Namibia Statistic Agency

2023 CENSUS
POST-ENUMERATION SURVEY (PES)

MS. OTTILIE MWAZI

DEPUTY STATISTICIAN-GENERAL

30 OCTOBER 2024

2023 Census

PLAY YOUR PART, BE COUNTED

OUTLINE

- Background
- Methodology
- Matching and Reconciliation Approach
- Parameters Estimated
- Results
- Conclusion

Background



PES is an independent sample survey that is conducted immediately after the completion of census enumeration.



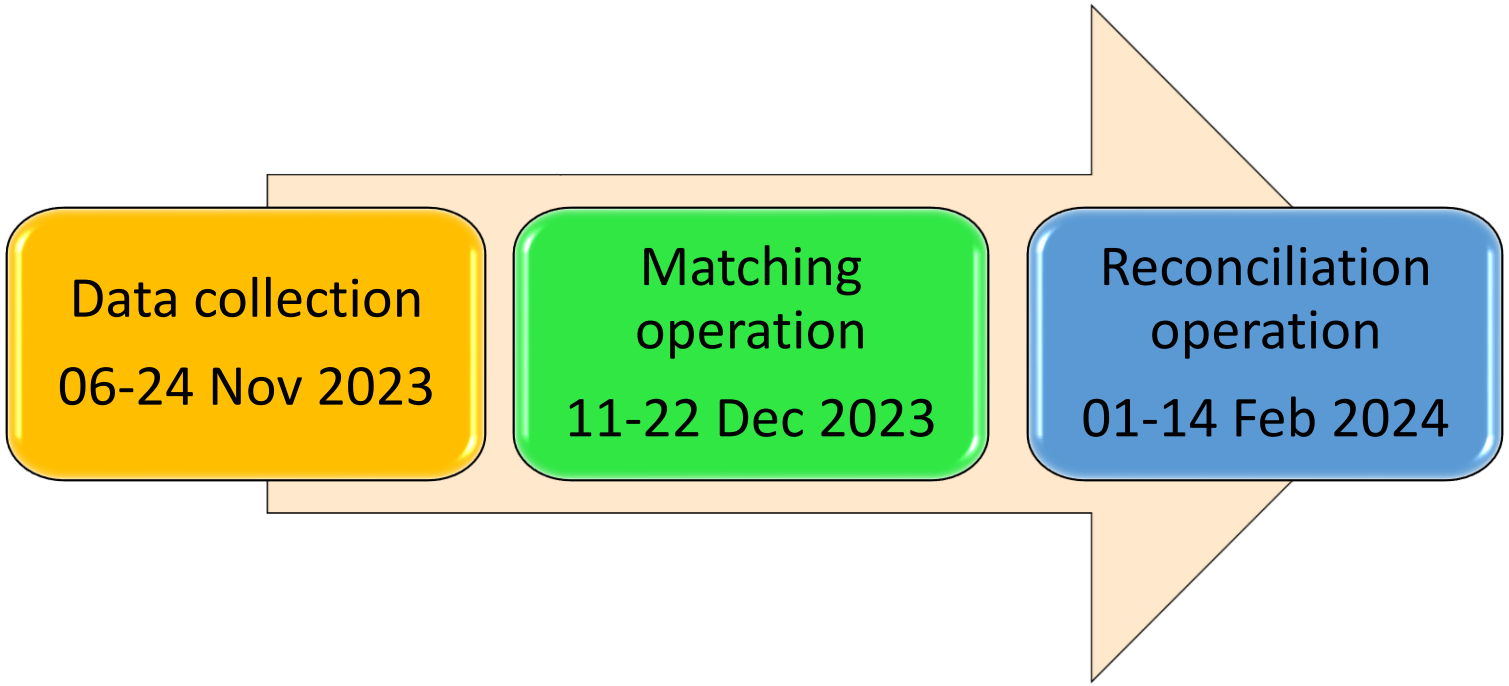
The objectives of the PES was to:

-Evaluate the coverage and content errors of the census.

-Provide an indication of the quality of the census data.

