Life expectancy of Kokoda Track Authority communities in Central Province, Papua New Guinea

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Abstract

A cohort survival method is used to construct life tables for resident and non-resident families in Ward 18 of the Koiari Rural Local-Level Government. The life tables plausibly show that the rural-dwelling residents had a life expectancy of 49.9 years compared to 61.1 years for the Port Moresby-dwelling non-residents.

The finding reveals a gap in life expectancy between rural and urban Papua New Guineans suggesting rural-dwellers are 30 years behind urban-dwellers in health status, the two figures matching life expectancy from the 1980 census (49.6 years) and as quoted by UNDP for PNG in 2010 (61.1 years). It backs the findings of general reviews that PNG's rural health service is 'impaired' and 'unable to fulfil basic functions'.

Key words: Life expectancy, rural health.

Introduction

The Kokoda Initiative Social Mapping Project was part of a programme of technical assistance provided by the Australian government to the PNG Department of Environment and Conservation[1] (DEC) under the first and second bilateral 'Joint Understanding between PNG and Australia on the Kokoda Track and Owen Stanley Ranges' agreements (Commonwealth of Australia & GoPNG, 2008, 2010). The objective of the project was to provide DEC and other Kokoda Initiative stakeholders with detailed profile of the communities making up the LLG wards of Kokoda Track Authority (KTA), an entity created in the late 1990s or early 2000s as a Special Purpose Authority under the *Local-level Governments Administration 1997* (Filer, 2004, Table 1). My colleagues and I produced a series of reports 2009-2015, with 2.5 months fieldwork across multiple trips into the area. Field team members came from DEC, the University of Papua New Guinea and the Australian National University. The work was jointly commissioned by DEC and the International Projects–Heritage Division of the Australian Department of the Environment.[2]

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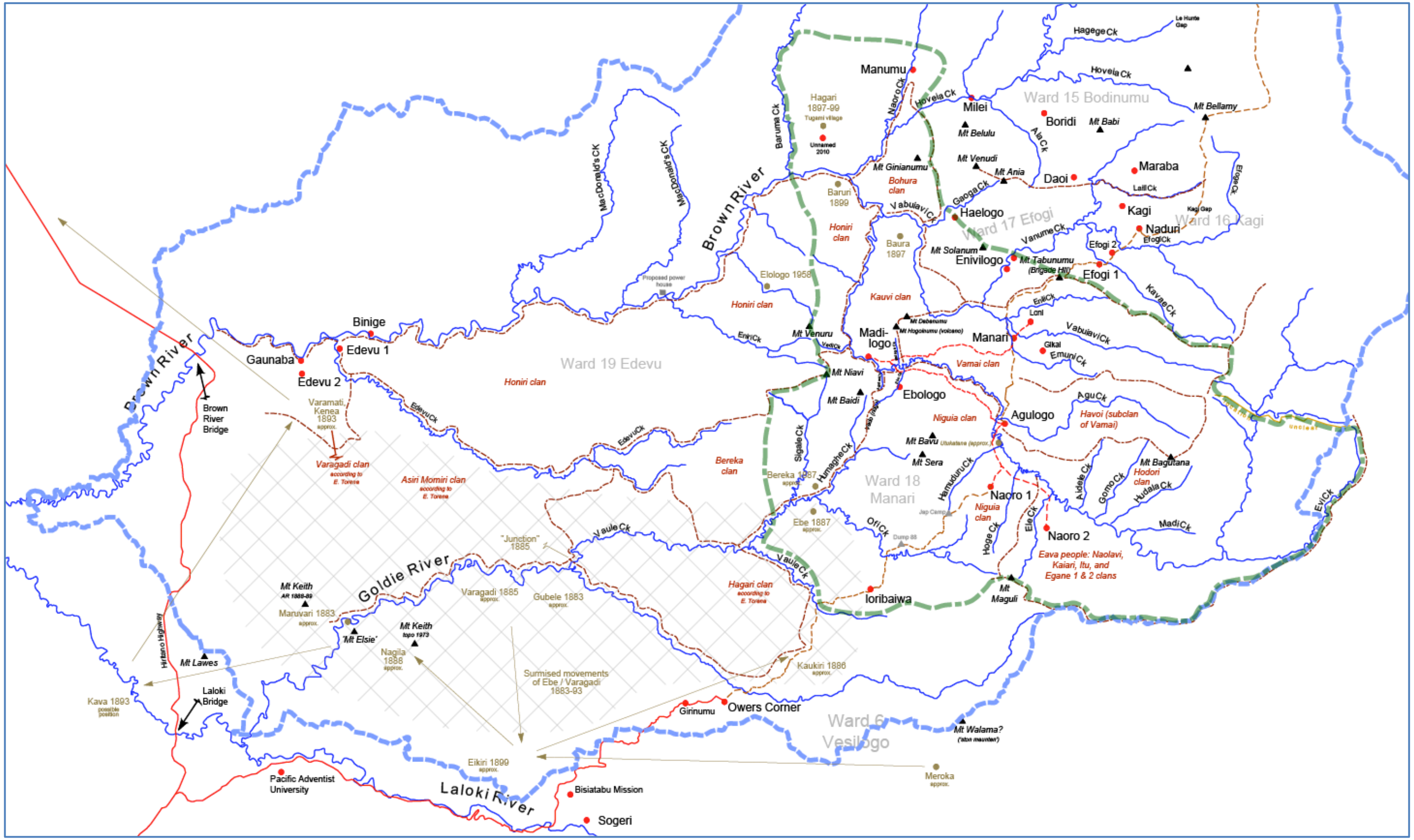
1 The Conservation and Environmental Protection Authority from 30 May 2014.

