



Estimated impact of drought and frost on food supply in rural PNG in 2015

R.M. Bourke, Bryant Allen and Michael Lowe

SUMMARY

Since April 2015, much of rural Papua New Guinea (PNG) has been severely impacted by a severe drought and, at a number of very high altitude locations above 2200 m altitude, by repeated frosts. The El Niño drought has had a major impact on water supply in many parts of PNG, with negative impacts on school operations, women's labour and villagers' health. In many locations, subsistence food supply has been affected.

This brief uses a wide variety of reports to assess the impact of the drought on food supply for rural villagers for the whole of PNG at the Local Level Government Area (LLGA) level. We have assembled over 200 reports, of which about 75% contained useable information on food supply. These have been generated from August to December 2015. Reports included a number of formal assessments done by the National Disaster Centre, some churches, NGOs and provincial authorities; detailed local assessments; semi-formal and casual communications; and press and social media reports. The methods used in the assessments differed to some degree. We assembled the reports in a database and allocated a five-point scale for food supply for each location.

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In 27 of the 271 rural LLGAs, food supply from all sources (subsistence, purchased or donated) is very scarce or extremely scarce. Food was also reported to be scarce in a number of small and often remote islands in Milne Bay Province in parts of a further seven LLG areas. We estimate that a maximum of 770,000 people live in locations where food is very scarce or extremely scarce. This figure is an upper limit and the number of people who are very short of food is likely to be considerably less, as not everyone in an LLGA is similarly impacted.

People suffering the greatest food deficit are located in five ecological zones, as follows:

1. Very high altitude (2200-2800 m) in parts of Enga, Southern Highlands, Hela and Western Highlands provinces (53% of people in the two worst categories for food deficit).
2. Central Highlands or the fringe of the Central Highlands (35%).
3. Inland lowland locations in parts of Western Province (9%).
4. Small and often remote islands in Milne Bay Province (3%).

There is an urgent need for action to alleviate food shortages in those locations where food is extremely scarce, particularly where there are clear indications of an increase in the crude death rate.

There is also a need to obtain further information from all locations assessed as Category 4 or 5, as well as from a further 16 LLGAs in nine sub-regions where there are indications that the food supply situation is inadequate, but current information is insufficient to form a judgment.

INTRODUCTION

Since April 2015, much of rural Papua New Guinea (PNG) has been severely impacted by a major drought and, at a number of very high altitude locations (above 2200 m altitude), by repeated frosts. Temperatures as low as minus 2°C were recorded between 5 and 7 am at Tambul High Altitude Agricultural Research Station between mid-July and mid-August (Kud Sitango, NARI Tambul, pers. comm, August, 2015). These frosts destroyed the staple food, sweet potato, as well as many other food crops,

including potato. The drought has had a severe negative impact on many rural communities. As always in PNG, the impact is very uneven. At one extreme, villagers are only mildly inconvenienced. At the other extreme, the drought has impacted severely on villagers' lives, making food scarce for very many people, increasing the death rate in some locations, and forcing people to eat unusual foods or particular foods in abnormally large quantities.

The most widespread and generally the first impact of the drought has been on the supply of drinking water. This has resulted in many women and girls having to walk or sometimes drive long distances to obtain drinking water, often from sources that they would not normally use, such as large rivers. There has been an increase in reported incidence of gut and skin diseases.

A widespread failure to maintain tanks, downpipes and gutters at many schools meant that they had no drinking water available for students when small nearby springs and streams dried up. This resulted in the partial or complete closure of many schools.

Villagers who use sago as a staple food or as an emergency food have experienced considerable difficulty in processing it because of the lack of fresh water. Some people have addressed this by digging wells. Villagers in some other locations have dragged sago logs long distances to process them at larger streams and other people have been unable to use sago as a food.

At the time of writing (early January 2016), the impact of the drought continues, despite recent rain in some locations.

