# Feed the world

**Professor Stephen Haslett is fighting world hunger using statistics.** He talks to Malcolm Wood.

We live in a divided world. In places like New Zealand most of us are adequately fed or more-than, with one in four of us reckoned to be obese. Elsewhere, perhaps a billion people worldwide live with hunger as a constant. Countless children go to bed hungry night after night, with long-term consequences. Poor nutrition stunts their growth, blights their future health and education, and has long-term effects on the futures of the communities in which they live.

At Massey, Professor Steve Haslett and Associate Professor Geoff Jones are fighting world hunger, not with improved breeds of plants or better agriculture, but with a tool just as potent: statistics. They specialise in a technique called small area estimation. Working for the United Nations World Food Programme (WFP), the two have visited a roster of the world's poorest countries, including Bangladesh, Bhutan, Timor-Leste, the Philippines, Nepal, Cambodia and Pakistan, with their research used to determine the optimal locations for the distribution of food aid. Since 2006, in Bangladesh and Nepal alone the value of that aid has been put at US$1 billion.

Steve Haslett did not set out to become a statistician. Indeed, as he describes it, from the late 1960s onwards he was one of a now-rare species, the eternal student, following his interests, but – unlike many others of his kind – never failing a paper. He gained first a Bachelor of Science in biochemistry at Otago, then various Certificates of Proficiency, and finally a Bachelor of Arts in mathematics again at Otago. He had plans to continue on to study nutrition.

But, as the prospects for nutritionists didn't look good, instead he found himself a job

designing sample surveys for the Department of Statistics in Wellington. It was the papers he had done in pure mathematics that did it. "It was back in the days when they couldn't get stats graduates who knew anything about sample surveys, so they looked around for pure mathematicians and trained them on the job," he explains.

For three years he worked at what is now Statistics New Zealand, while simultaneously studying statistics working towards a BA Hons in mathematics. This time he graduated with first class honours and Victoria University did the right thing: it offered its new graduate a job as a junior lecturer.

As part of that role Haslett was expected to provide consultancy on statistical matters; his services proved popular. "I stopped counting when the number of projects I had been involved in topped 1000, not all of them in the university, and that consulting experience led to other things."

Everyone, it seems, needs a good statistician. The feeding patterns of wallabies, how to produce and harvest brine shrimp in the salt ponds of Lake Grassmere, the psychology of adolescent development, the valuation of leases... Haslett's CV affirms the universal usefulness of statistics.

Even historians need them. Working alongside historian Miles Fairburn, and drawing on New Zealand's remarkably comprehensive court and police statistics, Haslett tracked a long-term decline in recorded violence and drunkenness per capita between the 1860s and World War I. Talk to him about New Zealand's current alcohol consumption and he can provide the facts to put matters into context.

"In Westland in the 1860s they were consuming nine gallons of spirits per person per year – and that doesn't count any alcohol on which they were not paying excise duty."

His statistical expertise has made a polymath of him. "I get the benefit of one-to-one instruction from experts. I get to learn things I never would have otherwise."

The WFP connection began in 2003. This time Haslett was in Washington DC on a National Science Foundation Senior Fellowship, studying employment by applying small area estimation to Bureau of Labor statistics. WFP was looking for a statistician to help it apply small area estimation to the distribution of food aid, and a colleague at the bureau put his name forward.

Two major United Nations organisations exist to address world hunger directly: the Food and Agriculture Organization (FAO) and WFP. Of the two, FAO is more focused on improving agriculture, while WFP, which began as part of FAO, distributes food at the front line. In 2012 WFP aimed to provide food assistance to more than 90 million people in 73 countries.

WFP wanted Haslett to help it target food assistance, getting food to precisely the people who needed it. This is where small area estimation comes in.

Consider Nepal, a country where about 40 percent of the population live below the extreme poverty line of US$1.25 per day and food aid is badly needed, but which is also a country of great income disparities; some Nepalese are prosperous.

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How do you distribute food into the hands of those who most need it and not into the hands of those who are already comparatively well fed, with destructive economic consequences?

Perhaps the first thing to do is to consult the national statistics on poverty and child malnutrition, but Nepal lacks the comprehensive fine-level poverty and nutrition information that would be useful in guiding your choices. Many places can only be reached on foot and until quite recent times a Maoist insurgency made travel to some regions hazardous. It is no wonder that data is scarce.

The best sources that exist are the relatively coarse but nation-spanning data sets on poverty

Opposite page: Steve Haslett with monastery children in Wangdue Phodrang, Bhutan.

Below: Geoff Jones at a school feeding at Thinleygang Middle Secondary School in Bhutan.

Geoff Jones, Steve Haslett and Udaya Sharma of WFP near Wangdue Phodrang, Bhutan.

provided by the national living standards survey; the data sets on child malnutrition compiled by the demographic and health survey; and the fine-grained data set from the national census, which collects information from everyone but not on expenditure or children's heights and weights.

So how do you fill in the gaps in the information? The trick, as Haslett explains it, is to find a model that is predictive of a useful measure


The difficulties presented by Nepal's terrain are evident in satellite imagery.

– for example, of stunting or underweight in children or of poverty – on the basis of variables that are shared in common by the national living standards survey or the health survey, and the national census.

"So now, on the basis of the census data, you can make a prediction for every household, person or child. Of course the prediction won't be very accurate at these levels, but as you aggregate up more and more the accuracy improves."

