PUBLIC HEALTH MANAGEMENT

AT

OUTDOOR MUSIC FESTIVALS

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Thesis Abstract

Background Information: Outdoor music festivals (OMFs) are complex events to organise with many exceeding the population of a small city. Minimising public health impacts at these events is important with improved event planning and management seen as the best method to achieve this. Key players in improving public health outcomes include the environmental health practitioners (EHPs) working within local government authorities (LGAs) that regulate OMFs and volunteer organisations with an investment in volunteer staff working at events. In order to have a positive impact there is a need for more evidence and to date there has been limited research undertaken in this area.

The research aim: The aim of this research program was to enhance event planning and management at OMFs and add to the body of knowledge on volunteers, crowd safety and quality event planning for OMFs. This aim was formulated by the following objectives.

1. To investigate the capacity of volunteers working at OMFs to successfully contribute to public health and emergency management;

2. To identify the key factors that can be used to improve public health management at OMFs; and

3. To identify priority concerns and influential factors that are most likely to have an impact on crowd behaviour and safety for patrons attending OMFs.

Methods: This research program has involved a series of five exploratory research studies exploring two main themes within public health management for OMFs, event planning capacity and volunteer capacity. Four studies used a cross-sectional design and survey methodology to collect self-report data from each cohort while the remaining study utilised case methods.
The study participants were recruited from Australian and European OMFs. For volunteer capacity, data have been collected from volunteers at two internationally recognised OMFs. One had formal training for their volunteers and the other did not. For planning capacity, data have been collected on consumer concerns regarding OMFs, priority factors that influence crowd behaviour and safety and leadership in event planning.

Results (volunteer capacity): The first studies assessed the public health and emergency management capacity of volunteers working at two OMFs. Volunteer training was provided at one event but not at the other. Comparatively, the participants from the OMF where training was provided reported noticeably better awareness of and involvement in public health and emergency management at that event. Additionally, this awareness was improved with experience volunteering at the study festivals. These studies highlighted the benefits of volunteer training and retention.

Results (event planning capacity): The next three studies focused on event planning capacity with the first being a case study on event planning leadership. The purpose of this study was to demonstrate that the event licensing programs managed by LGAs could improve health outcomes for OMFs. A European OMF, the Glastonbury Festival, was chosen for this study. After problems in 2000, it was highly likely that the event would never be held again unless public health and safety was improved. This study documents the progression from that 2000 event through to the 2004 event that was considered the safest event yet. The LGA EHPs working through the event licensing programs had engineered these changes.

The next study focused on consumer priority concerns associated with attending OMFs. A wide range of public health issues were identified as high concern including access to drinking water, toilets, safe food and personal protection issues such as females being grabbed or losing valuables. Safety in the mosh pit was a particular concern for almost half of the participants in
the study. Also mosh pit safety was identified with other concerns such as females being grabbed, needing first aid, being struck by thrown items, crowd sizes, losing valuables and alcohol-related behaviour. Making safety in the mosh pit the most important public health issue for these study participants.

The final study focused on identifying the main influences on crowd behaviour and safety at OMFs, particularly mosh pits. This study follows on from the consumer study. The study participants were skilled event security guards, specialising in OMFs and considered the performers, the music and group mentality as the most common motivators for changes in mosh pit behaviour. They also considered that generally (1) crowd composition, (2) drugs and particularly alcohol, (3) the type of performance, (4) venue configuration, and (5) activities of security staff were highly influential on crowd behaviour and safety at OMFs.

**Conclusion:** Results from this research program have added to the body of evidence on public health management for OMFs. Findings support capacity building and retention for volunteer staff working at OMFs. Also this research has provided evidence on quality event planning, crowd behaviour and safety that can support EHPs working with OMFs. All of these studies have been published in peer-reviewed journals in order to communicate these findings to volunteer organisations and EHPs involved with OMFs.

**Where to from here?** There remains considerable opportunity for research on a variety of topics related to public health management for OMFs. Some specific areas where further work is recommended are:

- the development and evaluation of a pilot training program (web-based) for Australian volunteers working at OMFs (this training package is currently under development);
o the development of a national code of practice for the event management industry;

o research into festival patrons' risk perceptions and the impacts of those choices;

o evaluation of the planning and management approaches used by specific OMFs; and

o additional detailed investigations of event characteristics such as crowd mood and its impacts on public health safety at OMFs.
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Statement of Original Authorship

“The work contained within this thesis has not been previously submitted for a degree or diploma at any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.”

Signature:

__________________________________________________________________________

Cameron P Earl

Date: ______________________________________________________________
Dedication and acknowledgements

Dedication: I dedicate this work to the memory of my father, Henry “Frank” Earl, whose work in nursing and public health has been an immense inspiration to me – God Bless.

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Publications, presentations and media

Publications


Presentations


Media


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### Glossary of Terms

**Emergency Management:** The use of a range of measures to manage risks to communities and the environment (Emergency Management Australia, 1999:129).

**Environmental Health:** A professional field involved in creating and maintaining environments that promotes good public health (Commonwealth Department of Health and Aged Care, 1999:1).

**Environmental Health Practitioner (EHP):** A professional involved with development and implementation of environmental health programs, includes numerous professions (such as scientists and epidemiologists) with the most common EHPs being Environmental Health Officers (EHOs).

**Event Management:** To exercise control over an event (particularly crowds) by means of appropriate infrastructure, procedures and staff actions (Health & Safety Executive [HSE], 1999).

**Event Planning:** The preparation undertaken setting out the actions to manage an event giving consideration to such factors as venue design, crowd control and risk management (HSE 1999).

**Event Organisers:** The people responsible for the management and organisation of outdoor music festivals (OMFs), includes promoters.

**Festival seating:** Often referred to as "general admission areas" where no seating is provided, crowds remain highly mobile and "mosh pits" develop. These areas are generally in front of the stage and are common at OMFs.
**Moshing:** A general term used to describe several practices undertaken by crowds at music events. Commonly includes "crowd surfing" (where a person is supported above a crowd of people by their arms) and slam dancing, (a form of dancing where people throw themselves against other people). Moshing is carried out in the mosh pit (Emergency Management Australia, 1999:130).

**Mosh Pits:** The festival seating or general admission areas in front of the stage at a rock concert or festival where moshing is carried out.

**Outdoor Music Festivals (OMFs)** A non-routine activity within a community that brings together a large number of people. An event of this type requires additional planning, preparedness and mitigation efforts to minimise potential impacts on that community (Federal Emergency Management Agency 2003). OMFs are also known as mass gatherings.

**Public Health:** The efforts undertaken to protect, promote and restore the public's health (Last, 1983 in O'Connor and Parker, 2003). This considers environmental influences and includes personal protective methods (Ashton and Seymour 1992). For this research, public health was conceptualised in its broadest context and includes public safety, infrastructure and services.

**Risk Assessment** The overall process of risk analysis and risk evaluation (Standards Australia 1999).

**Risk Management** The process of identifying, evaluating, selecting, and implementing actions to reduce risk to human health and to ecosystems. The goal of risk management is scientifically sound, cost-effective, integrated actions that reduce or prevent risks while taking into account social, cultural, ethical, political, and legal considerations (The
Presidential / Congressional Commission on Risk Assessment and Risk Management, 1997:1).
CHAPTER 1.0 INTRODUCTION

1.1 Introduction: the research portfolio

This thesis argues that minimising public health impacts at OMFs is important to the delivery of successful events. It was clear from the discussions within the literature reviewed that improved planning and management at OMFs would result in better health outcomes (Emergency Management Australia [EMA], 1999; Health and Safety Executive [HSE], 1999). Local governments (LGA) are mandated to regulate OMFs held within their jurisdictions and it is the responsibility of Environmental Health Practitioners (EHPs) within that setting to ensure that these health outcomes are achieved.

OMFs are very complex events to plan, organise and run with many having attendance that exceeds the populations of many small cities. These events have been associated with many public health concerns particularly heatstroke, dehydration, respiratory distress and crowd crushes (Department of Health [DoH], 2004:76). According to the EMA (1999:31) and HSE (1999:6), there are three main opportunities for EHPs to achieve better health outcomes at OMFs; (1) through the early development or planning phase, (2) the approval phase and finally (3) the monitoring phase. It is during the first two phases that the greatest impacts can be gained and research that can better inform the EHPs involved in these phases would be particularly useful.

An overview of the research program is provided in Figure 1.1. This research program has involved a series of exploratory research studies. These studies have explored two main themes within public health management for OMFs: event planning capacity and volunteer capacity. For planning capacity, data have been collected on consumer concerns regarding OMFs, priority factors that influence crowd behaviour and safety, and leadership in event planning. For volunteer capacity, data have been collected from volunteers involved in public health management at two internationally recognised OMFs. One event
had formal training for their volunteers and the other did not. The findings were reported separately and then compared (Refer to Figure 1.1).

This chapter introduces the research undertaken and identifies the overall aims of the thesis and the aims and objectives of the research program. Additionally, it describes the different settings of the research, the different research participants, significance of the research, summary findings and provides an overview of the chapters that comprise this thesis.

**Figure 1.1: Overview of the research program**

1.2 The researcher’s personal and professional experiences

This researcher has had professional and personal experiences that have been the inspiration for these research projects. On a personal level, these experiences include many years of attending OMFs, managing local bands, some involvement booking bands for venues, collaborating with writing and performing original music for a variety of bands, and working as a volunteer at OMFs. This researcher’s professional experiences include involvement in the
administration and regulation of a variety of events while employed as an EHP within LGAs.

It was this collective experience has been motivational in undertaking this research. Notably observing the variations in the amount of planning and preparation undertaken for events has been a personal concern. Also when performing at a large event it is possible to see more of the operations than as a patron and in most cases I have been impressed with the contributions of the staff on the day of the events. Particularly, volunteers at these events who are often given limited support to carry out their roles.

1.3 Rationale for the research undertaken

Attending OMFs known to increase the audience’s exposure to numerous public health risks. As a result, the involvement of public health and safety professionals in the planning and operation processes for these events is mandatory with EHPs providing the major contributions from the LGA sector. Traditionally, these EHPs have been responsible for overseeing noise management, food safety, potable water, the provision of sufficient toilets and showers, and waste management services. Notably the most significant public health impacts are generally attributed to crowd-related issues (death and injuries) (EMA, 1999:63; DoH, 2004:5) and this is an area where there has been limited environmental health investment.