2023 Census
PLAY YOUR PART, BE COUNTED

Three phase of PES



Methodology

- Data collection started after all census materials were returned to the office
- The PES used a De- Jure method (*Usual members of HHs)*
- Listing of all household in selected EAs
- All households within selected EAs were enumerated
- The PES estimation methodology assumes independence between census and PES operations
- The domains of estimation for reliable estimates given the PES sample size was: Urban and Rural
- The dual-system was used to determined the census population

2023 census
PLAY YOUR PART, BE COUNTED

PES Questionnaire Design

- The PES questionnaire was designed by the PES Committee with technical input from the UNFPA consultant
- Variables Used: Name and Surname, residence status, relationship to the head of household, sex, age and marital status
- Was (name) a usual member of the household on the reference night? (Non-mover, in-mover, out-mover and born-after)
- Born- After census (not a member of the PES pop)

Sample Design

- A stratified one-stage cluster sample design was adopted for the 2023 PES.
- A sampling frame of EAs for the entire country was made available for the selection of PES Sample
- The EAs in each stratum were selected using a systematic selection procedure with probability proportional to size
- The process of selecting EAs was performed in SPSS using a Complex Sample module
- The first level of stratification corresponded to the two domain of estimation: (1) Urban; (2) Rural.

2023 Census
PLAY YOUR PART, BE COUNTED

Sample size

- The required sample size and allocation for the 2023 PES depended on the type of estimates, the required precision and the resources.
- The sample size was sufficient to provide a Coefficient of Variation (CV) to estimate the key PES indicators (census omission rate and net coverage error rate).

Region	Type of Residence		
	Total	Urban	Rural
//Kharas	18	11	7
Erongo	27	22	5
Hardap	18	12	6
Kavango East	17	11	6
Kavango West	9	2	7
Khomas	42	40	2
Kunene	16	8	8
Ohangwena	27	5	22
Omaheke	16	8	8
Omusati	31	4	27
Oshana	23	12	11
Oshikoto	25	5	20
Otjozondjupa	23	15	8
Zambezi	16	6	10
Total	**308**	**161**	**147**

Note: *One EA was removed from the 2023 PES sample in Khomas Region because during field work it was discovered that there were no dwelling units, therefore, only 307 EAs were enumerated during the PES data collection phase and matched against the census. Hence, only 307 EAs were involved in the analysis.*

2023 Census
PLAY YOUR PART, BE COUNTED

Matching Operations

- Matching is a process of checking whether the households and persons data collected within the selected EA during the PES match with the data collected during the census in the same EA.
- Cleaned data and processed
- Automatic matching done using the algorithms in Python
- One week training for the data clerks
- Clerical matching
- Unresolves cases send for reconciliation

Matching stages

Unique automatic matching– First stage of the matching, which matches according to predefined rules.

Clerical Matching– Manual matching of cases that were difficult to match in the Unique automatic matching.

Associative matching– Taking households with matched cases and trying to make more matches that could not be picked up in other stages.

Reconciliation Operation

- The first part of reconciliation was done on possible matched cases in the office by National Supervisors (NS) through telephone
- Follow up on persons enumerated in the census but not in the PES, to determine whether they were correctly, erroneously /fabricated enumerated or duplicated
- Determine final match status for the possible cases.
- Some non-matched households were found to be outside the EA boundary

2023 Census
PLAY YOUR PART, BE COUNTED

Parameters estimated

For the Coverage Error analysis:

- Estimated numbers of non-movers, out-movers, in-mover
- E-sample: Estimate population enumerated in the Census
- P-sample: PES Population
- Census Omissions and Census Omission Rates
- Census correctly enumerated persons
- Census erroneous inclusions and Census erroneous inclusion rates
- True Population
- Net census coverage errors
- Gross census coverage errors

2023 Census
PLAY YOUR PART, BE COUNTED

For the Content Error analysis:

- Content error, is estimated only for matched persons and selected variables (age, sex, relationship and marital status)
- Measures the inconsistency between census answers and PES answers to the same questions
  - Net difference rate
  - Index of inconsistency
  - Gross difference rate (Off-Diagonal Proportion)
  - Agreement rate

RESULTS

2023 Census
PLAY YOUR PART, BE COUNTED

Response rate

Region	Listed Households	Responding Households	Response rate (%)
Namibia	27 933	26 888	96.0
Urban	16 147	15 494	96.0
Rural	11 786	11 394	97.0
//Kharas	1 392	1 350	97.0
Erongo	2 577	2 510	97.0
Hardap	1 407	1 287	91.0
Kavango East	1 766	1 726	98.0
Kavango West	1 026	999	97.0
Khomas	4 195	4 074	97.0
Kunene	1 269	1 225	97.0
Ohangwena	2 468	2 424	98.0
Omaheke	1 300	1 221	94.0
Omusati	2 576	2 501	97.0
Oshana	2 109	2 031	96.0
Oshikoto	2 134	2 058	96.0
Otjozondjupa	2 334	2 117	91.0
Zambezi	1 380	1 365	99.0

