

A food "lifeboat": food and nutrition considerations in the event of a pandemic or other catastrophe

Anna Haug, Jennie C Brand-Miller, Olav A Christophersen, Jennifer McArthur, Flavia Fayet and Stewart Truswell

Large catastrophes have caused the collapse of empires and civilisations.¹ Science and knowledge may help prevent some catastrophes, but urbanisation and narrowly concentrated food supplies, climate change and terrorism contribute to considerable risk. Viruses responsible for severe acute respiratory syndrome (SARS) and avian influenza A (H5N1) or "bird flu" are among the most immediately identifiable risks. The World Health Organization has stated that the risk scenario associated with an outbreak of pandemic H5N1 influenza should be considered more serious than was previously assumed.²

Early self-isolation and social distancing measures are known to be highly effective.³ In the event of a lethal pandemic, emergency measures such as closing schools, staying home with family and friends, and avoiding contact with other people (until all have been immunised) will be instrumental in avoiding infection. People employed in essential services or occupations may be required to reside at their workplace for the whole period of the crisis. To achieve this type of isolation, sufficient food of adequate quality and quantity must be available.

The Australian Government and the Australian Food and Grocery Council (AFGC) have been planning for such a scenario for several years and have advanced plans in place (Russell Neal, AFGC, Canberra, ACT, personal communication). Nonetheless, the logistics and practicalities of household food stockpiling should be given greater media coverage. Australia has one of the most concentrated food supplies of any country, being dominated by two large supermarket chains. These organisations operate with such efficiency that their logistic chains hold only a few weeks' supplies (Russell Neal, AFGC, personal communication). If the supply chain shuts down, or if there is no delivery from central stores, supermarkets' stocks will be depleted within 2–4 weeks (Clare Buchanan, Public Relations Officer, Woolworths Pty Ltd, Sydney, NSW, personal communication). If domestic stockpiling begins at this late stage, then depletion will be accelerated.

Food supplies in the home will need to last as long as it takes for vaccine development and production. For ordinary seasonal influenza vaccines, there is a lag of 6 months or more after a new virus strain has first been discovered until a new vaccine is available for distribution. For weather-related catastrophes, food stockpiles might be required for much longer. A destabilised global climate, where small changes in atmospheric and ocean circulations have major consequences for temperature, rainfall, wind and storm patterns, may precipitate food stockpile dependence for several years.⁴ While long-term food stockpiling could be considered a governmental responsibility, we suggest that home stockpiling of food to last about 3 months might be done by individual households. This would allow a window of time for governments to put emergency action plans and food deliveries in place.

Which foods and in what quantities?

It is logical that the foods to be stockpiled should be staples and well accepted, easy to store, packed where possible in an inert gas for a longer shelf life, and not dependent on refrigeration.

ABSTRACT

- Influenza pandemics are a real risk and are best managed by self-isolation and social distancing to reduce the risk of infection and spread.
- Such isolation depends on availability of food of adequate quantity and quality.
- Australia has one of the most concentrated food supplies of any country, making rapid food depletion more likely in a crisis.
- Food stockpiling by both authorities and citizens is an important safety precaution that should be given greater media coverage.
- Food and nutrition guidelines are provided for survival rations in the event of a pandemic or other catastrophe.

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Importantly, they should be nutrient-dense, providing the recommended macronutrients and micronutrients for all members of the family.⁵ Ideally, they can be eaten without cooking, in case gas and electricity fail. Cost, volume and storage space are further considerations.

A food stockpile should provide an average energy intake of about 9 MJ (2150 kcal) per person per day in order to avoid significant weight loss. This is near the average intake — men need a little more than women, while children need less.⁵ In a home quarantine situation, physical activity is not likely to be high.

Box 1 shows a food "lifeboat" for one person for 10 weeks, and in Box 2, we provide an example of a food list that provides one person with 9 MJ per day for 10 weeks and covers all known nutrient needs. This example was generated using the nutrient

1 The food "lifeboat" for one person for 10 weeks



All the foods listed in Box 2 in the quantities required are displayed. Food courtesy of Woolworths Pty Ltd.

2 Suggested food list of a daily ration for one person (providing 9 MJ per day) and purchase list for 10 weeks

Food	g/day	kg/person for 10 weeks
Milk powder, full-fat, dry*	65	4.6
Weet-Bix, [†] regular (breakfast cereal)	30	2.1
Pasta, regular, dry	20	1.4
Instant noodles	20	1.4
Rice	25	1.8
Dehydrated potato flakes	15	1.1
Tortilla	10	0.7
Biscuit, savoury	15	1.1
Biscuit, wholemeal	20	1.4
Oil, canola	20	1.4
Powdered soup	20	1.4
Sweet chilli sauce	10	0.7
Tomato concentrate	10	0.7
Tuna, canned	60	4.2
SPAM, [‡] regular (luncheon meat)	40	2.8
Lentils, dry	20	1.4
Peas, green, canned	20	1.4
Three beans mix	50	3.5
Baked beans, canned in tomato sauce	20	1.4
Corn, canned	50	3.5
Sun-dried tomatoes	20	1.4
Milo [§] (beverage base)	10	0.7
Seaweed, dried	10	0.7
Raisins	30	2.1
Honey	10	0.7
Almonds	20	1.4
Apricots, dried, raw	20	1.4
Juice, carrot	50	3.5
Juice, orange	50	3.5
Vegemite [¶] (yeast extract)	2	0.1
Chocolate	30	2.1

* In case of lactose intolerance, the intake of dry milk powder may be replaced by soy protein powder. Alternatively, the milk may be fermented. [†] Sanitarium Australia, Sydney, NSW. [‡] Hormel Foods Corporation, Austin, Minn, USA.