Crowd-related issues dramatically increase at events where patrons participate in moshing, slam dancing, crowd surfing, stage diving and have “festival seating” or general admission areas (Crowd Management Strategies [CMS], 2002:1, 2001a: 1, 2000:1; Janchar, Samaddar and Milzman, 2000:2; Raineri 2004). Additionally incidents caused by crowd-related behaviours have become news worthy contributing to an increase in public concern and outcry against OMFs (for example Courier Mail ‘Autopsy shows Jessica was crushed to death’, 18 May, 2001). Authors such as Davies (1998) and Hanna (1995) and public health and safety organisations such as EMA (1999), HSE
(1999), and Liquor Licensing Division - Queensland (LLD) (1999), have argued for improvements in crowd management at OMFs. HSE (1999:2) explained that only by undertaking detailed, comprehensive planning and preparation for each event could this be achieved. This is seen as a critical step in improving public health outcomes (EMA, 1999:xiii; HSE, 1999:6).

Historically there have been considerable variations in the planning of OMFs in Australia and EMA (1999:xiii) argued that this has had a major affect on public health and safety. Possibly, as identified by Arbon (2002:60), was due to a lack of uniform standards that were widely accepted and used. LGA EHPs have considerable influence on event planning processes and consequently have also contributed to these variations through a lack of knowledge or experience in the area. Generally, EHPs strengths are in other areas such as food and water safety and noise management, which are supported by clear management guidance (eg. EMA, 1999; HSE, 1999). These areas remain important however improving crowd safety remains the critical concern. Without doubt, there are benefits in EHPs growing their capacity in crowd safety at these events.

In addition to increased public concern for public health and safety at OMFs, there has been an increase in the number and size of these events compounding the need for better environmental health policy to support EHPs. Strategically, The National Environmental Health Strategy (1999) highlighted the importance for this type of policy to be guided by evidence (CDH&AC, 1999:27). Critically though, Stoneham (2003:41) said there was no clear research agenda to drive environmental health research. The research program reported in this thesis does not clash with any current environmental health research agenda.

In addition to improving event planning to improve crowd safety, EMA (1999) and HSE (1999) recommended improvements in operations at OMFs. Au, Ryan, Carey and Whalley (1993) suggested improvements to a number of operational areas particularly staff capacity. These authors suggested that all staff should have the skills to undertake assigned tasks and be aware of
Volunteers play an important role in the provision of services for many OMFs, the majority of which directly affect the public health and safety of patrons. Yet many of these volunteers do not receive training to support their work at these events. This is the case, despite evidence from the emergency management sector where training programs have been very successful for other volunteer groups such as volunteer fire (Hughes & Henry 2003a) and ambulance (Fahey, Walker & Sleigh 2002) services. Consequently, the volunteer capacity research reported in this thesis was intended to provide evidence to advocate for the introduction of formal training programs for volunteers engaged at OMFs in Australia.

In summary, this research portfolio within this doctoral candidature was intended to provide evidence to (a) contribute to increased capacity for environmental health professionals working for LGAs involved with OMFs; and (b) advocate to increase volunteer capacity through the introduction of formal training for volunteers at OMFs. The research detailed in this thesis document covers two main themes of event planning capacity and volunteer capacity. The research program has been given the major title of "Public Health Management at Outdoor Music Festivals".

1.4 Research Aim

The aim of this research program was to enhance event planning and management at OMFs and add to the body of knowledge on volunteers, crowd safety and quality event planning for OMFs. This aim was formulated by the following objectives:
1. To investigate the ability of volunteers contribute successfully to public health and emergency management at OMFs;

2. To identify the enabling factors that can improve public health and safety at OMFs; and

3. To identify priority concerns and influential factors that are most likely to have an impact on crowd behaviour and safety for patrons attending OMFs.

1.5 Community and Environmental Health Significance

The following sections discuss the community and environmental health significance of OMFs.

1.5.1 Risk management

Risk management is a critical tool used in the management of public health and safety issues and has been used extensively in the planning and management processes for these issues at OMFs (eg. DoH 2004 and EMA 1999) and is central to the discussion within this thesis. Risk management is the methodological or systematic approach to the prediction of adverse events and guides decisions about their management (Boroush, 1998:8). When applying risk management in the OMFs context, the national Australian Standard AS/NZ 4360: 1999 has been recommended. This is because of its robust processes, accessibility, good guidance notes and it is well known (Tatrai, 2001a:2). This research portfolio was intended to inform risk management processes used in the event planning and management processes used to improve public health outcomes for OMFs.

1.5.2 Injuries and deaths

There is considerable evidence of injuries and deaths associated with attendance at music events including festivals in recent years (CMS; 2000:1, 2001a:1 & 2002:1). Janchar, Sammaddar and Milzman (2000:2) considered
that participation in moshing, crowd surfing and stage diving dramatically increased the potential for injuries or death to occur at these events. Additionally, the Ministry of Culture (2000:3) identified the general admission or standing areas were where the most injuries to patrons occurred.

In January 2001, the first OMF death was reported in Australia. A young girl was crushed to death while in the mosh pit of the Sydney Big Day Out (Raineri, 2004:1). The increased attention has alerted politicians and the community to the risks and resulted in increased pressure on event organisers and licensing authorities to provide safer events.

1.5.3 Community benefits
OMFs are an affordable medium for the delivery of a complete entertainment experience that combines performance (musical and theatrical), food and mind-expanding experiences. The capacity of OMFs varies considerably with reports of up to 2 million people attending a single, multi-day event (Costa, 2002:482). These events are important social and economic highlights as the people attending usually inject considerable funds into the surrounding local communities (Ministry of Civil Defence & Emergency Management [MCDEM], 2003:5). For example the Queensland Folk Federation (2002) reported:

“Apart from the nationally recognised cultural value of the event (Woodford Folk Festival), the festival has become a significant drawcard for interstate and overseas visitors. The 1996 visitors study….revealed a $3 million injection into the local community…. $1 million in box-office sales. The 1999/2000 survey indicated an economic impact to the local region in excess of $7 million, which included $2 million in box-office sales” (p5).

It is due to these cultural and economic benefits that there is continued support for OMFs.
1.5.4 Event planning and management
Evidence is now available on the factors that affect public health and safety at OMFs. Arbon (2004:211) summarised these factors into three domains: psychosocial (eg. behaviour, mood etc), biomedical (eg. age, gender etc) and environmental (eg. alcohol, temperature etc). The formal identification of factors such as these has been a crucial step in improving planning and management for OMFs as well as other events.

Historically there have been concerns regarding the capabilities of event organisers and their staff (Au et al., 1993:8; EMA, 1999:xiii). For example, there was evidence that the provision of emergency management for events was a particular problem (Davies, 1998:15). Davies (1998:14) reported this was the result of ad hoc and informal planning. EMA (1999:xiii) added the occurrences of major emergency were rarely considered within these planning processes. Davies (1998:15) theorised that these issues were the result of limited understanding and commitment by the event organisers to this area.

1.5.5 Environmental health impacts
EHPs have considerable opportunity to influence public health through their involvement within the planning, approval and monitoring processes for OMFs. Environmental health has become a very dynamic profession with an onslaught of new knowledge, broadening portfolios and changing environments (Harvey, 2001, http://www.ehj-online.com, 15/08/2005). Generally there are concerns that EHPs are not keeping up with these demands (Brown, 2001b: 27; CDH&AC, 1999:ii; Gochfield and Goldstein, 1999:37). Consequently, it is possible that many EHPs do not have sufficient capacity to contribute effectively to these processes.

The planning, approval and monitoring processes for these events are time and resource intensive. For example, Lakin, Brown and Williams (2001, http://www.ehj-online.com, 20/7/2004) reported that:
“the licensing and monitoring….involves the drafting and monitoring of almost 200 conditions, requires not only careful planning over a period of six months or more, but also the use of over 80 staff, many of whom are recruited from outside the [Mendip District] Council”.

EHPs need to be aware of the issues and the common management methods used for their control when involved with OMFs.

1.6 Extent of current research

An extensive literature search has been undertaken as part of this thesis. It was found that published literature on the public health impacts, planning and management at OMFs was quite limited. The majority of the published literature could be classified into risk management, medical and emergency management and guidance categories. There have been examples of exemplary work published. Examples include:

- Jardine et al. (2003) carried out a very extensive review of risk management frameworks;
- Hughes and Henry (2003a) were looking for that volunteering retention “sweet spot”; and
- Au et al. (1993) undertook an extensive study in 1993 that was used to form the basis of the redevelopment of a comprehensive, international event management guideline published by the HSE (1999) in England;
- Arbon (2002) reported on a predictive method of determining injuries and proposed a proximity model for mass gathering health care (Arbon, 2004); and
- Milsten et al. (2002) produced literature on the main factors that affect the number of presentations at mass gatherings.

There was also a limited number of research studies focusing on OMFs or music events reported within the literature. One such example was a study that attempted to better clarify the issues related to crowd surfing and moshing and offered solutions. Commons, Baldwin and Dunsire (1999) undertook this study. Other work undertaken by Davies (1998) identified a
lack of emergency management planning and legislation for mass gatherings while Vider (2004) revisited the violence that occurred at the Woodstock 1999 festival. Overall, there was limited relevant literature available to support the research in this thesis supporting Arbon’s (2002) claim that this is a new area of inquiry.

1.7 Overview of research program and summary of the publications

The research program reported in this thesis has involved a number of unique projects that look to increase awareness of current approaches to manage public health impacts at OMFs. The research will be discussed in two parts covering volunteer capacity and event planning capacity.

1.7.1 Volunteer capacity

The Volunteer studies have been reported in Chapter 4 of this thesis. This component involved two studies that investigated volunteer’s involvement in public health and emergency management at two large, multi-day OMFs. Au et al. (1993:86), who believed that all event staff should be aware of emergency management and public health at events, provided the basis of this study. Some public safety experts considered that using volunteers within event management at OMFs was a concern (eg. Wertheimer 2001b:3). However there was very little evidence of research or formal evaluations that supported this claim within the literature reviewed. This was surprising considering the number of OMFs that rely heavily on volunteer staff for the provision of essential services.