METHODS

We assembled reports on the impact of the drought over the period late August to late December 2015. These consisted of:

1. Rapid assessments by teams assembled by the PNG National Disaster Centre (NDC) and done for all four regions of PNG between late August and mid-September. They provide an overview of the situation in each region, with some information on the worst impacted locations. Many of these assessments did not involve field visits to the affected areas, but were based

- on interviews with administration staff at district and province centers.
2. Assessments conducted by CARE PNG in parts of Menyama District (Morobe Province), Wonenara area (Eastern Highlands) and Gumine District (Simbu Province). (Initial assessments in September and formal ones in October). These assessments are based on first hand observations by CARE field staff.
 3. An assessment in late September in mostly United Church communities in parts of Hela, Southern Highlands, Enga and Western Highland provinces conducted by United Church of PNG. These assessments are based on field visits by Mr Matthew Kanua, an experienced agriculturalist, and locally based United Church staff in selected areas.
 4. A general assessment, with some more detailed information, from parts of East Sepik Province, conducted by Save the Children Fund (October).
 5. An assessment of the impact of frost and drought in 19 high altitude communities in the Lower Kaugul Valley, Western Highlands Province, conducted by PNG Red Cross (October).
 6. Detailed assessments for all Milne Bay Province (October). These were based on observations by residents in the local area and field visits by Alotau based provincial staff. Information was collated by Mr Steve Tobessa, Milne Bay Provincial Disaster Co-ordinator.
 7. Detailed information based on field visits and extensive telephone and email consultation by Dr Dan Jorgensen (University of Western Ontario, Canada) in Telefomin District and some adjacent areas in North Fly District of Western Province (September to December).
 8. Detailed information on the Nomad/ Mougulu/Strickland area, provided to Ms Sally Lloyd by local informants, particularly Mr Noah Lamusa (September to December).
 9. Detailed information on many other locations elsewhere in Western Province provided by another eight informants or residents (September to December).

10. Press reports from many provinces on the impact of the drought (Post Courier newspaper and National newspaper).
11. Numerous email communications and some telephone conversations with Dr Mike Bourke from observers in most provinces of PNG.
12. Photographs and comments posted on Facebook.

Over 200 reports in total were assembled. Reports range from many pages in length to a few sentences in an email or a telephone conversation. Over 150 reports (about 75%) contained useable information on the impact of the drought and frosts on food supply. There was information from multiple sources and on different dates for some locations, from one or two sources for others, and none from other locations.

Most reports were printed out and given a unique number. Where possible, the reports were assigned to a Local Level Government Area. The information was entered into a database. The database fields are:

- Local Level Government Area (LLGA) ID number (from the 2000 census);
- Report ID (all the reports have been sequentially numbered);
- Place (the commonly used local place name of the areas being reported on, preceded by a three letter province code, e.g. ENG [Enga] lumbis);
- LLGA Name (the official name of the LLGA concerned from the 2000 Census);
- Date (the date the report was made);
- Source (the source of the report, or the name of the person, or the organisation which made the report);
- Type (the type of report, e.g. newspaper, email, NDC report, NGO report or phone call);
- Score (the food supply score recorded in the report, or estimated from the details contained in the report);
- Adjusted score (some scores are known to be slightly incorrect or have changed over time and so every score was examined and adjusted if necessary).

The five point scale used is given in Table 1. After entering the assessments, the scores were mapped by LLGA. We then extrapolated scores into the LLG areas for locations where there were no reports. This was based on the score of adjacent areas in a similar environment, our knowledge of the impact of the 1997 drought and the local food production systems. Extrapolated scores are distinguished from those with scores from actual reports in the database. For most locations, we are reasonably confident of the extrapolated data. We have flagged the locations where the extrapolated scores require confirmation by field visits or phone calls to the areas concerned. For a number of reports, we have adjusted the score given in the report to better reflect information provided in the report so that it is consistent with scores from other locations.

This appears to be the only national assessment of the food supply situation for all PNG at the LLGA level.

FINDINGS

There are 271 rural Local Level Government areas in PNG (with further 24 urban or non-rural LLGs). We were able to obtain information of food supply for 141 of the LLG areas. We have extrapolated findings to the remaining 130 LLG areas.

In 27 of the 271 LLG areas, food supply from all sources (subsistence, purchased or donated) was very scarce (Rating 4) or extremely scarce (Rating 5) (Table 2; Figure 1). Food was also scarce for a limited number of people living on very small and often remote islands in Milne Bay Province. As those populations represent only a small proportion of the total population in the LLG, we have presented data from these islands separately (Table 3; Figure 1). In Tables 2 and 3, we have presented data for locations with a rating of 4 or 5 at this stage. This is because observations were made over a long period (late August to late December) and we suspect that different observers have used the rating system somewhat differently. In the areas scored 4 or 5, the food supply situation is likely to be dire, and these areas require urgent and immediate field checking.

