TECHNICAL NOTES
2024 Functional Literacy, Education and Mass Media Survey

I. Introduction

a. Background of the Survey

The Functional Literacy, Education and Mass Media Survey (FLEMMS) is a household-based nationwide survey conducted every five (5) years in accordance with the Designation of Statistical Activities that will Generate Critical Data for Decision-making of the Government and the Private Sector (Executive Order No. 352 of 1996). The 2024 FLEMMS is the seventh in the series of literacy surveys in the country, starting in 1989. Prior to this survey round, FLEMMS was conducted in 2019.

The survey operations for 2024 FLEMMS ran from September to October 2024.

The 2024 FLEMMS adopted the revised operational definition and methodology in estimating basic and functional literacy in the Philippines as approved by the Philippine Statistics Authority (PSA) Board through Resolution No. 13, Series of 2024.

Basic literacy is defined as the ability of a person to read and write a simple message in any language or dialect with understanding, and to compute or perform basic mathematical operations.

Functional literacy is the ability of a person to read, write, compute and comprehend. In addition to the basic literacy skills, functional literacy includes higher level of comprehension skills, such as integrating two or more pieces of information and making inferences based on the given information.

Basic literacy rate is computed for individuals five (5) years old and over, while functional literacy rate is computed for individuals 10 to 64 years old.

Also, for the first time, the 2024 FLEMMS utilized the Computer-Assisted Personal Interview (CAPI) System for the collection of the FLEMMS Form 1 (Household Questionnaire) and FLEMMS Form 3 (Individual Questionnaire).

Furthermore, the 2024 FLEMMS added new data items that are aligned with the Programme for the International Assessment of Adult Competencies (PIAAC), which is the recommended tool to measure functional literacy endorsed by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

b. Objectives

The FLEMMS generally provides a quantitative framework that will serve as a basis for the formulation of policies and programs for the improvement of literacy and educational status of the population. Specifically, the FLEMMS gathers data that will generate:

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1. estimate of the proportion of the population five (5) years old and over with basic literacy and their socio-economic characteristics;
2. estimate of the proportion of the population 10 to 64 years old with functional literacy and their socio-economic characteristics;
3. data on the educational skill qualifications of the population in terms of formal schooling; and
4. data on the mass media exposure of the population.

The data collected from the 2024 FLEMMS will be used in the following:

1. Monitoring of the Global indicator SDG 4.6.1: the percentage of the population in a given age group achieving at least a fixed level of proficiency in functional (a) literacy and (b) numeracy skills, by sex;
2. Monitoring of the Global indicator SDG 4.4.1: the proportion of youth and adults with ICT skills, by type of skill; and
3. Reporting of the proportion of the population who are (a) basic literate and (b) functionally literate.

c. Scope and Coverage

The reporting unit is the household, which means that the statistics emanating from this survey will refer to the characteristics of the population residing in private households. Persons who reside in the institutions are not within the scope of the survey.

d. Questionnaires/Forms

The survey utilized the following forms:

FLEMMS Form	Type of Questionnaire	Respondent	Data Items
1	Household	any knowledgeable member of the household	Demographics, Education, Employment, Housing Characteristics
2A	Individual	5 to 9 years old (self-administered)	Basic Literacy
2B	Individual	65 years old and over (self-administered)	Basic Literacy
2C	Individual	10 to 64 years old (self-administered)	Basic and Functional Literacy
2D	Individual	10 to 64 years old (self-administered)	PIAAC
3	Individual	10 to 64 years old	Mass Media, Digital Literacy, Rider questions

e. Developments from the 2019 FLEMMS

The FLEMMS, as in any survey, adopts recent developments in statistical methodology/processes and in the education system. Among the major enhancements made in the 2024 FLEMMS is the implementation of individual tests in the assessment of basic literacy. In the 2019 FLEMMS, the basic literacy of the members of the household were gathered from a proxy respondent. In 2024 FLEMMS, cue cards to assess the respondent's reading skills and self-administered individual questionnaires (FLEMMS Forms 2A and 2B) to assess the writing and numeracy skills were introduced to allow further validation of the individual's basic literacy skills.

