Definitions

1. Definition of resident population

The Census covers nationals and foreigners who have been living or plan to live at current address for 6 months or more on 00.00.AM as of December 26 of 2010, including government employees stationed abroad and their dependents living with them, foreign labors and foreigners, but excluding foreign government employees stationed in Taiwan-Fukien area and their dependents living with them.

2. Definition of household

(1) Ordinary household : A household is mainly composed of family members sharing common foods or other arrangements for essential living no matter they live in the house, group quarters or other places, including relatives, employees and other nonrelatives living with these family members. The ordinary household also includes the following households, one person living alone, two or more unrelated individuals living in the same housing unit, a family household usually living in the group quarters or other places, one or more persons living in the boat as their home.

(2) Group quarters : Group quarters is mainly composed of non-family members sharing common living essentials and headed by one person, including two or more persons living in the convalescent hospital, hospital, dormitory (single, student, etc.), church, temple and hotel, etc.

(3) Sharing common living essentials : Household members usually live together in the same housing unit and share common foods or other arrangements.

3. Definition of housing

(1) House (housing unit) : A housing unit mainly for one or more family households living and with independent entrance (having direct access from outside of the building or through a common hall) and house facilities (including kitchen, bath or toilet, etc.) is defined as an independent "house", such as apartment, mansion, cottage, institution dormitory, no matter it is occupied or unoccupied, including occupied house, unoccupied house for other uses, unoccupied house not for other uses.

(2) Occupied collective living quarter : A quarter not mainly for family use but being occupied, including :

①Those for individuals temporary living : Hotel, hospital, work hut, etc.

②Those for institution or group members living : Institution dormitory, police or servicemen barracks, prison, detention center, charity organization dormitory, student dormitory, etc.

③Those not for living but being occupied : Office, firm, store, department store, theater, restaurant, church, temple, etc.

(3) Other places but occupied : An occupied place for shelter only, such as tent, roadside, subway, tank, boat, cave, etc.

Explanation of Census Terms

1. Average annual growth rate = $\left(\sqrt[n]{\text{data of this period} / \text{data of last period}} - 1 \right) \times 100\%$, n = this year - last year.

2. Area

  (1)Northern region：Including New Taipei City (administered as Taipei County previously), Taipei City, Keelung City, Hsinchu City, Yilan County, Taoyuan County and Hsinchu County.

  (2)Central region：Including Taichung City (administered as Taichung City and Taichung County previously), Miaoli County, Changhua County, Nantou County and Yunlin County.

  (3)Southern region：Including Tainan City (administered as Tainan City and Tainan County previously), Kaohsiung City (administered as Kaohsiung City and Kaohsiung County previously), Chiayi City, Chiayi County, Pingtung County and Penghu County.

  (4)Eastern region：Including Taitung County and Hualien County.

  * New Taipei City, Taipei City, Taichung City, Tainan City and Kaohsiung City are 5 municipalities in Taiwan area.

  (5)Kinma area：Including Kinmen County and Lienchiang County.

3. Population density：number of resident population / total land area

4. Sex ratio：(number of male resident population / number of female resident population) x 100

5. Dependency ratio for children：(number of population aged 0-14 years / number of population aged 15-64 years) x 100

6. Dependency ratio for the elder：(number of population aged 65 years and over / number of population aged 15-64 years) x 100

7. Dependency ratio：((number of population aged 0-14 years + number of population aged 65 years and over) / number of population aged 15-64 years) x 100

8. Aging index：(number of population aged 65 years and over / number of population aged 0-14 years) x 100

9. Child-Woman ratio：(number of population aged 0-14 years / number of women at childbearing age 15-49 years) x 1000

10. Marital status

  (1)Unmarried："Unmarried" refers to one never married or cohabited.

  (2)Married or cohabited："Married" refers to the couple officially married and living with the spouse in the same household, including the married couple living apart due to working or health, etc.; "Cohabited" refers to the couple not officially married but living together as a wife/husband.

  (3)Divorced or separated："Divorced" refers to the couple ever officially married but now divorced, one who divorced and still living in his/ her spouse's home but not as a wife/husband is considered as divorced; "Separated" refers to the couple not officially divorced but separated by fact.

