

Britain's tsunami: just 400 years ago

We know lots about tsunamis because we have all seen them in action from the comfort of our lazy boy chairs, courtesy of tourists with video cameras and the wonders of TV. But tsunamis happen somewhere far away in countries with white sandy beaches and coconut palms. Sure, there is geomorphic evidence of tsunamis in our neck of the woods (where ever that may be) but there is little or no oral or recorded history of these events, even in Britain where they seem to have recorded everything.

Of course tsunamis come from earthquakes or underwater landslides and Britain does not have earthquakes – although the people of Kent might now disagree, yet the recorded history of tsunamis is there, its just that no one knew to call them that.

At the start of the 17th century James I had succeeded Elizabeth I and the English were busy colonizing North America. We have all watched countless movies and TV epics set in those since romanticized times and have some understanding of the lifestyle of the people.

Around 9am on the '20th January 1606', (30th January 1607 in the modern calendar) a massive wave from the ocean surged up Bristol Channel flooding more than 500 km² of lowland along 570 km of coast and killing at least 2,000 people. It is considered Britain's worst natural disaster on land. On that sunny day four centuries ago, a fully laden 60 tonne ship in Appledore harbour, north Devon, was picked up and dumped in nearby marshland. The waters took one Mistress Van before she could reach the higher rooms of her house. She was caught unawares because she lived more than 6km from the sea.

Contemporary descriptions of the event have many of the characteristics of accounts of recent catastrophic tsunamis. Geomorphic evidence for tsunamis in the channel can be found in the form of transported and imbricated boulders, bedrock sculpturing on coastal platforms and ramps, and, at isolated locations, wholesale erosion of the coastal landscape. Hydrodynamic calculation of the height of the tsunami and flow velocities can be derived from boulder dimensions. Tsunami wave height increased from 4m in the outer Bristol Channel to more than 6 m within the inner Severn Estuary. Theorized flow velocities range between 11.8 and 18.1 m s⁻¹, increasing up the estuary. Under topographic enhancement, these depths and velocities may be sufficient to generate bedrock sculpturing, which is indeed observed at a few locations on rocky headlands in the channel.

That this huge flood happened is undisputed. It is commemorated in church plaques in the coastal counties of Somerset and Monmouthshire. But why it happened is another matter. For the past five years Edward Bryant and Simon Haslett of the University of Wollongong in Australia, have propounded the idea that a storm surge may have been wrongly accused. They think the flood was caused by a large tsunami that began off Ireland. They outline their evidence in the May issue of *Journal of Geology*.

The Bristol Channel is shaped like a funnel. That means it experiences smaller storm waves

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in its inner regions, which are narrow and shallow, than in its wider, deeper parts. Conversely, a tsunami wave rolling up the channel would grow in height as it became increasingly constricted. Dr Bryant and Dr Haslett looked at large boulders that had been transported onto the land by the sea in this region. Had a storm surge moved these boulders, Dr Bryant and Dr Haslett calculate that its waves would have to have been seven times higher than those of the largest storm waves ever recorded in these parts. A tsunami is more plausible.

Next they looked at the arrangement of the boulders. Rather than being dribbled erratically over the land, many form overlapping "trains" like roof tiles, oriented along the direction from which a tsunami would have struck. This pattern is more pronounced as the channel becomes narrower and turns into the Severn estuary.

Finally Dr Bryant and Dr Haslett found four examples of coastal bedrock that has recently been sculpted by high-energy vortices. That is an after-effect associated with historical tsunamis.

What might have caused such a tsunami is unclear. One possibility is a submarine landslide. Another is an earthquake at sea. Such earthquakes are rare in the geologically placid British Isles. But, as the people of Kent have just discovered, they do occasionally happen.

The event is recorded on plaques in a number of churches, including those at Kingston Seymour in Somerset, and in Monmouthshire at Goldcliff, St. Brides, Redwick and Peterstone.

The Kingston Seymour plaque reads: "An inundation of the sea water by overflowing and breaking down the Sea banks; happened in this Parish of Kingstone-Seamore, and many others adjoining; by reason whereof many Persons were drown'd and much Cattle and Goods, were lost: the water in the Church was five feet high and the greatest part lay on the ground about ten days.

A number of historical documents exist that describe the event and its aftermath. An area from Barnstaple in north Devon, up the Bristol Channel and Severn Estuary to Gloucester, then along the South Wales coast around to Cardigan was affected, some 570 km of



coastline. In some parts of the coast the population never recovered from the social and economic disaster.

