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The Feasibility of Using Random Administrative Samples (The French Experiment) in Population Censuses in African Countries

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ABSTRACT: This paper aims to introduce the usefulness of the French method in using administrative samples in population censuses, especially in African countries that suffer from financial, logistical and human difficulties in completing their censuses in a comprehensive and accurate manner every ten years according to international standards. In this paper, the results of the Fifth Population Census 2008 AD were compared with the results of the Comprehensive Health Survey 2006 AD to test the adequacy of the samples in expressing the population census at least. Additional to the feasibility of the French method in general.

KEYWORDS: Census Population, Correlation, T-Test.

1- INTRODUCTION

We note that many African countries do not commit to conducting population censuses at regular intervals (every ten years) according to the standards of the United Nations. Some African countries did not conduct a census for more than thirty years [1] We also note that those countries that were able to do censuses faced many negatives and challenges, the most important of which is the lack of comprehensiveness and coverage of the census for all regions and the inaccuracy of many results [2] for several financial or financial reasons human or otherwise.

As for the material reasons, we mention, for example, the high cost of population censuses in general and the poor infrastructure in many African countries, which increases the cost and makes the task difficult.

In addition to the large geographical area, which makes it difficult to inclusive geographical coverage and the wide spread of population groups, which weakens accessibility for families.

As for the human causes, we mention, for example, the weakness of qualified staff, lack of awareness of the importance of population censuses, unwillingness to participate, as well as family resistance to censuses and their connection in some groups (with the eyes) and other local cultures, in addition to security problems in some areas [2].

The difficulties facing population censuses are not actually specific to African countries, although they are more severe in developing countries in general and African countries in particular, but they are also a problem even in developed countries. That is why the United Nations Statistics Committee gives great attention to researching these difficulties and issues an updated document every period on the most important recommendations and solutions to these difficulties [3]. This is in addition to statistics and research centers and universities in many countries that publish valuable research in this field. Research to address this problem, the French National Institute of Statistics, which produced several research and scientific papers in this regard We mention, for example, the following scientific papers [5], [6], [7], [8], which all look at the possibility of overcoming the above difficulties, especially the high cost and poor results. The population census refers to a number of administrative samples that cover the whole country and the implementation of the census in those samples during separate periods (a sample every year, for example) to complete the cycle and cover the whole country within five or ten years as a maximum.

To prove the feasibility of using samples against the comprehensive census, in this paper a statistical comparison was made between the results of the fifth population census 2008 and the results of the comprehensive Sudanese health survey for the year 2006 AD, considering that the health survey method used administrative samples in one way or another. In this paper we present, for example, the results of the comparison in education and health to see the extent of concordance between these results, especially the following are the results of the discrepancy between the states in Sudan, which represent the basic rule in supporting decision-making in the fair distribution of services between those states.

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On the other hand, the results of the Comprehensive Health Survey were compared with the data of the direct ministries of health and education to see the extent of concordance between these results, confirming the accuracy of the comprehensive health survey data and the extent of confidence in its accurate representation of reality.

2- Comparing the health survey data with the data of the fifth population census (field work)

In the following table No. (1), we see that there is a strong correlation at a rate of (0.807) between the percentage of basic schools in villages from the data collected by the population census and the percentage of net attendance of students in the base from the data collected by the health survey because there is no data on the number of schools in The health survey, and considering that the number of students can express in one way or another the number of schools, may be sufficient for the purpose of this study.

Table No. (1)

Correlations

		T.of PSCH.in state/No of EAs=P.of .PSCH in the state	Net attendance rate of PSCH in the sample
T.of PSCH.in state/No of EAs=P.of .PSCH in the state	Pearson Correlation	1.000	.807**
	Sig. (2-tailed)	.	.000
	N	15	15
Net attendance rate of PSCH in the sample	Pearson Correlation	.807**	1.000
	Sig. (2-tailed)	.000	.
	N	15	15

**. Correlation is significant at the 0.01 level (2-tailed).

Also in Table No. (2) we notice a strong correlation with a rate of (0.752**) with regard to the results of secondary school data.