The main concerns regarding the reliance on volunteer staff was ineffective or inadequate service provision. This problem was highlighted in 2000 during an incident at the Roskilde festival in Denmark where a number of patrons were killed and others injured in a crowd crush. Wertheimer (2001b:3) stated “last year (2000) the Roskilde Festival organisers found that their crowd management volunteers – through no fault of the volunteers themselves – were overwhelmed when critical crowd safety skills were needed most.” The
festival organisers refuted this claim (Roskilde Festival Organisers, 2001: 7, http://www.roskilde-festival.dk/2001/english/nyt/151100.shtml, 18/04/2001). Regardless, the following year additional the festival provided training organisers but Wertheimer remained concerned at the inexperience of these volunteers (Wertheimer, 2001b:3). The HSE supported Wertheimer (2001b:3) and considered that experience was equally as important as knowledge (HSE, 1997 in HSE, 2003a:19).

There was some information within the literature reviewed on the expectations for event staff. According to Au et al. (1993:87), the minimum expectation for all event staff should be (a) adequate skills to perform designated tasks, (b) awareness of problems that may arise and have some understanding of the control measures, and (c) awareness of roles, responsibilities, and contingency and emergency procedures. Alternatively there was no guidance on an acceptable mix for experienced and inexperienced event staff.

Basically, the first two studies of the thesis research portfolio assessed (1) the level of awareness and involvement in public health and emergency management and (2) relevant experience and skills within study participants from two large OMFs. The first study was carried out at the Woodford Folk Festival, Australia (Study 1). The organisers of this festival used volunteers in the operation of that festival but did not provide formal training to support them to carry out their work. The second study was carried out at the Glastonbury Festival in England (Study 2). This study festival also used volunteers however the festival organisers did provide formal training.

The two studies used a cross-sectional design and survey methodology to collect self-report data from the study participants. These studies were conceptualised as exploratory studies and limited statistical testing was employed. A single survey instrument was used and similar data collection methods were used for both studies. There were 75 volunteers recruited from the Woodford Folk Festival (2001) and 50 volunteers were recruited into the Glastonbury Festival study (2003).
These studies have been written up as journal articles and published in the peer-reviewed journal *Australian Journal of Emergency Management*. An additional comparative discussion has also been reported as a journal article and was published in the *Australian Journal for Volunteers*. These articles appear in Chapter 4 of this thesis. The two journals were selected to bring capacity building for volunteers working at OMFs to the attention of emergency management organisations such as Emergency Management Australia and volunteer organisations such as Volunteering Australia. These organisations invest in volunteers and are capacity-building advocates. The articles in Chapter 4 are:


**1.7.2 Event planning capacity**

The event-planning component of the research program has been reported in Chapter 5 of this thesis and was a series of three unique studies. The first study investigated leadership in event planning and the remaining two studies were designed to gain a better understanding of crowds and their impact on event planning at OMFs.
EHPs become involved in the planning and operation of OMFs through LGA entertainment licensing programs. It was the intention of these studies to provide supportive evidence for EHPs working in these programs. As a result, the *Environmental Health* journal was selected for the dissemination of these study findings to Australian EHPs.

(a) **Leadership case study**

There are numerous resources available supplying guidance on good planning and operation for OMFs (eg. EMA 1999 and HSE 1999) however there have been no complete case studies documented in contemporary literature. Consequently, a study was conceptualised to address this particular deficiency in literature. This study was undertaken at an internationally renowned festival that has been very successful in recent years: The Glastonbury Festival in England (**Study 3**).

This study utilised case methods (Yin, 1994:24) and covered the operation of that festival from 2000 to 2004. Data for the case study was collected using two methods. Firstly self-report data was collected from senior EHPs employed by the Mendip District Council (MDC) involved in the licensing program for the festival for the 2000 and 2004 events. A survey instrument was developed to collect this data. The second method involved the collection of documents for the period of 2000 to 2004 to provide supporting evidence for the study (Yin, 1994:85). These documents included Council reports, licence information, guidance literature and media articles on the operation of the festival. Creswell (2003:204) said that the purpose of utilising data collected from a variety of methods was to improve internal validity.

The investigation carried out for this study involved (1) reviewing the public health and safety issues identified, (2) planning, management and monitoring approaches utilised and (3) gaining an understanding of the services and infrastructure provided for that festival site. The study reported on the following:

- *The progressions of the festival from 2000 to 2004* – this section focuses on the written reports and other documents collected;
• *Comments provided by the key informants* – this section focuses on the data collected from the MDC staff on the hazards and risks associated with the festival; and
• *Successful planning and management of the event.*


**(b) Consumer-based study**

EMA (1999:5) considered there were benefits in having consumer-based data to assist the event planning process for OMFs. There was no evidence in the literature reviewed of studies that involved festival patrons. Consequently, a study was conceptualised to survey consumer opinion about public health impacts at OMFs (*Study 4*).

A cross-sectional design was used for this study (Morton, Hebel & McCarter, 1990:133) involving a survey methodology for the collection of self-reported data from the study participants. The study was conceptualised as an exploratory study with no formal hypothesis testing conducted. The participants were recruited exclusively from a university population. One hundred and twenty-three responses were received with the majority being between the ages of 18 and 25 years.

The study participants were asked to identify their areas of priority concern associated with attending OMFs. Not all of the study participants had attended OMFs. A secondary component of the study was to determine if experience attending these events reduces this level of concern. The study was written up into a journal article and published in the *Environmental Health* journal.

(c) The influences on crowd behaviour and safety study

There has been considerable concern directed at mosh pits at OMFs within the contemporary literature. Upton (2004a:3) reported that 5% of the crowds in the mosh pits generate up to 75% of concern at an event. The general characteristics of OMFs and the crowds that impact on health and safety have been identified through research undertaken by researchers such as Arbon (2002; 2004) and Milsten et al. (2002). However, no studies were identified from the literature review that clarified the level of influence these characteristics have on the crowds in mosh pits. As a result, a study was conceptualised to provide further clarification on these factors (Study 5).

Specialist event security guards were targeted for this study due to their proximity to the crowds in the mosh pits and their positions require a good understanding of crowd behaviour in this setting. The study participants were recruited from the 2003 Livid Festival in Sydney Australia. This study used a cross-sectional design and survey methodology to collect self-report data from the study participants. A survey instrument was developed that reflected the factors, pilot tested and modified prior to use in the study.

The study findings investigated the views of a sample of these specialist security guards (N=44) who gave their opinions on a range of factors that were identified within the literature to have an impact on crowd behaviour and safety. The study participants were also asked to identify the factors that were most likely to change crowd behaviours and safety at OMFs. The findings were written up in a journal article and published in the peer-reviewed Environmental Health journal.

1.7.3 Summary of the Chapter
This chapter outlined the background, research aims and overview of the research undertaken for the portfolio. The next chapter provides a review of the literature.
CHAPTER 2.0 BACKGROUND AND LITERATURE REVIEW

This chapter provides a discussion and critical analysis of the current relevant literature covering the following main sections:

- **Risk management:** This section includes an introduction to risk assessment and treatment, common frameworks, organisational supports and limitations.

- **Public health:** This section includes an overview of public health leading and its links to the discipline of environmental health. This section also included discussion on the roles of research and the *Environmental Health* journal in environmental health policy and practice.

- **Local government:** The section covers an introduction to local government, the links to environmental health, legislative mandates and finally, emergency management.

- **Emergency management:** This section provides an overview of emergency management and the links to OMFs.

- **Outdoor music festivals (OMFs):** This section introduced OMFs and provided a historical perspective, also discussed the public health significance of these events citing recent incidents and a landmark Australian incident, sources of risks and the influences of youth culture on these risks.

- **Crowd management:** This section introduced crowd management, understanding crowds that included discussion on high-risk behaviours, crowd composition and introduces a new crowd behaviour model.

- **Event management:** This section includes discussion on two key operational factors that have considerable implications on public health and safety at OMFs: crowd management and the use of volunteers. For crowd management, the discussion is further divided into three main areas that cover understanding crowds; design considerations and crowd management operations. For volunteers at OMFs the discussion includes the use of and training for volunteers and an introduction to the two OMFs used in the research.
- **Event planning**: This section covers the implications of event planning; variations in planning and their implications and guidance for event planning.

### 2.1 Risk management

Risk management is the principal tool used in many settings to manage adverse effects. The settings where risk management is used extensively include environmental health and workplace health and safety. Risk management has been used extensively in the planning and management of public health and safety issues at OMFs (e.g., DoH 2004; EMA 1999 etc) and is central to the discussion within this thesis. The following sections include an introduction to risk management: (risk assessment and treatment), common frameworks, organisational supports and limitations.

*Figure 2.1: Risk management is central to this discussion*
2.1.1 Introduction to risk management
The risk-based approaches can be described as having two basic processes: (1) undertaking the assessment (risk assessment) and (2) the selection and implementation of management options (risk management) (National Research Council 1983).

Overall numerous authors endorse risk assessment and management approaches with Salter (1998) explaining that these methods ‘have been widely used, thereby providing a common language and processes across all organisations’ (p. 50). Fairman (2000) and Jardine et al. (2003) disagreed with Salter’s (1998) views considering there was not a common risk language and this had contributed to the immense difficulties in the application of these approaches. Fairman (2000:3) went on to imply that this issue was made worse by the variety of approaches available. These and other issues associated with risk management will be discussed within this section.

Risk management particularly, risk assessments are used in varied capacities within the health sector. They are used in the identification of new hazards and risks; comparing risks; testing theoretical constructs or the reviewing matters of high level public interest, population vulnerability or environmental concern (EnHealth Council, 2002:1). For example, risk assessment has been used extensively in the workplace setting (HSE, 2003a: 2).

2.1.2 Risk assessment
Risk assessments are a methodological or systematic approach to the prediction of adverse events and provide guidance in decisions made about risks (Boroush, 1998:8; EnHealth Council, 2002:3; EnHealth Council, 2001:19; Fairman, 2000:1; HSE, 2003b: 2). Risk assessments provide an estimation of the amount of damage or injury that could be expected from exposures to hazards (Boroush, 1998:8). When undertaken properly, this process generates useful data that can inform and improve management decisions (EnHealth Council, 2002:6-7). Two of the universal terms in risk management are “hazard” and “risks”. A hazard is anything, which has the potential to
cause harm to people (Standards Australia, 1999:2). Risk is the probability that an adverse action related to that hazard will occur (EnHealth Council, 2001:v).