Some historical accounts indicate that the weather was fine, "for about nine of the morning, the same being most fayrely and brightly spread, many of the inhabitants of these countreys prepared themselves to their affayres"

The wave appeared as "mighty hills of water tumbling over one another in such sort as if the greatest mountains in the world had overwhelmed the lowe villages or marshy grounds. Sometimes it dazzled many of the spectators that they imagined it had bin some fogge or mist coming with great swiftness towards them and with such a smoke as if mountains were all on fire, and to the view of some it seemed as if myriads of thousands of arrows had been shot forth all at one time." This is very similar to descriptions of more recent tsunami, such as the tsunami associated with the eruption of Krakatau in 1883, where accounts refer to the sea as being 'hilly', and the reference to dazzling, fiery mountains, and myriads of arrows, is reminiscent of accounts of tsunami on the Burin Peninsula (Newfoundland) in 1929, where the wave crest was shining like car headlights, and in Papua New Guinea in 1998 where the wave was frothing and sparkling.

The sea appears to have been "driven back" i.e. retreated out to sea, before the wave struck, a classic tsunami herald and the speed of the wave appears to have been faster than a storm flood as the wave is 'affirmed to have runne with a swiftness so incredible, as that no gray-hounde could have escaped by running before them'.

A possible cause of the proposed tsunami is not yet known, but the possibilities include a landslide off the continental shelf between Ireland and Cornwall, or an earthquake along an active fault system in the sea south of Ireland. This fault system has apparently experienced an earthquake greater than magnitude 4 on the Richter scale within the last 20 years, so the chance of a bigger tsunami earthquake is a possibility. It may also have been a combination, in that an earthquake might have triggered a submarine slide. #

The breaking of the sea bank at Burnham-On-Sea led to some 30 villages being utterly inundated, and their cattle destroyed, and men, women and children besides. The accounts state that 28 people were drowned at Huntspill and 26 at Brean, a death toll that was repeated in many other villages.

In Barnstaple, Devon, the wave burst open doors that were locked and bolted and knocked down many walls and houses, one of which was the house of a James Frost in that the roof and walls collapsed and killed both him and two of his children.

In Monmouthshire, "A little childe is affirmed to have been cast upon land in a cradle, in which was nothing but a catte [cat], the which was discerned as it came floating to the shoare, to leape still from one side of the cradle unto the other, even as if she had been appointed steresman to preserve the small barke from the waves furie".

In Monmouthshire, "A certain man and woman having taken a tree for their succour, espying nothing but death before their eyes, at last among other things which were carried along, they perceived a certain tubbe of great bignesse to come nearer and nearer unto them, until it rested upon that tree wherein they were, committed themselves, and were carried safe until they were cast upon the drie shore".

In Monmouthshire, "more than did, had perished for want of food, and extreme cold, had not the Rt. Honble. Lord Herbert sent out boats to relieve the distresse himself going to such houses as he could minister to their provision of meate and other necessaries

Nearly Half of California Hospitals Unprepared to Meet Seismic Safety Deadlines

Thirteen years after the devastating Northridge earthquake, a new analysis shows that almost half of California hospitals will not meet seismic safety standards by a 2013 state deadline, according to a report released by the California HealthCare Foundation.

The report, "Seismic Safety: Will California's Hospitals Be Ready for the Next Big Quake?" by the non-profit RAND Corporation, is a follow-up to a similar 2002 study. The report finds that upgrading hospital facilities to meet the deadlines set by a 1994 state law known as SB 1953 could total as much as \$110 billion. The cost of financing construction upgrades could double the price tag, the RAND report found.

"Our analysis shows that not only will many hospitals have trouble meeting the near-term deadline, but many may have trouble becoming earthquake safe by the final 2030 deadline," said Charles Meade, lead author of the report and a senior physical scientist at RAND. "Unfortunately, hospitals face several obstacles that make it difficult for them to comply."

Firm Deadlines

The California Legislature passed SB 1953 in the wake of the 6.7 magnitude Northridge earthquake, which caused an estimated \$3 billion in damage to Southern California hospitals and resulted in 12 "red tagged" as unsafe for occupancy. The law established specific deadlines to ensure that hospitals would remain operational following a significant earthquake.

The legislature anticipated that hospitals would meet the state's seismic safety goals in two phases. The most vulnerable buildings – those subject to collapse during an earthquake – were required to undertake safety retrofitting or reconstruction by 2008 (later extended to 2013). All other buildings not compliant with the new standards were required to be rebuilt by 2030.

