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THE IMPORTANCE OF COMMUNITY INVOLVEMENT AND ENGINEERING ADVOCACY ON THE ROAD TO SCHOOL SEISMIC SAFETY IN BRITISH COLUMBIA

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ABSTRACT

This paper outlines the road to a 1.5 billion, 15 year commitment by the government of British Columbia to school seismic safety. Key components to the approach were an alliance with the scientific community in educating government and the population about the risks and the solutions, and the incorporation of a public health approach to the problem. From a public health perspective, if there is any population in whom an expensive preventive intervention is worthwhile – it is children.

The paper examines the history of disproportionate damage to school buildings in earthquakes both in North America and around the world. The paper reviews general obstacles to mitigation, including fatalism of the population and perceived lack of short-term political gain for governments. The specific obstacles to mitigation of schools in BC will also be examined. These obstacles have included: 1) Failure to designate the buildings as a priority for retrofit. 2) Locus of responsibility placed within the already cash-strapped education sector. 3) Discomfort at the price tag.

A return to basic social principles assisted government in setting priorities and funding this work. These basic principles include the recognition of the two following facts: 1) Children are number one on the public safety agenda. 2) The two basic human rights of children, to physical safety and an education must not compete for the same funds. We don't need equations or calculations of cost-effectiveness to tell us what our guts already know and millennia of evolution have wired us to feel, there is no greater treasure to a society than its children.

In engineering, as in public health, there is much work left to be done in educating the population about risks and prevention. Hopefully, the case study of BC can be an example of the broader benefits which flow from taking a multidisciplinary approach to the issue and creating an alliance between engineers and the community.

Introduction

On Nov 6, 2004, the Premier of British Columbia, Canada, made a 1.5 billion dollar commitment to ensuring that the schools of British Columbia will meet acceptable seismic life safety standards by 2019. This commitment was made largely in response to a concerted one and a half year

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public education, media and advocacy campaign by the parents of BC school children, under the banner of Families for School Seismic Safety, working in collaboration with the engineering community of BC.

It has been 2 years since the impressive commitment was made. There is much work left to be done in holding government's feet to the fire on it's promise; the advocacy of engineers, seismologists and community members will be required to see the work completed. The issuing of an annual report card by the engineering community on the state of progress of this work, is one example of an advocacy tool that could play a significant positive role in ensuring that political good intentions become a long term reality.

This paper will examine the components of the successes and long term challenges of the FSSS advocacy campaign and review the obstacles often encountered in efforts to promote mitigation of seismic hazard both generally, and with specific reference to schools. An essential component in the success of this campaign was an alliance with engineers and the scientific community. The concern and commitment of engineers and seismologists played an essential role in educating parents and the broader population both to seismic risk and the importance of prevention.

To place the issue in context, this paper will present a brief overview of the issue of school seismic safety both globally and in North America. Schools frequently sustain disproportionate levels of damage in earthquakes. Sometimes they have been occupied, resulting on some occasions in greater loss of life among children than adults in affected communities, and sometimes they have collapsed unoccupied, still with significant social and economic impacts.

North American History of School Collapses

Many North American engineers may be unaware of the disproportionate levels of damage to school buildings in the North American earthquake experience because we have never had an earthquake during school hours on this continent. Death tolls in North American earthquakes have been relatively low. A review of the photographic historical record highlights how much LUCK has gone into our low death tolls, and how children have been at significantly increased risk.

Schools have been disproportionately damaged, often to levels of life-threatening severity, repeatedly in North American history. (See table 1) The disturbing history of poor performance of school buildings in North American earthquakes begins in Long Beach California 1933. The earthquake of magnitude R 6.3 occurred in the evening. Seventy schools collapsed, 120 were seriously damaged. There were 5 children in a gymnasium that evening who were all killed. Had school been in session, the death toll among children could have been greater than a thousand. (See photos) It is widely known that the events of Long Beach led to the creation of California's Field Act which legislated special protection for schools.