Risk assessments can be qualitative, semi-quantitative or quantitative (Fairman, 2000:2). Fairman (2000:2) considered that qualitative approaches are useful however can only estimate risk and, where precision and accuracy are required, are unreliable. These assessments are based upon subjective judgement and expertise. Similarly, semi-quantitative assessments use judgements of severity and frequency and rank hazards against each other but do not estimate risks (Fairman, 2000:2). Quantitative approaches alternatively, can ‘establish how much of the hazard causes what degree of harm’ and provide numerical estimates of risk (Fairman, 2000:2). This is often referred to as the dose-response or hazard characterisation (Metha, [http://www.piercelaw.edu/risk/vol8/spring/metha.htm](http://www.piercelaw.edu/risk/vol8/spring/metha.htm), accessed on 27th May 2005).

The HSE (2003a:13) suggest that a thorough risk assessment should commence with a simple qualitative assessment. Many hazards affecting modern communities are complex, have long lag times and consequently these hazards require more rigorous assessments. It is generally necessary to supplement these qualitative processes with semi-quantitative or quantitative assessments (HSE, 2003a:13).

Commonly, the first step in risk assessment would be to establish the organisational context and identify the issues that will impact on the process (eg. Department of Health [DoH], 2004:31; Standards Australia 1999:7). Alternatively, other options overlook this step and go straight to the identification of the hazard step (eg. Department of Employment, Training and Industrial Relations [DETIR], 2000:5; HSE, 1999:7; HSE, 2003b:4). The variations in steps continue based on the approach chosen.

Risk analysis, as the name suggests, involves analysing the risks associated with identified hazards and considers both the likelihood of an incident
occurring and any consequences when it does (DETIR, 2000:12). Then decisions must be made as to whether a risk is ‘acceptable’ (Fairman, 2000:3). According to Panikkar, Riley and Shrestha (2004:12) acceptability of risks is relative and dependent on an individual's perceptions of that risk. Also Paul Slovic reported in *Risk Management Reports* (1997, [http://www.riskinfo.com/rmr/jun97rmr.html](http://www.riskinfo.com/rmr/jun97rmr.html), 10/05/2005) that people are, on average, much healthier and safer; however, are more rather than less concerned about risk. Importantly authors such as Glendon and McKenna (1995:102) and Knight (1999:30) asserted that gauging the effect of this risk perception is vital.

However, this is not an easy task as risk perception is complex and affected by controllable and uncontrollable factors (Glendon & McKenna, 1995:121). These controllable factors may include an individual’s analytical reasoning, experience, emotion and the understood effects of the hazards. Less controllable factors could be personal control of the situation, the media, gender and even age (EnHealth, 2001:6; Glendon & McKenna, 1995:121; Panikkar, Riley & Shrestha, 2004:12; Slovic, Finucane, Peters & MacGregor, 2004:313). Long latency periods before the onset of many health-related risks have considerable impact on risk perceptions.

The next step is often called “risk evaluation”. This involves deciding whether risks are acceptable or unacceptable (Australian Standards, 1999:31). Some risk assessment frameworks use other terms such as hazard assessment, exposure assessment and risk characterisation to describe this step (EnHealth Council, 2002:5). This stage generally involves the prioritisation of risks against standard criteria or target levels (Reynolds, 2000:1). Boroush (1998:10) has suggested that this is the stage where uncertainties and limitations of the data used will be identified.
2.1.3 Risk treatment
This process involves (a) reviewing the options, (b) selecting and (c) implementing the best control measures to manage identified risks (EnHealth Council, 2001:v). Knight (1999:13) implied that the control measures selected should be comprehensive. By this Knight (1999:13) meant that the measures used would facilitate and support both procedural (eg. industrial procedural decisions) and infrastructure (eg. introduction of technology) changes.

2.1.4 Common frameworks (and links to OMFs)
When applying risk management in the OMFs context, Tatrai (2001a:2), an event and crowd specialist, recommended the national Australian Standard AS/NZ 4360: 1999. Tatrai (2001a:2) argued that it has a robust process, is readily accessible and has good guidance notes. Tatrai (2001a:2) reported success with this approach and was confident of continued good outcomes for events.

Another option is the model developed and published by the EnHealth Council (2002) that was developed with environmental health hazards in mind. This option has similarities to the AS/NZ 4360: 1999 standards but uses different terminology, which best reflects the hazards that relate to environmental health. The EnHealth Council (2002:8) framework uses the terms - issue identification, hazard and exposure assessments, and risk characterisation and management. Finally, this model is encapsulated in risk communication and consultation processes (EnHealth Council 2002:7-9). Overall, both of these frameworks have detailed guidance notes to assist with the implementation processes, however, the AS/NZ 4360: 1999 standards are widely known and accepted within industry.

There are simpler models available, for example the HSE (1999) and the DETIR (2000) models. These involve five (5) basic steps: identify the hazards; identify who could be affected; identify the existing control measures; evaluate the risks, and decide what further action may be required (HSE 1999:7).
OMFs are very complex events (eg. HSE, 1999) and there have been a number of criticisms of risk assessments (eg. Langley in Cromar, Cameron & Fallowfield, 2003, Oosthuizen 2001 or particularly Weir, 2002c) so the AS/NZ 4360:1999 is recommended. This option has the support of Tatrai (2001a) and others because it is more robust and better known than other models (eg. EnHealth Council (2002) model). However, risk management processes when correctly applied will reduce risks and improve public health and safety at OMFs (DoH, 2004:5). For all cases, the use of these risk management frameworks must be reinforced with good organisational supports.

2.1.5 Organisational supports
All the approaches reviewed recommended the development and implementation of communication and monitoring strategies (eg. Standards Australia, 1999:11). Oosthuizen (2001:16) advised that outcomes from a risk assessment needed to be verified through the monitoring of performance. The HSE (1999:9) reported that there should be ‘active’ and ‘reactive’ monitoring systems. The active systems provide feedback on performance and the reactive system is triggered by an incident. LLD (1999:27) added it was equally important to have a comprehensive record system to manage the data collected. HSE (1999) asserted ‘that without these additional systems no improvements in health and safety performance’ would be possible (p. 9).

There are numerous models to guide risk management approaches. Interestingly the choice of model was not considered that vital. As recommended by Knight (1999:13), it is important that a comprehensive approach be taken. Jardine et al. (2003) reviewed numerous risk management models and identified common features regardless of the approach chosen. Jardine et al. (2003) considered that the processes should focus on three levels - (a) strategic (senior management), (b) tactical (policy and program planning) and (c) operational levels. The Strategic Level would provide the long-term view and guide the other two levels. At this level, Jardine et al. (2003:701) considered there needed to be a balance between taking enough risks to further goals while reducing the risk inherent in the
operations. The next level was the Tactical Level. This level would provide the medium term view and involved program modification and policy development to reduce risks. Jardine et al. (2003:703) suggested that this was where traditional risk management was undertaken. Finally, there was the Operation Level. This is where the day-to-day operations are undertaken. Jardine et al. (2003:703) referred to this level as where the efforts to achieve a balance for organisational risks at the higher levels become a practical reality.

2.1.6 Using risk management
Risk assessments are not perfect processes and there are occasions where definite outcomes will not be possible. There are numerous factors that impact on these processes including the use of inappropriate values and assumptions (EnHealth Council 2002:1), differences in definitions or the use of inappropriate or ambiguous language (Thompson & Dean (http://www.piercelaw.edu/risk/vol7/fall/thompson.htm, 27/05/2005) or not fully scoping the process being undertaken (HSE 2003a:vii-viii). The most common factor affecting the risk assessment processes is the availability of data.

Gaps in information, poor exposure and toxicological data or confidentially of health and commercial information were commonly cited (EnHealth Council, 2002:1-2). The last critical point about these assessments was that it should be undertaken as a meaningful process and not as a ritual. For example, a risk assessment should not be undertaken when data is very limited, subsequent action is unlikely, insufficient resources or the outcomes would be politically or socially unacceptable (EnHealth Council, 2002:2).

2.1.7 Summary
Risk management has been used extensively in the planning and management of public health and safety issues at OMFs (eg. DoH 2004; EMA 1999 etc) and is central to the discussion within this thesis. This section included an introduction to risk management: risk assessment and treatment, common frameworks, organisational supports and limitations. The next
sections focus on public and environmental health (Section 2.2) and emergency management (Section 2.3). Both of these paradigms rely heavily on risk management within their management strategies and have clear links to OMFs.

### 2.2 Public health

This section provides a passage from the contemporary understanding of health to environmental health. Environmental health is a discipline that has a vested interest in better health outcomes within the community, particularly within the local setting.

#### 2.2.1 Introduction to public health

Health has long been considered ‘a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity’ (World Health Organisation [WHO] 2005, [http://www.who.int/about/definition/en](http://www.who.int/about/definition/en), 19/04/2005). Achieving this level of health for a community is difficult and goes far beyond the provision of mere medical services. There needs to be good sanitation and housing, safe drinking water and food, disease control and waste management, and immunisation programs (CDH&AC, 1999:1; Fielding, 1999:xiii). The field of public health encompasses the majority of these. This field has been critical to achieving better outcomes for population health (Fielding, 1999:xiv).

The term “public health” is used in a variety of ways, for example as a condition, an activity, a discipline, a profession, an infrastructure, a philosophy, or movement (Beaglehole & Dal Poz, 2003, [http://www.human-resources-health.com/content/1/1/4](http://www.human-resources-health.com/content/1/1/4), 25/04/2005). Public health is also improving and protecting the health of whole communities (Baum & Keleher, 2002:1; Burke, Gray, Paterson & Meyrick, 2002:3; Shoaf & Rottman, 2000b:1). Last (in O'Connor & Parker, 2003) describes public health as ‘being all the various efforts undertaken to protect, promote and restore the public's health’. Specifically, public health focuses on the determinants of health and the
systematic management of these determinants (National Public Health Partnership [NPHP], 2000a:1).

This systematic approach involves prevention, surveillance, early detection, diagnosis, treatment activities and also assuring the quality and accessibility of health services (NSW Health Department, 1999:1; Shoaf & Rottman, 2000a:1; Varmus et al. 2003:2). Consequently the scientific and health-related disciplines underlying these strategies are very diverse. Additionally there are three overarching ingredients for a successful public health approach: values (eg. equity, social justice), vision (eg. dream the impossible) and leadership. These can translate the values and vision into policy and programs (The Commission on Risk Assessment and Risk Management, 1997, http://www.riskworld.com/Nreports/1997/risk-rpt/miscinfo/nr7mi003.htm, 27/05/2005).