Just how accurate are the predictions? This is where more subtle statistical methods are applied, says Haslett. "We have good estimates of accuracy based on repeating this prediction exercise many times. We can estimate the variation within children in a household, among households in a ward, and among wards within a small area. Generally we can come up with estimates of poverty at local levels that are accurate to within plus or minus 5 percent."

The benefit? In Nepal, small area estimation has meant that aid can be targeted down to the level of ilakas (subdistricts), of which Nepal has around 1000. Haslett puts the savings made by being able to target aid by small area at anywhere between 30 and 60 percent.

Haslett's and Jones's work is used to decide where it is best to distribute food aid, and WFP then uses food distribution methods that further direct food towards the individuals most in need, says Haslett. "It runs programmes like Work for Food. It will determine the minimum wage for survival and offer that as the wage for work on useful infrastructure projects, often paying the workers in food. Its aim is to target not just areas but people within areas." School feeding programmes are another staple, especially for micronutrients.

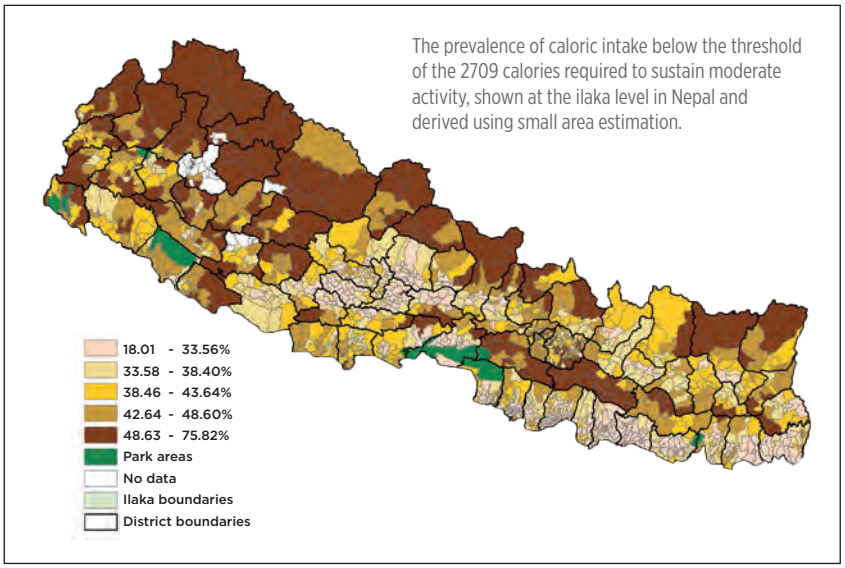
All of the countries in which Haslett and Jones have worked are poor and many are beset by unrest. But Haslett shrugs off any mention of difficulty. WFP is generally good about security, and most of Haslett's and Jones's work is carried out in large cities alongside the civil servants who have compiled the data on which they are drawing. It is a good exchange: local knowledge and interpretation for some training in small area estimation. Many a friendship has resulted.

Years of working together have taught Haslett and Jones each other's strengths. Haslett, who has a natural courtesy and patience, is usually the one who covers more of the meetings with government ministers and the like. "I provide a bit of shelter for Geoff to get on and do more of the technical implementation work. And then we talk about it in the evening: what needs to be done, what the complications are, and how best to solve them."

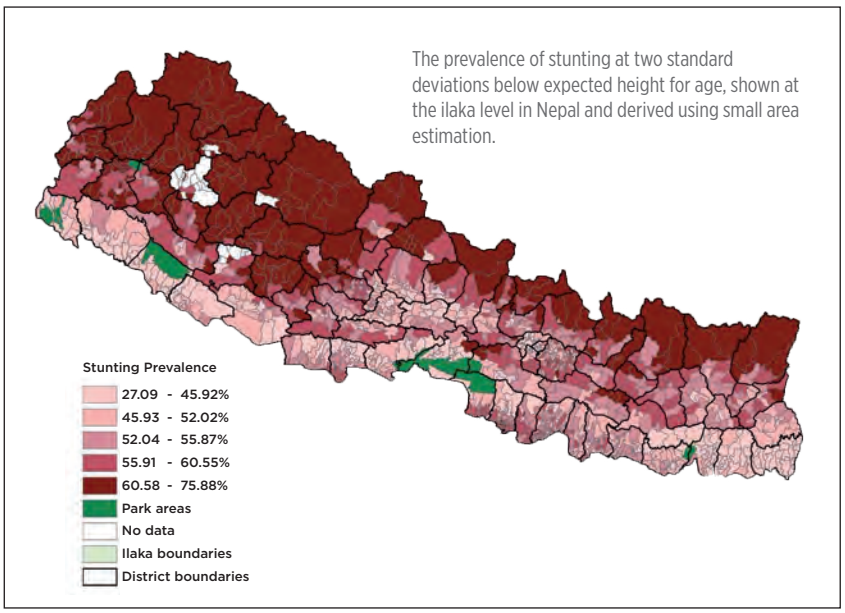
Long hours are the rule, he says, with 13- or 14-hour days. But then Haslett, evidently worried about creating the wrong impression, hedges.

There are times when the pace slackens and often they can walk into the city to relax with a meal and a drink. Or a meal, anyway.

"Geoff doesn't drink, but if I can I have an occasional beer." ■




The prevalence of caloric intake below the threshold of the 2709 calories required to sustain moderate activity, shown at the ilaka level in Nepal and derived using small area estimation.




The prevalence of stunting at two standard deviations below expected height for age, shown at the ilaka level in Nepal and derived using small area estimation.

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