2 Department of the Environment, Water, Heritage and the Arts prior to 2010; Department of Sustainability, Environment, Water, Population and Communities 2010-2013.



Map 1. Ward 18 of Koiari Rural LLG in relation to the Naoro and Brown Rivers, Central Province, Papua New Guinea .
Naoro SubCatchment = dashed line in light green. Dashed line in light blue = Kokoda Track Interim Protection Zone.
Source: Burton et al. (2015).

The results I present in this paper were a part of this work. Specifically, we made detailed investigations of family compositions in Madilogo, Nauro 1 & 2, Agulogo, Manari and Loni villages, which make up Ward 18 of Koiari Rural LLG, in 2010-2012 and 2014. These were a subset of the villages visited in the full project. Community members readily gave their time when the long-term aim of helping to better target the development programs of the wider Kokoda Initiative – itself well-known to all communities in this area – was explained in community meetings.

An immediate from the first fieldwork for this project in 2010 was that 65-75% of 'Kokoda Track villagers', depending on their villages, were actually resident in settlements in Port Moresby, like Saraga at Six Mile, and in other suburbs around the city.

Plate 1. Goma Gere clarifying a point on her chart of genealogy at Manari village with Conservation and Environmental Protection Authority staff member Elton Kaitokai, 6 Aug 2014.

It was not difficult for the 25% who were resident in Wards 15-19 to grasp the concern that Kokoda Initiative programs should be properly designed to benefit rural dwellers. Indeed, these wards had already been cheated by various financial scandals, such as the fees paid by the Australian trekkers who walk the Kokoda Track and stay in their villages being intercepted by city-based leaders instead of being paid into the KTA's bank account to be shared by all, and decision-making over Kokoda Track matters being taken without consultation.[3] They were therefore more than interested in

[3] An intervention by the Australian aid programme to stabilise the finances of the KTA and put in proper systems of accountability probably cost >A$1 million, 2011-2013. Media reports in 2018 showed that whatever was done, was unsuccessful (*The National*, 2018; Ferns, 2018)

providing information on who was who, who lived where, and who spoke for what resources. The analysis presented in this paper is derived from data collected for the Kokoda Initiative Social Mapping Project. I report here only on aggregated, de-identified data.

Life expectancy

A persistent question that eludes researchers is this: what is the life expectancy of a rural population in Papua New Guinea? Life expectancy is, along with the ratio of mean years of schooling to expected years of schooling, and GNI per capita, one of three metrics required to calculate PNG's ranking on the Human Development Index (HDI), the assessment of human well-being developed by the economist Mahbub ul Haq and published in the United Nations Development Programme's Human Development Report (HDR) each year since 1990.

