Estimating the population of Papua New Guinea in 2020

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Abstract

The present national population of Papua New Guinea (PNG) is not known. There is no official estimate of the population of the country in 2020 and figures by others are usually between 8 and 9 million people. Our purpose is to make estimates of the likely range of population more readily available. We generate estimates of the PNG population in 2020, using the 2000 base-year population and three growth rates from different inter-census periods. We conclude that the estimated population in PNG in mid-2020 was likely to be between 8.8 and 9.6 million people, with a caveat that reliable census data may have revealed a different total population. We also generate projections of provincial populations in mid-2020, and present data on the population of the 27 urban centres that had more than 4,000 people in the 2011 census. Finally, we offer some suggestions for the next national census.

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R. Michael Bourke and Bryant Allen

Dr R. Michael (Mike) Bourke[1] is an agricultural scientist and geographer and is a specialist in PNG and Pacific Island agriculture. He is an Honorary Associate Professor in the School of Culture, History and Language, ANU College of Asia & the Pacific, The Australian National University, Canberra.

Dr Bryant Allen is a geographer with almost 50 years' experience of research, fieldwork and teaching in Papua New Guinea. He is an Honorary Associate Professor at the Department of Pacific Affairs, ANU College of Asia & the Pacific, The Australian National University, Canberra.

Please note:

This Discussion Paper was amended in January 2023 to include 2011 population numbers for Aitape and Rabaul and recalculate the total in Table 5.

[1] Corresponding author: Dr Mike Bourke, PO Box 492, Bungendore NSW 2621, Australia
Phone: +61 (0)406 376 056 | Email: mike.bourke@anu.edu.au

1.   Introduction

The present national population of Papua New Guinea (PNG) is not known and there is no official estimate of the population of the country in 2020. The website of the National Statistical Office (NSO, 2020b) provides a figure of 7,275,324—the final total population derived from the 2011 national census and now almost 10 years old. The website does contain a page titled 'Population projections', but it is blank.

Estimates vary among sources but are usually between 8 and 9 million. For example, a figure of 8 million is used in the PNG Agriculture Medium Term Development Plan 2020–2022 (DAL, 2020). Journalist Natalie Whiting noted in a 2019 article that "the country is said to have a population of 8 million people, but no-one knows if that is actually true". In a recent PNG National Research Institute report, McMurray and Lavu (2020, Table 2) generated projected provincial populations which total 8.943 million for 2020, with a caveat that their estimates should be treated as minimum figures. The United Nations gives the projected mid-2020 population as 8.947 million (UN, 2020). The CIA World Factbook gives the population as 7.3 million in July 2020 (CIA, 2020).

This paper makes available some estimates of the PNG population in 2020. We summarise a recent paper published by the PNG National Research Institute (McMurray & Lavu, 2020) and then provide the results of some basic calculations to project the population from enumerated census totals to 2020. The paper does not present the findings of original demographic research. The purpose is to make estimates of the PNG population in 2020 more readily available and to indicate how those estimates are derived.

Knowledge of the national population of a country is important. The total population is the denominator in the calculation of numerous important rates, such as death rates, population densities, food consumption, employment and income. It is also necessary for the planning and provision of services such as schools and health facilities.

Problems created by a lack of reliable population data were highlighted in 2016 when distributions of food were being planned after a major drought and frosts in 2015 (Kanua et al., 2016). In some locations, such as Milne Bay Province, the provincial authorities

carried out their own count of the provincial population and the results were similar to the 2011 national census figures, after accounting for population growth. But in other locations, such as in Western Province, population counts done by provincial authorities in 2016 were significantly different from the 2011 census figures, with the latter appearing to grossly underestimate the actual population.

2.   Vital statistics

In the years following a census, the population in any particular year can be estimated by adding the number of people who have joined the population—by being born (fertility) or by immigrating to the country—and subtracting the numbers of people who have left the population—by dying (mortality) or by emigrating. This is how the Australian Bureau of Statistics provides an estimate of the national population of Australia (ABS, 2020). The accuracy of the total population figure derived in this way depends on the quality of the original census and the quality of the registration of births and deaths, and the counting of immigrants and emigrants at the borders.