Table No. (2)

Correlations

		Net attendance of SSCH Sample	T.of SSch State/NO.of Eas=P.of sschool
Net attendance of SSCH Sample	Pearson Correlation	1.000	.752**
	Sig. (2-tailed)	.	.001
	N	15	15
T.of SSch State/NO.of Eas=P.of sschool	Pearson Correlation	.752**	1.000
	Sig. (2-tailed)	.001	.
	N	15	15

**. Correlation is significant at the 0.01 level (2-tailed).

On the other hand, here are the health data. For example, in the table below No. (3), we present an analysis between the ratio of the number of health centers taken from the census with the ratio of the number of health centers from the Comprehensive Health Survey. The correlation rate was 0.540*, which shows an acceptable correspondence between the ratio of the number of health centers Taken from the census with the percentage of the number of health centers from the Comprehensive Health Survey.

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Table No. (3)

Correlations

		P.of health services - sample	P.of health services - census
P.of health services - sample	Pearson Correlation	1	.540*
	Sig. (2-tailed)	.	.046
	N	14	14
P.of health services - census	Pearson Correlation	.540*	1
	Sig. (2-tailed)	.046	.
	N	14	14

*. Correlation is significant at the 0.05 level (2-tailed).

When comparing water sources data from the health survey with the results of the fifth population census, we find that the correlation rate was 0.546* according to the analysis in the following table No. (4) It also gives an acceptable indication of the adequacy of the comprehensive health survey data, especially with regard to the fair distribution of services between states.

Table No. (4)

Correlations

		percentage of Water services(census)	Use of improved drinking water sources (sample)
percentage of Water services(census)	Pearson Correlation	1	.546*
	Sig. (2-tailed)	.	.035
	N	15	15
Use of improved drinking water sources (sample)	Pearson Correlation	.546*	1
	Sig. (2-tailed)	.035	.
	N	15	15

*. Correlation is significant at the 0.05 level (2-tailed).

As for Table No. (5), it shows the correlation rate between the percentage of drinking water services (population census) and the percentage of dwellings that use improved drinking water sources from a pipe in the yard or plot of land (sanitary survey), which was 0.625*.

Table No. (5)

Correlations

		percentage of Water services(census)	Im. Piped Into yard/plot
percentage of Water services(census)	Pearson Correlation	1	.625*
	Sig. (2-tailed)	.	.013
	N	15	15
Im. Piped Into yard/plot	Pearson Correlation	.625*	1
	Sig. (2-tailed)	.013	.
	N	15	15

*. Correlation is significant at the 0.05 level (2-tailed).

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Although the questionnaire of the comprehensive health survey does not match the forms of the fifth population census, but what was reported from comparisons with information concluded in the health survey was sufficient to conclude that the sampling method can be relied upon, especially in the difficulties that were referred to at the beginning of this paper and prevented it from working Comprehensive population censuses.

3- The extent to which the data of the comprehensive health survey are compatible with direct data from the ministries

To ensure the accuracy of the results obtained from the comprehensive health survey samples, they were compared with the direct data of the ministries, and we obtained positive results, for example:

When comparing basic education data between the Comprehensive Health Survey and the data of the Ministry of General Education for males in Table No. (6), we find that the correlation rate is 0.811**, which indicates a significant agreement between the data collected by the health survey and the data collected by the Ministry of Education for the net enrollment rate for males in foundation stage.

Table No. (6)

Correlations

		male primary school att(sample)	male primary school att(M.of ED)
male primary school att(sample)	Pearson Correlation	1	.811**
	Sig. (2-tailed)	.	.000
	N	15	15
male primary school att(M.of ED)	Pearson Correlation	.811**	1
	Sig. (2-tailed)	.000	.
	N	15	15

**. Correlation is significant at the 0.01 level (2-tailed).

The same applies to female students, as we find in the table below No. (7) that the correlation rate is 0.929**, which indicates a strong correspondence between the data collected by the health survey and the data collected by the Ministry of Public Education for the net enrollment rate for females in the basic stage.

Table No. (7)

Correlations

		Sample Female Net att	M. ED female net att
Sample Female Net att	Pearson Correlation	1	.929**
	Sig. (2-tailed)	.	.000
	N	15	15
M. ED female net att	Pearson Correlation	.929**	1
	Sig. (2-tailed)	.000	.
	N	15	15

**. Correlation is significant at the 0.01 level (2-tailed).

As for secondary education for males, we see in the table below No. (8) that the correlation rate is 0.891**, which also shows the existence of a strong correlation between the data collected by the health survey and the data collected by the Ministry of Public Education for the net enrollment rate of males at the secondary level.