Long Beach, CA, 1933: Franklin Marshall School (Before)

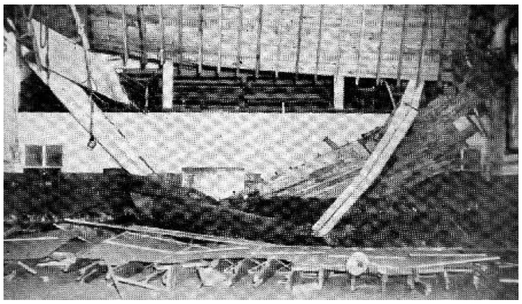

Franklin Marshall School (After)

Table 1. North American Schools in earthquakes – None during school hours.

Year	Location	M	Outcome	Source
1933	Long Beach, California	6.3	70 schools collapsed, 120 damaged (Field Act enacted)	California Seismic Safety Commission
1935	Helena, Montana	6.25	Collapse of Helena high school. The greatest amount of damage to a single structure was incurred by this building	National Geophysical Data Center (NGDC)
1944	Cornwall, Ontario Canada	5.6	Collegiate and Vocational School - falling masonry broke through the roof of the adjacent gymnasium obliterating a large area of the unoccupied gym	NRCan
1946	Courtney BC, Canada	7.3	Serious damage to interior of classroom	BC Archives
1949 & 1965	Seattle & Puget Sound	7.1 6.5	Washington schools sustained a disproportionately high level of damage - schools built prior to 1950 suffered extensive structural and non-structural damage. Thirty were damaged in 1949. Ten of these schools were condemned and permanently closed. Three Seattle schools were torn down, and one was rebuilt. In 1949, a large brick gable over the entry of Lafayette Elementary School in West Seattle collapsed directly onto an area normally used for assembly of pupils at the time of day the earthquake occurred.	Source – (1)
1952	Kern County California	7.3	About 20 schools were damaged or destroyed by this earthquake. Many of the schools that collapsed were built prior to 1933.The Cummings Valley School completely collapsed	NGDC
1964	Alaska	9.2 approx 120 km from epicenter	Government Hill Elementary School split in two and was virtually destroyed when the ground beneath it slumped down. Fortunately, the earthquake occurred on Good Friday, a school holiday. The entire second floor of West High School classroom wing was a total loss.	NGDC
1993	Scotts Mills, Oregon	5.7 crustal	Mount Angel High School – large quantity of bricks fell into school yard	

(1) http://www.geophys.washington.edu/SEIS/PNSN/INFO_GENERAL/NQT/where_damage.html)


Cornwall Ont, 1944 -Vocational School (exterior)


Cornwall Ont, 1944 Vocational School (gym interior)


Helena High School, Montana, 1935


Cummings Valley School, Kern County CA, 1952


Jefferson Junior high, Long Beach, 1933

It is easy to forget the role that both luck of timing, and extensive mitigation in California, have played in the relatively low death tolls in North American earthquake history to date. While it is true that North American construction is superior to developing nations – it is not immune to earthquake collapse and we are lucky that death tolls have not been higher, especially among children.

The record of poor performance of school buildings also highlights the serious shortcomings of attempts to create casualty models for North American schools using tools such as HAZUS. Casualty models of this type were developed based on the North American experience to date which omits the performance of unoccupied school buildings.

Japanese engineers acknowledge that prior to the Kobe earthquake, a sense of complacency was common. In North America, insufficient knowledge of our own historical "near misses" can contribute to complacency among school boards, governments, emergency preparedness experts and even some engineers. We all know that those who don't know history are doomed to repeat it. In the case of earthquake performance of school buildings, how much more Russian roulette can we afford to play?

World History of School Collapses

In October 2005, 18,000 children in Pakistan died while attending school. When earthquakes strike during school hours, the consequences are often devastating. In Spitak Armenia, 1988, schools were disproportionately damaged and the death toll among school children was over 1,000. (NGDC, 2004) In one school, 285 of 302 children died, representing 94% of the school's population. (Noji et al., 1990).

In Cariaco Venezuela, 2001, two of the five reinforced concrete buildings which collapsed, were schools (Lopez, 2004) School was in session when the earthquake hit. In Spitak and Cariaco, more children died than adults.

In the aftermath of the collapse of a primary school in Molise Italy in 2002, the citizens remarked that the school should have been the safest building in town. Instead it was the only one to collapse.

Ben Wisner (Benfield Grieg Hazard Research Institute) responded to this event remarking:

> "The question is why, again and again, even in industrialized nations with a wealth of engineering expertise – schools collapse in earthquakes . . . Every that is EVERY school should be inspected and where necessary reinforced. This is so basic to risk mitigation in a seismically active area, it seems foolish to have to write it down."

