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## Epidemics following natural disasters

Misconceptions reported in the media may distort the science behind a story – so students should look to primary sources for the real facts. **Dariel Burdass** asks if people are more at risk from the living or the dead?

Following a natural disaster, such as the tsunami on 26 December 2004, which overwhelmed much of Indonesia, and the cyclone, which devastated Myanmar (Burma) on 3 May 2008, reports in the media often overstate the risk of epidemics of highly infectious diseases such as cholera, hepatitis and typhoid. This is mainly due to the fear associated with the presence of numerous dead bodies in an affected area. However, evidence has shown that disease outbreaks following a natural disaster are a rare occurrence and that a dead body decomposing either on the land

or floating in the floods is unlikely to cause an epidemic (1, 2, 3). Survivors with diseases (Table 1) are a far greater hazard to health than the dead (2, 4).

Deaths following natural disasters are usually due to blunt trauma, crush-related injuries or drowning, not communicable diseases. (3, 5, 6). For an infection to be successfully transmitted from person to person, three factors are necessary (6):

- The presence of an infectious agent e.g. in the case of cholera, the bacterium *Vibrio cholerae*
- Exposure to that agent

**Table 1.** Micro-organisms most commonly linked by the media and some health officials with transmission from dead bodies

Mode of transmission	Micro-organism	Disease
Gastrointestinal tract	<i>Salmonella typhi</i>	Typhoid
	<i>Shigella sonnei</i>	Dysentery
	<i>Vibrio cholerae</i>	Cholera
Blood-borne	Hepatitis B and C	Hepatitis
	HIV	AIDS
Air-borne	<i>Mycobacterium tuberculosis</i>	TB
Vector-borne	<i>Plasmodium</i> spp.	Malaria

- A susceptible host (human), e.g. someone with underlying poor nutritional levels, as malnutrition increases the risk of death from communicable diseases.

A person killed in a natural disaster through trauma, etc., is no more likely than any other person from the local population to have a communicable disease. So unless they were carrying an infectious agent when they died, their bodies do not pose a risk to human health. Micro-organisms associated with the decay of the human body (the decomposers) are not usually human pathogens.

### Persistence

When the host dies, pathogens usually have limited viability, as they cannot sustain their growth alone. Consequently, they are unable to survive for long in the surrounding environment and present little infectious risk. The ability of a micro-organism to survive outside the human body is called its persistence. For all pathogens, survival is dependent on a range of factors, including temperature; microbes will persist for longer at lower temperatures. However, because pathogens do not die immediately after their host does, transmission from a dead body to a living person is still possible, but those most likely to be at risk are not the general population but relief workers who can minimize their exposure to potential pathogens by following basic hygiene rules such as hand washing and using protective equipment such as gloves (1, 6).

### Transmission

The factors which influence the transmission of infectious diseases from person to person after a natural disaster are

- the size of the displaced population
- access to clean water
- sewage facilities
- health status of the population
- whether a disease is endemic locally

The peak danger period for transmission is between 10 days and a month after a natural disaster as this is usually when water, hygiene and sewage facilities are at their poorest and levels of overcrowding are particularly high due to population displacement. For example, if a survivor carrying *V. cholerae* is housed in an overcrowded facility with poor or no toilet facilities and the sewage is leaking into the drinking wells, then the microbe could spread rapidly through the population via the faecal-oral route.

### Fact versus fiction

In 2004, there were no serious epidemics and no cases of cholera reported to the WHO or other health surveillance bodies in the 4 months after the tsunami, even though more than 175,000 people died (7). Several factors may have been responsible:

- cholera occurs in Indonesia between March and September and the tsunami hit in December (7)
- the displaced population was housed in small camps compared with the

*'Access to clean water and sanitation remains a major health challenge in Myanmar.'* **WHO, 4 June 2008**



large overcrowded settlements often used to house conflict- or disaster-associated people (7).

- adequate drinking and washing water were supplied to the camps (7).

### The real risk of an epidemic in Myanmar

According to WHO medical epidemiologist, Dr John Watson, Myanmar is at higher than usual risk of a communicable disease because at least a quarter of a million people have been displaced, coupled with serious overcrowding (4). Also the underlying nutritional levels in the country are poor and there is very limited access to health services (4). With respect to gastrointestinal infections such as cholera, approximately 75 % of people in Myanmar have no toilets and defecate outside. As the water levels are so high, this excrement is contaminating water supplies, putting those displaced at greater risk. Appropriate disposal of human faecal matter can reduce diarrhoea by 40 %. It is also the cholera season in Myanmar and cholera is endemic in the Irrawaddy delta. So in this area the dangers of a cholera epidemic are real.

[Click on the numbered references in the above article to link to websites with further information.](#)

◀ Cyclone-affected families living in temporary accommodation near Yangon, Myanmar, on 25 May 2008. *Khin Maung Win / AFP / Getty Images*

## Bioscience Outreach in Schools Colloquium

Tuesday, 28 October 2008 – National Science Learning Centre, York

The Biosciences Federation Education Committee (chaired by Sue Assinder, SGM Education Officer) is organizing this Colloquium in partnership with the National Science Learning Centre. It will aim to bring together school biology teachers with deliverers of outreach (e.g. learned societies, academics and industry) to discuss effective practice and make recommendations on how activities within the biosciences might be co-ordinated. Professor John Holman (National STEM Director) has agreed to give a keynote talk.