The table below summarizes the comparison between 2019 FLEMMS and 2024 FLEMMS.

Item	2019 FLEMMS	2024 FLEMMS
Sampling frame	2013 Master Sample based on 2010 Census of Population and Housing and updated using the results of the 2015 Census of Population.	2023 Geo-Enabled Master Sample
Data Collection	Paper-and-Pencil Interviewing method of data collection	Utilized the CAPI System for the collection of the FLEMMS Form 1 and FLEMMS Form 3
Domain	Regional	Provincial/HUCs
Scope and Coverage	4 replicates of the MS	16 replicates of the MS
Definition of Basic Literate	Can read and write	Can read, write, and compute
Definition of Functionally Literate	a. can read, write, and compute, or b. can read, write, compute and comprehend (with numerical and comprehension skill), or c. at least high school graduate in the old curriculum or at least junior high school completer in the K-12 curriculum	Can read, write, compute, and comprehend
Levels of Literacy	0 - cannot read and write 1 - can read and write only 2- can read, write, and compute	0-A - cannot read and write 0-B - can read and write only

Item	2019 FLEMMS	2024 FLEMMS
	3- can read, write, compute, and comprehend 4- at least high school graduate in the old curriculum or at least junior high school completer in the K-12 curriculum	1 - can read, write, and compute 2 - can read, write, compute, and comprehend
Additional Items		
FLEMMS Form 2A (Individual Questionnaire for 5 to 9 years old)	Individuals aged 5 to 9 years did not answer an individual questionnaire.	Q1. Reading Indicator Q2. Full Name Q3. Current Home Address Q4. Date of Birth Q5. Put a check √ in the box opposite your highest level of education completed and write the grade, level you completed on the line after it. Q6. Add the apples in the picture. Write your answer on the space provided. Q7. Subtract the bananas in the picture. Write your answer on the space provided.
FLEMMS Form 2B (Individual Questionnaire for 65 years old and over)	Individuals aged 65 years and over did not answer an individual questionnaire.	Q1. Reading Indicator Q2. Full Name Q3. Current Home Address Q4. Date of Birth Q5. Put a check √ in the box opposite your highest level of education completed and write the grade, level you completed on the line after it.

Item	2019 FLEMMS	2024 FLEMMS
		Q6. If a kilo of rice costs PhP55.00, how much will two (2) kilos cost? Q7. How much will half a kilo of sugar cost, if one kilo costs PhP88.00?
FLEMMS Form 2C (Individual Questionnaire for 10 to 64 years old)		Q9. Based on the heat index table below of Region 3, how many times did Casiguran, Aurora experience the danger level in the heat index?

FLEMMS Form 3 (Individual Questionnaire for 10 to 64 years old) – Mass Media and Rider questions
 	
Culture, Arts and Sports:
	Q10. Are you proud that you are a Filipino?
	
	Q11. Are you proud of the city/municipality where you reside?
	
	Q12. Do you recognize that the Philippines has different cultures, traditions and customs?
	
	Q13. Do you respect persons/groups who are different from you in terms of the following:
	   Q13a. other religion
	   Q13b. other gender
	   Q13c. other ethnicity
	
	Q14. Are you a creative person?
	
	Q15. In the last three (3) years, how often do you engage/participate in the creation or improvement of a product, process or strategy related to the following:
	   Q15a. Arts and Performance?
		C1. In the past 12 months, have you engaged in a physical cultural and artistic activity?
		
		C2. In the past 12 months, have you engaged in a digital cultural and artistic activity?
		
		C3. What is the main reason that will make you participate in culture and arts activities/ events?
		
		C4. What is the main reason that prevents you from engaging in a cultural and artistic activity?

