



**Emergency Management Hazard Identification
Risk Assessment
For the
Simcoe Muskoka District Health Unit**

October 20, 2010

Version 1.0

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Hazard Identification and Risk Assessment (HIRA)

What is HIRA?

Hazard Identification Risk Assessment (HIRA) is a process of defining and describing hazards by characterizing their probability, frequency and severity and evaluating adverse consequences, including potential losses and injuries. [Guideline for Provincial Emergency Management Programs in Ontario, Essential Level, Emergency Management Ontario (EMO), FEBRUARY 2004, Page 27]

In accordance with the Ontario Public Health Standards “Public Health Emergency Preparedness protocol” is to enable and ensure a consistent and effective response to public health emergencies and emergencies with public health impacts. There is an expectation that boards of health are aware of the hazards in the health unit and that the boards of health have enhanced risk-based emergency planning and programming to guide ongoing board of health preparedness efforts.

Requirement # 1 of this protocol states that:

The board of health shall identify and assess the relevant hazards and risks to the public’s health in accordance with the proposed *Population Health Assessment and Surveillance Protocol, 2008* (or as current); the proposed *Public Health Emergency Preparedness Protocol, 2008* (or as current); and the proposed *Identification, Investigation and Management of Health Hazards Protocol, 2008* (or as current).

A key challenge in the development of any emergency management program is the ability to focus our resources and time in the development of emergency plans for dealing with the most significant risks. To obtain such focus, credible hazards must be identified and assessed to determine their probability of occurrence and identify potential public health consequences/impacts.

The HIRA process reflects a proactive attitude for dealing with potential threats. It is essential that this risk-based approach involves stakeholders from various organizations who have a common interest in emergencies, hazards, and vulnerabilities.

The Simcoe Muskoka District Health Unit (SMDHU) conducted a local public health risk assessment using a risk assessment grid model adopted by emergency management officials in Ontario (EMO) to assist the agency’s planning and response to incidents with public health impacts. This was accomplished by assigning a likelihood value and an impact level to a risk and combining those two values to arrive at the level of risk completes the assessment. In general, risk with the highest assessment values should be treated first. [*Emergency Management Workbook; A*]

tool for Emergency Management Practitioners, Emergency Management Ontario, FEBRUARY 2006, Page 29]

For the purpose of this hazard assessment **impacts (consequences) were** assessed. Three factors/components were considered when assessing overall impacts to the health unit's ability to deliver an appropriate level of service. These three areas of impact included: **the human impact, the property impact and the business impact**. An **overall impact rating** was assigned to reflect how significantly an incident would have on the ability of the agency to function.

This hazard identification and risk assessment process involved four distinct steps:

- 1) Identifying and researching the risks/hazards, Research focused on two components: a literature review for mass gathering public health implications and local community assessments with emergency planners to identify most likely hazards within Simcoe Muskoka
- 2) Conducting a risk assessment for each hazard identified to determine probability of occurrence and public health consequences
- 3) Establishing program priorities (Using a Risk Assessment Grid).
- 4) Development of incident specific plans for prioritized hazards.

Step 1: Identifying and Researching Risks/Hazards

Part A: Identifying and Researching Risks/Hazards based on EMO's Provincial HIRA

The following list of emergencies are identified as hazards found in the Provincial HIRA by Emergency Management Ontario

Natural

Drought/low water,

Water Emergencies

Agricultural and Food Emergencies,

Fires (Forest/Wildlife)

Major winter Storms (Blizzards, Ice, Hail, Snow)

Major Storms (Hurricanes, Lightning, windstorms, tornadoes)

Weather Related (Heat, Cold, Fog, Smog, Earthquakes, Land/mudslides, and Floods) erosion

Human Health Emergencies and epidemics,

Technological

Critical Infrastructure Emergencies

(Energy supply disruptions electricity and natural gas, Telecommunications)

Hazardous material incidents (Chemical, Biological, Nuclear, Radiological)

Transportation incidents (air, road, rail, marine)

Petroleum

Space object crash

Human

Terrorism

Sabotage

War/International Emergencies

Civil Disorder

[Emergency Management Workbook; a tool for Emergency Management Practitioners,
Emergency Management Ontario, FEBRUARY 2006]

Each of these hazards was assessed based on whether these types of incidents were to occur within Simcoe Muskoka.