  (4)Widowed："Widowed" refers to one's spouse was deceased but not married or cohabited.

11. Unmarried rate：(number of unmarried population aged 15 years and over / number of resident population aged 15 years and over) x 100%

12. Married or cohabited rate：(number of married or cohabited population aged 15 years and over / number of resident population aged 15 years and over) x 100%

13. Divorce rate：(number of divorced or separated population aged 15 years and over / number of resident population aged 15 years and over) x 100%

14. Widow rate：(number of widowed population aged 15 years and over / number of resident population aged 15 years and over) x 100%

15. Educational attainment

Refers to the highest level completed or the highest degree received either from domestic or foreign schools and institutions, or passed an equivalency qualification test at the standard time of the Census (census reference time).

(1)Students completed the 3rd grade of 5-year junior college are supposed to report " Vocational senior high school " , the 4th or 5th grade is " Junior college ".

(2)The highest level completed or the highest degree received refers to those qualified by the Ministry of Education. If the level or degree is not being qualified by the Ministry of Education, please report the previous level completed or degree received, such as,

①Those who received the credits from the Master's degree program are supposed to report " Attended not completed－Master degree ".

②Those who received the credits from courses of the university before accepted by the university are supposed to report " Attended not completed－University ".

(3)People who passed the civil service examinations, professional or technical personnel examinations, or any tests qualified by the education authorities are supposed to report his/her educational attainment as follows：

①Those who passed the elementary level of the civil service examination or the equivalent level of the special civil service examination, rank promotion examination, or any equivalency test held by the Examination Yuan should report their educational attainment as " Junior high school ".

②Those who passed the junior level of the civil service examination or the equivalent level of the special civil service examination, or any equivalency test held by the Examination Yuan should report their educational attainment as " Vocational senior high school ".

③Those who passed the senior level of the civil service examination or the equivalent level of the special civil service examination, rank promotion examination, or any equivalency test held by the Examination Yuan should report their educational attainment as " University ".

④Those who passed the advanced level of the civil service examination or the equivalent level of the special civil service examination, rank promotion examination, or any equivalency test held by the Examination Yuan should report their educational attainment as " Master degree ".

⑤Those who passed the professional level of civil service examination should report their educational attainment as " Doctorate degree ".

(4)Pre-school children：Children born on or after September 1 of 2004 and not reach school age.

(5)Illiterate：Persons born on or before August 31 of 2004 (attained school age) and never attended formal school or cannot read letters or newspapers.

(6)Self-educated：Persons born on or before August 31 of 2004 (attained school age) and never attended formal school but can read letters or newspapers by self-study, including attended non-formal schools such as community university, cram school, training center, study school, correspondence course or school, home study, etc.

16. School enrollment rate：(number of school enrollment population for the specific age group / number of the specific age group population) x 100%

17. Civilian resident population aged 15 years and over

Refers to population aged 15 years and over, usually living within the border and engaged in various kinds of economic activities, not include armed forces and institutional population.

18. Working status

Refers to the working status the interviewees are engaged in within the census reference week.

(1)Holding a job：Refers to those who are engaged in a paid job or those receiving no pay but help family members to do a paid job and work for more than 15 hours from December 19 to 25 of 2010.

①**Industry**：Refers to the economic activities the job holders are engaged in, including production of tangible or intangible goods and providing of various kinds of services. Industry is classified by【Agriculture, Forestry, Fishing and Animal Husbandry】of the Agriculture Sector,【Mining and Quarrying】,【Manufacturing】,【Electricity and Gas Supply】,【Water Supply and Remediation Activities】and【Construction】of the Industry Sector,【Wholesale and Retail Trade】,【Transportation and Storage】,【Accommodation and Food Service Activities】,【Information and Communication】,【Financial and Insurance Activities】,【Real Estate Activities】,【Professional, Scientific and Technical Activities】,【Support Service Activities】,【Public Administration and Defense, Compulsory Social Security】,【Education】,【Human Health and Social Work Activities】,【Arts, Entertainment and Recreation】 and【Other Service Activities】of the Services Sector.