Item	2019 FLEMMS	2024 FLEMMS
	Q15b. Science and Technology? (including Agriculture)? Q15c. Work and business?	
Technical Vocational Education and Training	Q6. Have you passed and received a national certification from TESDA or any TESDA-accredited institutions?	T2. What Technical Vocational course did you complete? _____ T3. What year did you complete the Technical Vocational course? _____ Year (YYYY) T4. Did you benefit from any scholarships or financial assistance? T5. Did you take the competency assessment test? T6. What type of certificate did you receive, either COC, NC, or TM? T7. What year did you take the competency assessment test? (specify year (YYYY) then go to T9 T8. What was your reason for not taking the competency assessment test? T9. Are you currently attending training for Technical Vocational? T10. What Technical Vocational training are you attending? _____ T11. Did you benefit from any scholarships or financial assistance?

Item	2019 FLEMMS	2024 FLEMMS
Pathway Plans (15 to 64 years old only)		P1. What is/are your plan(s) in the next 12 months? Yes/No a - Go to college/Continue studies b - Go to skills training c - Start a business d - Get employed e - Study Abroad f - Work Abroad g - Others, specify _____
Digital Literacy (10 to 64 years old only)		D1. In the last three (3) months, have you used the internet? Yes/No D2. In the last three (3) months, which of the following digital activities have you performed? Yes/No
Program for International Assessment of Adult Competencies (PIAAC)		L1. Based on GMA News, which areas are NOT under Signal Number 1? L2. Which of these Emergency Hotlines should I call if there is a fire accident? Write your answer in the space provided? L3. To have extra income, Sir Ben thought of planting vegetables on his vacant lot. According to the Bureau of Plant Industry, which of the following vegetables should he plant to have income throughout the year? L4. Study the map below and answer the question. Inday was feeling hungry, so she invited her friend Natoy to eat outside. If they will be coming from Natoy's house, in which street will they find the closest restaurant they can go to?

Item	2019 FLEMMS	2024 FLEMMS
		L5. Manuel became a close contact with his co-worker who had COVID-19. He has no symptoms and travel history to areas with travel restrictions. According to the DOH's decision tool, what shall Manuel do? L6. Read and understand the news about the full face-to-face classes from Pilipino Star Ngayon. How will the conduct of public and private school classes be different starting November 2, 2022? N1. The chart below shows the number of mangoes sold by Caloy from the past week. Based on the chart, how many kilos of mango did he sell last Thursday? N2. Karen is selling cupcakes. In one box, there are six cupcakes inside. Today, 30 cupcakes were ordered from her. How many boxes does she need to prepare? N3. See the ingredients needed to cook a biko. Edgar will cook one kilo of malagkit (1000g = 1kilo). Based on the recipe, how many cups of water does he need to use? N4. Alex, John and Mark agreed to collect their money to buy one T-shirt each. If they buy T-shirts during the "Summer Promo" as shown in the picture, how much will each of them need to contribute to avail the promo.

Item	2019 FLEMMS	2024 FLEMMS
		N5. Miguel will buy a rubber mat for his two-year-old son's room that measures 4 meters per side (4 x 4 meters). If each rubber mat is 50 x 50 cm, how many rubber mats does he need to cover the entire floor? (1 meter = 100cm) N6. The bus company has a promo where a round-trip ticket to Roxas City and Carles, Iloilo only costs PhP800 for the month of August. A regular one-way ticket from Roxas City to Carles, Iloilo and vice versa costs PhP450. If Jay makes a return trip to Roxas City and Carles, Iloilo for three times in August, how much will he save if he buys a round-trip ticket?

II. Revised Operational Definitions and Methodology

Basic Literacy

Conceptual definition

The ability of a person to read, write, and compute with understanding a simple message in any language or dialect and be able to perform basic mathematical operations.

Operational definition

The ability to read, write, and compute (with numerical skill)

Functional Literacy

Conceptual definition

Is a significantly higher level of literacy which includes reading, writing, numeracy, and comprehension skills. The skills must be sufficiently advanced to enable the individual to engage fully and efficiently in activities commonly occurring in this life situation that require a reasonable capability of communicating by written language.