[§] Nestlé Australia, Sydney, NSW. [¶] Kraft Foods Limited, Melbourne VIC.

Total daily ration provides 80 g protein and 80 g fat comprising 24 g saturated fat (31% of fat intake and 10% of energy intake), 20 g polyunsaturated fat (22% of fat intake) and 36 g monounsaturated fat (47% of fat intake). The daily cholesterol intake is 101 mg. Energy intake is 16% from protein, 34% from fat and 50% from carbohydrate. Recommended intakes of all essential nutrients are provided for women and men, except for folate (which is not adequate for women of childbearing age, so a folate supplement might be considered).

The cost of this diet for 10 weeks for one person is about \$500. The most expensive items are milk powder, Weet-Bix,[†] SPAM,[‡] and chocolate. ♦

3 A list of simple dry foods that will cover basic energy needs (9 MJ per day) and most nutrients for one person, assuming multivitamin tablets are provided, and a purchase list for 10 weeks

Food	g/day	kg/person for 10 weeks
Wheat flour, wholemeal, plain	150	10.5
Oats, raw	100	7.0
Oil, canola	25	1.8
Milk powder, dry*	65	4.6
Lentils, dry	30	2.1
Peas, split, green/yellow, dry	40	2.8
Noodles, dry	50	3.5
Vegemite [†] (yeast extract)	2	0.1
Fruit, mixed, dried	35	2.5
Almonds, raw	40	2.8
Multivitamin–mineral supplement	One tablet	One box

* In case of lactose intolerance, the intake of dry milk powder may be replaced by soy protein powder. Alternatively, the milk may be fermented.

[†] Kraft Foods Limited, Melbourne VIC.

Total daily ration provides 80 g protein and 76 g fat comprising 15 g saturated fat (20% of fat intake and 6% of energy intake), 20 g polyunsaturated fat (26% of fat intake) and 41 g monounsaturated fat (54% of fat intake). The daily cholesterol intake is 43 mg. Energy intake is 16% from protein, 32% from fat and 52% from carbohydrate.

Vitamins C and A would have to be taken as supplements. Otherwise, recommended intakes of all essential nutrients are provided for women and men, except for folate (which is not adequate for women of childbearing age, so a folate supplement might be considered) and iron (which is provided at a lower level than recommended).

In addition, about 2 litres of water per person per day would be required.

This diet costs about \$250 for one person for 10 weeks. The most expensive items are dry milk powder and noodles. These food items could be packed in airtight packages filled with inert gas of a few kilograms per package, and stored in food stores throughout the country. ♦

Government Department of Health and Ageing.⁵ Together, these two sources make it possible to compose diets with the appropriate quantity of nutrients. As most people have no access to detailed nutrient data, we have developed these examples to show what is needed, and typical of what might be acceptable. We acknowledge that such food lists are culturally and ethnic-specific, and that other food combinations are possible.

It would be cheaper and require less storage space to rely on multivitamin tablets rather than canned fruit and vegetables to cover the requirements of vitamins such as C and A. For this reason, Box 3 shows a food list that covers basic nutrient requirements when taken together with a multivitamin–mineral supplement. Indeed, some micronutrients do not need to be consumed on a daily basis because of the capacity of the body to store them (eg, vitamin A). Our calculations allow for cooking losses. While the foods can be eaten raw, some foods taste better cooked. In the event that the electricity or gas supply fails, a gas cylinder to fuel a barbecue might make eating more enjoyable.

In Australia, most people have adequate money and storage space to build up their own store of foods. For those who do not, federal, state and local governments should consider a plan to construct food stockpiles across the country.³

analysis software, FoodWorks (Professional Edition 2007; Xyris Software, Brisbane, QLD), which is based on the composition of Australian foods, and commonly used by Australian dietitians. The recommended daily intake of specific macronutrients and micronutrients for adults and children is published by the Australian

Further suggestions, recipes and guidelines are given on our website (<http://www.foodlifeboat.com.au>). This is a university-linked, not-for-profit initiative, developed by dietitians and public health nutritionists.

Competing interests

None identified.

Author details

Anna Haug, PhD, Visiting Associate Professor¹
Jennie C Brand-Miller, BSc, PhD, FAIFST, Professor of Human Nutrition¹
Olav A Christoffersen, Medical Student²
Jennifer McArthur, MHPED, APD, Dietitian¹
Flavia Fayet, BSc, MNutrDiet, PhD Candidate¹
Stewart Truswell, MD, FFFPHM, FRACP, Emeritus Professor¹
¹ University of Sydney, Sydney, NSW.
² Ragnhild Schibbyes, Oslo, Norway.
Correspondence: J.Brandmiller@mmbr.usyd.edu.au

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