②**Occupation**：Refers to the works or businesses the job holders are engaged in. Occupation is classified by【Legislators, Senior Officials and Managers】,【Professionals】,【Technicians and Associate Professionals】,【Clerical Support Workers】,【Service and Sales Workers】,【Skilled Agricultural, Forestry and Fishery Workers】and【Operators (including Craft and Related Trades Workers; Plant and Machine Operators, and Assemblers; Elementary Laborers)】.

(2)Not holding a job：Refers to those who are neither engaged in a paid job nor receiving no pay but help family members to do a paid job and work for more than 15 hours from December 19 to 25 of 2010. Those only invest on stocks, play gambling or lottery are considered as "Not holding a job".

19. Married woman：Refers to a woman reported her marital status as married or cohabited, divorced or separated, widowed.

20. Rate of living together with children：(number of those who living together with their children /number of those having children) x 100%

21. Migration population：Refers to the population whose living place 5 years ago was not the same as the usually living place.

22. Migration rate：(number of migration population / number of resident population aged 5 years and over) x 100%

23. Population commuting to other county/city：Refers to the population commuting to the county/city for work or study which is other than the county/city he or she lived.

24. Population commuting from other county/city：Refers to the population lived in the other county/city but was commuting to the county/city for work or study.

25. Activity population：activity population＝resident population – population commuting to other county/city + population commuting from other county/city

26. Population commuting to work：Refers to the population whose working place and usually living place were located in the different township, city or district.

27. Rate of commuting to work：(number of population commuting to work / number of the employed population) x 100%

28. School enrollment population：Refers to the population attended at school and not holding a job

29. Population commuting to school：Refers to the population whose schooling place and usually living place were located in the different township, city or district.

30. Rate of commuting to school：(number of population commuting to school / number of the school enrollment population) x 100%

31. Long-term care：Refers to the status that one needed care of others for 6 months or more since illness, injury or aging which causes difficulty in doing following activities：(1)eating (2)getting on/off bed (3)dressing (4)going to the lavatory (5)bathing (6)walking (7)housekeeping, including cooking, cleaning and laundering, etc.

32. Relationship to householder

(1)Householder：The representative of the household (not necessarily the householder listed on the household registration record).

(2)Spouse (cohabitant)：Wife or husband of the householder, or the cohabitant of the householder.

(3)(Foster) parent：Parent, foster parent or step parent of the householder.

(4)Spouse's (foster) parent：Parent, foster parent or step parent of the householder's spouse.

(5)Grandparent：Grandparent of the householder or the householder's spouse, including foster and step grandparent.

(6)(Foster) child：Child(ren) , foster child(ren) or step child(ren) of the householder.

(7)(Foster) child's spouse：Spouse of the (foster or step) child(ren) of the householder.

(8)Grandchild or his/her spouse：Grandchild(ren) or grandchild(ren)'s spouse of the householder.

(9)Brother/sister or his/her spouse：Brother/sister or brother's/sister's spouse of the householder.

(10)Other relatives：Relatives not listed in the category of (1) to (9), such as grand grandparents and grand grandchild(ren), uncles, aunts, cousins, etc.

(11)Employees：Usually living in this household and employed by the householder and received salary or alike from doing a paid job.

(12)Other nonrelatives：Usually living in this household but not being listed in the category of (1) to (11).

33. Type of household

(1)Nucleus family household：A household composed of "a married couple", "a married couple with their unmarried child(ren) "or "father/mother with his/her unmarried child(ren)".

(2)Stem family household：A household composed of "grandparent, parent and their unmarried child(ren)", "a married couple with their married child(ren)"or "grandparent with their unmarried grandchild(ren)".

(3)One-person household：An ordinary household composed of only one person.

(4)Other household：

①" With relatives " refers to a household unable to be classified as "nucleus family household", "stem family household" or "one-person household" but composed of the householder and the relatives of the householder

②" With no relatives " refers to a household composed of the householder and the non-relatives of the householder, such as the employees and those registered but never living in this household

34. Main family living supporter：Refers to the person usually lives in the household and shares the most part of the common living essentials or expenses of the household.

35. Single parent family：A family composed of father or mother with his or her unmarried children.

36. Ownership of the house

(1)Self-owned：Refers to this house is owned by any one of the usually living members of this household. If this house is owned by spouse, parents or children who are not living in this household should not report self- owned but report " Spouse, parents or children not living together ".