Table 1. Five point scale used to assess impact of drought in food supply in PNG in 2015

Unusually dry, but no major food supply problems.	1
Some inconvenience. Staple food is short but other foods available.	2
Difficult, with food short and some famine or unusual foods being eaten.	3
No food in gardens, famine food only being eaten.	4
Extreme situation. No food available at all.	5

Note: This scale was modified slightly from one that we developed during assessments of the impact of the 1997 drought in Papua New Guinea. It is similar to the IPC Acute Food Insecurity Reference Table for Area Classification¹. Both scales use a rating of 1 to 5. The scale used here is much simpler to apply than the IPC scale, particularly for those with limited or no training in its use. There is a tendency to give a somewhat higher rating in PNG than if the IPC scale was rigorously applied using Crude Death Rate and Under 5 Child Mortality Rates.

¹ IPC Global Partners. 2012. Integrated Food Security Phase Classification Technical Manual Version 2.0. Evidence and Standards for Better Food Security Decisions. FAO. Rome.

The areas scored 4 and 5 are not randomly scattered throughout PNG. They are located in four ecological zones:

1. Very high altitude places (2200-2800 m altitude) which were repeatedly frosted in July to September, as well as being affected by drought. These LLGAs are in Enga, Southern Highlands, Hela and Western Highlands provinces.
2. Central highlands or on the edge of the central highlands ('highlands fringe'). These are located in Telefomin District of Sandaun Province; Tari-Pori and Koroba-Kopiago Districts in Hela Province; Mul-Baiyer District in Western Highlands Province; Kundiawa-Gembogl, Chuave, Gumine, Karimui-Nomane Districts in Simbu Province; Obura-Wonenara District in Eastern Highlands; and Kerema District in Gulf Province.

3. Inland lowland Western Province; many locations in South Fly and Middle Fly Districts.
4. Small and often remote islands in Milne Bay Province.

The number of villagers living in LLGAs where severe food shortages are reported is about 770,000, based on the estimated 2015 population extrapolated from the 2000 census (Tables 2 and 3)². Just over half (53%) of them live in the very high altitude zone, a third (35%) are in the highlands fringe, almost one tenth (9%) in the interior lowlands of Western Province, and the balance on very small islands in Milne Bay Province (3%). Most of the worst affected areas are remote and are difficult or impossible to reach by vehicle. As well, villagers in most of these locations have limited access to markets where they can sell produce and purchase rice and other foods.

The figure of 770,000 is an upper limit and the number of people who are very short of food is likely to be considerably less. This is because firstly we have included all reports where the food supply situation has been classed as Category 4 or 5 and, in some locations at least, there is likely to be an element of exaggeration. More importantly, these figures include all villagers living in a LLG area, but in many locations, only a proportion of people in the LLG are in the worst categories. This is particularly the situation for the very high altitude zone where people in a LLG live and farm over a range of altitudes, for example from 1800 to 2500 m. However, repeated frosts have destroyed crops at the highest altitudes only, that is, above about 2200 m.

Useful rain has fallen in many parts of PNG in November and December 2015 and early January 2016. This has eased the water supply situation in most but not all locations. Despite this rain, subsistence food supplies are likely to be scarce for periods ranging from several months to one year. This is because:

1. Little rain has fallen in some locations, especially in the south of Papua New Guinea.
2. Where frost destroyed all sweet potato crops at very high altitude locations, it will take up to a year before new plantings will

bear a regular supply of tubers, particularly where villagers have migrated to lower altitude urban or rural locations.

3. Plantings made after adequate rain falls require time to mature. In the lowlands, sweet potato requires 3-5 months. The period for sweet potato crops to mature is typically 5-6 months at 1600-1800 m altitude and 8-12 months at over 2200 m.
4. Where access to water to process sago has limited access to this food, rainfall sufficient for small streams to flow again will ease the situation relatively quickly.

CONCLUSIONS

This assessment has defined the high priority locations for delivery of food aid. It demonstrates that contact with many observers who are resident in or who are in contact with rural villagers by mobile phone can provide a significant amount of information on food supply, without the need for extensive field investigations from Port Moresby or overseas-based observers. However, this approach requires an extensive knowledge of the physical, economic and social environments of rural PNG, the food production systems and the 1997 El Niño induced drought and frosts.