The experience of Taiwan in the Chi Chi earthquake of 1999 highlighted again the importance of ensuring the seismic safety of schools. As William Ellsworth (USGS) has stated:

> The Chi-Chi earthquake exposed the vulnerability of technologically advanced society to damage and loss. Some of the lessons, such as the importance of building earthquake-resistant schools continue to be relearned despite the best advice of scientists and engineers. (Ellsworth, 2004)

Again schools took a disproportionate hit, and on this occasion they were empty. The economic impact of the failure of their children's school buildings was enormous for the Taiwanese. At a social level, families were disrupted "from the bottom up" impairing the productivity of parents (Wei Lee, 2004). The broad economic impacts of the loss of school buildings extended well beyond the educational sector into all aspects of the economy.

Other world examples of schools collapsing unoccupied, where the economic and social impacts were enormous, include Skopje, Yugoslavia 1963 where 44 schools were destroyed representing 57% of the building stock (Multinovic, 2004). Multinovic explains that:

> Among EUROPA-MHA (multi-hazard agreement) member states, earthquakes have only caused severe damage to a small portion of existing buildings – unfortunately, ***most were schools**,* some were hospitals" (Multinovic, 2004)

Some other global examples of failure of unoccupied school buildings include the following:

- Sapporo, Japan 1952 – 400 schools collapsed (as per USGS)
- El Asnam, Algeria 1989 – 70-85 schools collapsed or were severely damaged (Bendimerad ,2004; NGDC 2004)
- Pereira, Colombia 1999 – 74% schools damaged (Garcia & Cardona, 2000)
- Xinjiang, China 2003 – dozens of schools collapsed (Harmsen, 2003)
- Boumerdes, Algeria 2003 – 130 schools suffered extensive to complete damage (Bendimerad 2004) (Full table in - Wisner et al, 2005)

School collapses of occupied buildings (some representing disproportionate deaths among children) have included the following:

- Molise, Italy 2002 (27 children died) (Aguenti et al, 2004)
- Bingol Turkey 2003 (84) (Gulkan et al, 2003)
- Ardakul, Iran1997 (110) (CNN, 1997)
- Tangshin, China 1976 (>2,000) (FSSS, 2004)
- Ahmedabad, India 2003 (>25) (FSSS, 2004, Wisner et al 2005)
- Bachu, China 2003. (>20) (Wisner et al, 2005)

In summary, school children around the world are often facing disproportionate risk from seismic hazard.

General Obstacles to Mitigation

It has been traditionally difficult to convince populations and governments to embrace the idea of preventive interventions, particularly for rare events.

General obstacles to risk mitigation include the following:

- Fatalism of the population
- Perceived lack of short-term political gain for politicians
- Discomfort at the price tag

Fatalism is often simply a result of lack of understanding. Spence and Coburn (2002) have explained that in many ways the state of hazard mitigation is at the same point now, that public health was at in the mid-nineteenth century. The population was very fatalistic and believed that epidemics were just part of life. Large numbers of people were dying of water -borne illnesses. The population had to be educated to understand first, that the epidemics were preventable, and then to see that it was worth it to spend a portion of public funds on prevention.

The simple message for the public is that although we cannot prevent nature from unleashing her forces, the ensuing disaster can often be prevented. As the slogan of the Nepalese engineering group NSET proclaims "Earthquakes don't kill people, bad buildings do."

Because these events have long time horizons, politicians may have the impression that they will only be incurring costs, without scoring political points, by undertaking preventive measures whose benefits may not be realized for decades or more.

Circumventing General Obstacles: Government as "White Knight"

At the outset of our BC campaign, political insiders suggested that no one would see fixing up a "bunch of tired old school buildings" as "politically sexy". In a global political policy environment that is perhaps over-driven by political sex appeal, it is key to engage the community in a manner that educates the population to understand the problem and demand solutions. A popular demand creates the short-term political gain that politicians desire.

Governments have always scored big political points in responding to disasters once they occur. It is an opportunity to ride in like a "white knight" that makes it so appealing. Millions are often spent deploying rescue teams when the same dollars would have been spent far more productively in preventing the building failures in the first place.