(2)Owned by spouse, parents or children not living together：Refers to this house is owned by the householder's spouse, parents or children who are not living in this household, not owned by any one of the usually living members of this household.

(3)Rented：Refers to this house is occupied by paying rent.

(4)Other (including allotted)：Refers to this house is issued by the interviewee's working institution, group, company, store or school for the interviewee's living.

37. Vacant housing unit：Refers to a house not being occupied and not for other uses, including for rent, for sale, sold out, rented, or no one usually living in, the second or more houses where no one usually living in, usually living in elsewhere other than this house due to work.

38. Home vacancy rate：(number of unoccupied housing units / number of housing units) x 100%

Statistics Compilation and the Linkage of the Official Registration Files

1. Items and contents of the official registration files

(1)Household registration file (the Department of Household Registration, the Ministry of Interior)：

Use household registration data on the census reference day as the basis to compile the total number of nationals on the census reference day (A) by adding the data of new born baby who born before the census reference day but not register and deleting the data of those who deceased before the census reference day but not update. Link this updated data with the census data by Personal Identification Number (PIN) to mark the group identification of indigenous people.

(2)Enter/exit border records of nationals (the National Immigration Agency, the Ministry of Interior)：

Use nationals enter/exit border records dated before June 26 of 2011 as the basis to compile the total number of nationals who usually live overseas on the census reference day (B) by selecting and adding up the data of those not living within the border on census reference day and those already out of the border or plan to be out of the border for 183 days or more.

(3)Enter/exit border records of foreigners, the population of the Chinese Mainland, Hong Kong and Macau (the National Immigration Agency, the Ministry of Interior)：

Use foreigners, the population of the Chinese Mainland, Hong Kong and Macau enter/exit records dated before June 26 of 2011 as the basis to compile the total number of foreigners, the population of the Chinese Mainland, Hong Kong and Macau who usually live within the border on the census reference day (C) by selecting and adding up the data of those living within the border on the census reference day and those already living within the border or plan to live within the border for 183 days or more.

(4)Foreign industry labor, maid and nursing worker file (the Bureau of Employment and Vocational Training, the Council of Labor Affairs, Executive Yuan)：

Use foreign industry labor, maid and nursing worker data dated before June 26 of 2011 as the basis to compile the total number of foreign industry labors, maids and nursing workers who usually live within the border on the census reference day (D).

(5)Student enroll and registration file (the Department of Household Registration, the Ministry of Interior)：

Use student enroll and registration data from 2005 to 2010 to check and evaluate the validity of the census data.

(6)Handicapped population file (the Department of Social Affairs, the Ministry of Interior)：

Link handicapped population data of Taiwan-Fukien area in December 2010 with the census data by Personal Identification Number to mark the handicap item and the level of severity as well as to evaluate the validity of the census data.

(7)House tax registration file (the Financial Data Center, the Ministry of Finance)：

Use house tax records in December 2010 and county/city tax master file as the basis to link the census data by housing address as the key variable to compile and check the validity of the statistics on the completion year of construction, total floor area, type and material of the house, etc.

2. Formula of the total number of the resident population in Taiwan-Fukien area on the census reference day

the total number of the resident population on the census reference day

= the total number of nationals on the census reference day (A)

  - the total number of nationals who usually live overseas on the census reference day (B)

  + the total number of foreigners, the population of the Chinese Mainland, Hong Kong and Macau who usually live within the border on the census reference day (C)

  + the total number of foreign industry labors, maids and nursing workers who usually live within the border on the census reference day (D)

Sampling and Estimation Methodology

1. Sampling： The type of the household was classified into the general survey household and the specific survey household[1] by the characteristics of the household and each type uses different survey methods.

(1)the general survey household： "Random stratified cluster sampling" was used for all general survey households. Townships, cities and districts of each city or county in Taiwan-Fukien area are used as the sub-population. The enumeration area was the basic unit of the cluster sampling. The number of the strata of each sub-population was based on the number of the registered population (Table 1). The number of the samples of each stratum was allocated by using Neyman allocation. The enumeration areas of each stratum were selected by using systematic sampling. All population and housing units in these sampled enumeration areas were interviewed. The total sampling rate was 16%[2]. The sampling process was summarized as follows：

①**Population for sampling：** Geographic Information System (GIS) was used to integrate registered addresses with household registration data to set up digital enumeration areas[3] covering whole Taiwan-Fukien area (each enumeration area contained 110±30 households in average). These enumeration areas were used as the population for sampling.