Given that Papua New Guinea included the bold ambition to enter the world's top 50 nations by HDI rank in the next 30 years in Vision 2050 (Papua New Guinea, 2009), it might be thought that the Department of National Planning or the National Statistical Office would have a section dedicated to calculating this measure, or even a single statistician capable of doing it. However, it appears that this is not the case and the HDRs show that PNG has fallen from 145th position over the decade since the Vision 2050 taskforce set this national ambition, to 153rd (UNDP, 2018).

Year	e^0 (years)	Source	Reference
1946	31.5	Life table projection	van de Kaa (1971, Table 7.2).
1966	43.5	Census	McDevitt (1979, p. 48).
1971	49.2	Census	McDevitt (1979, Tables 5.4, 5.5).
1980	49.6	Census	Bakker (1986, p. 221).
1991	51.7	Census	Hayes (1996, Table 6.3).
2000	58.7	Census	UNDP (2014a, Appendix 2).
2010	61.1	Modelled	UNDP (2010, Table 1).
2013	62.4	Modelled	UNDP (2014b, Table 1; 2014a, Appendix 2).
2015	60.1	Modelled	IMHE Viz Hub[4]
2016	65.9	Modelled	WHO (2018a, Annex B).

Table 1. Historical measurements of life expectancy in Papua New Guinea.

4 https://vizhub.healthdata.org/le/

Conventionally, life expectancy is calculated either (i) using intercensal methods in large populations or (ii) from records of births and deaths. Papua New Guinea has no system of vital registration so using census data is the only means available to obtain a national figure. This has been done on five occasions (Table 1).[5] A third method is to use mathematical modelling techniques. This is the approach taken by the three main multilateral agency collectors of health performance data: WHO, UNDP and the World Bank, while the non-government Institute for Health Metrics and Evaluation (IHME)[6] at the University of Washington coordinates the periodic Global Burden of Disease Study and curates available datasets on health and demography.

In general, the techniques used rely on supporting estimates life expectancy by means of global correlations with economic and other data. This is the basis of the annual changes in UNDP and World Bank figures for life expectancy. As may be seen in Table 1, though the IHME modellers are conservative, those of the World Bank now believe that life expectancy in PNG has risen by a full seven years during the 21st century – without there being any actual new data to say this is the case.

The census method gives a snapshot of life expectancy as experienced by the population between two census dates, which is for the previous 10 years in Papua New Guinea (see Bakker 1986 for an example of PNG calculation methods). The second method reflects the lived years and the burden of mortality experienced over the lifetime of the individuals recorded in birth and death registers, which could be as long as 100 years. Many guides explain how the various columns in a life table are derived (e.g. Palmore and Gardner 1986). Conventionally the M_x or q_x columns are the starting point and the entry in the last column of the first row, e^0, gives the most usually quoted figure: life expectancy at birth. In respect of a project area, part of the Kokoda Track in this case, conventional methods cannot be used: the population is far too small and few death dates are known. I have instead used a *cohort survivorship* method as a heuristic means of deriving the l_x column in a life table from which M_x / q_x can be calculated.[7]

While the cohort survivorship method can give a 'divide by zero' error in a population with five-year cohorts of erratically different sizes, when this is not the case a figure

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[5] After this article was complete, a new paper gave life expectancy estimates of 62.0 years for males and 64.3 years for females for PNG as a whole from the 2011 census; these findings are broadly consistent with the urban-dwellers of the present paper: Kitur, U., Adair, T., & Lopez, A. D. (2019). Patterns of all-cause mortality in Papua New Guinea, 2011. *Asia Pacific Journal of Public Health*, OnlineFirst, 9 April 2019. https://doi.org/10.1177/1010539519841492

[6] http://www.healthdata.org

[7] Individual l_x entries are simply 1000 x (survivors) / (number born) for each age cohort. This requires a knowledge of deceased members of age cohorts which can be obtained in genealogical interviews. The critical cohorts are those up to 45 years – where informant recall is best – as the statistical contribution to a life table of people in older cohorts is much less marked than those in younger cohorts.

for e^0 can be derived for a population of as few as 500 individuals. The question is whether the e^0 that emerges is believable.