Creating a "white knight" opportunity for government in disaster <u>prevention</u> simply requires an educated population with an imagination. A unique capacity of our species is our ability to think beyond the here and now.

Once the public grasps an issue of this nature, it feels good about the government spending funds on a preventive project. This feeling was captured by a popular radio host and political columnist in BC who proclaimed after the Premier had committed 1.5 billion, that he "couldn't think of a better way for the government to spend our money."

Specific Obstacles to the Mitigation of Schools

Specific obstacles to seismic mitigation of schools in British Columbia have included the following:

- Failure to designate school buildings as a priority for retrofit
- Locus of responsibility within the already cash-strapped education sector

In much of the world, deep layers of bureaucracy and division of responsibilities between multiple levels of government have distanced us from our ability to see and act on basic priorities. This is how school seismic safety so often falls between the cracks. There have been some notable exceptions such as California, Utah and New Zealand where schools have been extensively retrofitted and replaced. Our sister city Seattle will have completed upgrading or replacing its at-risk schools by 2010.

Public education in BC, as elsewhere in the world, has faced increasing cutbacks. Although funding for the buildings is a separate capital budget, the education budget is seen as a single pie in the minds of the public and educators alike. It was difficult for anyone within education to even consider asking for funding to make school buildings safe if it seemed that it would in any way compete with day to day classroom needs of children. Essentially, parents and educators had been left feeling that they had to choose either between educating their children or keeping them safe. Two basic human rights of children were left to duel it out within the same budget.

A central tenet of Families for School Seismic Safety was the notion that school building safety was not an educational issue, but rather a safety and infrastructure issue, and must not compete for the same funds. It was on these grounds that FSSS pursued federal funding, in addition to provincial funding, for school upgrades.

Education is traditionally a provincial jurisdictional issue, but there have been precedents for joint federal provincial hazard mitigation initiatives as part of our national disaster mitigation strategy with projects such as Manitoba's Red River floodway – a 600 million project.

Other types of government infrastructure have not had to face inherent competition of two such basic human rights; hence, prisons, bridges, tunnels, water supply, community centers and even the liquor branch had all been upgraded. Education was saddled with a particularly hazardous building inventory in which to house children for the day. The management of these buildings has also been separated out from the management of most other government facilities – within the Ministry of Education. In the wake of Taiwan's '99 earthquake, which disproportionately damaged schools, it was noted that these buildings had also been managed differently than other government infrastructure with less oversight. Taiwan has taken steps to remedy this.

In Oct 2004, the government of BC completed an assessment of the 800 schools within our zone of seismic risk. 311 were found to be at high risk of sustaining severe damage to structural elements in the event of a moderate to strong earthquake. The initial estimate, to address all structural and non-structural safety issues in BC's 800 schools within the zone of risk, was 1.5 billion dollars. Two days before the assessment results were made public, the Premier made a 1.5 billion commitment to seeing all BC schools brought up to acceptable seismic life safety standards within 15 years.

The price tag in BC comes in around 2% of GDP spending on education. This is in line with the theoretical estimate given by Spence for addressing school building seismic safety in European nations (Spence, 2004).

BC's school building annual capital budget has ranged historically between 140 and 650 million per year. Current spending levels have been around 200-250 million per year. The seismic commitment adds another 100 million per year for 15 years. The combined total is well within the traditional range of spending on school infrastructure.

Schools as Critical Infrastructure and Social Priority

Most nations include schools on their critical infrastructure list. Canada is one of the few nations which does not. While national monuments make Canada's critical infrastructure list, schools, which often fill a post-disaster receiving function, have somehow remained off our national critical list.

Other countries have understood the critical infrastructure role of school buildings for a multiplicity of reasons, including their post disaster function, and the importance of maintaining educational capacity. The omission of schools on our national list has left many parents to wonder if the contents of school buildings are somehow not a national treasure, and if these buildings are not essential to the functioning of our communities?

It is interesting to note that GeoHazards International (an NGO retrofitting schools in developing nations – led by seismologist Brian Tucker) conducted a survey in Nepal prior to undertaking efforts to retrofit schools in the Khatmandu valley. The aim was to ensure that this was actually what the population wanted. When asked if they would spend their own funds to prevent earthquake collapse of their government buildings or temples, the answer was "no". When asked if they would spend their own funds to prevent collapse of the neighbourhood school, the answer was an overwhelming "yes".