However, according to an analysis of state data, about half of collapse-hazard hospital structures – classified as Structural Performance Category-I (SPC-I) buildings – will not meet the 2008/2013 deadlines. Many of those will likely not meet the 2030 deadline either, according to the RAND report. Indeed, based on the amount of infrastructure to re-built and the current pace of construction, it may take more than 30 years for SB 1953 to be fully implemented, the RAND researchers found.

Slow Pace of Compliance

It is difficult to determine how much progress hospitals have made retrofitting or replacing SPC-I structures, the report finds. The Office of State wide Health Planning and Development (OSHDP) has limited data about the scale and purpose of hospital construction projects. In addition, there is no guarantee that planned projects under OSHPD review will be completed, because in some cases the required funds may be unavailable.

OSHDP also intends to use new seismic risk analysis software, called HAZUS, developed by the Federal Emergency Management Agency and the National Institute of Building Sciences, to re-assess the risk of earthquake damage to individual buildings. This could result in a re-classification of a number of facilities to a lower-risk category.

Bigger, Costlier Facilities

Hospitals are among the most expensive infrastructure projects. In California, the finished cost of a fully furnished

and equipped new hospital building is about \$1,000US per square foot – more than three times that of a new office building.

Recent trends also suggest that hospitals are replacing old structures with new buildings that are 35% to 60% larger, yet designed to handle the same number of patients. In part, this is due to consumer preference for private rooms, as well as larger spaces to accommodate sophisticated diagnostic imaging services, surgery, and postpartum and neonatal care. Since 2001, hospital construction costs in California have almost doubled, driven by a number of factors.



In 1971, a 6.7 earthquake severely damaged the Olive View Psychiatric Hospital in San Fernando, California

Few Options to Recoup Costs

According to OSHPD data, in 2004 the average "cost per adjusted patient day" – an industry term that refers to the cost to provide a day of inpatient acute care with an adjustment to take outpatient care into account – among California hospitals was \$1,980. The report estimates those costs could rise as much as \$950 because of construction costs triggered by the seismic safety standards.

"Hospitals will be required to pay \$1,000 a square foot to replace infrastructure that nets around \$40 per

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square foot per year," said David O'Neill, senior program officer at CHCF. "Many hospitals are operating below or very close to break even. For them, it will be difficult, if not impossible, to finance new construction with revenue from health care operations."

Los Angeles and Bay Area Particularly Vulnerable

The report finds that nearly half (47%) of California hospital floor space in need of retrofitting is in buildings that are considered vulnerable to collapse during a major earthquake, with the vast majority (nearly 80%) in heavily populated greater Los Angeles and the Bay Area.

According to the U.S. Geological Survey, there is an 80% probability of an earthquake with 7.0 or greater magnitude striking the Los Angeles area by 2030. In the San Francisco Bay Area, the likelihood of a similar-magnitude earthquake by 2030 is 62%.

Difficult Policy Choices

The RAND issue brief outlines three potential options for policymakers in fully implementing SB 1953:

Push ahead with implementation of SB 1953. This could lead to substantial problems, as the state would be forced to close large numbers of noncompliant hospitals.

Modify or eliminate SB 1953's requirements so most facilities can comply. This approach raises the question of policy fairness, given that a significant number of California hospitals have already made a large investment to comply with the original law, and the issue of seismic vulnerability would remain mostly unaddressed.

Provide public financing for hospitals unable or unwilling to comply with SB 1953. Hospitals are critical public facilities and there is a history of state funding for seismic strengthening of public infrastructure. However, this approach would also raise fairness questions among hospitals that have already invested in SB 1953 compliance.

"Ultimately, patients, employers, and taxpayers will pay for the cost of new hospital buildings," said CHCF's O'Neill. "And the high cost of earthquake disaster mitigation may force some hospitals to close, reducing vital access to services in some communities." #

Bangladesh losing Bird Flu battle

Bangladesh authorities are struggling to combat deadly bird flu as it spreads across farms in that impoverished country, with a leading expert warning the situation is "very grave." Officially, 12 separate outbreaks have been reported since February 07.

Officials were facing enormous challenges in combating the virus in the nation, where resources are badly stretched, government spokesman Abdul Motalib said. "The situation is not grave yet. But with limited technical men and working 7 days a week, we have been struggling to combat the deadly disease," he said.

However, the technical adviser to the Bangladesh Poultry Association said the situation was worse than the government described. "The situation is very grave and a disaster could happen any time. There have been a lot of unreported bird flu deaths in farms and cover-ups," leading poultry industry expert MM Khan said. "The flu is no longer confined to farms.