3.   Other sources

In PNG the reporting of deaths and births is incomplete and inaccurate (Kitur et al., 2019; Mola & Kirby, 2013). This has resulted in demographers relying on other sources of fertility and mortality data, such as the Demographic and Health Survey (DHS), in which a random sample of individuals are interviewed about births and deaths in their families. These sources are not without problems. Tran et al. (2011) report that, in the 2006 DHS, the females surveyed were not representative of the PNG female population, the number of children born was under-reported and the birthdates of mothers and children were misreported. Sorchik et al. (2019) describe similar problems.

4.   Population projection

In 2017 the Secretariat of the Pacific Community prepared national and provincial population projections for the PNG Department of National Planning and Monitoring (DNPM). These projections are not available to the public but were made available to the

PNG National Research Institute (NRI) to do further analysis. The Secretariat projections took into account the following factors: the 2000 census figures were adjusted upwards by 4% to take into account the undercount in that census; estimates of fertility and mortality were made from the 2000 census and 2006 DHS; fertility was assumed to be declining by 0.2 births per woman per 5 years; life expectancy was assumed to be increasing by 1 year per 5 years; and migration was not taken into account. The projections from 2000 to 2011 were compared with the 2011 census. The 2011 enumerated population was then adjusted accordingly and used as inputs for a further projection from 2017 to 2022 (McMurray & Lavu, 2020, 5).

McMurray and Lavu (2020, 4) accept that "a complete census is the only feasible way to count the PNG population". Because the national identity system is not fully developed, they suggest "natural rates of population increase" can be used to "adjust census data" and they refer to the DHS surveys, in which they appear to have confidence. They used this approach to extend the Secretariat projections to consider differences in provincial growth rates and to estimate the size of key groups who will be needing to access particular services such as schools and maternity clinics.

If there are no reliable fertility or mortality rates available, as is the case in PNG, the national population can be estimated simply by applying an annual rate of growth to a population enumerated at a census, for a given number of years into the future. What is required to best estimate the 2020 population is a reliable base population and an accurate annual rate of increase for the period between the base population and 2020.

5.   PNG censuses

PNG national censuses have occurred in 1966, 1971, 1980, 1990, 2000 and 2011. The 1980 census and the 2000 census are considered a good estimate of the national population. But the 1990 census is said to have suffered from a "significant coverage error" (Stott, 1992) or a high rate of undercounting (NSO, 2002, 5). The National Statistical Office was instructed in 2017 to explain to Cabinet why the 2011 national census failed (Pakakota & Nalu, 2017). Because of this, projections from the 1990 or the 2011 censuses are likely to be less accurate than those from 2000.

The enumerated population was 2.2 million in 1966 and in 2011 it was 7.3 million (Table 1). The population growth rate between intercensal years from 1980 to 2011 ranges from 2.2% per annum to 3.2% per annum (Table 2). But the growth rates for the periods 1980–1990, 1990–2000 and 2000–2011 are likely to be less reliable because of the problematic censuses in 1990 and 2011.

Table 1: Reported national population at the time of six national population censuses

Census year	Population
1966	2,184,982^
1971	2,489,947^
1980	3,010,727*
1990	3,761,954*
2000	5,190,786*
2011	7,275,324*

Sources: ^ DNPM (1999); * NSO (2013)
Note: The figures for the first two national censuses are reproduced in Allen and Bourke (2009, 31)

Table 2: Reported annual population growth rates for five inter-census periods

Inter-census period	Growth rate (% per year)
1966–2000	2.5
1980–1990	2.2
1990–2000	3.2
1980–2000	**2.7**
2000–2011	3.1

Sources: Allen and Bourke (2009, Table 1.1.2); NSO (2002, Table 3); NSO (2013)

6.   Projection of national population to 2020

Here we use the 2000 base-year population of 5.19 million and growth rates of 2.5, 2.7 and 3.1% per annum to estimate the mid-2020 population (Table 3). These growth rates are those reported for the following inter-census years: 1966–2000, 1980–2000 and 2000–2011, respectively (Table 2). We used Excel's POWER and FV (future value) functions, which incorporate the equation $LogN(P_n)–LogN(P_o)/intercensal\ period\ x\ 100$. The intercensal period 1980 to 2000 is 19.84 years. The intercensal period for 2000 to 2020 is 20 years.