However, in tests across seven demographic surveillance areas the method appears to be robust in that e^0 values are (a) what one might expect based on the health profile of the area and (b) consistent with life expectancy reported by other calculation methods.[8]

For example, the cohort survivorship method gives a life expectancy of 69.9 years for males and 70.8 years for females in Torres Strait whereas the 2015-2017 data for Australia's combined Aboriginal and Torres Strait Islander population, in Remote and Very Remote areas combined, is 65.9 years for males and 69.6 years for females (Australian Bureau of Statistics, 2018). The cohort survivorship method has a built-in time lag of perhaps 15 years, lowering the result because of poorer health conditions in the past, but a counter-bias raising the result because of the number of Torres Strait Islanders living in cities who enjoy better access to health services. Further benchmarking is required to investigate the biases in any surveillance area.

Results

The calculation tables for the rural-dwelling and urban-dwelling populations of Ward 18 are given in Table 5 and Table 6 (Appendix B). The results for life expectancy at birth, e^0 are given in Table 2. Comparing these findings with the historical figures for life expectancy in PNG given in Table 1, it appears that the rural-dwellers of Ward 18 are experiencing health conditions as they were in the country as a whole in 1980 (Plate 2), while the urban-dwellers, who have access to the better housing standards, much reduced prsesence of insect disease vectors, reticulated water, electricity, and health services of Port Moresby, have a life expectancy essentially the same as was estimated for Papua New Guinea as a whole by UNDP in 2010.

Where resident	**N**	**e^0 (years)**
Rural-dwellers in Ward 18	940 (33%	49.9
Urban-dwellers in Port Moresby and elsewhere	1906 (67%)	61.1
Total	**2846**	

Table 2. Life expectancy of resident and non-resident subpopulations of Ward 18 of the Koiari Rural LLG, Central Province, Papua New Guinea.

It may well be surprising that the figure of 61.1 years for the urban-dwellers matches UNDP's figure of 61.1 years for Papua New Guinea in 2010, considering the small

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8 The seven demographic surveillance areas are the Kokoda Track Wards 15-19 of the Koiari Rural LLG (this paper); Lihir Group of islands (data collected 1992-2016); Special Mining Lease area of Porgera (data collected 1990 & 2006-2007); the former Yaganon Census Division of Rai Coast District (data collected 1998-1999); the seven Biangai villages of Wau Rural LLG (data collected 1995-2000 and 2010-2012); the villages of Nauti, Akikanda, Yokau and Minava of Watut Rural LLG (data collected 1995-200 and 2010-2012); and Torres Strait Islanders resident in Torres Strait (data collected 2001-2004, 2016-2018). See Burton (2007) for commentary.

size of the population under consideration. However, whether or not the match is fortuitous and there is some systematic bias in the method of data collection that further investigation will reveal, the fact remains that the method has yielded a life expectancy 'gap' of 11.2 years between rural-dwellers and urban-dwellers.

These people are typically members of the same extended family, where adult siblings either live and raise their nuclear families in the village, and live a subsistence lifestyle, on the one hand, or have gone to find work, enrol their post-primary age children in High Schools and live in town as unexceptional working-class Papua New Guineans, on the other hand. There is no class difference between the two groups, and all but a few adhere to the same religious denomination, Seventh Day Adventism.

This is a major finding because the gap is not subject to any systematic bias due to the method of calculation.

Plate 2. Living conditions at Loni hamlet, part of Manari village at 1110m altitude, Ward 18 of the Koiari Rural LLG area, Central Province, 8 Aug 2014.
Note: No safe water supply, no improved sanitation, no houses connected to power, no insect vector-proof houses, access by foot only.

Nonetheless, several qualifications may be made. The rural- and urban-dwellers do not have the same age profile. The urban-dwellers have a bigger proportion of adults of working age raising children whereas the rural-dwellers are missing part of the adult working age population and the children who accompany them. These cohorts (the ones that live in the city) might be expected to be healthier and this will explain some of the gap – but not all of it.

In terms of data accuracy, details of the rural-dwelling population are likely to be more accurate in respect of informant recall, because fieldwork was undertaken in the villages not in Port Moresby, and again this will explain a small part of the gap – but not much of it.