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Table No. (8)

Correlations

		Sample S.Male att	M.S.ED male att
Sample S.Male att	Pearson Correlation	1	.891**
	Sig. (2-tailed)	.	.000
	N	15	15
M.S.ED male att	Pearson Correlation	.891**	1
	Sig. (2-tailed)	.000	.
	N	15	15

**. Correlation is significant at the 0.01 level (2-tailed).

The same applies to females in the table below No. (9), where we find that the correlation rate is 0.907**, which indicates a strong correlation between the data collected by the health survey and the data collected by the Ministry of Public Education for the net enrollment rate of females at the secondary level.

Table No. (9)

Correlations

		Sample S.Female att	M.S.ED female att
Sample S.Female att	Pearson Correlation	1	.907**
	Sig. (2-tailed)	.	.000
	N	15	15
M.S.ED female att	Pearson Correlation	.907**	1
	Sig. (2-tailed)	.000	.
	N	15	15

**. Correlation is significant at the 0.01 level (2-tailed).

When comparing the health indicators from the health survey with the data of the Federal Ministry of Health, we note the following: In Table No. (10), the percentage of patients with crisis was analyzed for the data taken from the Federal Ministry of Health, and the percentage of patients with crisis for the data taken from the health survey with the T-test. A match was found with a significant level of 0.006.

Table No. (10)

Group Statistics

	VAR00002	N	Mean	Std. Deviation	Std. Error Mean
بيانات المسح مع بيانات الوزارة	بيانات المسح	15	.5600	.3521	9.092E-02
	بيانات الوزارة	15	1.7933	1.4464	.3735

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
بيانات المسح مع بيانات الوزارة	Equal variances assumed	10.707	.003	-3.209	28	.003	-1.2333	.3844	-2.0207	-.4460
	Equal variances not assumed			-3.209	15.654	.006	-1.2333	.3844	-2.0496	-.4170

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The same applies to people with diabetes, as shown in the table below No. (11).

Table No. (11)

Group Statistics

	VAR00002	N	Mean	Std. Deviation	Std. Error Mean
المرضي المصابين بالسكري	بيانات الوزارة	15	1.7000	1.0379	.2680
	بيانات المسح	15	.7800	.5979	.1544

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
المرضي المصابين بالسكري	Equal variances assumed	.947	.339	2.975	28	.006	.9200	.3093	.2865	1.5535
	Equal variances not assumed			2.975	22.370	.007	.9200	.3093	.2793	1.5607

Table 1 and Table No. (12), (13), (14), (15) show the extent of concordance between the data of the percentage of children immunized against the triple: tetanus, diphtheria and whooping cough from the health survey and the data of the Ministry.

Table No. (12)

Group Statistics

	التصنيف	N	Mean	Std. Deviation	Std. Error Mean
نسبة الأطفال المحصنين ضد الثلاثي -وزارة	وزارةالصحة	15	90.2600	8.92571	2.30461
	المسح الصحي	15	77.6867	13.26057	3.42386

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
نسبة الأطفال المحصنين ضد الثلاثي -وزارة	Equal variances assumed	1.148	.293	3.046	28	.005	12.5733	4.12723	4.11908	21.02759
	Equal variances not assumed			3.046	24.525	.005	12.5733	4.12723	4.06479	21.08188

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Table No. (13)

Group Statistics

	التصنيف	N	Mean	Std. Deviation	Std. Error Mean
نسبة الأطفال المحصنين ضد شلل الاطفال -وزارة	بيانات الوزارة	15	90.1333	8.89516	2.29672
	بيانات المسح الصحي	15	73.2333	9.05828	2.33884

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
نسبة الأطفال المحصنين ضد شلل الاطفال -وزارة	Equal variances assumed	.001	.972	5.156	28	.000	16.9000	3.27797	10.18539	23.61461
	Equal variances not assumed			5.156	27.991	.000	16.9000	3.27797	10.18529	23.61471