Table 3: National population projections in 2020

Population in base year 2000	Assumed population growth rate	Estimated population in mid-2020
5,190,786	2.5% p.a.	8,505,707
5,190,786	2.7 % p.a.	8,843,863
5,190,786	3.1% p.a.	9,558,867

The estimated PNG national population in mid-2020 ranges from 8.5 million to 9.6 million (Table 3). A population growth rate of 2.5% per annum is probably too low given rates reported in recent decades. If the population growth rate is 2.7% per annum, as it was between 1980 and 2000, the 2020 population is likely to be about 8.8 million. If we accept the growth rate between 2000 and 2011 of 3.1% per annum (NSO, 2013), the 2020 population is likely to be about 9.6 million (Table 3).

We conclude that the estimated population in PNG in mid-2020 was likely to have been between 8.8 and 9.6 million people, with a caveat that reliable census data may have revealed a different total population. Census data generated at a provincial level has sometimes indicated that counts done in the national census are too low. Hence we suggest that the national population may be closer to the top of the range of 8.8 to 9.6 million rather than the bottom of this range.

7.   Projection of province populations 2000–2020

Another approach to estimating the 2020 PNG national population is to project the populations of the individual provinces from 2000 to 2020, using individual province growth rates from the 1980 to 2000 period and then sum the projected province populations to arrive at a national population.

Projected provincial populations were generated from the enumerated provincial population in 2000 and the provincial growth rate between 1980 and 2000 (Table 4). These projected provincial populations total 9.01 million in 2020. The projected 2020 provincial populations of McMurray and Lavu (2020) give a total population of 8.94 million (Table 4).

Morobe is projected to be the most populous province in 2020 with 937,000 people (Table 4), after the separation of Southern Highlands into two provinces in 2012. These estimates of the provincial populations assume that the growth rates between 2000 and 2020 were similar to those between 1980 and 2000. This may not be the case given movements of people to provinces where there is greater capacity to earn cash incomes.

Table 4: Province populations projected to 2020

Province	Growth rate 1980–2000 (% pa) (NSO, 2002)	Growth rate 2017–2022 (McMurray & Lavu, 2000)	Censused population in 2000	Projected 2020 population (this paper)	Projected 2020 population (McMurray & Lavu, 2000)
Western	3.3	3.0	153,304	293,500	271,000
Gulf	2.6	2.9	106,898	178,600	189,000
Central	2.3	2.7	183,983	289,900	323,000
National Capital District	3.6	3.5	254,158	515,600	456,000
Milne Bay	2.5	2.5	210,412	344,800	367,000
Northern (Oro)	2.7	2.8	133,065	226,700	234,000
Southern Highlands & Hela	4.2		546,265	1,243,800	

Province	Growth rate 1980–2000 (% pa) (NSO, 2002)	Growth rate 2017–2022 (McMurray & Lavu, 2000)	Censused population in 2000	Projected 2020 population (this paper)	Projected 2020 population (McMurray & Lavu, 2000)
Southern Highlands		2.5			628,000
Hela		3.0			329,000
Enga	2.9	3.1	295,031	522,600	524,000
Western Highlands & Jiwaka	2.5		440,025	721,000	
Western Highlands		1.0			502,000
Jiwaka		3.0			246,000
Chimbu (Simbu)	1.9	2.4	259,703	378,400	451,000
Eastern Highlands	2.2	2.4	432,972	669,100	674,000
Morobe	2.8	2.5	539,404	937,100	879,000
Madang	2.7	2.8	365,106	622,100	642,000
East Sepik	2.2	2.3	343,181	530,300	595,000
West Sepik (Sandaun)	2.4	2.5	185,741	298,500	324,000
Manus	2.6	2.7	43,387	72,500	76,000
New Ireland	2.6	3.5	118,350	197,800	212,000
East New Britain	2.5	2.9	220,133	360,700	388,000
West New Britain	3.6	3.5	184,508	374,300	331,000
Bougainville	1.5	2.1	175,160	235,900	302,000
Papua New Guinea				**9,013,200**	**8,943,000**

Notes:
1. The 1980 to 2000 growth rates and censused populations for 2000 are from NSO (2002, Table 3). Data from McMurray and Lavu (2020) are in Appendix Table 2 of their report.
2. Because separate figures for Hela and Jiwaka provinces are not available before they were created in 2012, except from individual district figures, they are included with Southern Highlands and Western Highlands provinces, respectively, in our analysis.