The most likely types of hazards within impacting on public health units that can lead to health related emergencies include:

- Food Quality Issues
- Animal Diseases
- Severe Weather (snow/ice storms, blizzards, tornadoes)
- Human Health Issues and Epidemics/Pandemics
- Water Quality Issues (Low pressure, flooding, contamination of water supply)
- Hazardous Material/Chemical Spill or Explosion Incidents (spills, leaks, fires)
- Environmental (Forest Fires, Smog, Earthquakes, Heat waves)
- Technological/Critical Infrastructure Failures (Power/utility outages, road access)
- Bioterrorist Events

Part B: Identifying Risk/Hazards based on Literature Review on Mass Gatherings

In order to fully assess public health implications as a result of mass gatherings and to make this HIRA process more specific to these types of events, the Simcoe Muskoka District Health Unit conducted a literature review for mass gatherings. This review identified the most common public health implications based on history at past mass gathering events.

Based on Research findings, the following is a list of Mass Gathering Risk/Hazards:

Mass Gathering Hazards/Risks:

- Infectious and Contagious Disease
- Food Related Hazards
- Environmental/Weather Related
- Water Related Hazards
- Hazardous Material/Chemical Spill or Explosion Incidents (spills, leaks, fires)
- Technological/Critical Infrastructure Failures
- Bioterrorist Events (Biological Agents Only)
- Injury Related & Public Safety Hazards

Table 1 below identifies these hazards and defines the specific hazards associated with incidents having public health impacts.

Table 1: Hazards Associated with Incidents having Public Health Impacts

Public Health HIRA		
Hazard	Specific Hazard	Rationale for Public Health Implications
<p>Infectious and Contagious Diseases</p> <p>Infectious and Contagious Diseases can either be of domestic origin or imported by persons attending the event. Note: imported diseases are not often diagnosed in the country of origin</p>	<p>Out of season Influenza Meningitis/meningococcal Measles, Mumps, Varicella Gastroenteritis Respiratory illness</p>	<p>high probability of illness in affected population potential exists for fatalities depending on severity and duration of illness High potential for multiple illness and deaths children elderly immune suppressed most vulnerable contact and case management, staff redeployment</p>
<p>Food Related Hazards</p> <p>Suspect food adulteration (could be from international/domestic sources)</p>	<p>E-coli 157[hamburger disease] outbreak with potentially fatal results</p> <p>Outbreak with other organisms – salmonella, campylobacter, or Hepatitis A, Shigella, Staphylococcus aureus ,Clostridium perfringens and Listeria now common sources of food poisoning Parasitic contamination of food Giardia/ Cryptosporidium/ Cyclosporiasis most common types</p> <p>Gastroenteritis</p>	<p>high probability of illness in affected population potential exists for fatalities depending on severity and duration of illness</p> <p>children elderly immune suppressed most vulnerable contact and case management</p>