2023 Census
PLAY YOUR PART, BE COUNTED

Coverage Errors

2023 Census
PLAY YOUR PART, BE COUNTED

Census Omissions and Census Omission Rate, by Sex and Age Group

Age group	Omissions			Omission rate (%)		
	Male	Female	Total	Male	Female	Total
0 - 9	22 099	22 292	44 390	5.63	5.64	5.64
10 - 39	49 577	50 573	100 150	6.90	6.81	6.86
40 - 59	20 321	15 465	35 786	9.17	6.32	7.68
60+	5 592	5 787	11 379	6.62	4.55	5.37
Total	**97 588**	**94 117**	**191 705**	**6.89**	**6.24**	**6.55**

2023 Census
PLAY YOUR PART, BE COUNTED

Census Erroneous Inclusions and Census Erroneous Inclusion Rate, by Sex and Age Group

Age group	Erroneous Inclusions			Erroneous Inclusion rate (%)		
	Male	Female	Total	Male	Female	Total
0 - 9	14 908	15 667	30 575	3.69	3.84	3.76
10 - 39	36 839	33 139	69 978	5.01	4.41	4.71
40 - 59	8 384	5 554	13 938	3.91	2.32	3.07
60+	2 611	2 418	5 029	3.12	1.92	2.40
Total	**62 742**	**56 778**	**119 520**	**4.36**	**3.72**	**4.03**

2023 Census
PLAY YOUR PART, BE COUNTED

Coverage rate

Age group	Coverage Rate (%)		
	Male	Female	Total
0 - 9	94.40	94.40	94.40
10 - 39	93.10	93.20	93.10
40 - 59	90.80	93.70	92.30
60+	93.40	95.50	94.60
Total	**93.10**	**93.80**	**93.50**

Area	Coverage Rate (%)
Urban	94.90
Rural	92.10

2023 Census
PLAY YOUR PART, BE COUNTED

Gross Census Coverage Error and Gross Census Coverage Error Rate, by Sex and Age Group

Age group	Gross Census Coverage Error			Gross Census Coverage Error rate (%)		
	Male	Female	Total	Male	Female	Total
0 - 9	37 007	37 959	74 965	9.15	9.31	9.23
10 - 39	86 416	83 712	170 128	11.75	11.14	11.44
40 - 59	28 705	21 019	49 724	13.39	8.76	10.94
60+	8 203	8 205	16 408	9.80	6.50	7.82
Total	**160 330**	**150 895**	**311 225**	**11.15**	**9.89**	**10.50**

2023 Census
PLAY YOUR PART, BE COUNTED

Post enumeration estimates and sampling errors

- Coefficient of Variations (CVs) was used to measure the quality of the census data.
- The CVs is one of the quality indicators that ascertain the data users about the level of precision of the estimates at different analysis of domains.
- A larger CVs means that there is more variability in the data set.
- A smaller coefficient of variation (CV) means there is less variability in the data set, **the survey estimates are more precise**.

2023 Census
PLAY YOUR PART, BE COUNTED

Interpretation of Coefficient of Variation

	Level of the Coefficient of Variation for the survey estimates	
a	0.0% - 1.0%	Estimates are reliable
b	1.1% - 5.0%	
c	5.1% - 15.0%	
d	15.1% - 25.5%	Estimates can be used with caution
e	25.6%+	Estimates are unreliable

2023 Census
PLAY YOUR PART, BE COUNTED

Coefficient of Variation (CV) by Area by Measure

Urban		Rural	
Measures	**Coefficient of variation (%)**	**Measures**	**Coefficient of variation (%)**
Non-mover	**2.90**	Non-mover	**3.60**
Matched non-mover	**2.80**	Matched non-mover	**3.40**
Out-mover	**5.10**	Out-mover	**6.00**
Matched out-mover	**5.60**	Matched out-mover	**5.80**
In-mover	**6.40**	In-mover	**8.80**
Census population	**2.90**	Census population	**3.30**
PES population	**2.80**	PES population	**3.60**
Omissions	**4.90**	Omissions	**7.30**
Erroneously enumerated	**9.20**	Erroneously enumerated	**10.90**

2023 Census
PLAY YOUR PART, BE COUNTED

Content Errors

Sex

	Net Difference Rate			Index of Inconsistency		
Sex	**Rate**	**95% CI**		**Index**	**95% CI**	
		Lower	**Upper**		**Lower**	**Upper**
Male	0.0502	-0.029	0.1294	2.5036	2.3497	2.6675
Female	-0.0502	-0.1294	0.029	2.5036	2.3497	2.6675