Recently it infected domestic birds and fowls and there's a real danger it could infect humans" in densely populated Bangladesh, said Khan. "The farmers are not reporting bird flu deaths to government authorities for fear of losses in their farms and pressure by adjoining farms. There is hardly any monitoring," Khan added.

Government official Motalib said a farm in the northern Nilphamari district was the latest to be infected with the deadly virus on the 11 May. More than 3000 chickens and ducks were culled.

So far, there have been no reports of human infection in Bangladesh, but the country could see a "South East Asia-like" situation if the government does not step up its efforts to fight the disease, said poultry expert Khan. "The whole situation lacks transparency and even though we have had the flu for about 2 months, the government still lacks doctors, technical people, and the protection kits to combat the disease," he said.

Bangladesh is home to hundreds of thousands of poultry farms employing more than a million people. It had already banned imports of live birds from more than 50 countries, including neighbouring India and Myanmar, after outbreaks were detected there.

The country does not have proper facilities to detect the disease and usually sends samples to Bangkok, Thailand. The government has sought United Nations help to set up a lab to tackle the disease. "The Food and Agriculture Organisation (OIE) has agreed to help us," Motalib said.

And in Viet Nam

Meanwhile, in Viet Nam where there have been outbreaks since 2003, there has been a fresh outbreak in the Hung Nguyen district. Viet Nam is working hard to eliminate bird flu. Millions of birds have been culled and there is an active vaccination programme to prevent outbreaks. Some 111 million poultry in 60 cities and provinces have been vaccinated so far this year.

Yet Viet Nam's central Nghe An province now faced a new outbreak a local veterinary official told Xinhua News on May 13th.

On condition of anonymity, an official from the Department of Animal Health under the Ministry of Agriculture and Rural Development said that nearly 1300 out of flocks of 3800 ducks raised by 3 households in Nghe An, were found dead on 9 May 2007. He added that samples from dead poultry tested positive to bird flu virus strain H5.

Earlier, specimens from ducks raised by a household in Dien Chau district, Nghe An, tested positive to H5. Among the flock of 610 ducks, 246 died between the 1st and 4th of May. #

Field Test finds low level of correct respirator fit

N95 respirators are recommended for any circumstance that poses a risk for airborne transmission of infection and part of our planning for a pandemic influenza outbreak is to have front line staff wear N95 respirators when making patient contact. But an incorrectly fitted N95 offers little or no protection. Let's be generous and state that all of our staff will be well trained and able to fit their N95s. What of others helping to make up numbers by taking on non clinical roles? In a paper published in the May edition of *Emerging Infectious Diseases*, Kristin J. Cummings, Jean Cox-Ganser, Margaret A. Riggs, Nicole Edwards, and Kathleen Kreiss report on **Respirator Donning in Post-Hurricane New Orleans**. This is the first known field investigation of N95 respirator donning that has focused on non-occupational use.

They evaluated the correctness of N95 respirator donning by the public in post-hurricane New Orleans, where respirators were recommended for mould remediation. Of 538 observed participants only 24% demonstrated proper donning. Errors included nose clip not tightened (71%) and straps incorrectly placed (52%); 22% put on the respirator upside down. Interventions to improve respirator donning should be considered in planning for influenza epidemics and disasters.

In 2005, after the flooding in New Orleans, caused by Hurricanes Katrina and Rita, public health officials recommended that members of the public use N95 respirators when cleaning or reconditioning mould-contaminated buildings. A survey of 159 New Orleans area residents 7 weeks after Katrina found that 68% of those interviewed were aware of the recommendation and that at least 30% of those participating in remediation activities had used an OSH certified respirator. Despite these levels of awareness and experience, subsequent anecdotal reports suggested that some New Orleans residents were not properly donning N95 respirators. This would promote the entry of unfiltered air through leaks or gaps between the

respirator and the skin, compromising the protection offered. To better understand respirator use by the public, Cummings et al investigated the non-occupational use and donning of N95 respirators in post-hurricane New Orleans.

Questionnaire and Evaluation of Respirator Donning

Over one week in March 2006 survey team members interviewed participants with a 10-minute questionnaire that collected information on experience with residential flooding, water damage, and mould growth; participation in mould clean-up activities; and lifetime and post-Katrina experiences with respiratory protection.