8. Urban populations

Urban census units are those located within designated urban areas and there were 27 designated urban centres with a population of over 4,000 people in 2011 (Table 5). Most PNG towns have spread physically beyond their urban census unit boundaries into surrounding rural census units. The outcome is that rural census units around urban areas have higher enumerated populations than if they were really rural areas, and enumerated urban populations are probably lower than the real numbers of people who live in towns in PNG. Most urban boundaries need urgent review before the next census, but this would be a major exercise.

There are two larger cities in PNG (Port Moresby and Lae), eight moderately large towns with a population between 20,000 and 35,000 people in the 2011 census (Madang, Mt Hagen, Kokopo-Vunamami, Popondetta, Wewak, Goroka, Kimbe and Mendi). As well, there are another 17 urban centres with a population between 4,000 and 17,000 people in 2011 (Table 5). There are about a further 50 small to very small centres classed as urban in PNG. However, the total population in those centres is small with only about 50,000 people living in urban centres with a population of less than 4,000 people in 2011.

Table 5: Populations of the 27 largest urban centres in the 2000 and 2011 censuses

Urban area	Province	Population in 2000	Population in 2011
Port Moresby	National Capital District	254,158	364,125
Lae	Morobe	78,692	88,608
Madang	Madang	28,547	35,971
Mount Hagen	Western Highlands	27,877	32,830
Wewak	East Sepik	20,257	24,471
Kokopo-Vunamami	East New Britain	19,933	31,965
Popondetta	Northern (Oro)	19,866	29,454
Goroka	Eastern Highlands	19,523	23,277
Mendi	Southern Highlands	17,128	21,135
Kimbe	West New Britain	14,184	22,923

Urban area	Province	Population in 2000	Population in 2011
Wau-Bulolo	Morobe	13,037	10,598
Daru	Western	12,935	15,142
Kavieng	New Ireland	11,274	16,725
Alotau	Milne Bay	9,888	11,857
Vanimo	West Sepik (Sandaun)	9,778	13,970
Tari	Hela	8,824	39,279
Kiunga	Western	8,295	10,981
Kundiawa	Chimbu (Simbu)	8,087	10,833
Kainantu	Eastern Highlands	6,788	7,287
Lorengau	Manus	5,874	8,882
Ialibu	Southern Highlands	5,479	6,914
Kerema	Gulf	5,124	5,885
Aitape	West Sepik (Sandaun)	4,536	6,229
Wabag	Enga	4,208	5,041
Kerowagi	Chimbu (Simbu)	4,130	4,714
Rabaul	East New Britain	3,907	4,785
Balimo	Western	3,143	4,394
Total larger urban centres		**625,472**	**858,275**

Sources: Data for 2000 are extracted from the 2000 national census data; data for 2011 are from NSO (2013)
Note:
Tari was in Southern Highlands in 2000 and 2011. It is now in Hela Province. It is a small centre, and it is extremely unlikely that the population was actually as high as 39,000 people in 2011, thus making it the third largest urban centre, particularly given that the population lived in only 4,857 households (see NSO, 2013).

The urban citizen population in the 2011 census was 908,465 people (NSO, 2020a). It seems safe to say that, in 2020, the national urban population of PNG is greater than 1 million. As many urban areas have spread into adjacent rural census units, the number of people who live in towns in 2020 may be as high as 1.5 million. The urban population of PNG is about 13% of the total population. This makes PNG the least urbanised nation in the world, according to the CIA World Factbook (CIA, 2020).

9.   The next census

The scheduled census to be done in 2020 was deferred because of the COVID-19 pandemic (RNZ, 2020). Only limited preparations have taken place for a census in 2021. Whenever the next census is held, it is most important that it is conducted carefully and competently. Papua New Guinea should seek assistance from international experts in censusing in conditions similar to PNG. It will require international funding to provide the resources needed to plan well in advance, do the counting and analyse the results. It is worth considering whether the national census should occur over the whole country within a few months, which spreads the expertise thinly across the whole nation and is difficult to properly supervise. Collecting census data over 12 months, with fewer well-trained and well-resourced teams moving progressively from province to province, working closely with district staff, ward councillors and locally employed field staff, could deliver a more complete and credible census.