Components to a Successful Approach: Surmounting the Obstacles

The following elements played a part in the success of this advocacy campaign:

1) Alliance with the scientific community – To assist in educating the population; an educated population is not fatalistic
2) A public health approach – if there is any population in whom an expensive preventive intervention is worthwhile, it is children.
3) A return to basic social principals
   a) Children are number one on the public safety agenda
   b) The two basic human rights of children to education and physical safety must not compete for the same funds

4) Extensive use of web site and internet to create an alliance of concerned parents and experts
5) Concerted lobbying of all 3 levels of government
6) Frequent media events and press releases and letters to the editor. Media serves as an even more direct pipeline to the ear of government, than lobbying – and media coverage must accompany lobbying to reinforce the message.

Alliance with the Scientific Community

The support and assistance of the scientific community in ensuring that all information presented to the public was scientific, factual and calmly delivered, was central in creating political and public credibility for the group. Prof Carlos Ventura, Director of UBC's earthquake engineering research facility, was a local leader in helping to educate the public in order to create a "culture of prevention." Andy Mill, Head of the Seismic Task Force of APEG-BC (Association of Professional Engineers and Geoscientists) also took a lead role as an expert who explained engineering concepts in simple terms for the media. Local seismologists such as Garry Rogers, John Clague and Michael Bostock also did an excellent job of informing the public of the nature of the seismic risk in BC.

The risk has undoubtedly been better understood by the population than the solutions. Preparedness, such as having water ready, bookcases screwed in, and an emergency plan, were well understood, but the message which had not been well understood by the public was the fact that earthquakes don't kill people, bad buildings do.

What was a particular surprise in BC was the fact that our schools happen to have been built of some of the most vulnerable materials and designs, and in many neighbourhoods, the school would be the most dangerous building to be in, during an earthquake.

Architectural history has seen many of our schools constructed first in the early 1900's as "little red brick schoolhouses" from unreinforced masonry, and then with non-ductile concrete between the mid- fifties and mid-seventies. In addition, schools have other features which tend to make them higher risk structures: large windows on main floors, large open gyms and a history of additions over the years often made without due consideration for principles of seismic resistant design.

The issue of the poor seismic resistance of BC schools had surfaced a few times in the political history of the province. Various parent groups from individual schools at risk, and even a brilliant student-led seismic advocacy effort (The Van Tech Lizards) had helped to bring the issue into the public consciousness.

A Public Health Approach to Seismic Mitigation

Creating better, more hazard-resistant buildings is a public health intervention in the same way that building safer highways and legislating seat belts are public health interventions. Safer buildings can be achieved through legislating and enforcing building codes and mitigation of older buildings. The seismic mitigation of schools can be seen as a childhood injury prevention program.

An advantage to building mitigation, compared to say vaccination, or seat belt laws, is that it does not require the compliance of the beneficiary. No one has to show up for the shot, or remember to buckle up, and the intervention protects generations of inhabitants.

In public health, interventions are assessed in terms of cost per year of life saved. (Or sometimes as cost per DALY or QALY, disability or quality adjusted life year.) In school aged populations average age at death or injury would be 12. Each child death represents 63 years of lost life. Each brain or spinal cord injury represents 63 years of expensive medical care – a cost incurred by society as a whole.

The public health approach captures what we all feel in our guts, that the loss of a young life is more tragic; the cost to society of the loss of a younger life is higher. It is a basic evolutionary principal that we place extra value young life. Global media coverage of events in which even a small number of children perish together, (worse if their demise was preventable) is further evidence of our deep collective sense that children are number one on the public safety agenda.

If costs are examined, there are many things we routinely do in medicine which cost tens or even hundreds of thousands of dollars to prolong the life of someone who is expected to die. It is common to spend tens of thousands per year of life saved on medical interventions.

The other central point in a public health approach to structural mitigation is that it focuses on the humans and human impacts. There has been a tradition within engineering to, understandably, focus on the buildings and often to make cost-benefit analyses purely in infrastructure terms. The economic impacts of the human consequences of earthquakes have seldom been quantified. (Exceptions include the work of Noji, Shoaf, Petal, Seligson and others) The cost benefit analyses become even more compelling when human impacts are taken into account.