②**Sampling unit：** The enumeration area was the unit for cluster sampling.

③**Criterion of stratification：** The number of the strata of each sub-population was first based on the number of the registered population of each sub-population and then decided by the number of the registered population of each enumeration area. The maximum number of the strata was 7. The optimum stratum threshold of each sub-population was decided by using DH (Dalenius and Hodges) stratification method.

Table 1　The stratum allocation for 2010 Population and Housing Census

Items	Number of strata	Number of townships/ cities/districts	Percent (%)
Total	-	368	100.0
Number of registered population< 5,000 persons	1	23	6.3
5,000 persons <= number of registered population < 10,000 persons	2	41	11.1
10,000 persons <= number of registered population < 25,000 persons	3	82	22.3
25,000 persons <= number of registered population <50,000 persons	4	91	24.7
50,000 persons <= number of registered population < 100,000 persons	5	64	17.4
100,000 persons <= number of registered population <200,000 persons	6	42	11.4
Number of registered population>= 200,000 persons	7	25	6.8

④**Sample allocation：** The confidence coefficient of each sub-population (1-α) % was 95% and the sampling error (ε) was less than 3%. Neyman allocation and the equations of (a), (b) and (c) were used to obtain the number of the sampled enumeration areas of each sub-population, the total number of the sampled enumeration areas, the number of the sampled enumeration areas of each stratum of each sub-population respectively.

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[1] The general survey household and the specific survey household: The specific survey household refers to group quarters composed of more than 100 persons or population with specific features, such as servicemen on active duty, dormitory students of junior college or higher level, inmates of detention centers, etc.; those not classified in the specific household are classified in the general household.

[2] To evaluate the feasibility of sampling design, many tests and researches were conducted beforehand by using the data of 2000 Population and Housing Census and household registration files, The random stratified cluster sampling was adopted as sampling methodology of the census and 16% of the enumeration areas was sampled (in which each person and household was fully interviewed) after several alternative simulation models had been performed. The results of a hundred times of simulation tests showed that the average estimate error of the resident population of the county and city was lower than 1% and the estimate error of a single time test was lower than 2%.

[3] Digital enumeration area: The enumeration area is demarcated based on a block and the natural geographic border such as roads, rails, rivers, streams, etc. by using Geographic Information System (GIS). Each enumeration area contained 110±30 households in average and is adjacent to the neighbor enumeration area covering whole Taiwan-Fukien area.

Under $\quad \Pr\left(\left|\dfrac{\overline{y}_i - \overline{Y}_i}{\overline{Y}_i}\right| \ge \varepsilon\right) = \alpha$

$$n_i \ge \frac{\left(\sum_h N_{ih} S_{ih}\right)^2}{\left(\dfrac{Y_i \varepsilon}{Z_{1-\frac{\alpha}{2}}}\right)^2 + \sum_h N_{ih} S_{ih}^{\ 2}} \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (\text{a})$$

$$n = \sum_i n_i \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (\text{b})$$

$$n_{ih} = \frac{N_{ih} S_{ih}}{\sum_h N_{ih} S_{ih}} \times n_i \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (\text{c})$$

Notations :

n_{ih} : Number of the sampled enumeration areas from stratum h and sub-population i

n_i : Number of the sampled enumeration areas of sub-population i

n : Total number of the sampled enumeration areas to be sampled

N_{ih} : Number of the enumeration areas from stratum h and sub-population i

S_{ih} : Standard deviation of the number of the registered population of the enumeration areas from stratum h and sub-population i

$Y_i = \sum_h N_{ih} \overline{Y}_{ih}$, Number of the registered population of sub-population i

$\overline{Y}_{ih}$: Average number of the registered population of the enumeration areas from stratum h and sub-population i

$\overline{Y}_i$: Average number of the registered population of the enumeration areas of sub-population i

$\overline{y}_i$: Average number of the registered population of the sampled enumeration areas of sub-population i

ε : Sampling error

Z : Standard normal distribution $\alpha = 0.05$

⑤**Sample adjustment**：Townships, cities and districts were fully interviewed if their sampling rate was greater than 75 % after the sample allocation. There were a total of 44 townships, cities and districts.