Gross Difference Rate	**1.3** (Proportion of Off-Diagonal Cases)
Rate of Agreement	**98.8**

2023 Census
PLAY YOUR PART, BE COUNTED

Age group

	Net Difference Rate			Index of Inconsistency		
Age group	Rate	95% CI		Index	95% CI	
		Lower	Upper		Lower	Upper
0 - 9	0.1381	0.072	0.2042	2.1765	2.0172	2.3484
10 - 39	0.0465	-0.0516	0.1445	3.83	3.6388	4.0313
40 - 59	-0.1331	-0.2181	-0.048	5.391	5.0818	5.7191
60+	-0.0515	-0.0982	-0.0048	3.1564	2.8343	3.515

Gross Difference Rate **2.3** (Proportion of Odd- Diagonal Cases)

Rate of Agreement **97.7**

2023 Census
PLAY YOUR PART, BE COUNTED

Marital Status

Marital Status	Net Difference Rate			Index of Inconsistency		
	Rate	95% CI		Index	95% CI	
		Lower	Upper		Lower	Upper
Never married	0.9667	0.7803	1.1531	14.1714	13.7947	14.5584
Married with certificate	0.0979	0.2016	0.0058	11.2959	10.7617	11.8566
Married trad/custom	0.0264	0.1399	0.0872	45.5893	43.6162	47.6517
Consensual union	0.5813	0.7222	-0.4403	69.2019	66.7791	71.7127
Widowed	0.3955	0.479	-0.312	31.2882	29.4615	33.2282
Divorced	0.0477	0.1057	0.0103	54.4006	49.8835	59.3266
Separated	0.0653	0.1211	-0.0094	74.4837	68.0761	81.4943
Don't know	0.0967	0.0479	0.1455	99.6997	89.9454	110.5118
Not Applicable	0.1431	0.0771	0.2091	2.4995	2.3163	2.6971
Not Stated	0.0075	0.0009	0.0142	100	45.1416	221.525

Gross Difference Rate **9.8** (Proportion of Off-Diagonal Cases)

Rate of Agreement **90.2**

2023 Census
PLAY YOUR PART, BE COUNTED

Relationship to head of household

Relationship	Net Difference Rate			Index of Inconsistency		
	Rate	95% CI		Index	95% CI	
		Lower	Upper		Lower	Upper
Head	0.7583	0.5584	0.9581	20.9833	20.4626	21.5171
Spouse	0.5926	0.7195	-0.4656	35.4949	34.1177	36.9277
Partner	0.2737	0.1539	0.3935	50.0182	47.9648	52.1595
Daughter/Son	0.4344	0.6417	-0.2271	20.5508	20.0589	21.0547
Daughter/Son In-Law	0.0753	0.1435	-0.0072	80.4627	74.7455	86.6172
Grandchild	0.9202	1.1161	-0.7243	25.4913	24.846	26.1533
Parent	0.2599	0.1982	0.3216	63.3723	58.4168	68.7482
Parent-In-Law	0.0151	0.044	0.0139	79.6006	66.8976	94.7157
Sister/Brother	0.4444	0.3171	0.5718	48.2595	46.3935	50.2006
Sister/Brother-In-Law	0.0653	0.0061	0.1244	68.7431	63.1448	74.8378
Other Relative	0.7784	0.542	1.0147	58.8664	57.6289	60.1303
Domestic Worker	0.2599	0.3207	-0.1991	37.8883	34.8822	41.1535
Other Non-Relative	0.2825	0.4099	-0.1551	74.7205	71.832	77.7253

Gross Difference Rate **25.5** (Proportion of Off- Diagonal Cases)

Rate of Agreement **74.5**

2023 Census
PLAY YOUR PART, BE COUNTED

Dual- System Estimation

- Is the estimation of the population using two populations which is the PES population and census population.
- The PES estimated the final census population of Namibia to be **3 103 841 (Census POP:3 022 401; Difference: 81 440 (Equivalent to 2.7%)** . The difference between the two populations lies within the 95% CI of the two population.

Conclusion

- The PES thus confirm the census data to be of quality and the government, private sectors, investors, donors etc. can use them for their planning policy formulation and decision-making.

2023 Census
PLAY YOUR PART, BE COUNTED

In the field









2023 Census
PLAY YOUR PART, BE COUNTED



Visit NSA Online

www.nsa.org.na

digitalnamibia.nsa.org.na

geofind.nsa.org.na

2023 Census

PLAY YOUR PART, BE COUNTED