Petal (2004) assessed the relative contribution of structural and non-structural failures to death and injury in the Kocaeli earthquake of 1999.She found that 87% of severe injuries were caused by failures of structural elements and 68% of light injuries were caused by non-structural elements. Minor injuries were far more common. Infill walls were the most common non-structural element to cause death or injury accounting for 14% of combined deaths and injuries. Ceiling components and standing cabinets each accounted for 10% of non-structural combined deaths and injuries. 100% of the severe injuries in the Kocaeli quake, occurred in buildings with heavy damage or collapsed damage states.

A fully integrated assessment of the impacts on humans of partial or complete structural and non-structural failures of buildings, would take into account the costs of short and long term disability and medical costs for injured survivors. Work absence has easily quantifiable costs for both insurers and employers. Serious injury is often far more costly to society in pure economic terms than death.

Reviewing historical data including triage category at time of injury is a potential element of attempts to build more accurate casualty models. It would also be important to differentiate between the subsets of serious injury like chest wounds – of which the patient may either die rapidly or recover with a good chance to go on to lead a productive life - versus brain and spinal cord injuries, which will likely have huge and lasting impacts on both the individual and society.

Ultimately, whatever the cost-benefit analyses, there are certain things we do as a society, simply because they are the right thing to do We don't need equations or calculations of cost-effectiveness to tell us what our guts already know and millennia of evolution have wired us to feel, there is no greater treasure to a society than its children.

FSSS Lobbying, and Media Campaign

FSSS (Families for School Seismic Safety – www.fsssbc.org) was founded in June 2003. Our first step was to compile a lobbying document. We laid out the information in a compelling manner that explained the problem in simple terms that would be clear to politicians and the public. We made condemning comparisons to other jurisdictions which were far ahead of us in carrying out this work such as California, New Zealand Seattle our sister city die to complete seismic work on its schools in 2010. We pointed out that prisons had been upgraded while schools had not. We made nice charts demonstrating how far behind we were

Our lobbying document laid out the case for potential cost-effectiveness in building management terms, public health terms and legal terms (e.g. possible legal costs if liability found in case of brain injured child – 5 to 10 million). The assistance of the scientific community was essential in creating accurate and objectively presented scientific information. Our approach was always reasoned and scientific, it was never about fear mongering; it was simply about having our priorities in the right place as a society and being able to say at the end of the day, that we had done our best to protect children from a known risk.

The final section of the lobby document was "The Ask". We asked government to carry out an assessment of all schools at risk within 1 year and to ensure that all schools met acceptable life safety standards within 10-15 years.

Initially the information was presented only to politicians at the provincial and federal levels behind closed doors. It was clear in its presentation that there was potential for political embarrassment, but also potential to look good and be praised publicly if they acted on the information.

When government did not appear to be responding, FSSS launched mass e-mail campaigns through our web site and e-mail list. We held press conferences and media events. A range of parents appeared on the news and on numerous radio shows discussing the issue. Calm, reasoned and concerned parents were sometimes accompanied at news conferences by experts.

Students participated in the media campaign painting banners and even writing and staging a brilliant play about attending school in a building at risk and government's skewed priorities. The play was attended by politicians and media alike.

The culmination of close to one hundred media hits for the issue in print, radio and TV was a press conference of international experts at the World Conference of Earthquake Engineering in Vancouver in August 2004. The press conference heralded the release of the OECD expert's recommendations on school seismic safety. Six international experts explained the often disproportionate risk faced by school children around the world. These experts were: Carlos Ventura (UBC), Wilfred Iwan (CalTech), Brian Tucker (GeoHazards International), Robin Spence (Cambridge), Mauro Dolce (Univ Basilicata) and Andy Mill (APEG-BC). The press conference resulted in a front page banner headline story and a national TV news story as well as extensive radio coverage.

Each media event served both to create pressure on politicians and to calmly inform the public of the nature of the risk and the solutions. There has been no panic in BC among parents of school children. The recognition of schools as an infrastructure priority has built a sense of community across the political spectrum. Awareness of seismic risk and mitigation that began with an awareness of the issue specific to schools and children, has translated into a broader level of concern among the public.

Community involvement and an alliance with the scientific community played key roles on the road to school seismic safety in BC.