Each interview included an evaluation of respirator donning. Interviewers were trained before the survey on proper donning. The interviewer asked the participant to put on the N95 respirator as he or she would for participating in mould clean-up activities. Written and pictorial manufacturer's instructions were included with the respirator packaging, but no additional instructions were given until the evaluation was complete. The interviewer recorded whether the participant referred to the manufacturer's instructions and, once the participant indicated that the respirator was donned, noted any observed "donning errors" that could contribute to an insufficient fit.

Most of those interviewed described previously using a mask or respirator, but few reported ever having a respirator fit test. Most had participated in mould clean-up activities since Hurricane Katrina.

Five hundred and thirty eight (97%) participants agreed to put on an N95 respirator. Only 2% referred to the manufacturer's directions. Overall, 80% of the participants who donned a respirator were noted to have at least 1 donning error that could contribute to a poor fit. More than half of these did not tighten the nose clip, and half incorrectly placed the 2 straps. In addition, 22% put the respirator on upside down, and 21% used only 1 strap.

Two in three made more than one error.

The protection afforded by a certified respirator depends on its fit, and a fundamental component of achieving a good fit is proper donning. In post-hurricane New Orleans, public concern about adverse health effects of exposure to mould was near universal. Yet the investigation demonstrated that, despite this high level of motivation, most participants did not properly don an N95 respirator.



The findings have implications for the use of N95 respirators by members of the public to prevent the transmission of communicable diseases. Both experimental and epidemiologic studies suggest that airborne transmission of influenza (by small particles <math><10\ \mu\text{m}</math>) can occur and may result in more severe disease than transmission by large droplets or fomites. While formal recommendations for N95 respirator use by the public do not exist, a properly fitted N95 respirator is likely to be both the least expensive and the most widely available respirator for protecting the public against airborne influenza infection. The results suggest that members of the public may have difficulty achieving a proper fit. Given the observed role of experience in proper donning, and the high frequency of recent experience with respirators reported by survey participants, one could argue that the overall performance in post-Katrina New Orleans is

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likely to be superior to that of virtually any other locale.

The World Health Organization anticipates use of respiratory protection by the public will occur spontaneously in the event of pandemic influenza. Indeed, N95 respirators are currently being marketed to the public as "bird flu masks". While uncertainty remains about the level of protection needed against influenza and that offered by an N95 respirator, an improperly donned N95 respirator will provide a false sense of protection. Since few of the participants reported, or were observed, referring to manufacturers' instructions, consideration also should be given to incorporating instructions onto the respirator itself, such as arrows or simple words ("nose," "chin") to indicate orientation. The IOM report's authors could find no simple modification of N95 respirators that would prevent the need for fit testing. Short of mass fit testing, proper donning will be the vital step to ensuring that members of the public using N95 respirators derive the greatest possible benefit from them.

Even under workplace conditions, respirator donning may be imperfect. An observational study of 62 healthcare workers in 3 California hospitals found that 40 (65%) improperly put on N95 respirators before entering the room of a patient in isolation for tuberculosis. Errors included use of only 1 strap, incorrectly placed straps, and presence of facial hair. The results of that study, in terms of the proportion who demonstrated improper donning and the nature of the errors, are similar to the findings of this survey. The impact of the 2005 US policy that suspended annual fit testing of healthcare workers who use respirators for occupational exposure to tuberculosis is unknown. Further evaluation of respirator donning among healthcare workers therefore may be warranted.

In summary, this population-based survey of non occupational respirator use found that a minority of participants demonstrated proper donning of an N95 FF respirator. The findings are of particular importance to public health agencies planning for future events, from floods to pandemic influenza, in which use of N95 respirators by the public will be recommended or is anticipated. A unique opportunity exists to enhance protection of the public through interventions, such as educational campaigns, training sessions, and respirator design modifications, aimed at improving the public's ability to don a respirator correctly. Infection control officers and the healthcare workers they protect also may benefit from the insights gained from this survey. #

Compensation wrangle over bird flu outbreak

The reluctance of bird farmers to report bird flu is understandable when they face severe personal loss for doing so. The difference in approach between Hungary and Britain is illustrated in a story in *The Telegraph*, London, on May 12th which reported that Hungary has admitted for the first time that it may have been the source of the deadly flu virus that caused an outbreak at a British turkey farm. Bogнар Lajos, Hungary's deputy chief veterinary officer, conceded that the H5NI virus could have gone undetected in a Hungarian turkey flock which was sent to slaughter. He said the meat might then have been exported by Bernard Matthews, the British poultry company, to its plant in Holton, Suffolk, before the virus infected birds there.