A caution is that the method is based on the accumulation of person-years lived by members of the population. It means that, very much like the sisterhood method commonly used in PNG for estimating maternal mortality, the result is a historical one and reflects a period some years in the past. The method is therefore suited for those wishing to understand the baseline situation for health in a project area, but it is not suited for measuring the effect of a short-term development intervention.

As observations suggesting that baseline health has not improved in recent years, we constantly encountered instances of children and adults under 40 who were alive in 2010 but had died by 2014. Some died in Port Moresby; two examples were a woman of 38 photographed by the field team in 2010 who had fallen sick and died in Port Moresby a year later, and a boy aged 16 at school in Port Moresby, whose body was returned to Naoro 1 for burial the day after we began the field trip in 2014.

Further, there were 19 families in which multiple members of the family had died. For example, three or more died in cases of one or both spouses having died as well as 1-3 children. Where parents had died, it was common for surviving children to be adopted into other families.

We found two deaths in childbirth in the five 5 years to 2014: a mother of five aged 35 at Manari and a mother of five aged 37 at Madilogo. There were 110 women in Ward 18 aged between 18 and 44 years during 2014. It is difficult to convert this into a recognisable health statistic like the maternal mortality ratio, but it is in the range of the often-quoted lifetime risk of dying from a pregnancy-related cause in Papua New Guinea of 1 in 20 (e.g. Mola 2009).

Comparison with ‘the gap’ in Australia

To understand the significance of the figures reported here, the Australian Institute of Health and Welfare reports regularly on Indigenous v Non-Indigenous life expectancy in Australia (Table 3). Recent data show that ‘the gap’ – the life expectancy gap between Indigenous and Non-Indigenous sections of the population that causes so much anxiety for Aboriginal reconciliation and that is the subject of an annual report to parliament – was 9.7 years for females in 2005-2007 and 11.5 years for males.

But between Indigenous Australians (both sexes: ~70.1 years) and the urban-dwelling members of Ward 18, there is a comparable gap of ~9 years and, but between urban-dwellers and rural-dwellers, a *further gap* of 11.2 years.

The Ward 18 urban-dwellers matched the life expectancy of Northern Territory Indigenous men in 2005-2007, considered to be the section of the Australian population that has the least acceptable health outlook.

Year	**e^0 (years)**	**Source**
Australian Non-Indigenous Females	82.6	AIHW (2011, Table 2)
Australian Indigenous Females	72.9	
Australian Non-Indigenous Males	78.7	
Australian Indigenous Males	67.2	
Australian Indigenous (NT males only)	61.5	AIHW (2011, p. 7)
Ward 18 Urban dwellers	61.1	This paper
Ward 18 Rural dwellers	49.9	

Table 3. Life expectancy gaps: Australian Non-Indigenous and Indigenous and Ward 18 non-residents and residents.

In brief, and while it has limitations, the cohort survival life table method backs up direct observation that mortality is unacceptably high in both sexes and in all age groups in the project area.

Discussion – measuring health outcomes

The life expectancy gap of 11.2 years between rural and urban living members of the same families is the most significant finding of this work. It is significant in that it is possible to obtain such a statistic at all, but it is not a finding that can come as a surprise after numerous poor reviews of Papua New Guinea's rural health system. Pryke & Barker (2017) note that the capacity of rural clinics is now significantly impaired – 30 per cent of staff are not paid on time, 43 per cent of clinics need significant maintenance, 60 per cent do not have electricity or refrigeration, and 73 per cent conduct no patrols in the local community. Howes et al. found that primary health in Papua New Guinea was 'in retreat', with in-stock rates for standard drugs lower in 2012 than a decade previously, facilities unmaintained, with steady staff absenteeism, and such that the training of health workers was not keeping pace with demand (Howes et al., 2014, Chapter 9).

Neglecting rural health does not come at no cost. However, it is quite rare for health system *outcomes* – how long do citizens live, what is the success rate of curing major diseases – to be headlined in standard reporting. Rather, most of the focus of the routine monitoring and evaluation of health systems is on the measurement of *inputs* (the health budget; how many facilities are available by province; outreach clinics per 1000 children under 5; the value of donor support, Kevin et al., 2019) and *outputs* (number of outpatient visits to facilities per person per year; number of measles doses delivered; number of bed nets distributed), things which are most easily and reliably reported.

