ✧ *51.2% of the population were female*

Regarding gender distribution, the phenomenon of more women than men (51.2% vs. 48.8%) continued, attributable to about 60.0% of the immigrants were female.

### ✧ *7.0% were elderly population aged 65 and above*

General decline of the fertility rate led to a decreasing share of youth population aged 0-14, down from 21.6% in 2001 to 15.2% in 2006; besides, respective proportion of the elderly population aged 65 and above also fell slightly from 7.3% in 2001 to 7.0% in 2006, due to the rapid increase of younger migrants and expatriates moving to Macao.

### ✧ *Population density*

Continuous land reclamation has expanded the surface area of Macao from 21.4 sq km in 1996 to 28.6 sq km in 2006, corresponding to an average annual growth of 2.9% over the past 10 years. The fact that population growth has not measured up to that of the surface area, Macao's population density decreased from 19,400 per sq km in 1996 to 17,600 per sq km in 2006. Nevertheless, Macao's population density remains one of the highest in the world.