Historically, early public health interventions had focused on singular issues such as sewerage, waste management, improvements to nutrition and better housing (NSW Health Department, 1999:2). However in modern times, public health practice in Australia has wider objectives with the core functions described as:

- Assessment, analysis and communication of needs and expectations;
- Prevention and control of communicable and non-communicable diseases and injuries through risk management, education, screening, immunisation and other interventions;
- Promotion, development and support of healthy public policy;
- Planning, funding, managing and evaluating health gain and capacity building programmes;
- Strengthening communities and building social capital; and
- Promotion, development, support and initiation of actions which ensure safe and healthy environments; continued development through life and indigenous and vulnerable people (NPHP, 2000b:2)
Substantial developments in public health methods, practice and population health have occurred in recent years. According to Fielding (1999:xiv), these advances include improved knowledge of causative factors and exposures to pathogens and considerable advancements in vaccines. With these advances, there have come many great health outcomes. The most significant of these advances includes the eradication of smallpox, reductions in numerous communicable disease epidemics, the rise and decline of several chronic diseases, and an overall global increase in average life expectancy (Fielding, 1999:xix; Reid & Pearce, 2003:9). Similarly, there have been considerable advances in public health practice that have resulted in these successful outcomes. Specific examples include better legislative controls (for example tobacco legislation - CDH&AC, 2002:3 or quarantine laws – Martin 2005, http://www.globalizationandhealth.com/content/1/1/1, 22/04/2005), global health policies (eg. access to essential generic drugs – Ollila 2005, http://www.globalizationandhealth.com/content/1/1/1, 22/04/2005), better population screening programs (Scally, 1998:585), and engineering and technological advancements (eg. motor vehicle safety - Woodward, Hales & Hill, 2002: 592).

More recently, many public health concerns have been linked to the state of the environment (Cassis, 1998:568; Arnold 2002:4). McMichael, Smith and Corvalan (2000:1067) reported that the main threat to health has come from the increasing use of environmentally damaging technologies, specifically resulting in significant environmental pollution and climate change (UK Public Health Association 2005:8). The environment has suffered considerably in the pursuit of modern lifestyles and health impacts have resulted (CDH&AC 1999:iii; McMichael, 2001a:169; Nutbeam 1997:355).

The early 1990s saw a paradigm shift in public health with the World Health Organisation Commission on Health and the Environment declaring there needed to be a reduction of environmental harm to protect human health (Guest, 1997:567; McMichael, 1999:576). It was considered that public health was the best medium for these factors to be considered together (Fielding
1999:xiii). Subsequently health and the environment became the focus of numerous landmark actions.

Examples of these actions included the establishment of a global network of “Healthy Cities”, implementation of Local Agenda 21 (Brown 2001a:18) and holding international forums such as the UN Rio Earth Summit conference in 1992 (Ollila, 2005, http://www.globalizationandhealth.com/content/1/1/1, 22/04/2005). These initiatives were designed to help put (ecologically) sustainable development on the global agenda (McMichael, 1999:576). The important feature of sustainable development is that it is a medium to promote economic development and human health as synergistic and mutually beneficial, not conflicting (Cameron, 2002:45).

Recently, Soskolne and Bertollini (in Nicholson, 2001:73) referred to ecological integrity and sustainable development, as the cornerstones of modern public health, supporting the notion that public health must continue to have an ecological focus. This ecological focus also links public health to another important movement: environmental health. Environmental health has made significant contributions to global population health and is widely considered the basis of good public health (Fielding, 1999:xxii).

### 2.2.3 Environmental health

Formerly the term ‘environmental health’ was used as a synonym for ‘sanitation’ (Gochfield & Goldstein, 1999:36). Historically this sanitation movement was the foundation of good public health (CDH&AC, 1999:i). The movement began in the mid-nineteenth century to control diseases related to poor sanitary conditions (Gochfield & Goldstein, 1999:37). Through the provision of safe drinking water and removal of liquid and solid waste, this movement brought about significant reductions in premature morbidity and mortality in communities (CDH&AC, 1999:i). It is from these beginnings that the current discipline of environmental health has evolved.
Environmental health practice focuses on the aspects of human health and quality of life that can be affected by physical, chemical, biological and social factors within the environment (CDH&AC, 1999:3). Brown (2001b:21) explains that changes in the relationship between people and the environment have always had major part in determining the direction of environmental health practice. There has been considerable evidence of changes in this relationship and as Nicholson (2001) asserts ‘environmental health practice is characteristically complex, attempting to manage the impacts of societal changes on human health and environmental sustainability’ (p. 73).

The majority of environmental health practice is science based and is collaborative in nature, relying heavily on the support of a wide variety of disciplines (Brown, 2001b:22; CDH&AC, 1999:30; Goldman, 2004:38). In fact, it has been considered that no one discipline or organisation has the capacity to manage environmental health in isolation (CDH&AC, 1999:22). As a result, professionals working in this field (EHPs) come from diverse backgrounds and include researchers, technical officers, academics, policy officers and urban planners. It is the role of these EHPs to contribute to the evaluation of environmental health issues and guide the management processes in the community setting (CDH&AC, 1999:30).

The most common and readily recognised EHPs are the environmental health officers (EHOs) (Bell, 2002:29; CDH&AC, 1999:39). These professionals are tertiary educated with knowledge and expertise in the areas of public health policy, risk assessment and the administration of regulation (Gochfield & Goldstein, 1999:36). Within a conference presentation in 2002, Earl, Strickland, Stoneham and Capra (2002) produced a model that demonstrates the differences in the roles of EHOs and EHPs (refer to figure 2.2). EHOs have a strong generalist focus and can found in all areas of environmental health particularly the administration of public health legislation (Bell, 2002:31). Earl et al. (2002) suggested that EHPs tend to have a specific background or expertise and impact on specialised areas in environmental health (eg. environmental scientists). Commonly, science underpins the skill base of both EHPs and EHOs in Australia.
Traditional environmental health roles include the investigation and management of noise, air and water pollution; food safety management; liquid, solid and hazardous waste management; emergency management and environmental toxicology. These roles remain, however, this is a very dynamic discipline that is continuously evolving to meet the demands placed on it and the changes in contemporary hazards faced (Brown, 2001b:37; CDH&AC, 1999:ii; Gochfield & Goldstein, 1999:37). Stoneham (2003:38) considered that traditional environmental hazards more often directly translated into diseases. An example of a traditional hazard faced would be pathogens in drinking water. Contemporary hazards tend to have long latency periods with links to urbanisation and environmental degradation (Stoneham, 2003:38). An example of contemporary hazards would be community exposure to solar ultraviolet radiation resulting in skin cancer later in life (CDH&AC, 1999:18).

There has been a move away from traditional legislative enforcement models to the use of risk and exposure assessments, participating in decision making for urban planning and contributing to global environmental quality (CDH&AC, 1999:17). There is now greater reliance on epidemiology, toxicology and environmental science. Overall, there has been a significant paradigm shift towards to achieving goals of sustainable development (Brown, 2001b:22; Corkey, 2004, http://www.ehj-online.com (30/08/2005); Gochfield & Goldstein,
Halford (2002:168) asserted that environmental health, as a holistic profession, was ideally suited to the sustainability challenge. However, Cameron (2002:42) cautioned that this direction, though positive, has limitations. Sustainable development is a concept of ideal interactions and a tool to aid thinking about interdependencies from which solutions can be found. Sustainable development should not be pursued as an entity or health outcomes will suffer (Cameron, 2002:42).

2.2.4 The role of research
A review of environmental health has been undertaken in the greater literature review in this thesis. This secondary review identified some findings of particular benefit to this research program. These findings were dialogue on (a) a number of authors (eg. Bell, 2002; Halford, 2002; Nicholson, 2001) who were concerned that the environmental health workforce is under pressure to meet the demands imposed on the profession and (b) there was no clear research agenda. Positively, it was evident that the Environmental Health journal contained a wide variety of research aimed at supporting environmental health policy and practice.

2.2.4.1 Research agenda
Harvey (2001, http://www.ehj-online.com, 15/08/2005) advised there has been a rapid increase in new information and new knowledge, broadening of portfolios and changing environments impacting on environmental health capacity. In response, Bell (2002:30) asserted there was a need to develop a strong research culture to respond to these demands. Disappointingly, research has not been a strong feature within the profession to date with projects often under funded and fragmented, and with limited research capacity and poorly diffused or ignored findings (Stoneham, 2003:39). Stoneham (2003:37) added that unfortunately there was no formalised research agenda for environmental health in Australia currently.

There were however suggestions on the direction for environmental health research. Marrilee (1997 in Bell 2002:30) identified an extensive list of
potential research topics. These topics ranged from developing a better understanding of risk perception and priority setting to environmental change and infectious diseases. Stoneham (2003:38) also proposed a research framework for environmental health research in Australia but did little to reduce or prioritise the research agenda.

Positively, Bell (2002:30) reported that progress has been made to identify priorities. The National Environmental Health Strategy recommended that environmental health move towards evidence-based practice (CDH&AC 1999). Marrilee (1997 in Bell 2002:30) and Stoneham (2003:38) demonstrated that there was considerable scope for research in environmental health. However, without the identification of priorities it is likely that the criticisms raised by Stoneham (2003:39) will remain unresolved and research may continue to have limited impact.

### 2.2.4.2 The “Environmental Health” journal

Encouragingly there was evidence of research that focused on environmental health policy and practice. There was evidence that this work was being reported in the Australian peer-reviewed journal, *Environmental Health*. This journal is distributed to the majority of the workforce through the environmental health professional body. Specific examples include Scannell’s 2002 series of scientific reports on environmental noise; Richie, Montgomery and Walsh (2002) discussed mosquito control for rainwater tanks; Ward (2002) covered food labelling; and Richards (2002) provided a simple framework to assist with food complaint investigation and directions for action. It is uncertain, however, what impact these studies have for EHPs considering the lack of research agenda and critically much of the work undertaken reflects the criticisms raised by Stoneham (2003:38).

### 2.2.5 Summary

This section provided an overview of public health leading and its links to the discipline of environmental health. This section also included discussion on the roles of research and the *Environmental Health* journal in environmental
health policy and practice. The next section covers emergency management and its association with OMFs.

2.3 Emergency management

Maintaining safety is an integral component of staging an OMF (EMA 1999:14). EMA (1999:14) asserted that it is very important that event organisers have a written emergency response plan supported by a management plan developed by the emergency services. Efforts to minimise impacts of disasters is collectively termed ‘emergency management’. Emergency management, similarly to public health, “is a range of measures to manage risks to communities and the environment” (Salter, 1998:28).