We see input-output evaluation in the National Department of Health's 'Sector Performance Annual Review' reports, which are based on monthly reports from facilities (e.g. NDoH, 2017). International health sector evaluations tend to be constrained to use the same data in reporting on national health services (e.g. World Bank, 2018), and this undoubtedly arises from the limits set by diplomacy.

None of WHO, UNDP, the World Bank, and IHME is able to rely on more recent mortality data for Papua New Guinea than the 2006 Demographic and Health Survey (NSO, 2009), the last survey reporting demographic data for PNG. The next older data available internationally, according to WHO's Mortality Data Base ('Availability of countries-years on mortality data as of 1 Dec 2018') date to the 1977-1980 period (WHO, 2018b).

Outcome measures (1): the Oxford Multidimensional Poverty Index

An outcome measure introduced by UNDP in 2010 is the Oxford Multidimensional Poverty Index (MPI). Previously, I reported on an MPI assessment for Manda village, Middle Fly District, Western Province (Burton, 2018). I will not repeat the explanation here but present the MPI score for a sample of 77 households at Agulogo and Manari villages in Ward 18, where it was feasible to collect data, for the purpose of comparison (Appendix A).

The result for Agulogo-Manari is MPI = 0.39, making the surveyed households *poorer* – which correlates with being more service-deprived – than the people of Manda who I said were 'objectively poor by world standards, whether measured by income or by life's outcomes' (p. 48).

Outcome measures (2): disaggregating the MMR by non-remote and remote rural facilities

For its part, the 2006 DHS has notoriety for the discrepancy between its reporting of a specific outcome measure, the Maternal Mortality Ratio (MMR), at 733 deaths per 100,000 live births (NSO, 2009, Table 7.7) and what the international organisations say about the MMR. In respect of its own accuracy, NSO stated:

> NSO is confident that the overall MMR of 733 deaths per 100,000 live births for PNG calculated from the 2006 DHS data is reasonable and NSO stands by the quality of data it collected in the 2006 DHS (NSO, 2009, p. 111).

IMHE and the UN Maternal Mortality Estimation Inter-Agency Group (MMEIG) also report high figures for the MMR, but WHO/Western Pacific, UNDP and the World Bank consistently report much lower figures (Table 4).

As Table 4 shows, even across WHO's own web sites, data posted in one place is different from that in another. When Mola and Kirby (2013) attempted to make sense of the discrepancies, they separated data for PNG into: (a) statistics from urban areas where 15% of the population lives, and births have a good standard of supervision, (b), rural areas where 55% of the population lives and where births are usually supervised, but often by paramedics only, and (c) remote rural areas without access to health services, where 30% of the population lives (Mola & Kirby, 2013, Table 6). On the basis that 'the risk of maternal death in areas where there is no access to health services is not likely to have decreased since the 1980s' (2009, pp. 199-200), their best estimate was that the MMR for PNG in 2009 was 545/100,000 – much higher than the WHO – Western Pacific Region, World Bank and UNDP estimates.

Organisation	**What**	**1990-1996**	**2005-2006**	**2009-2010**	**2015-2017**
PNG NSO	Demographic and Health Survey (NSO, 2009)	372	733	—	—
UPNG	Mola & Kirby (2013)	—	—	545	—
IMHE	SDGs Visualisation Hub[9]	672	609	595	496
WHO	WHO, UNICEF, UNFPA, World Bank Group, and UN Maternal Mortality Estimation Inter-Agency Group[10]	470	550	490	460
WHO	Western Pacific Health Intelligence Platform (HIIP)[11]				215
World Bank	World Development Reports		470		220
UNDP	Human Development Reports			470	215

Table 4. Maternal Mortality Ratio as reported by NSO (2009), Mola & Kirby (2013), and four international agencies reporting health metrics.