<p>Water Related Hazards</p> <p>Water related Issues that may arise at a mass gathering event. The occurrence may be due to contamination, malfunctioning systems, disruption or by Vandalism/terrorism</p>	<p>Disruption/Malfunction in water treatment process Breach of system integrity Water main break Loss of pressure Vandalism/Bioterrorism Contamination of water supply (E.coli, Giardia, cryptosporidium, shigella Chemical/Biological contamination) Contamination of recreational water sources</p>	<p>High probability of illness, long term medical complications or death</p> <p>Increase in public fear and anxiety, hospitalization, extended medical treatment</p>
<p>Hazardous Material Incidents (HAZMAT)</p> <p>Hazardous Material Explosion Incident (Chemical, Nuclear or radiological events)</p>	<p>Chemical Spills Transportation Incidents Terrorists (Dirty Bombs, etc)</p>	<p>Decontamination of exposed individuals Evacuation of residents or surrounding areas Shelter in Place Hospitalizations of symptomatic cases Post Exposure contact and Case management High demand on health care services</p>
<p>Bioterrorist Event (Biological Agents Only)</p>	<p>Bioterrorist Agents: Anthrax, variola virus (small pox), botulism, plague, cholera, tularemia, plus others</p>	<p>Increased Public fear and anxiety, stress Potential to overwhelm health care facilities/professional Potential to overwhelm 1st responder resources</p>
<p>Environmental/ Weather Related</p>	<p>Extreme Heat, severe storms, tornadoes, lightening strikes</p>	<p>serious injuries, illness and potential for deaths (tornado)</p> <p>dehydration</p> <p>large scale evacuations</p> <p>vulnerable populations[elderly, COPD, mobility impaired] shelter in place</p> <p>impacts to local health care</p> <p>cooling centres, evacuation centres</p>
<p>Technological/Critical Infrastructure Failure</p>	<p>Energy supply disruption (power, natural), mechanical failure at water treatment and sewage Water and Sewage System disruptions/malfunctions Road closures Information Technology Communication System</p>	<p>Impacts on the Vulnerable populations long term care residents restoration of essential services, evacuation, food premises food suppliers retail last economic impact for business and other agencies</p>
<p>Injury Related_ Public Safety hazards</p> <p>Community Health Issues – Substance Abuse – alcohol/drug related injuries,, sprains/fractures, slips, falls, heat related, dehydration, exhaustion and strokes, medication related concerns</p>	<p>Alcohol Abuse Drug Use Slips/Falls Heat related Medication related</p>	<p>Increase risk of heat related illness (headache, fatigue, sunburn, insect bites)</p> <p>Dehydration</p> <p>Medication Concerns for individuals not travelling with vital medications</p> <p>Implications of Sprains/fractures</p>

Step 2: Conducting Risk Assessments and Determine Probability of Occurrence and Public Health Consequences

Hazard Identification Risk Assessment (HIRA)

Hazard Identification Risk Assessment identifies the risks, threats and vulnerabilities that can impede the delivery of services and leads to the development of controls and safeguards and strategies to mitigate the risks. (Guidelines for Provincial Emergency Management Programs in Ontario, 2004).

HIRA takes into account

- a) The Hazard- An event or physical condition that has the potential to cause Fatalities, injuries, property damage, infrastructure damage, agricultural loss, damage to the environment, or other types of harm or loss
- b) Probability- the likelihood of the event happening
- c) Consequence- How severe would the hazard (public health) impacts the community or the agency
- d) Impacts are rated from 1 being unlikely to 4 being high probability. The rating has a direct link to Public Health response and the resources required to respond and to the severity of the consequences to public health programs and the ability to deliver the programs

This HIRA will be based on the generic HIRA done for risks in the region (assessed from a list of emergencies identified when EMO's HIRA tool) and findings from literature reviews on public health risks associated with mass gatherings. The EMO Model was adopted to conduct the risk assessment; however, additional components from the Centre For Excellence in Emergency Preparedness Risk Assessment Model were incorporated into this model. The model was further modified to identify probability and consequences, specifically related to public health agencies.

Hazard Information Sheet were completed while conducting risk assessments for each Hazards; See Hazard Information Sheet 1- 8 (attached) for assessment findings

Step 3: Establishing Program Priorities (Using a Risk Assessment Grid)

Assigning a likelihood value and an impact level to a risk and combining those two values to arrive at the level of risk completes the assessment. In general, risk with the highest assessment values should be treated first. [Emergency Management Workbook; a tool for Emergency Management Practitioners, Emergency Management Ontario, FEBRUARY 2006, Page 29].