⑥**Sample selection**：Systematic sampling was used to select enumeration areas for each stratum of the township/city/district. All population and housing units of these enumeration areas were interviewed.

(2)the specific survey household：Group quarters composed of more than 100 persons or population with specific features, such as servicemen on active duty, dormitory students of junior college or higher level, inmates of detention centers, etc., were fully interviewed by the assistance of the authorities in charge of the businesses to avoid the estimates from statistical bias.

(3)Adjustment of the sampled enumeration areas：

①The update data of Typhoon Morakot-affected areas were collected and summarized from the Department of Household Registration and Department of Social Affairs, Ministry of Interior. A total of 31 villages which hit hardest by the typhoon with death toll more than 6 persons or more than 10 households in the ruined housing units unable for living were fully interviewed.

②To enhance the data accuracy of the indigenous population and handicapped population, the sampling rate was optimally increased.

Table 2   Sample statistics of 2010 Population and Housing Census

	Enumeration areas (unit)	Sampled enumeration areas (unit)	Sampling rate of the sampled enumeration areas (%)	The sampled enumeration areas for the general survey households	
				Number of the registered households (household)	Number of the registered population (person)
Total	**71 920**	**11 743**	**16.3**	**1 180 575**	**3 556 919**
Taipei County	12 175	1 448	11.9	157 034	444 453
Yilan County	1 361	284	20.9	28 046	86 690
Taoyuan County	6 267	856	13.7	77 307	236 887
Hsinchu County	1 539	389	25.3	37 680	121 381
Miaoli County	1 686	357	21.2	35 741	115 780
Taichung County	4 413	812	18.4	77 432	262 482
Changhua County	3 591	625	17.4	61 844	226 609
Nantou County	1 656	394	23.8	41 015	126 031
Yunlin County	2 138	456	21.3	49 252	156 928
Chiayi County	1 570	353	22.5	37 528	115 197
Tainan County	3 210	652	20.3	69 942	209 128
Kaohsiung County	4 215	758	18.0	70 492	207 197
Pingtung County	2 698	586	21.7	56 989	185 560
Taitung County	805	300	37.3	27 866	83 333
Hualien County	1 204	334	27.7	29 099	86 785
Penghu County	317	123	38.8	10 297	29 927
Keelung City	1 308	217	16.6	22 718	60 920
Hisnchu City	1 273	154	12.1	15 002	45 119
Taichung City	3 444	514	14.9	56 602	160 614
Chiayi City	860	102	11.9	10 799	31 660
Tainan City	2 428	292	12.0	31 162	88 993
Taipei City	8 266	977	11.8	107 998	287 758
Kaohsiung City	5 107	581	11.4	58 012	151 980
Lienchiang County	62	62	100.0	2 069	9 961
Kinmen County	327	117	35.8	8 649	25 546

Note：1. The data of the enumeration areas of this table refer to the summary data of both the general survey households and the specific survey households.

2. GIS was used to set up the enumeration areas for all general survey households (each enumeration area contained about 110±30 households).

3. For the specific survey households, each enumeration area contained about 250 persons (adjusted by fact). These enumeration areas were demarcated by the authorities in charge of the businesses due to their specific features.

2. Estimation methodology：

(1)Township/city/district by sampling：The separate ratio estimation was adopted to estimate the characteristic values of the resident population, households and housing units. The sum of the sample characteristic values and the total number of the sampled registered population, households and housing units from the same stratum and the same township/city/district were used to calculate the ratio (r_{ih}). The characteristic values of each sub-population were estimated by that ratio. The inference formulas and notations were stated below.