Mola and Kirby have a specific objection to the use by MMEIG of covariates to estimate the MMR in the absence of recent data from countries like PNG. The offending covariates (Alkema et al. 2016, pp. 5-6) are:

- Gross Domestic Product per capita (GDP)
- General Fertility Rate (GFR)
- The proportion of births delivered by skilled health personnel (SAB)

They point to the inclusion of GDP as the chief culprit for the low estimates of the international groups because per capita GDP rose in the last decade of the MDGs after a spike in the gold price and the construction of a large LNG project in the highlands. This did not flow through to increased health spending in the neglected areas and rendering invalid the idea that there is a positive correlation between a rise in GDP and an improvement in the MMR (Mola & Kirby, 2013, p. 199).

[9] http://vizhub.healthdata.org

[10] https://www.who.int/gho/maternal_health/countries/png.pdf/

[11] https://hiip.wpro.who.int/portal/countryprofiles/PapuaNewGuinea.aspx

Application of Mola and Kirby's logic to life expectancy

Mola and Kirby's logic is applicable to life expectancy estimates published by the international agencies (Table 1). These are just as likely as the MMR to have a systematic trend of annual improvement shadowing the rise of PNG's GDP. It is also plausible that, following Mola and Kirby, there is a split between urban and non-remote rural areas with accessible health facilities, on the one hand, and remote rural areas without access to health services, on the other hand. In the latter case, as Mola and Kirby say, there is unlikely to have been improvement in the health indicators that contribute to life expectancy – and there may have been deterioration with the introduction of new diseases such as HIV and the resurgence of TB – since the 1980s. The finding presented in this paper of life expectancy at birth, e^0, of 49.9 years for rural-dwelling Papua New Guineans two days walk from urban facilities therefore plausibly matches $e^0 = 49.6$ years reported by Bakker (1986, p. 221) for PNG as a whole in the 1980 census.

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Appendix A

Oxford Multidimensional Poverty Index

By way of comparison with the Oxford Multidimensional Poverty Index (MPI) score for Manda, in Western Province, that I reported previously (Burton, 2018; UNDP, 2010), the MPI score for the 77 households in the neighbouring villages of Agulogo and Manari in Ward 18 is plotted against the same reference communities as for Manda (cf. Burton, 2018, Figure 5). The MPI score for Agulogo-Manari was 0.39 (Manda = 0.34), with 80% of people in the 77 households considered poor. Agulogo-Manari fall into the 'service deprived group' of villages in Wampar Rural LLG with poor indicators (Figure 1, see also Burton, 2018, Figure 5).

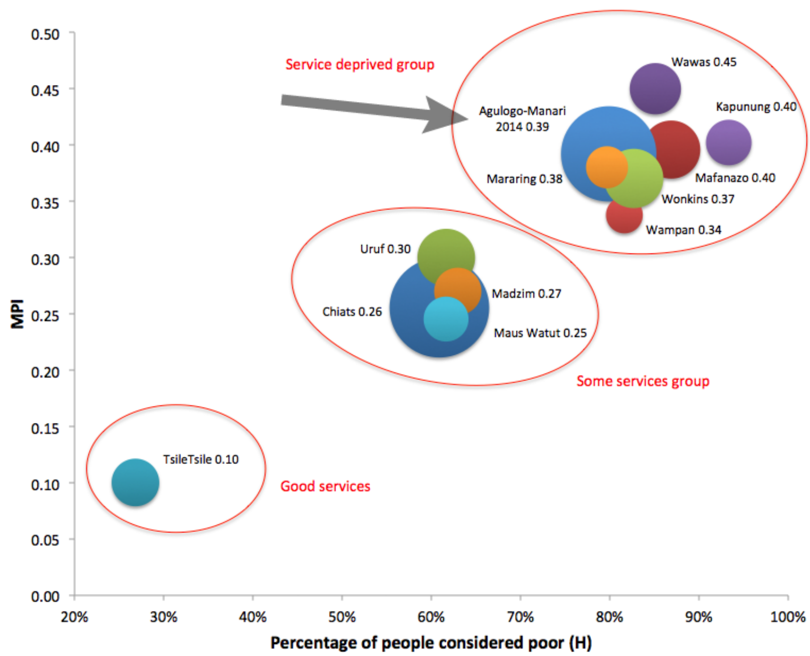

Figure 1. **Multidimensional Poverty Index results for Agulogo-Manari plotted with 11 villages in Wampar Rural LLG, Morobe Province (cf. Burton, 2014, Figure 2).**

The Agulogo-Manari MPI score of 0.39 places the combined villages in the 'Struggling to Achieve Development' category (Burton, 2018, p. 95), and *poorer* than the people of Manda who I said were 'objectively poor by world standards, whether measured by income or by life's outcomes' (Burton, 2018, p. 96).