Emergency management is important because each year millions of people around the world are affected by man-made (Pardy & Daly, 2002:62) and natural disasters (Shoaf & Rottman, 2000b:58). There are wide ranges of emergency situations that can impact on OMFs. These include infrastructure disruptions (eg. power and transport), extreme weather events (eg. heat waves and tsunamis), chemical-biological-radiological-nuclear events and direct public health threats (eg. HIV/AIDS and SARS) (Cole & Buckle, 2004: 6). The impact of these events can be anticipated and significantly ameliorated by appropriate planning and preparation (Dover 2004:22; Kizer, 2000:210).

Emergency management is a systematic approach based on science and undertaken by experts that focuses on planning, organising, directing (leading) and controlling emergency situations (Cronan, 1998:22) and is collaborative and intersectoral in implementation (Krimm 1998:60; Salter, 1998:22). LGAs are important stakeholders for local emergency response (Eggleston & Koob, 2004:29; Queensland Health, 2004:5). The benefits that LGAs provide include experience with essential services, infrastructure and risk management and possessing good local knowledge (Eggleston & Koob, 2004:29; Queensland Health, 2004:5).
Other frontline agencies in Australia providing emergency responses include the Defence Forces, State Emergency, Fire and Ambulance services (including voluntary services) and Police Services (Abrahams, 2001:165). These organisations are supported by a Federal and State emergency management system. Within these systems, there is a framework for the provision of financial assistance and strategic guidance through the Counter-Disaster Task Force, National Emergency Management Committee, Emergency Management Australia and State and Territory Emergency Management Organisations (Angus, 1998:34-35). A further line of defence is made up of the public health sector. The emergency management roles undertaken by the public health sector include routine surveillance, providing immunisation programs, environmental controls and medical care systems (Shoaf & Rottman, 2000b:62).

The peak emergency management agency in Australia is EMA. This agency has a variety of functions and responsibilities education, training; research, grants; planning and operational support (EMA, http://www.ema.gov.au/agd/ema/emaInternet.nsf, 11/08/2005). EMA publish a journal of emergency management in Australia (Australian Journal of Emergency Management) that is highly rated within the field. The aim of this journal is to build capacity in the emergency management industry by making information, knowledge and research on emergency management freely available to researchers, practitioners and emergency management organisations (EMA, http://www.ema.gov.au/agd/ema/emalInternet.nsf, 11/08/2005). There was evidence of a wide variety of emergency management research being published within this journal.

Traditionally in Australia, emergency management policy has been based on what is known as “the comprehensive approach”. This approach has been more commonly expressed as prevention, preparedness, response and recovery (Cronstedt, 2001:10). At the core of this policy there are legislative and regulatory arrangements guiding the actions of these emergency service agencies and the community (EMA, 1996). In recent times, there has been a shift towards the use of risk management models to improve community
safety and further reduce the impact of disasters (Cronstedt, 2001:11; Parkes, 2000:1). Within this shift, there has been a swing away from response management and reactive approaches undertaken by single agencies to a more proactive and collaborative approach incorporating risk management (Salter, 1998:22). This has meant the focus of emergency services has moved from a focus on the hazards to the reduction of vulnerability in the community (Pagram, 1999:28).

The next section focuses on local government and involvement with EHPs, OMFs, public health and emergency management.

2.4 Local government (LGA)

The section covers an introduction to LGA, the links to environmental health, legislative mandates and finally, emergency management.

2.4.1 Introduction to local government

In Australia, there are three tiers of government (federal, state and local) with local government having the most direct contact with the community. The LGA have a mandate to contribute to healthy, safe and enjoyable environments at the local level (CDH&AC, 2001:3).

Each LGA possess detailed and intimate knowledge of each community they serve on a day-to-day basis and of the environment in which they operate (Eggleston & Koob 2004:29). LGAs’ contributions in local communities include:

(a) making improvements to the local natural environment;
(b) promoting good urban design;
(c) managing local environmental health services and infrastructure (eg. garbage collection, landfill management etc);
(d) coordination of emergency management for local communities;
(e) developing and maintaining open space and recreation facilities;
(f) addressing locally generated environment and health concerns (eg. food safety, vector control and noise management etc); and
(g) control of mass events.


2.4.2 Links to environmental health

In terms of environmental health, there was a consistent theme in the literature, which was the focus on local environments and communities (Nicholson, 2001:73). MacArthur (2000 in Nicholson, 2001:73) considered that the greatest gains for environmental health both locally and globally are through the consolidation and enhancement of action at the local level. Jukes (2004:4) supported this notion and added that LGAs were responsible for considerable improvements in health and continue to be a major contributor to at the local level.

There are a variety of EHPs contributing to environmental health programs in LGAs with EHOs being the most common. These practitioners are involved in programs such as immunisation, food safety, environmental protection, waste management and campground management. Legislation is the principal tool used by EHOs in administering their duties. One responsibility for LGA EHOs is the regulation and monitoring of environmental health outcomes at OMFs.

2.4.3 Local government legislative mandates

LGAs are mandated to administer legislation to support the delivery of many environmental health programs at the local level. For example in Queensland, the legislation administered by LGAs includes the Local Government Act 1993, Food Act 1989, Health Act 1937, Integrated Planning Act 1997 and Environmental Protection Act 1994. It is through this legislation that the regulation of locally based, high-risk activities is carried out. High-risk activities include food premises, motor vehicle repair operations and entertainment facilities. The regulatory process for these activities involves licensing and
registration programs. The rationale behind the licensing and registration programs is to (a) progress these activities towards industry best practice and (b) minimise potential health impacts.

The Queensland *Local Government Act 1993* provides a mechanism for each LGA to respond to local issues through the development of localised legislation referred to as either ‘local ordinances’ or ‘local laws’. Examples of this type of legislation include the local laws developed for boarding houses, backpacker hostels, barking dogs, vegetation management, rental accommodation and places of amusement (eg. theme parks and outdoor music festivals) (Department of Local Government and Planning 2004 http://www.lgp.qld.gov.au/?ID=150, 28/09/2004). The key focus of environmental health work in LGAs is the administration of these legislative programs to achieve public health outcomes.

EHOs undertake the majority of the legislative work in these programs. The EHOs’ work can be summarised into the (1) assessment; (2) approval; (3) licensing and registration; and (4) ongoing monitoring of high-risk activities regulated by LGAs. In addition to legislation, other key tools used in the regulation of high-risk activities by EHOs are risk assessment and risk management (CDH&AC 1999:42).

### 2.4.4 Summary
The section covered an introduction to LGAs, links to environmental health, and legislative mandates. The following section introduces OMFs and provides an overview of the history, public health significance and factors affecting the risks associated with these events.
2.5 Outdoor music festivals (OMFs)

This section introduces OMFs; provides an historical perspective; and discusses the public health significance of these events citing a variety of recent incidents and a landmark Australian incident, sources of risks, and the influences of youth culture on these risks.

2.5.1 An introduction to OMFs

OMFs are music and cultural events. Peterson (2004) described festivals as "short-term special events… oriented towards the interests and tastes of one group while providing and opportunity for cultural tourism for all" (p. 123). The groups identified by Peterson were most commonly young people or targeted counter cultures (Peterson, 2004:123). OMFs have become an affordable medium for the delivery of a complete entertainment experience, combining a variety of performances (eg. the combination of live theatre, the political, and comedy with music) with performers (the famous with up-and-coming personalities), good food and mind-expanding experiences. The capacity of these events varies with reports of events having as many as 2 million people in attendance (Costa, 2002:482). OMFs are important social and economic highlights as the people attending usually inject large amounts of funds into the surrounding local communities (Ministry of Civil Defence & Emergency Management [MCDEM], 2003:5). For example the Queensland Folk Federation (2002) reported:

"Apart from the nationally recognised cultural value of the event (Woodford Folk Festival), the festival has become a significant drawcard for interstate and overseas visitors. The 1996 visitors study….revealed a $3 million injection into the local community…. $1 million in box-office sales. The 1999/2000 survey indicated an economic impact to the local region in excess of $7 million, which included $2 million in box-office sales" (p5).
OMFs are usually held in large public facilities such as LGA parks, stadiums or show grounds. There are two major areas that must be addressed in terms of public health and safety at OMFs. The adequate provision of essential services such as waste management, medical and security services is the first of these areas. These services need to be supported by infrastructure such as sanitation facilities, food outlets and site containment, which usually involve temporary arrangements. Both the services and infrastructure for each OMF must be able to cope with the number of people expected.

An additional factor that crosses both areas mentioned above is the direct impact of expression from the crowds attending OMFs. Festivals provide considerable opportunity for expression and are very popular with the general populace (Commons, Baldwin & Dunsire, 1999:434). Commonly the audience viewing areas are general admission areas with no seating, which allows for increased expression through activities such as moshing, slam dancing and swirling. These have also been referred to as ‘festival seating’ areas. Festival seating aids event organisers by allowing increased capacity but needs very effective crowd management strategies to minimise the public health and safety impacts.

2.5.2 History of the modern OMFs
OMFs have grown in popularity since the 1960s with events such as the Woodstock Festival renowned for not only being a landmark event but the public health impacts associated with the event. The 1969 the Woodstock event was attended by over 200 000 festival patrons and resulted in an unprecedented 4000 people receiving treatment for injuries and three deaths (EMA, 1999:65). In 1994, the event was held again with 4000 patrons treated at first aid stations and a further 150 treated at the festival field hospital (Ambrose, 2001:23). The event was held again in 1999 and Ambrose (2001) explained that:
‘...the Woodstock ‘99 event shocked America and gave it a wake-up call as stark as that which the original festival gave in 1969. The new message was that the kids were turning weird, getting involved in something bizarre...riots...the pit turned into a serious war zone...women were being pulled into the pit and having their clothes removed before being assaulted and raped...rioters torched a fleet of articulated lorries...’ (p.15).

The Woodstock festival is not the only infamous event from the 1960s. In 1969, a large OMF in America with the Rolling Stones headlining resulted in four deaths (EMA, 1999:65). Most notably one of these deaths, a young fan, was stabbed to death by security staff working at the event. Surprisingly members of the Hell’s Angels motorcycle gang were used for security at that event (Wood, 2003:251). The main criticism levelled at the event was the poor choice of security personnel with members of the Hell’s Angels motorcycle group considered completely inappropriate (USA Today, 2001, http://www.usatoday.com, 12/11/2001).