①the general survey household (not including the specific survey household)

$$r_{ih} = \frac{\sum_{j=1}^{n_{ih}} x_{ihj}}{\sum_{j=1}^{n_{ih}} y_{ihj}} = \frac{x_{ih}}{y_{ih}}$$

$$\hat{X}_{ih}^{'} = r_{ih} \times Y_{ih}$$

$$\hat{X}_{i}^{'} = \sum_{h=1}^{L_i} \hat{X}_{ih}^{'} = \sum_{h=1}^{L_i} r_{ih} \times Y_{ih}$$

$$V(\hat{X}_{i}^{'}) = \sum_{h=1}^{L_i} N_{ih}^2 \frac{N_{ih} - n_{ih}}{N_{ih}} \times \frac{1}{n_{ih}} S_{ih}^2$$

$$S_{ih}^2 = \frac{1}{N_{ih}} \sum_{j=1}^{N_{ih}} (x_{ihj} - r_{ih} y_{ihj})^2$$

$$= (S_{x_{ih}}^2 + r_{ih}^2 S_{y_{ih}}^2 - 2 r_{ih} \rho_{ih} S_{x_{ih}} S_{y_{ih}})$$

$$\rho_{ih} = \frac{S_{xy_{ih}}}{S_{x_{ih}} S_{y_{ih}}}$$

Notations :

x_{ihj} : Sum of the characteristic values of the resident population, households or housing units from sampled enumeration area j , stratum h and sub-population i

x_{ih} : Sum of the characteristic values of the resident population, households or housing units of the sampled enumeration areas from stratum h and sub-population i

$\hat{X}_{ih}^{'}$: Sum of the characteristic estimates of the resident population, households or housing units from stratum h and sub-population i

$\hat{X}_{i}^{'}$: Sum of the characteristic estimates of the resident population, households or housing units of sub-population i

y_{ihj} : Total number of the registered population, households or housing units from sampled enumeration area j , stratum h and sub-population i

y_{ih} : Total number of the registered population, households or housing units of the sampled enumeration areas from stratum h and sub-population i

Y_{ih} : Total number of the registered population, households or housing units from stratum h and sub-population i

r_{ih} : The ratio of the characteristic values of the resident population, households or housing units from stratum h and sub-population i

$V(\hat{X}_{i}^{'})$: The variance of the sum of the characteristic estimates of the resident population, households or housing units of sub-population i

S_{ih}^2 : The variance of the sum of the characteristic values of the resident population, households or housing units from stratum h and sub-population i

$S_{x_{ih}}$: The standard deviation of the sum of the characteristic values of the resident population, households or housing units from stratum h and sub-population i

$S_{y_{ih}}$: The standard deviation of the total number of the registered population, households or housing units of the sampled enumeration areas from stratum h and sub-population i

$S_{xy_{ih}}$: The covariance of x_{ih} and y_{ih}

ρ_{ih} : The correlation coefficient from stratum h and sub-population i

L_i : The number of strata of sub-population i

n_{ih} : The number of the sampled enumeration areas from stratum h and sub-population i

N_{ih} : The total number of the enumeration areas from stratum h and sub-population i

②the specific survey household

$$X_i^s = \sum_{k=1}^{M_i^s} x_{ik}^s$$

Notations：

x_{ik}^s : Sum of the characteristic values of the resident population, households or housing units from specific survey household k and sub-population i

X_i^s : Sum of the characteristic values of the resident population, households or housing units of sub-population i

M_i^s : Total number of the specific survey households of sub-population i

(2)Township/city/district by full interview：

①the general survey household (not including the specific survey household)

$$X_i^{'} = \sum_{j=1}^{N_i} x_{ij}$$

Notations：

x_{ij} : Sum of the characteristic values of the resident population, households or housing units from sampled enumeration area j and sub-population i

$X_i^{'}$: Sum of the characteristic values of the resident population, households or housing units of sub-population i

N_i : Total number of the enumeration areas of sub-population i

②the specific survey household

$$X_i^s = \sum_{k=1}^{M_i^s} x_{ik}^s$$

Notations：

x_{ik}^s : Sum of the characteristic values of the resident population, households or housing units from specific survey household k and sub-population i

X_i^s : Sum of the characteristic values of the resident population, households or housing units from sub-population i

M_i^s : Total number of the specific survey households of sub-population i

③**Sum of the characteristic values of the townships/cities/districts：** The sum was obtained by aggregating the sum of the characteristic values for both the general survey households and the specific survey households.

3. Reallocation of the estimates： The disparity between the estimates and the total number of the resident population on the census reference day in Taiwan-Fukien area was allocated proportionally based on the total number of the resident population of the townships, cities and districts which adopted sampling rather than full interview.