Despite the admission, Mr. Lajos insisted that ultimately the blame for the British outbreak must lie with Bernard Matthews, which was criticised for shortfalls in its biosecurity in the wake of the scare. Mr. Lajos said: "It is possible that the virus was still in an incubation period in a flock and no symptoms would have been seen. Such a flock could have been sent to slaughter and the meat transported to the UK. The problem was not with Hungary though. The problem was Bernard Matthews and its biosecurity." Until now, officials in the east European country have flatly denied that the virus could have come from Hungary. The Csongrad region of the country, south-east of the capital Budapest, is the area in which 2 goose farms were hit by the virus in January 07, weeks before the same strain infected a flock of Bernard Matthews turkeys.

A report into the British outbreak by the Department of Environment, Farming and Rural Affairs (Defra) concluded that the most plausible explanation was that the infection had been introduced to Britain through imported turkey meat from Hungary. Britain's poultry industry is still paying the price of the bird flu outbreak. Research by the analysts Nielsen shows turkey sales have fallen by 29 percent over the past 3 months while sales of frozen turkeys are down 33 percent on 2006. The industry is thought to have lost sales worth more than £9.4 billion. Sales at Bernard Matthews have also dropped dramatically, although the company insists the decline has been halted. Last month, the multi-million pound company was paid £600,000 in compensation by the Government for the 160,000 birds it had to cull as a result of the outbreak.

In Hungary, however, the goose farmers affected by bird flu shortly before the British outbreak say they are still waiting for compensation. In a dingy shed on the Kolos Agro farm in Szentcs-Lapisto, Csongrad, Garai Tibor, a farmer, described how just a few months ago it had been full of geese. Now, the only evidence of the 3335 birds that once inhabited his 3 55-yard huts is a small patch of feathers on the ground. "The outbreak has given us a bad name, but I am not angry about that," he said. "It was bad luck that the virus came to our farm. I am angry that we have been blamed for the English outbreak though when they seem to have brought the infection upon themselves. We did nothing wrong, while they had all these problems. How is it they have received all this money?" Mr. Tibor has been forced to lay off 3 workers from the local village and has lost more than 74 million Hungarian forints (£200,000).

Under European legislation, member states can have half of any compensation given to farmers hit by bird flu outbreaks paid by the European Commission. A spokesman at the EC said it had received no application for compensation for either of the farms hit by the outbreak.

However, Mr Lajos insisted that between them, the two farms had received about 100 million forints from his government. Szekely Zsolt, who owns the other farm in nearby Derekegyhaz, refused to comment. #

Poll shows many unready for public health crisis

A recent survey sponsored by the American Public Health Association (APHA) indicates that about a third of Americans have made no preparations for a public health emergency and nearly 90% have prepared less than they think they should. This is about the same level of preparedness reported in Civil Defence surveys conducted in New Zealand.

The APHA survey was released in April at an expert roundtable discussion during National Public Health Week and has been posted on the association's Web site. The online survey included 925 adults and sought the input of several specific groups, including mothers with children younger than 5, hourly wage workers, and adults who have chronic medical conditions.

The survey group also polled 120 employers and 150 school superintendents and interviewed a small group of regional food bank administrators and local food pantry and soup kitchen managers.

Among the survey's key findings:

- Thirty-two percent of the public have taken no special steps to prepare for a public health emergency that could leave them short of food, water, or medication.
- An 87% majority said they knew they had not done enough and could do more to prepare for a public health emergency.
- Forty percent of respondents said they had taken steps to prepare in the past, such as after the Sep 11 terrorist attacks, but had since let their plans lapse.
- More than a quarter (27%) said they were prepared for an emergency, but only about half (14%) had the 3-day supply of food, water, and medication currently recommended by the American Red Cross for general disaster planning. Close to half—46%—of respondents had not assembled a disaster supply kit.

Georges Benjamin, executive director of the APHA, said that the survey findings show public health officials have a

long way to go to prepare the nation for public health emergencies. "No one can predict where the next natural disaster, major storm, or disease outbreak will strike, but when it does, it is likely to disrupt basic services, leaving people without electricity, water, food or needed medications," he added.



In the press release, the APHA said the survey shows that several vulnerable subgroups are lagging in their emergency preparedness efforts. For example, 58% of mothers with young children said they did not have a 3-day supply of water for their families, and only 61% of people with chronic health conditions had at least a 2-week supply of medication.

The 17-page survey report says the term "public health crisis" does not resonate with people, though respondents reported being concerned about specific events, such as natural disasters, that might lead to one. Only 26% thought that a public health crisis would affect their family in the next year or two, but 57% thought a severe storm might strike their area in the next few years, 47% thought an infectious disease outbreak such as the flu is likely, and 43% believed a food borne disease outbreak is likely.