References

ABS (2020). National, state and territory population. Australian Bureau of Statistics, Canberra. https://www.abs.gov.au/statistics/people/population/national-state-and-territory-population/mar-2020

Allen B, & Bourke, RM (2009). People, land and environment. In RM Bourke & T Harwood T (eds). *Food and Agriculture in Papua New Guinea*. ANU E Press, The Australian National University, Canberra (pp 27–127). http://press-files.anu.edu.au/downloads/press/p53311/pdf/part11.pdf

CIA (2020). The World Fact Book. Central Intelligence Agency, Washington. https://www.cia.gov/the-world-factbook/static/22da2df478abae928e48312e858ee745/PP-summary.pdf

DAL (2020). Agriculture Medium Term Development Plan 2020–2022. Department of Agriculture and Livestock, Port Moresby.

DNPM (1999). Papua New Guinea National Population Policy 2000–2010. Department of National Planning and Monitoring, Port Moresby.

Hayes G (2007). The demographic impact of the HIV/AIDS epidemic in Papua New Guinea, 1990–2030. *Asia-Pacific Population Journal*, 22(3), 11–30. https://doi.org/10.18356/01ea416f-en

Kanua MB, Bourke RM, Jinks B & Lowe M (2016). Assessing village food needs following a natural disaster in Papua New Guinea. Church Partnership Program, Port Moresby. https://openresearch-repository.anu.edu.au/bitstream/1885/109282/1/Assessing-food-needs-following-a-natural-disaster-in-Papua-New-Guinea.pdf

Kitur U, Adair, T & Lopez AD (2019). Estimating adult mortality in Papua New Guinea, 2011. *Population Health Metrics*, 17(4), 1–14. https://doi.org/10.1186/s12963-019-0184-x

McMurray C & Lavu E (2020). Provincial estimates of key population groups 2018–2022. The National Research Institute of Papua New Guinea, Port Moresby. https://pngnri.org/images/Publications/Provincial_estimates_of_key_population_groups_2018-2022_Other_publications_.pdf

Mola G & Kirby B (2013). Discrepancies between national maternal mortality data and international estimates: The experience of Papua New Guinea. *Reproductive Health Matters*, 21(42), 191–202. https://doi.org/10.1016/S0968-8080(13)42725-8

NSO (2002). Papua New Guinea 2000 Census: Final Figures. National Statistical Office of Papua New Guinea, Port Moresby. (A different version of this report is available online at: https://www.nso.gov.pg/statistics/population/)

NSO (2013). Final Figures: Papua New Guinea National Population and Housing Census 2011 (PNG Final Figures 2011 – Booklet). National Statistical Office of Papua New Guinea, Port Moresby. https://www.nso.gov.pg/statistics/population/

NSO (2020a). Statistics. Demography: Urban Population. National Statistical Office of Papua New Guinea, Port Moresby. https://www.nso.gov.pg/statistics/population/demography/

NSO (2020b). Statistics. Population. National Statistical Office of Papua New Guinea, Port Moresby. https://www.nso.gov.pg/statistics/population/

Pakakota C & Nalu M (2017, 24 August). Census flop probed. *The National*. https://www.thenational.com.pg/census-flop-probed/

RNZ (2020, 30 March). PNG govt reveals plans for economic stimulus and relief. Radio New Zealand. https://www.rnz.co.nz/international/pacific-news/412948/png-govt-reveals-plans-for-economic-stimulus-and-relief

Sorchik RJ, Than K, Carter C, Linhart G, Haberkorn G & Taylor R (2019). Fertility trends in Pacific Island Countries. Pacific Community, Noumea. https://www.spc.int/updates/blog/2019/07/fertility-trends-in-pacific-island-countries-and-territories

Stott H (1992). Post enumeration check, Papua New Guinea Census 1990: Estimates of coverage. Unpublished paper cited in Hayes (2007).

Tran LN, Bauze A, Nguyen KH, Firth S & Jimenez-Soto E (2011). Under-five mortality analysis for Papua New Guinea. Investment Case MDGs 4 and 5. School of Population Health, University of Queensland, Brisbane.

UN (2020). United Nations, Department of Economic and Social Affairs, Population Division. World Population Prospects, Papua New Guinea. http://data.un.org/Data.aspx?q=Papua+New+Guinea+population+in+2020&d=PopDiv&f=variableID%3a12%3bcrID%3a598%3btimeID%3a85

Whiting, N (2019, 26 October). PNG's population is booming, but many women remain under intense pressure to have babies. ABC News. https://www.abc.net.au/news/2019-10-26/png-population-growth-tipping-the-country-towards-disaster/11603372