An urgent requirement is to obtain further information from the locations assessed with a rating of 4 or 5 (Tables 2 and 3). Further information is also needed from other locations where current information is inadequate and there are indications that the food supply situation may be dire. The other locations where further information is required are indicated by the letter 'i' in a circle on Figure 1. Our approach to be more rather than less inclusive means that, as more detailed assessments are done in high priority locations, the estimated number of those severely impacted by the drought and frost is likely to be much less.

The locations where updating is needed for the information in this report are all 27 LLG areas with a current rating of 4 or 5 for food supply (Table 2; Figure 1), as well as the small islands in Milne Bay Province (Table 3; Figure 1). In addition, further information is needed from 16 LLGAs in 9 sub-regions where information is currently inadequate.

² Numbers are somewhat lower (720,000) if figures from the less reliable 2011 census (Table 2) are used.

These sub-regions are:

1. Mountainous areas in inland Central Province (Goilala District).
2. Musa Valley in Oro Province.
3. All locations on the north side of the Huon Peninsula in Morobe and Madang provinces, including the Kabwum, Teptep and Rai Coast areas.
4. Menyamya District in Morobe Province.
5. Garaina area in Morobe Province.
6. Bundi and Simbai areas in the mountains of Madang Province.
7. Long Island in Madang Province.
8. The islands off the north coast of East Sepik Province.
9. Coastal, inland and nearby mountainous places in the Cape Vogel to Dogura area of Milne Bay Province.

It is important to set priorities on the delivery of food aid. This is because of the very high cost of buying food and especially of delivering food and other aid to the remote communities who are suffering the most. A basic food aid ration is 400 grams of rice and 60 grams of tinned fish per person per day³. The weight of such a ration is 4.6 tonnes per 10,000 people per day. It would require 3.5 loads in a Twin Otter aircraft to transport this volume per day for these 10,000 people.

The cost of purchasing sufficient rice and tinned fish to feed this basic diet to 10,000 people for a 120 day period is K2.1 million, based on wholesale prices in main ports. However, the cost of transporting food to the remote locations increases these figures considerably, often more than doubling the cost. The current cost of transporting food in a chartered Twin Otter aircraft is K15,000 to K25,000 per tonne, depending on the distance of the trip.

If, for example, it were determined that the highest priorities for food aid in January 2016 were in the following Rural LLG areas: Nomad and Morehead in Western Province; Kotidanga and Kaintiba in Gulf Province; and Kandep and Wage in Enga Province, the estimated population in these areas is 116,000 (Table 2). Hence the costs of purchasing a basic ration of rice and tinned fish to feed this population for a 120 day period would be about K24 million. The cost of

transporting the food to these remote locations would increase this very considerably given the dependence on air transport in many places.

ACKNOWLEDGEMENTS

Very many concerned people have provided information on the impact of the drought, including those who conducted formal assessments and many who provided informal comments on the situation in their local areas. We thank all of them. Our wish is that their efforts will be rewarded when food and other aid is provided to villagers who continue to suffer from the current El Niño induced condition.

ABOUT THE AUTHORS

R.M. (Mike) Bourke and Bryant Allen are Honorary Associate Professors in the College of Asia and the Pacific at The Australian National University, Canberra, Australia. Michael Lowe is an independent consultant. Dr Bourke and Dr Allen were team leaders, and Dr Lowe the GIS manager, of the two national assessments of the availability of food and water during the 1997 drought. Bourke and Allen were also the team leaders of the AusAID-funded Mapping Agricultural Systems of PNG project, which identified and described food production systems for all of PNG.

Author email addresses:
mike.bourke@anu.edu.au
bryant.allen@anu.edu.au
michaelhamishlowe@gmail.com

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³ This is less than the full ration recommended by UNICEF in PNG in 2015 and provides about 80% of the food energy intake for an active adult rural Papua New Guinean.