Table 2: Risk Assessment Grid:

<p>LEGEND</p> <p>BLUE High Priority for Incident Specific Planning</p> <p>BLACK- Lower Priority for Incident Specific Planning</p>

<u>RISK ASSESSMENT GRID</u>				
<u>PROBABILITY</u>	<u>4</u> <i>Multiple Incidents in 5yrs</i>		<p><i>Food Related hazards</i></p> <p><i>Infectious and Contagious Diseases</i></p>	
			<p><i>Environmental/ Weather Related</i></p>	
	<u>3</u> <i>One incident in 5yrs</i>	<p><i>Injury Related and Public Safety Hazards</i></p>	<p><i>Critical Infrastructure Failures</i></p> <p><i>Water Related Hazards</i></p> <p><i>Hazardous Material incidents</i></p>	
	<u>2</u> <i>last incident in -5-15 yrs</i>		<p><i>Bioterrorist Events (Biological Agents Only)</i></p>	
	<u>1</u> <i>No Incidents in 15 yrs</i>			
	<i>1 Negligible</i>	<i>2 Low</i>	<i>3 Moderate</i>	<i>4 High</i>
	<u>CONSEQUENCES</u>			

Table 2; Risk Assessment Grid depicts assessment values for each hazard. In general, risks that have an assessment score placing them in the upper right quadrant of the graph should be treated as priorities. This is because both their likelihood and impact are high. [pg 29 EMERGENCY RISK MANAGEMENT WORKBOOK EMO] The overall impact rating reflects the effect on Public Health resources and personnel. The hazard or risk may directly impact on staff, clients, critical infrastructure and the ability to conduct business and provide services to the community in the normal manner

Public Health Emergencies (Priority Planning Hazards)

a) Infectious and Contagious Diseases. These types of hazards are common at mass gathering events and have significant impacts to the population as a whole.

b) Food Related Hazards have the potential to happen at any time during the year and are common at mass gathering events. These hazards can be directly related to power outages/winter and summer. Large scale food borne illness outbreaks and large scale food recalls [Maple Leaf Meats & Leadbetters] are associated with poor food handling practices and with mass gathering events has been linked to illegal operations.

c) Environmental/Severe Weather emergencies can happen at any time during the year and have the potential to cause food, water, human health and technological emergencies. In Simcoe Muskoka, this region experiences a wide variety of incidents including tornadoes, severe summer and winter storms. The most common environmental issues associated with mass gathering events, based on literature review, are heat related incidents.

d) Drinking Water emergencies can occur at any time during the year and although large scale emergencies are rare the consequences and impact can be severe

e) Hazardous Material Emergencies

HAZMAT incidents are fortunately few in number given the volume of hazardous materials that are transported via road and rail on a daily basis in this country. Highly trained specialist teams would normally respond to such an emergency with Public Health being used in an advisory role and not as first responders.

f) Critical Technological and Infrastructure emergencies such as road closures due to accidents or bridge collapses due to aging infrastructure are fortunately rare. The province wide power outage that occurred in the summer of 2003 caused food, water and human health emergencies as a direct result. As the infrastructure ages and the demand for electricity increases the potential for more of these emergencies exists

Less Likely Events – Lower Planning Priority for Public Health

a) Injury Related & Health & Safety Hazards common at mass gathering events. Research findings indicate that most of these incidents are associated with substance abuse (alcohol and drugs).

b) Bio/Terrorism emergencies can happen at any time and the impact and consequences can be catastrophic. Fortunately they are very rare and usually happen only in areas of political or religious significance or in areas of high population density. This type of incident ranked low as a Public Health planning priority, however, for security and safety purposes, federal officials consider this type of hazard as a high priority issue

Step 4: Develop Incident Specific Plans for Prioritized Hazards

Identified public health emergencies have been ranked using an assessment grid. The Risk Assessment Grid identified in Step # 3 identifies which emergencies have been ranked with the highest priority. The health unit uses these rankings to make decisions on program planning priorities. Incident action plans will be dependent on the outcome of these risk assessments. Incident specific plans may not be required for all public health incidents with the lowest priority ranking if the agency is already responding well to these incidents, with existing day-to-day structures and resources.