Appendix B – Life Tables

Table 5. Ward 18 – Resident families (Naoro 1 & 2, Manari, Agulogo and Madilogo combined)

Living = 565. Dead = 375. Total = 940. Life expectancy at birth, e^0 = 49.9 years.

x	n	nax	Mx	qx	lx	dx	Lx	Tx	ex
0	1	0.0500	0.0750	0.0700	1000	70	934	49879	**49.88**
1	4	1.5240	0.0145	0.0559	930	52	3591	48945	52.63
5	5	2.5000	0.0094	0.0457	878	40	4290	45354	51.66
10	5	2.5000	0.0044	0.0215	838	18	4144	41065	49.01
15	5	2.5000	0.0015	0.0077	820	6	4083	36920	45.04
20	5	2.5000	0.0045	0.0221	814	18	4023	32837	40.36
25	5	2.5000	0.0069	0.0338	796	27	3911	28814	36.22
30	5	2.5000	0.0090	0.0439	769	34	3759	24904	32.40
35	5	2.5000	0.0116	0.0565	735	42	3571	21145	28.77
40	5	2.5000	0.0158	0.0758	693	53	3336	17574	25.34
45	5	2.5000	0.0216	0.1024	641	66	3040	14238	22.22
50	5	2.5000	0.0283	0.1322	575	76	2686	11198	19.47
55	5	2.5000	0.0348	0.1599	499	80	2296	8512	17.05
60	5	2.5000	0.0404	0.1835	419	77	1905	6215	14.82
65	5	2.5000	0.0466	0.2086	342	71	1534	4311	12.59
70	5	2.5000	0.0569	0.2491	271	68	1186	2777	10.25
75	5	2.5000	0.0785	0.3281	203	67	851	1591	7.82
80	5	2.5000	0.1324	0.4973	137	68	514	740	5.42
85+	n/a	3.3000	0.3030	1.0000	69	69	227	227	3.30

Table 6. Ward 18 – Non-resident families (Naoro 1 & 2, Manari, Agulogo and Madilogo combined)

Living = 1479. Dead = 427. Total = 1906. Life expectancy at birth, e^0 = 61.1 years.

x	n	nax	Mx	qx	lx	dx	Lx	Tx	ex
0	1	0.0500	0.0525	0.0500	1000	50	953	61070	**61.07**
1	4	1.5240	0.0094	0.0369	950	35	3713	60117	63.28
5	5	2.5000	0.0022	0.0110	915	10	4550	56404	61.65
10	5	2.5000	0.0006	0.0029	905	3	4518	51854	57.31
15	5	2.5000	0.0001	0.0005	902	0	4510	47337	52.46
20	5	2.5000	0.0003	0.0015	902	1	4505	42827	47.49
25	5	2.5000	0.0011	0.0055	900	5	4490	38321	42.56
30	5	2.5000	0.0027	0.0132	895	12	4448	33832	37.78
35	5	2.5000	0.0048	0.0236	884	21	4366	29384	33.25
40	5	2.5000	0.0074	0.0363	863	31	4236	25018	29.00
45	5	2.5000	0.0108	0.0526	831	44	4048	20782	25.00
50	5	2.5000	0.0156	0.0752	788	59	3791	16734	21.24
55	5	2.5000	0.0226	0.1071	729	78	3448	12944	17.77
60	5	2.5000	0.0325	0.1504	650	98	3008	9496	14.60
65	5	2.5000	0.0461	0.2069	553	114	2478	6488	11.74
70	5	2.5000	0.0657	0.2822	438	124	1882	4011	9.15
75	5	2.5000	0.0993	0.3976	315	125	1260	2128	6.76
80	5	2.5000	0.1888	0.6414	190	122	644	868	4.58
85+	n/a	3.3000	0.3030	1.0000	68	68	224	224	3.30