Table 2. Locations where food supply was extremely limited at time of assessment (score of 4 or 5) and estimated number of people affected

LLGA	Location	Province (District)	Rating	Pop (estim.)	Pop 2011
Very high altitude					
Kandep Rural	Kandep Basin	ENGA (Kandep)	5	33,099	42,074
Wage Rural	Panguaga, Wage, Bioko, Iumbis, Karekare	ENGA (Kandep)	5	38,001	30,775
Lagaip Rural	Lagaip	ENGA (Lagaip-Porgera)	5	61,793	47,602
Porgera Rural	Pilikambi	ENGA (Lagaip-Porgera)	5	34,214	55,419
Ialibu Basin Rural	Ialibu	SHP (Ialibu-Pangia)	5	23,165	18,427
Imbonggu Rural	Imbonggu	SHP (Imbonggu)	5	38,481	20,251
Magarima Rural	Magarima, Yangari	HELA (Komo-Magarima)	5	49,833	38,042
Mt Giluwe Rural	Tambul Basin	WHP (Tambul-Nebilyer)	5	47,426	36,524
Nebilyer Rural	Upper Nebilyer	WHP (Tambul-Nebilyer)	5	43,809	33,031
Upper Mendi Rural	North of Mendi	SHP (Mendi)	4	40,570	34,204
				410,389	356,349
Highland and highland fringe					
Telefomin Rural	Telefomin	SAN (Telefomin)	5	13,463	9,996
Yapsie Rural	Yapsie	SAN (Telefomin)	5	9,977	6,947
Mitnande Rural	Gembogl	SIM (Kundiawa-Gembogl)	5	22,683	25,742
Gumine Rural	Gumine	SIM (Gumine)	5	22,529	25,461
Oksapmin Rural	Oksapmin	SAN (Telefomin)	4	18,432	13,260
Hulia Rural	Dauli, Tigibi	HELA (Tari-Pori)	4	22,688	42,172
Lake Kopiago Rural	Strickland, Kopiago	HELA (Koroba-Kopiago)	4	21,800	35,382
Baiyer Rural	Baiyer River	WHP (Mul-Baiyer)	4	30,479	34,266
Elimbari Rural	Elimbari area	SIM (Chuave)	4	19,242	12,896
Salt Rural	Salt, South	SIM (Karimui-Nomane)	4	19,145	23,635
Nomane Rural	Nomane, South	SIM (Karimui-Nomane)	4	10,061	7,872
Yelia Rural	Wonenara, Marawaka	EHP (Obura-Wonenara)	4	23,235	22,581
Kaintiba Rural	Inland Gulf	GUL (Kerema)	4	13,757	12,960
Kotidanga Rural	Inland Gulf	GUL (Kerema)	4	24,978	19,867
				272,465	293,037
Inland lowland Western Province					
Nomad Rural	Mougulu, Nomad	WP (Middle Fly)	5	15,843	4,962
Morehead Rural	Morehead	WP (South Fly)	5	17,256	14,444
Gogodala Rural	Balimo area	WP (Middle Fly)	4	36,275	32,249
				69,374	51,655
Total population, all mainland LLGs, Category 4 or 5				752,227	701,041

Notes (Table 2)

1. Pop (estim.) is the estimated population in the LLGA in 2015. The figure is derived by multiplying the 2000 national census figure by 1.5 to take account of population increases in the 15 years since the 2000 census. (Population growth rate of 2.7% per year for 15 years results in almost 50% more people).

2. Pop 2011 is the LLGA population from the 2011 National Census tables. Some of the 2011 figures present significant and unexplained increases or decreases in population between 2000 and 2011. Our judgement is that the 2011 census data is less reliable than the 2000 census figures.

Table 3. Small islands in Milne Bay Province where food supply was extremely limited at the time of assessment (Category 4 and 5) and number of people affected

LLGA	Island name (Ward)	District	Rating	Population 2015
Louisiade Rural	E/W Panaeati, Panapompom, Brooker, N/S Motorina, Bagaman, Panaumala, Kimuta	Samarai-Murua	5	5,409
Murua Rural	Iwa, Gawa, Kwaiwata, Ianaba, Egom, Alcester, Budibudi	Samarai-Murua	5	5,131
Suau Rural	Babaibaisiga, Suau Is, Bonabona, Bonarua	Alotau	4	1,076
Bwanabwana Rural	Ware, Dawson, Anagusa, Kwaraiwa, Tubetube	Samarai-Murua	4	3,043
Dobu Rural	Gumawana, Kenaia, Buduwagula, Sanarua	Esa'ala	4	3,164
Kiriwina Rural	Simsimla	Kiriwina-Goodenough	4	370
Yeleyamba Rural	Nimoo Island	Samarai-Murua	5	512
Total				18,705

Notes (Table 3)

1. Data was provided by Milne Bay Provincial Disaster Co-ordinator (Mr Steven Tobessa).
2. Assessments were conducted in mid-October 2015.
3. Population census was generated by Milne Bay provincial authorities in late 2015.