Table No. (14)

Group Statistics

	التصنيف	N	Mean	Std. Deviation	Std. Error Mean
نسبة الأطفال المحصنين ضد المل الونوي-الوزارة	وزارةالصحة	15	83.3333	9.78093	2.52543
	المسح الصحي	15	10.7000	3.50938	.90612

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
نسبة الأطفال المحصنين ضد المل الونوي-الوزارة	Equal variances assumed	9.912	.004	27.071	28	.000	72.6333	2.68306	67.13733	78.12934
	Equal variances not assumed			27.071	17.546	.000	72.6333	2.68306	66.98595	78.28072

Table No. (15)

Group Statistics

	التصنيف	N	Mean	Std. Deviation	Std. Error Mean
نسبة الأطفال المحصنين ضد الحصبة -وزارة	وزارةالصحة	15	76.7333	10.39551	2.68411
	المسح الصحي	15	74.2267	10.84300	2.79965

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
نسبة الأطفال المحصنين ضد الحصبة -وزارة	Equal variances assumed	.043	.837	.646	28	.523	2.5067	3.87846	-5.43801	10.45134
	Equal variances not assumed			.646	27.950	.523	2.5067	3.87846	-5.43864	10.45198

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Table No. (16) shows the percentage of children suffering from diarrhea. From the results of the analysis, it is clear to us that there are no statistically significant differences between the results of the Federal Ministry of Health and the results of the health survey.

Table No. (16)

Group Statistics

	التصنيف	N	Mean	Std. Deviation	Std. Error Mean
نسبة الأطفال الصابين بالاسهال-وزارة	بيانات الوزارة	15	4.0200	1.97129	.50899
	بيانات المسح الصحي	15	22.1667	5.40934	1.39669

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
نسبة الأطفال الصابين بالاسهال-وزارة	Equal variances assumed	13.655	.001	-12.207	28	.000	-18.1467	1.48654	-21.19170	-15.10163
	Equal variances not assumed			-12.207	17.654	.000	-18.1467	1.48654	-21.27416	-15.01917

So, we conclude from this analysis that the data of the random administrative samples are very similar to the administrative data of the ministries, which supports the reliance on statistical survey information as an alternative to population censuses in the event of the problems that we have detailed in this paper.

4- RESULTS AND CONCLUSION

All these results that were presented in the previous two paragraphs give a clear indication of the strength of congruence between the outputs of the samples and the outputs of the census in addition to the administrative outputs of the ministries. Then it becomes clear to us the extent of the efficiency and effectiveness of the sample method in the way of collecting data and relying on its results, taking into account the relatively small cost of completing the work in a manner Samples and in those prohibitive circumstances in which it is not possible to collect data in the traditional way in censuses, such as natural conditions such as rain, earthquakes, volcanoes, wars, the lack of paved roads, in addition to the lack of financial, human and logistical resources, especially since there are countries such as France that rely on the sampling method in the population census.

This is in addition to the administrative, logistical and material problems that weaken the results of the traditional method of population censuses in countries such as African countries where trained staff and social awareness are less.

On the other hand, the use of information and communication technology increases the efficiency of the sampling method in data management and the integration of the accumulated outputs of the samples, and the existence of a civil registry for all citizens has its clear advantages in the following population count. This is in addition to using the Internet as a means of filling out and renewing forms, as a supportive mechanism for that method.

Enumerators can use modern tools and technologies such as hand computers and the Internet instead of paper forms, at least in areas where there are communication services.

Isn't it enough to use the civil registry to count the residents?

Is it not more useful to use the huge budgets in traditional population censuses to support the infrastructure of communications and information technology in building an accurate civil registry system?

Couldn't the use of information and communication technology in filling out online forms, iPhones, GPS, and the civil registry system be more accurate, less expensive, and more comprehensive than traditional censuses?

We conclude from all of this that information technology has made the use of the random sampling method in the population census, which was invented by France because of its economic advantages due to its low cost, administrative advantages, especially in the

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broad Sudanese country, and security advantages because of the possibility of special treatments in areas with security problems more feasible than the method. in poor countries with special problems.
But in any case, the matter still needs more study, experiments and comparisons at the local and global levels in order to answer these questions scientifically.

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