Over the forty years leading up to 1993, Wertheimer (1993) explained that OMFs had became more regular, larger and linked with scandals, crowd mayhem, deaths, injuries and chaos. The injuries at OMFs are generally the by-product of high-risk actions such as crowd surfing and stage diving, and are generally accepted as normal for these events by many festival patrons. Wertheimer (1993) added that incidents at concert events have changed over time. One issue, however, remains consistent, that ‘too many concert promoters and facility managers act as though they are operating in the Wild West: free to call the shots and make the rules up as they go’ (Wertheimer 1993, p. 1). Wertheimer (2003a and 2003b) followed up this earlier statement with similar comments in two reports on crowd safety that indicated that he considered that little had changed over the last ten years.

The largest recorded, single day OMF was held in 2003 in Toronto called “Toronto Rocks” featuring the Rolling Stones. This event ran for twelve hours and consisted of fifteen musical acts performing at an operational airfield.
450 000 people attended that event and 1870 sought medical care (Feldman et al. 2004:287). Feldman et al. (2004:287) considered the event a planning triumph with a very large integrated emergency medical service. This service was provided by paramedics, physicians and nurses and the care sites for the events that included ambulances, medically-equipped, all terrain vehicles, bicycle paramedics, first-aid tents and a 124-bed field hospital with a rehydration unit (Feldman et al. 2004:287).

2.5.3 Public health significance associated with OMFs
OMFs worldwide have been associated with considerable public health significance. Raineri (2004:2) reported that 232 people had died at OMFs between 1992 and 2002. Alternative data reported by Upton (2004a:2) showed that there were 136 crowd-related deaths from 1974 to 2003, which occurred at the following locations at music events:

- 32 deaths during egress from a concert;
- 29 deaths in front of (or diving off) a stage during a performance;
- 13 falls from balconies at arenas and stadiums;
- 9 deaths during ingress into a concert venue; and
- 53 deaths during egress from a concert venue directly into a railway station subway (Upton, 2004a:2).

The highest number of deaths at music events recorded in a calendar year was 70 deaths in 1999 (CMS, 2002:5). The highest number of fatalities at a single incident was 53 deaths at Minsk, Belarus also in 1999 (CMS, 2001b:5).

Injury figures from OMFs are much more difficult to determine as not all injuries that occur are reported. CMS (2002), an American-based organisation, has collected injury data from 306 events around the world with an estimated 66 787 injuries recorded for the period between 1992 and 2002. The highest number of injuries was recorded in 1999 where one event (Woodstock, 1999) contributed 10 000 injuries alone (CMS, 2002:5).
It is important to note that the majority of the injuries associated with these events are minor and critical illnesses are infrequent occurrences (Arbon, 2002:62; Varon et al. 2003:409). Varon et al. (2003:409) reported that over 95% of the patients in their study returned to the event. Milsten et al. (2003:335), Salhanick, Sheahan and Bazarian (2003:350) and Thierbach, Wolcke, Piepho, Maybaurer and Huth (2003:16) found slightly lower percentage (82-85%). All these researchers agreed that minor trauma and headaches were the most common reasons for presenting. Not all the presentations treated by the emergency medical services at OMFs have been minor. Salhanick, Sheahan and Bazarian (2003:351) reported the more serious injuries treated were concussion and fractures; Zeitz et al. (2002:149) added asthma and cardiac pains.

Figure 2.3 is an example of a casualty report from an OMF where 90% of the people presenting for first aid attention only had minor medical conditions (St John Ambulance, 2001).

*Figure 2.3: Casualty report – Livid Festival 2000, Brisbane (St John Ambulance 2001)*

There were numerous reports of injuries at OMFs evidenced in the literature. Janchar, Sammaddar and Milzman (2000:62) reported that the combined injury rate of four large concerts in America was approximately 0.80% of the
attendance. The Woodstock 1999 event in America did have an unusually high injury rate of approximately 4.0% (CMS, 2001b:5). Chapman, Carmichael and Goode (1982:936) found an injury rate of 1.5% while Furst and Sandor (2002:200) reported a rate of 1.3% at two Canadian events. Forrest (1999:2874) found an overall rate for three European festivals to be 3.3%. The rate for an Asian summer concert was 0.56% (Kao et al. 2001:525). Arbon (2002:61) found that highest rate for an OMF in Australia was 2.7%.

Davies Associates (2003:20) summarised the specific events that historically have led to injury and death at events like OMFs:

- slips, trips and falls in a crowded area;
- fast uncontrolled movement of large numbers of people;
- crowd surges;
- crushing against immovable objects;
- crushing against an immovable object that breaks leading to a crowd collapse;
- pressure and crushing caused by overcrowding; and
- opposing movements of people.

Additionally there have also been a number of traditional public health concerns at OMFs reported in the literature reviewed. Examples of potential impacts affecting public health at OMFs include:

(a) general population concerns Foot and Mouth disease in England and SARS virus in Asia (Tambyah, 2004); and

(b) specific outbreaks of diseases such as Shigellosis (eg. Wharton et al. 1990; Lee et al. 1991); diarrheal illness (eg. Macey et al. 2002; Thackway et al. 2000) and Hepatitis A (eg. Centres for Disease Control and Prevention 2003).

(c) other general concerns such as fire incidents (eg. Wertheimer, 2003a), alcohol management (eg. Wertheimer, 2000b:15), violence (Wertheimer, 1993:3), noise (MCDEM, 2003:25), terrorism (Counter Terrorism Coordination / Security Planning and Coordination Units, 2004), occupational health and safety (Australian Entertainment Industry
Association / Media Entertainment and Arts Alliance, 2001) and sun burn (EMA, 1999:32).

2.5.4 Recent incidents
This sub-section contains a chronological account of the most significant events at music venues and OMFs over the last five years. Additionally this section includes an overview of the print media reports regarding the death of a young girl at the Sydney Big Day Out in 2001. Chronologically the recent media worthy events include:


2001 There was an incident at a Bengali New Year’s concert in 2001. Eleven people were killed, including a police officer, and fifty people treated for injuries resulting from a terrorist action. Three bombs were involved (CMS 2002, http://www.crowdsafe.com/new.html, 27/08/2002).


when official confirmation was given as to the cause of death. A girl died because of injuries sustained during a crowd crush (Weir 2002a:1).


1999 A follow up to the famous Woodstock concert of the 1960s involved a riot and claims of rape, numerous arrests and 10,000 of the patrons being treated for injuries during the three-day event (CMS 2001a:5).

Then there were problems for the Glastonbury festival in 1999. Reports identified numerous injuries, some fatalities including an incident resulting in two deaths and the hospitalisation of nine people after taking poisonous pills disguised as the drug "Ecstasy", and 1322 crimes including assaults, thefts and assorted violent acts (Mengel, 2001).

Fifty-three people were crushed to death in the entrance of a subway station trying to escape a hailstorm at an OMF in Belarus, Minsk (CMS 2001b:5).

2.5.5 Landmark Australian incident
In Australia there has been only one fatality at a live music event, at the 2001 Big Day Out at Homebush Stadium in Sydney. Raineri (2004) said that ‘following this incident, significant attention is now being paid to crowd safety and security issues, as well as infrastructure and production safety issues, by the promoters and managers of live music events in Australia’ (p. 1). Additionally this event attracted considerable media attention.
A crowd crush resulted in the death of a young girl from asphyxia. This girl had no drugs or alcohol in her system at the time of the incident. At the same event, five patrons were hospitalised for suspected spinal injuries and hundreds more were treated on site by the emergency services. After this incident, media attention turned to the promoters and the band at the centre of the controversy, Limp Biskit, an American Rap / Metal Band (*Courier Mail*, 2001).

In subsequent reports, the promoters implicated the band (Limp Biskit) on stage at the time of the incident, due to the intensity of their performance (*Courier Mail*, 2001). The band responded by saying that security was inadequate at the event (McCabe, 2001) and that they had pleaded with the promoters to increase security prior to the Sydney event. The band (*Limp Biskit*) then left the Big Day Out tour citing concerns of further incidents as their reason.

An event manager for the Big Day Out revealed 'as soon as Limp Biskit left (the tour) we had a totally different show, totally incident-free' when discussing the remaining events (Who Weekly 12th February 2001). However, there were further reports of injuries at the remaining three events in the tour. Subsequent newspaper articles then focused on injury reports from other concerts and festivals throughout the country (eg. White, 2001 or Mengel, 2001).

On the day of the Big Day Out victim's funeral, her parents urged for 'drastic improvements in crowd safety, changes in the way the events are managed and that musicians should consider crowd safety before committing to a performance' (Cock, 2001:5). The reaction in Queensland was the Youth Minister was going to ban 'mosh pits'. The journalist included a disclaimer saying 'it would be premature to speculate on his position as he had not researched the issue at the time of this statement' (Franklin, 2001:3).

The findings from the subsequent coroner's inquest have suggested further improvements to the planning and operation of OMFs (Weir, 2002c:10).
Additionally the parents of the young girl have initiated civil action against the band Limp Biskit and the companies who provided the event security and the barriers (Rave Magazine, 2004:2). This case was due to appear in court however the parties filed a confidential settlement on 3rd August 2005 (The Manly Daily, 2005:3). Also, Raineri (2004:1) reported there have been notable improvements in safety for events in Australia that have been directly attributed to this incident.

2.5.6 Sources of public health risks
The main sources of public health risks at OMFs are derived from three main areas: (a) inadequate provision of infrastructure and services (with links to patron numbers), (b) impacts of the natural elements and (c) features within the crowds (EMA, 1999). The following sections provide an overview of these three areas.

2.5.6.1 Infrastructure and services
Particularly of interest from an environmental health perspective is the immense size of these events, as they are not limited by the same physical constraints of indoor events. Also for the majority of OMFs there are limited or no permanent facilities existing on the sites used and these crowds require substantial liquid and solid waste services, food and water supplies, and high levels of crowd control. It is important that appropriate infrastructure and services that reflect the intended attendance are provided for each event (EMA, 1999:xiii; HSE, 1999:1).