Successful Seismic Advocacy

Olshansky (2004) has made the following observations about successful seismic advocacy which have been borne out by the BC experience

- If you are a scientist or engineer, don't be afraid to jump into the policy arena. Seismologists and engineers with broader social interests have been able to successfully mix these talents and interests over the years.
- Take the initiative to meet with key decision makers. If you don't talk to them, they won't know of the earthquake problem. If you don't talk to them about seismic safety, who will?

- The press can be very helpful in publicizing your cause, but use them wisely. (I would add that in BC, press was very effective in gaining the attention of decision makers. Professional organizations and scientists are essential in adding credibility, and it is an informed voting public who will influence government.)

I would also add the following observations for successful seismic advocacy:

- Simplify the message of prevention for the public – “Earthquakes don’t kill people – bad buildings do”*
- Educate the population to the risk and the solutions to create a “culture of prevention”

Creating a Culture of Prevention

This year the United Nations has launched a 2 year campaign to make schools the global primary focus of efforts to reduce the impacts of disasters. There is currently a coalescence of global conscience around this issue, recently intensified by the deaths of 18,000 children in schools in Pakistan.

October 2006, UN Secretary General Kofi Annan noted:

> Children are especially vulnerable to the threats posed by natural hazards. At the same time they can be powerful agents of change. It is essential therefore to make disaster risk education a component of national school curricula. Governments must act now to reduce the devastating impact of disasters on their citizens, especially their children. Strengthening school buildings and educating students about how to prepare for disasters will save lives. (Annan, 2006)

Activating populations to mitigate risk is really all about activating the most primitive and protectionist parts of our brain – the cave people in us all. There is no more potent activator of that part of our brains than children at risk. It is no coincidence that many successful seismic advocacy efforts have had, as a starting point, risk to children and schools. (Olshansky, 2004) Once the public has grasped the issue of prevention, with children as a focal point, they often become ready to embrace broader mitigation measures.

The Importance of Engineering Advocacy

The engineering credo highlights the protection of public safety. Experts in engineering sometimes fear that they appear self-interested if they speak publicly about the need for seismic mitigation. No one thinks that doctors and public health officials act out of self-interest when they state publicly that children need vaccinating, the drinking water must be clean, and we must take measures to prevent influenza pandemics. Engineers and seismologists are simply another expert community laying out risks and prevention.

The message of risk is ineffective in bringing about change if it is delivered in isolation; it must be tied to a message of hope: there is a solution. Simply informing the public that there is going to be an earthquake is not enough. The public needs to understand that it can do more than just screw in bookcases and make an emergency kit – it can do more than just be prepared for a disaster. The public can press government to <u>prevent</u> the disaster by mitigating public buildings

It has been 2 years since the Premier’s commitment was made. There is much work left to be done in ensuring that government delivers on its promise; the advocacy of engineers, seismologists and community members will be required to see the work completed. The issuing of an annual report card by the engineering community on the state of progress of this work is one example of an advocacy tool that could play a significant positive role in ensuring that political good intentions become a long term reality.

Governments, engineers and citizens alike have a choice between fatalism and activism. Engineers have a critical role to play in informing decision-makers about risks and solutions and taking an active advocacy role to ensure their wisdom is heeded.

Conclusions

In summary, school children around the world are often facing disproportionate risk from seismic hazard. North American complacency about seismic risk is misplaced; references to low death tolls in North American earthquakes omit the repeated catastrophic performance of school buildings. A review of the historical record provides a sobering lesson in how lucky we have been that there has never been an earthquake during school hours on our continent.

A panel of seismic experts was convened by the OECD and GeoHazards International in February 2004. Based on the observation that schools worldwide routinely collapse during earthquakes, they made the following powerful statement:

> *"The motivation for school seismic safety is much broader than the universal human instinct to protect and love children. The education of children is essential to maintaining free societies . . . most nations make education compulsory. A state requirement for compulsory education, while allowing the continued use of seismically unsafe buildings, is an unjustifiable practice. School seismic safety initiatives are based on the premise that the very future of society is dependent upon the safety of the children of the world."* (OECD, 2004)

In engineering, as in public health, there is much work left to be done in educating the population about risks and prevention. Hopefully, the case study of BC can be an example of the broader benefits which flow from taking a multidisciplinary approach to the issue and creating an alliance between engineers and the community.

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