Operational Definition

The ability to read, write, compute and comprehend (with numerical and comprehension skill)

Levels of literacy identifies the range of skills and competencies of an individual. Specifically,

Literacy Level	Description	Classification
0-A	Cannot read and write	Illiterate
0-B	Can read and write only	Below basic/ Low literate
1	Can read, write, and compute	Basic literate
2	Can read, write, compute, and comprehend	Functionally literate

III. Survey Design

Starting July 2023, the 2023 Geo-enabled Master Sample (GeoMS) frame and design are used in all household surveys conducted by the Philippine Statistics Authority.

A. 2023 Geo-enabled Master Sample Design

The 2023 GeoMS is defined as a sample from which subsamples are drawn to serve the needs of household surveys. The use of master sample promotes efficiency on the use of limited resources (e.g. single cost for the development of survey design and preparation of sampling frames). Usually, a master sample is an area sample of clusters of households referred to as Primary Sampling Units (PSUs).

Primary Sampling Unit

Each province and Highly Urbanized City is divided into exhaustive and non-overlapping area segments known as Primary Sampling Units (PSUs) where each PSU consists of about 100 to 300 households. A PSU can be any of the following:

1. A single enumeration area (EA) barangay; or
2. Two or more adjacent small EAs within the same barangay; or
3. Two or more adjacent small barangays of the same city/municipality; or
4. Portion or an EA of a multi-EA barangay.

Out of the 42,046 barangays in the Philippines, 127,028 PSUs were formed. A significant number of these PSUs or about 15 percent of the total PSUs were formed in Region IV-A. CAR has the fewest PSUs formed, making up about 2 percent of the total.

Enumeration Area

An Enumeration Area (EA) refers to the smallest statistical, geographic or territorial unit defined for the purpose of census taking. A barangay may constitute one or more EAs. The EA boundary refers to the imaginary line that separates two or more EAs within a barangay. Each EA has 100 to 300 households

The 2023 GeoMS uses the results of the 2020 Census of Population and Housing (CPH). The EA Reference File (EARF) of the 2020 CPH is used as reference in constructing the PSU frame, while the 2020 list of housing units for each of the PSUs is used as the SSU frame. The 2023 GeoMS covers all households in the Philippines, excluding institutional households.

Domain

A domain refers to the subdivision in which estimates of adequate precision is desired. It can be national, regional or provincial/Highly Urbanized City (HUC) level. The domain differs by survey, hence, the 2023 GeoMS was designed to be flexible on the domain requirement of each household survey.

For provincial/HUC domain, the 2023 GeoMS has considered 118 domains with the following breakdown:
1. 82 provinces (including Maguindanao del Norte and Maguindanao del Sur);
2. 33 HUCs (including 16 cities in the National Capital Region); and
3. Three (3) other urban areas (Pateros, City of Isabela, and City of Cotabato).

Implicit Stratification

The PSUs are implicitly stratified in each domain using the following stratification variables:
1. Geographic location which can either be north or south/west or east;
2. Proportion of households with overseas workers; and
3. Wealth Index which is constructed using the following variables: internet access, household size, educational background and class of work of the household head, ownership of assets, and housing characteristics such as type of toilet, type of walls and roofs, and quality of water supply.

The stratification is done by sorting the PSUs by geographic location first. Further sorting of PSUs is done in descending order according to proportion of households, followed by Wealth Index.

Formation of Replicates of Sample PSUs

From the ordered list of PSUs, sample PSUs are drawn systematically to form replicates of sample PSUs for each province/HUC domain. The number of sample PSUs selected for each replicate differs by area as follows:

1. Six (6) sample PSUs per replicate for all provinces, except small provinces indicated in No. 3;
2. Eight (8) sample PSUs per replicate for HUCs, except City of San Juan and City of Lucena;
3. Three (3) sample PSUs per replicate for:
   - small provinces such as Batanes, Guimaras, Siquijor, Camiguin, Apayao, and Dinagat Islands, and
   - City of San Juan, Pateros, and City of Isabela; and
4. Five (5) sample PSUs per replicate for City of Lucena and City of Cotabato.