In other findings, researchers reported that only 37% of employers believed that a public health crisis would affect their business during the next few years, and only 18% said they could continue paying their employees if busi-

ness operations were interrupted. Though 63% of employees realized they might not be paid during a public health crisis, only 15% had saved enough money to provide for their families if such an event occurs.

School administrators generally reported a high level of preparedness in the form of evacuation, communication, and community sheltering plans, but few said they had enough drinking water or food to last students for 3 days. Representatives of regional food distribution centres said they had devoted a lot of time and resources to preparedness planning, but those from local pantries or food shelves reported they were not prepared for public health emergencies.

All groups that were surveyed said cost was a major barrier to their preparedness actions.

Greg Dworkin, one of the editors of the FluWiki, an interactive pandemic planning Web site, commends the APHA for commissioning the survey and said it's important to gauge the public's preparedness opinions from time to time, rather than making assumptions. The survey results suggest that preparedness messages are getting through to the public, but that people are not following through with action, said Dworkin. "That's a real problem: the public hears the information, but the next question is how they process it," he said.

Some public health officials are overly concerned that the public will overreact or panic if they use specific terms when referring to public health threats, but not using specific terms represents a missed opportunity, Dworkin asserted. "The message has to be crystal clear. Say 'pandemic' if that's what you mean," he said.

Also, it likely takes sustained, high-profile, and consistent messages to successfully persuade the public to prepare for public health emergencies, Dworkin said. "It's a marathon, rather than a sprint," he added. #

Rapid Response Crucial To Containing Flu Pandemic

One of the persistent riddles of the 1918 influenza pandemic is why it struck different cities with varying severity. Why were some communities spared the fate of the hard-hit cities when both implemented similar public health measures? What made the difference, according to two independent studies funded by the United States' National Institutes of Health (NIH), was not only how but also how rapidly different cities responded.

Cities where public health officials imposed multiple social containment measures within a few days after the first local cases were recorded cut peak weekly death rates by up to half compared with cities that waited just a few weeks to respond. Overall mortality was also lower in cities that implemented early interventions, but the effect was smaller.

These conclusions -- the results of systematic analyses of historical data to determine the effectiveness of public health measures in 1918 -- are

described in two articles published online in the journal "Proceedings of the National Academy of Sciences".

"These papers suggest that a primary lesson of the 1918 influenza pandemic is that it is critical to intervene early," says Anthony Fauci, director of NIH's National Institute of Allergy and Infectious Diseases (NIAID), which funded one of the studies. "While researchers are working very hard to develop pandemic influenza vaccines and increase the speed with which they can be made, non-pharmaceutical interventions may buy valuable time at the beginning of a pandemic while a targeted vaccine is being produced."

The historical analyses are part of an ongoing effort called the Models of Infectious Disease Agent Study (MIDAS). Through MIDAS, researchers have developed computer models to examine how a future pandemic influenza virus

might spread and what interventions could minimize the impact.

Although the MIDAS models can't predict the exact spread of a potential influenza pandemic, they have all suggested that introducing public health measures soon after the first cases ap-

pear could greatly reduce the number of people who get sick. The historical analyses help validate the models' conclusion and their potential usefulness in preparing for a pandemic.



Liberty Loan Parade at Philadelphia, 28 September 1918
Naval Aircraft Factory float, featuring the hull of a patrol seaplane, going south on Broad Street, escorted by Sailors with rifles.

This parade, with its associated dense gatherings of people, contributed significantly to the massive outbreak of influenza which struck Philadelphia a few days later. In New Zealand we experienced similar problems with Victory Parades and the Canterbury Show

pear could greatly reduce the number of people who get sick. The historical analyses help validate the models' conclusion and their potential usefulness in preparing for a pandemic.

The ideal way to contain a potential influenza pandemic would be to vaccinate large numbers of people before they were exposed to the virus. But with current technologies, it would take months to develop a new vaccine after the first cases of pandemic influenza appear.

Non-pharmaceutical interventions may limit the spread of the virus by imposing restrictions on social gatherings where person-to-person transmission can occur. The first of the two historical studies, conducted by a team of researchers from NIAID, the Department of Veterans Affairs, and the Harvard School of Public Health, looked at 19

different public health measures that were implemented in 17 U.S. cities in the autumn of 1918. The second study, undertaken at Imperial College London, looked at 16 U.S. cities for which both the start and stop dates of interventions were available.