In addition to showcasing the outreach opportunities available, the Colloquium will explore strategic questions about outreach provision and result in publication of a formal stakeholder report. The Colloquium will be preceded on the previous afternoon by a professional development event for A level biology teachers. The SGM is providing financial sponsorship to the Colloquium and Janet Hurst and Dariel Burdass are playing a major role in organizing the event. Registration details are available on the Biosciences Federation website ([www.bsfc.ac.uk](http://www.bsfc.ac.uk)).

# Antibiotic resistance challenge – poster competition

Key Stage 3 Science students are invited to enter an exciting poster competition. Their eye-catching poster should aim to encourage friends and family not to go to the GP for antibiotics for coughs and colds as these do not work on such virus infections. It is important that people understand when they should use antibiotics and when it is not appropriate.

In the UK, the Department of Health's Advisory Committee for Antimicrobial Resistance and Healthcare Associated Infection is holding a national conference to mark European Antibiotic Awareness Day which will take place on 18 November at the Science Museum, South Kensington, London. The target audience will be health/science journalists and health professionals. The winning poster will be printed to coincide with the day and displayed at the conference.

Prizes include an *iPod Nano* for the winner and £1,000 worth of science equipment for the school, which will be presented at the conference. The winning school will also be invited to visit a microbiology laboratory. Three runners up will receive £25 entertainment vouchers and £100 worth of science equipment for the school.

Information on how to enter is available at [www.nhs.uk/arc](http://www.nhs.uk/arc) and includes teachers' notes, lesson plans, key facts, the competition rules and entry form. Closing date for entries is 10 October 2008.

## Germ Proof Your Kids: The Complete Guide to Protecting (without Overprotecting) Your Family from Infections

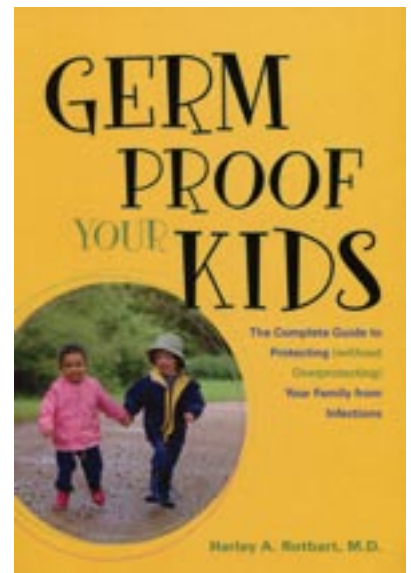
By H.A. Rotbart  
Published by the American Society  
for Microbiology (2008)  
ISBN 978-1-55581-427-4

As the healthy daughter of parents who firmly believe in the hygiene hypothesis and think sawdust and soil are perfect additions to a toddler's diet, I was initially sceptical about this book. In fact, I was looking forward to writing a scathing review. But I should have paid more attention to the *without overprotecting* caveat: this book is excellent and deserves a place on every parent's bookshelf and would be a useful addition to any school library.

The first chapter, 'Worthy Enemies', is an introduction to pathogens and their transmission. Rotbart also provides a glossary of infections that includes the most common childhood ailments plus those that children are unlikely to contract but are parents' greatest fear. The profiles of diseases, such as measles and polio, which are 'so last generation' remind readers of the importance of vaccination and the consequences of complacency.

In 'Weapons in War', the author explains the basics of immunology, the science of vaccination and the treatment of infections. He provides clear explanations, with easy-to-understand analogies, of concepts that can be difficult to grasp. The section on vaccination provides detailed information about specific vaccines and a balanced discussion of parental concerns and recent controversies. The section about the use and misuse of antibiotics is informative.

'Wear Your Boots in the Rain' is a guide to personal, domestic and community hygiene, nutrition and the reality behind 'miscellaneous momisms'. These include: chicken soup (it tastes nice, nothing more), sleep (yes, you need it), stress (too



much depresses the immune system) getting cold and catching one (the jury is still out) and exercise (regular exercise good, extreme exercise bad).

The final chapter 'The Wisdom of Ages' offers guidance in dealing with what is described as the continuous onslaught of newspaper fear factors. His advice is to respond with prudence, not paranoia and the 'good sense to recognize the nonsense'. So, when running late on a Monday morning, I will continue to leave the house with wet hair; but I will be washing (and drying) my hands as frequently as Lady Macbeth and discarding my dish cloths daily. I will ensure my children are up-to-date with their vaccinations and I won't be asking the doctor for antibiotics to treat a cold.

The book is scientifically accurate and up-to-date. As a reference book it is a reliable resource that is easy to navigate. As bedtime reading, its mixture of humour and common sense make it an enjoyable read. Rotbart manages to correct misconceptions and debunk myths while sensitively dealing with contentious issues and parental anxiety. It is an antidote to all the rubbish science that we are too often bombarded with. I would highly recommend it.

Gemma Sims, SGM