Since the 2023 GeoMS was designed to satisfy sample size requirements of the different levels of domain (e.g., region, province/HU) of household surveys, the selection of samples according to the sample size requirement of the domain can be easily done by selecting the appropriate number of replicates as follows:

1. For national domain, the number of replicates is one (1)
2. For regional domain, the number of replicates is four (4)
3. For provincial/HUC domain, the number of replicates is 16

Sample Size and Allocation of Sample Housing Units per PSU

Per domain, the required number of sample housing units, which serve as the Secondary Sampling Units (SSUs), was computed based on the desired reliability of estimates of not more than 10 percent coefficient of variation. The required number of sample housing units in each domain is proportionately allocated to the sample PSUs.

In general, a total of 12 sample housing units are allocated for each sample PSU in Highly Urbanized Cities, while 16 sample Housing Units are allocated for every sample PSU in the provinces.

Formation of Rotation Groups of Sample Housing Units

The 2023 GeoMS will be used for a period of 10 years or until a new master sample design is available. Selecting the same samples for various surveys and survey rounds can result to response burden or non-response, thus affecting the quality of estimates. To avoid this, a rotation scheme for sample housing units is applied. This is done by forming rotation groups in each PSU, each rotation group contains on the average 12 or 16 sample housing units which are systematically drawn. If the PSU is sampled, the housing units in the first rotation group are used as samples, followed by the housing units in the next rotation group for the next survey.

Sample Selection

The selection of samples for all household-based surveys uses two-stage systematic sampling design. The first stage is the systematic selection of sample PSUs, while the second stage is the systematic selection of sample housing units.

Since the 2023 GeoMS forms clusters of PSUs, called replicates, in each provincial/HUC domain, and clusters of housing units, called rotation groups, in each PSU, the selection of sample PSUs and housing units is operationalized by the assignment of sample replicates and sample rotation groups to the survey.

Generally, all households within the sample housing unit are interviewed. However, for housing unit with more than three households, a maximum of three sample households are randomly selected.

Samples are independent by survey round, except for the Family Income and Expenditure Survey (FIES) where the two rounds use the same sample size. Also, the samples for the Labor Force Survey during these two rounds of FIES are the same as they are merged to include relevant information about the household or individual that are not in the FIES. The same is true with the Annual Poverty Indicator Survey where samples are the same as that of the LFS.

B. 2024 Functional Literacy, Education and Mass Media Survey

The 2024 FLEMMS, being a household survey, used the 2023 GeoMS frame and design.

Domain

The domain for the 2024 FLEMMS is province/HUC, hence 16 replicates of sample PSUs were used consisting of about 172,800 sample housing units. For the 2024 FLEMMS, all individuals aged five (5) years old and over in the sample households were interviewed.

In terms of number of households and individuals, covered in the survey were 179,560 eligible sample households and 610,590 individuals/household members five (5) years old and over, respectively.

C. Estimation Procedure

Survey Weight Computation

1. Base Weight

The base weight is computed as the inverse of selection probability. In general, the base weight is computed as:

$$w_{dij} = \frac{A_d}{a_d} \ x \ \frac{B_{di}}{b_{di}} x \frac{C_{dij}}{c_{dij}}$$

where:

w_{dij} - base weight for each of the sample households within sample housing unit j in PSU i of domain d

A_d - total number of PSUs in domain d

a_d - total number of sample PSUs in domain d

B_{di} - total number of housing units in PSU i of domain d

b_{di} - total number of sample housing units in PSU i of domain d

C_{dij} - total number of households in housing unit j of PSU i at domain d

c_{dij} - total number of sample households in housing unit j of PSU i at domain d = 3 (maximum number of sample households per housing unit)

However, for sample housing units with at most three (3) households, where all households are to be interviewed, the formula for the base weight is reduced to:

$$w_{di} = \frac{A_d}{a_d} \ x \ \frac{B_{di}}{b_{di}}$$

where:

w_{di} - base weight for each of the sample housing units/households within sample PSU i in domain d

This is because the ratio $\frac{C_{dij}}{c_{dij}} = 1$. For housing units with more three (3) households, three (3) sample households are selected for interview. Hence, the ratio $\frac{C_{dij}}{c_{dij}} > 1$.