Schools, theatres, churches and dance halls in cities across the country were closed. Kansas City banned weddings and funerals if more than 20 people were to be in attendance. New York mandated staggered shifts at factories to reduce rush hour commuter traffic. Seattle's mayor ordered his constituents to wear face masks.

The first study found a clear correlation between the number of interventions applied and the resulting peak death rate seen. Perhaps more importantly, both studies showed that while interventions effectively mitigated the transmission of influenza virus in 1918, a critical factor in how much death rates were reduced was how soon the measures were put in place.

Officials in St. Louis introduced a broad series of public health measures to contain the flu within two days of the first reported cases. Philadelphia, New Orleans and Boston all used similar interventions, but they took longer to implement them, and as a result, peak mortality rates were higher. In the most extreme disparity, the peak mortality rate in St. Louis was only one-eighth that of Philadelphia, the worst-hit city in the survey. In contrast to St. Louis, Philadelphia imposed bans on public gatherings more than two weeks after the first infections were reported. City officials even allowed a city-wide parade to take place prior to imposing their bans.

If St. Louis had waited another week or two, they might have fared the same as Philadelphia. Despite the fact that these

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Articles and comment on emergency management issues are welcomed

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Check out our Web site at
www.hemnz.org.nz

Up coming Events

19 - 22 June 2007
13th International Congress on Infectious Diseases
Kuala Lumpur, Malaysia
More information from
www.isid.org/13th_icid/index.shtml

25 - 26 June 2007
Disaster Management & Continuums of Care for the Health Sector
Duxton Hotel, Wellington
Cost \$2195 + GST
More information from
www.conferenz.co.nz

Critical Incident Stress Management Course
27—28 August 2007 Wellington
30—31 August 2007 Christchurch
Cost \$680
More information from
www.langmontadvantage.com

20 - 21 September 2007
The NZ Health Sector: Performance, Productivity and Evolution;
NZIHM and RACMA Conference
Rydges Hotel, Rotorua
Cost \$750 incl GST
More information from
www.nzihm.org.nz

Editor's soapbox



I am writing this the day after the two big days of our Exercise Cruikshank series so the comment does not reflect the feedback I am already starting to get from others.

I am sure you will have noticed the improvement in the operation of your EOC over the first three days of this exercise and the marked improvement on Exercise Makgill. Were you surprised at how many people it takes to run an EOC properly and how draining a 12 hour shift in this environment can be?

Have you questioned how you will keep your EOC operating over an eight to ten week period while losing staff to sickness and other calls on their services? We are going to have to accept a regular rotation of new staff into our EOCs.

We have a distinct advantage in the health sector. We have intelligent adaptable staff who are used to extemporizing, making decisions and getting on with it. We can set out to train as many as possible in at least the fundamentals of CIMS but we are going to miss many. Can we, for an evolving event, bring in untrained staff and quickly bring them up to an operational level with on the job training? The experience in the EOC where I was stationed is that the answer is yes.

Exercising and training are important and must continue, particularly for those assigned leadership roles. For others, a more realistic approach may be good desk files and on the job training.

And one final thought. It was inspiring to see the way people at all levels got stuck in and competently dealt with the issues as they came to hand. As they say of top sportspeople, "class always comes through." We can never stop training and improving, but we match up well against the other emergency services.

Bruce Parkes

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cities had dramatically different outcomes early on, all the cities in the survey ultimately experienced significant epidemics because, in the absence of an effective vaccine, the virus continued to spread or recurred as cities relaxed their restrictions.

The second study also shows that the timing of when control measures were lifted played a major part. Cities that relaxed their restrictions after the peak of the pandemic passed often saw the re-emergence of infection and had to reintroduce restrictions, says Neil Ferguson, of Imperial College, London, the senior author on the second study. In their paper, Dr. Ferguson and his co-author used mathematical models to reproduce the pattern of the 1918 pandemic in different cities. This allowed them to predict what would have happened if cities had changed the timing of interventions. In San Francisco, which they found to have the most effective measures, they estimate that deaths would have been 25 percent higher had city officials not implemented their interventions when they did. But had San Francisco left its controls in place continuously from September 1918 through May 1919, the analysis suggests, the city might have reduced deaths by more than 90 percent.

The fact that the early, non-pharmaceutical interventions were effective at the height of the pandemic can inform pandemic planners today, the authors of both studies say. In particular, the two studies lend weight to guidance that the [Centres for Disease Control and Prevention](#) recently released on the use of non-pharmaceutical interventions during a pandemic which recommends precisely such a rapid early response. #