The identification and prioritization of potential public health hazards within our communities can also assist with business continuity planning. Impacts on pre-identified essential services by these hazards can be assessed to determine potential surge impacts on each service area. Once assessed, staff redeployment plans and specialized training can be provided.

Based on the HIRA Assessments, the health unit develops detailed Incident Specific Action Plans. Hazards/risks were prioritized. **Table 3 below**, identifies which types of risks require supporting action plans.

Table 3: Incident Action Plan Assessments:

HIRA Identified Hazards	Risk Assessment Findings		Incident Action Plan (Y/N)
	Probability of Occurrence (High, Med, Low)	Severity of Consequences)	
Environmental/Weather Related Extreme Heat. Lightning strikes, Severe storms Tornadoes	Probability – 4 <i>High</i>	Consequence – 3 <i>Moderate</i> Impacts Human- 3 Property/Community- 2 Business impact -2	Y
Food Related Hazards Food Recalls Food Adulteration Food Poisonings/ Gastrointestinal illnesses	Probability- 4 <i>High</i>	Consequence -3 <i>Moderate</i> Impacts Human- 3 Property/Community- 3 Business impact (4)	Y
Water Related Hazards Water System Malfunction/disruption Contamination	Probability –low 3 <i>Moderate</i>	Consequence -3 <i>Moderate</i> Impacts Human- 3 Property/Community- 2 Business impact (3)	Y
Infectious and Contagious Diseases Respiratory illnesses Asthma exacerbations Influenza (HINI Pandemic) Varicella Meningococcal disease	Probability - 4 <i>High</i>	Consequence - 4 <i>High</i> Impacts Human- 3 Property/Community- 3 Business impact (4)	Y
Critical Infrastructure Failures	Probability – Low3	Consequence- High 2	Y

Energy supply disruptions (electricity and natural gas) Telecommunications Malfunctions/disruptions of sewage and water treatment systems Road Closures	<i>Moderate</i>	<i>Moderate</i> Impacts Human- 2 Property/Community- 2 Business impact (3)	
Hazardous Material incidents Chemical, Nuclear, Radiological Incidents Chemical Spills Transportation Incidents Terrorist (Dirty Bombs)	Probability - 3 <i>Moderate</i>	Consequence-3 <i>Moderate</i> Impacts Human- 3 Property/Community- 2 Business impact (low3)	N (general Planning Training to be provided)
Bioterrorist Events (Biological Agents Only)	Probability -1 <i>Negligible</i>	Consequence - 3 <i>Moderate</i> Impacts Human- 3 Property/Community- 3 Business impact (3)	N (general planning and response _support to community partners)
Injury Public Safety Hazards Alcohol Drug Related Concerns Sun Safety Medication Related Concerns Sprains/fractures Heat Related- heat exhaustion and Strokes Dehydration	Probability- 3 <i>Moderate</i>	Consequence - 2 <i>Low</i> Impacts Human- 2 Property/Community- 1 Business impact -2	Y

Other Factors Impacting on Business Operations

The identification and prioritization of potential public health hazards within our communities can also assist with business continuity planning. Activities carried out to address these hazards will have an impact on the agency's capability to deliver other routine activities.

Other factors impacting on business operations

- **Business Continuity & Critical Infrastructure Considerations**
 - Surge Capacity and Redeployment Plan
 - Mutual assistance agreements.
 - Human resource policies – reviewing after-hours response, vacation requests & scheduling, shift lengths.
 - Occupational health & safety issues-
 - Travel restrictions: highway closures restricting provision of essential services.
 - Community partnerships – coordination/planning with other government organizations, community partners and health sector required.
 - Information technology – communication capabilities between field staff and command

Business Continuity

The agency's continuity plan must be flexible to apply to any type of emergency/incident impacting on agency response services and resources to ensure that employees are protected and to minimize program and service disruptions. Our agency has initiated steps to develop staff redeployment plans for large scale events. We are continuing to work toward the assurance for the provision of essential services, including telecommunications and financial and public program delivery services