2. Adjustment Factors

The base weight is adjusted for unit non-response and further calibrated to conform to the known or projected population count. The projected population count used for the 2024 FLEMMS was 114.47 million.

a. Adjustment due to Non-responding Eligible Sample Households

For unit non-response adjustment, it is computed as:

$$A_{d1} = \frac{\sum_{i=1}^{a_d} \sum_{j=1}^{b_{di}} \sum_{k=1}^{c_{dij}} w_{dij} X_{1dijk}}{\sum_{i=1}^{a_d} \sum_{j=1}^{b_{di}} \sum_{k=1}^{c_{dij}} w_{dij} X_{2dijk}}$$

where:

A_{d1} - adjustment factor due to unit non-response for domain d

X_{1dijk} - eligible status of sample household k in housing unit j of PSU i in domain d

= 1 if eligible, 0 otherwise

X_{2dijk} - responding status of sample household k in housing unit j of PSU i in domain d

= 1 if responding, 0 otherwise

Applying this to the base weight, the **adjusted base weight** is given by:

$$w'_{dij} = w_{dij} \; x \; A_{d1}$$

where:

w'_{dij} - adjusted base weight due to non-responding eligible sample households

b. Adjustment due to Known Population Count

Further calibration is made so that the estimated population count conforms to known or projected population count by age-sex class (c) as follows:

Age Group	Sex	
(in years)	Male	Female
0 – 4	C1	C2
5 – 9	C3	C4
10 – 14	C5	C6
15 – 19	C7	C8
20 – 24	C9	C10
25 – 29	C11	C12
30 – 34	C13	C14
35 – 39	C15	C16
40 – 44	C17	C18
45 – 49	C19	C20
50 – 54	C21	C22
55 – 59	C23	C24
60 – 64	C25	C26
65 – 69	C27	C28
70 – 74	C29	C30
75 – 79	C31	C32
80 and over	C33	C34

The population adjustment factor by class (age-sex category) is computed as follows:

$$A_{d2c} = \frac{X_{dc}}{\hat{X}_{dc}}$$

where:

A_{d2c} - population adjustment factor for age-sex class c in domain d

X_{dc} - total population for age-sex class c based on census or projection

$\hat{X}_{dc}$ - weighted estimate of population for age-sex class c based on survey results and using the adjusted base weight due to nonresponding eligible sample households (w'_{dij}).

3. Final Weight Computation

Given the adjustment factors, the final weight is computed as

$$w'_{dij,fin} = w_{dij} \; x \; A_{d1} \; x \; A_{d2c}$$

or

$$w'_{dij,fin} = w'_{dij} \; x \; A_{d2c}$$

where:

$w'_{dij,fin}$ - final weight

Estimation of Totals and Ratios

1. Estimation of Totals

a. For domain total

The estimate for the population total for a domain is computed using:

$$\hat{Y}_d = \sum_{i=1}^{a_i} \sum_{j=1}^{b_{ij}} \sum_{k=1}^{c_{ijk}} w'_{dij} \, y_{dijk}$$

where:

$\hat{Y}_d$ - estimate of population total for domain d

b. For provincial/HUC total

- **If the domain is province/HUC**, the estimate of the population total for the province/HUC is computed as:

$$\hat{Y}_p = \hat{Y}_d$$

where:

$\hat{Y}_p$ - estimate of population total for province/HUC p

c. For regional total

- **If the domain is region**, the estimate of the population total for the region is computed as:

$$\hat{Y}_r = \hat{Y}_d$$

where:

$\hat{Y}_r$ - estimate of population total for region r

- **If the domain is province/HUC**, the estimate of the population total for the region is computed as:

$$\hat{Y}_r = \sum_{p=1}^{P_r} (\hat{Y}_p)$$

where:

P_r - total number of provinces and HUCs in region r

d. For national total

- **If the domain is national**, the estimate of the population total at the national level is computed as:

$$\hat{Y} = \hat{Y}_d$$

where:

$\hat{Y}$ - estimate of population total at the national level

- **If the domain is region or province/HUC**, the estimate of the population total at the national level is computed as:

$$\hat{Y} = \sum_{r=1}^{Re} (\hat{Y}_r)$$

where:

Re - total number of regions

2. Estimation of Ratios

The estimation of population ratio at domain level is given by:

$$\hat{R}_d = \frac{\hat{Y}_d}{\hat{X}_d}$$

where:

$\hat{R}_d$ - estimate of population ratio for domain d

$\hat{Y}_d$ - estimate of population total for variable y at domain d

$\hat{X}_d$ - estimate of population total for variable x at domain d

Same formula is applied for geographic level higher than the domain, except that d refers to the geographic level.

Estimation of Standard Error and Coefficient of Variation

1. Sampling Error

a. For estimate of population total

The estimate of the standard error for the population total estimate at the domain level is given by:

$$SE(\hat{Y}_d) = \sqrt{\hat{V}(\hat{Y}_d)} = \sqrt{\left(1 - \frac{a_d}{A_d}\right) a_d s^2 + \frac{a_d}{A_d} \sum_{i=1}^{a_d} \left(1 - \frac{b_{di}}{B_{di}}\right) b_{di} s_i^2}$$

where:

$SE(\hat{Y}_d)$ - estimate of the standard error of the population total estimate for domain d

$\hat{V}(\hat{Y}_d)$ - estimate of the variance of the population total estimate for domain d

$$s^2 = \frac{\sum_{i=1}^{a_d}(y_{di} - \bar{y}_d)^2}{a_d - 1}$$

$$s_i{}^2 = \frac{\sum_{j=1}^{b_{di}}(y_{dij} - \bar{y}_{di})^2}{b_{di} - 1}$$

y_{dij} is the weighted total for housing unit j of PSU i in domain d given by:

$$y_{dij} = \sum_{k=1}^{c_{dij}} w'_{dij,fin}\, y_{dijk}$$

$$\bar{y}_{di} = \frac{y_{di}}{b_{di}} = \frac{\sum_{j=1}^{b_{di}} y_{dij}}{b_{di}}$$

y_{di} is the weighted total for PSU i in domain d given by:

$$y_{di} = \sum_{j=1}^{b_{di}} y_{dij}$$

$$\bar{y}_d = \frac{y_d}{a_d}$$

b. For estimate of ratios

The Taylor series linearization method is used to estimate the variance of a ratio. It is given by:

$$SE(\hat{R}_d) = \sqrt{\hat{V}(\hat{R}_d)}$$

$$\hat{V}(\hat{R}_d) \approx \frac{1}{\hat{X}_d{}^2}\left[\hat{V}(\hat{Y}_d) + \hat{R}_d{}^2 \hat{V}(\hat{X}_d) - 2\hat{R}_d \widehat{Cov}(\hat{Y}_d, \hat{X}_d)\right]$$

where:

$SE(\hat{R}_d)$ - estimate of the standard error of the population ratio estimate for domain d

$\hat{V}(\hat{Y}_d)$ - estimate of the variance of the population ratio estimate for domain d

$$\widehat{Cov}(\hat{Y}_d, \hat{X}_d) = \frac{a_d}{a_d - 1}\sum_{i=1}^{a_d}(y_{di} - \bar{y}_d)(x_{di} - x_d)$$

IV. Dissemination of Results

The 2024 FLEMMS results, press release, and statistical tables are publicly available at the PSA website www.psa.gov.ph.

V. Contact Information

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