Closely linked to the provision of infrastructure and services is the need to control and regulate patron numbers at the OMFs. The Glastonbury festival, a premier OMF in Europe was not given a licence in 2001 because the event manager had not managed to control the numbers attending the 2000 event (MDC 2000). The police officers that witnessed the impacts of the overcrowding at the 2000 event reported that there was a significant concern as the site capacity and infrastructure had been significantly compromised.
and public safety was put at high risk (Avon & Somerset Constabulary 2000, http://www.avssompol.co.uk/report/, 01/03/2001).

Successfully securing the festival sites from unwanted entry is critical to ensuring that the infrastructure and services will remain adequate. Controlling numbers at OMFs can be difficult as many of the venues or sites used are not being constrained by secure, physical boundaries (EMA, 1999:17). Many of the venues used for OMFs are open farmlands or showgrounds and are generally easily accessible for unauthorised entry.

### 2.5.6.2 Natural elements

Being outdoors, these events can be affected by the natural elements. The environmental hazards include exposure to topography, solar ultraviolet, extreme temperatures, high winds, bushfires, flooding, pests and pollens (EMA, 1999:31). There have been incidents where natural events have resulted in fatal disasters at OMFs. For example, fifty-three deaths from a crowd crush at Belarus in 1999 when festival patrons sought shelter from a hailstorm in an underground railway station (CMS, 2001a:5).

### 2.5.6.3 Features of crowds

Davies (1998:16) described the crowds at events like OMFs as the source hazard that needed to be mitigated. The DoH (2004:7) indicated that the likelihood of problems in crowds was increased with disruptions to flows or reactions to perceived risk or competitive rushes. To date, crowd management has been an area where there has been limited investment by EHPs in Australia. Among the variety of factors known to influence crowd behaviour, alcohol consumption is particularly noteworthy.

Many authors perceived that alcohol consumption was the biggest influence on crowd behaviour. Wertheimer (2000b:16), who reported on a large survey of event professionals in the United States, said that 70% of the respondents considered alcohol consumption was the major risk factor they had to manage. Parker and Auerhahn (1998:292) explained that experimental studies had
shown a consistent relationship between alcohol use and aggressive behaviour, especially in the presence of social cues. Examples of these social cues include aggressive music or an antagonistic performer.

Other factors known to have an effect on crowd behaviour include event-related factors such as type, seated or mobile, densities, size, duration, and crowd characteristics such as age and mood (Arbon, Bridgewater and Smith, 2001; Arbon, 2004; Milsten et al. 2002; Milsten et al. 2003). It is impossible to eliminate the main hazard for OMFs, however, it is possible to reduce the risks by managing the impacts of these factors. Arbon (2004:211) warned that many of these factors remain poorly developed and fundamental concepts have not been explored extensively and thus have implications for risk assessments.

When managing risks at OMFs it was considered important to understand the crowds attending (HSE, 1999:7). To establish the context for crowds at OMFs, it is necessary to understand “youth culture” and its influence.

2.5.7 The influence of youth culture on risks
Younger patrons were more often associated with poor behaviour and judgement while attending events. Milsten et al. (2002:158) found there was a clear relationship between age, rock concerts and drug and alcohol consumption. As a result, a bias of younger patrons in attendance has implications for infrastructure, services and security at OMFs. However there are more features within the youth demographic that can affect public health impacts.

For the purpose of this sub-section, the discussion on the impacts of youth culture will be divided into: (a) an explanation of youth culture (background), (b) counter cultures, (c) impacts on safety, and (d) encouraging and maintaining attendance.
2.5.7.1 Background to youth culture
Many of the increased risks associated with youth culture relate to exuberant expression. Youthful expression is usually defined by the norms of their individual social circles (Bennett, 2002:455). The collective methods of expression and association are known as “youth culture” (Anonymous, 2004a, http://www.jahsonic.com/Youth.html, 28/11/2004). Modern youth culture can be generally characterised by distinct dress, dislikes of others outside their social circles, glorification of bad behaviour (for example violence, drug taking or sexual behaviour), use of slang and profanities, strong desire to be cool, and the view that these social circles are a second family (Anonymous, 2004a, http://www.jahsonic.com/Youth.html, 28/11/2004). Of particular interest to this research are the associations between youth culture and music. According to Bennett (2002), there has been considerable interest in youth culture and music since the early 1970s.

In 1972, research undertaken by Cohen discovered that youth culture was perceived to be highly influential in social change and threatened the traditional values of the “establishment” (1972 in Forsyth, Barnard and McKeganey, 1997:1317). Little has changed since Cohen undertook that research in the 70s. The adults have been and remain concerned that their youth will reject them and their values as they grow up. This concern is particularly manifested in views on the choice of musical interests (Bostic et al. 2003:58). Bostic et al. (2003:58) said adults generally respond to these concerns with defensive actions such as “grounding” which often leads to retaliatory actions from the child. It is because of parental and other societal pressures that youth pursue escape and freedom.

The Ministry of Culture (2000:8) in Denmark and Commons, Baldwin and Dunsire (1999:434) both suggested that youth find escape and freedom at OMFs. Consequently, festivals are important cultural foci for youthful expression. Commons, Baldwin and Dunsire (1999:435) indicated that OMFs encouraged a sense of community for the patrons. It was through this sense of community that festival patrons gain the confidence to explore new behaviours and enjoy being entertained (Ministry of Culture, 2000:8). However,
it is possible for this youthful expression to become unruly or out of control as identified by authors, particularly Wertheimer within his 1993 publication “The American experience: rock safety”.

Wertheimer (1993) said crowds have a long history of unacceptable behaviour that dates back to the 1950s, particularly at rock music shows. At that time, rock music was first promoted as an anti-establishment youth culture and crowds were deliberately incited to demonstrative responses and very little has changed from those days (Wertheimer, 2003a). A number of authors have commented on the escalation of bad behaviour at music events. Ambrose (2001:4) who has been observing safety in mosh pits for some time considered that there has been an escalation in the violence and adverse behaviour at music events in recent years. He believed that there was once a crowd etiquette that no longer seems to apply. Wertheimer (in Radel, 2000, URL://www.gannett.news.service/, 20/10/2000) agreed, referring to the mosh pits of old as ‘a type of communal chaos' and believed that people would watch out for each other and help each other. Modern mosh pits have become associated with ‘wanton recklessness and violence…that is why today’s mosh pits cannot be guaranteed safe’. (Wertheimer in Radel 2000, URL://www.gannett.news.service/, 20/10/2000).

Youth culture is made up of numerous smaller social cliques often referred to as “counter cultures”. Counter culture is a term used to describe a cultural group whose values and norms are at odds with those of the social mainstream (Anonymous 2004b http://www.jahsonic.com/counter.html, 28/11/2004). History has shown a succession of counter cultures or subcultures with close links to musical styles. Examples of these groups are the Mods, Hippies, Beatniks, Rappers, Punks, Skinheads, Disco and Ravers (Anonymous, 2004c http://www.jahsonic.com/Rap.html, 28/11/2004; Anonymous, 2004b http://www.jahsonic.com/counter.html, 28/11/2004; Farlex 2004, http://encyclopedia.thefreedictionary.com, accessed 20/09/2004). Socialisation into counter cultures did not end here with many having their own subgroups (Weir 2000:1845). For example, the Rave music scene includes House, Happy Hardcore, Drum and Bass, and Trance (Weir,
Some of these subgroups are very specific. For instance, the band called the "Grateful Dead" created their subculture within their fans. These “deadheads” as they were known had their own unique form of culture and mores (Epstein, 1994). Milsten et al. (2002:157) found that counter cultures like these have a significant effect on crowd mood, one of the factors known to affect crowd behaviour.

There has been considerable sociological research into the relationships between youth, style and musical taste. The findings from early studies considered this relationship to be mainly influenced by social class related conditions (Cohen 1972 in Forsyth, Barnard and McKeeganey, 1997:1317; Lack 1995, http://www.library.nothingness.org/articles/SI/en/display/86, 17/09/2004; Stahl, 2003:140). Bennett (2002:462) argued that this was no longer the case as findings from recent research reject the cultural connection. Bennett (2002:462) argued that sociologists now favour the terms “scene” or “tribe” as these provide greater heterogeneity and categorisation of these groups. The explanation can be found in the modern social scenes.

Traditionally membership in these groups provided a complete lifestyle option and included unique social structures, rules and ethics; hence the association with cultures. The majority of people attracted into these different groups were drawn by the complete lifestyle options on offer, for example the lifestyle offered by being a “punk” (Ambrose, 2001) or by being a “hippy” (Farlex, 2004, http://encyclopedia.thefreedictionary.com, accessed 20/09/2004). Bennett (2002) reminded us that musical taste is only ‘one of a series of interrelated aesthetic values through which individuals both construct their own identities and identify with others who are seen to possess the same or similar values’ (p. 462).

More recently, it appears that the connection to lifestyle has been lost in the more recent counter groups. For example, the rave scene has been described as the next counter culture. Yet Priddle (2004, http://www.arasite.org/guestjpl.html, 28/11/2004) found “ravers” or “clubbers” only share attending rave events and taking ecstasy in common. Unlike the
earlier groups like the working class punks, these people come from all social
divisions, classes, gender and age and do not have the gang culture that was

The following sections cover some examples of social groups and their
implications for public health and safety at OMFs. The first is the punk
movement.

The Punk Movement
Punk rock is derived from “punk” meaning worthless, rotten or a prison term
used for a person who is sexually submissive (Anonymous, 2004d, http://www.jahsonic.com/Punk.html, 28/11/2004). It has been widely thought
that punk social practices were constructed as a response to life in white
working class Britain or lower middle class America, during the mid-seventies.
The punk movement was a reaction to government control, unemployment,
changing morals, consumer culture and urbanisation; was a reflection of the
collective boredom and angst of those groups; and was driven by an ethos of

When punks first appeared, they represented the social decay in Britain
cut-up clothes and spikey hair, the pogo and amphetamines, the spitting, the
vomiting, the insurrectionary poses and the soul-less, frantically driven music”
(p. 144). Bennett (2002:462) opposed this view considering that punks should
be best known for their alternative value systems and lifestyle choices, not
these other factors.

Punks also created their own form of music and dance. Joey Keithley from the
Canadian punk band DOA became interested in punk in the late 1970s and
described it as “different”. He explains that it ‘was anti-establishment, it made fun of everything and it was powerful, loud and obnoxious, the way rock was meant to be’ (Keithley, 2003 p. 17). The punk dance was aptly named ‘slam dancing’ which along with their clothing became symbols of their differences and fringe lifestyles (Ambrose, 2001:1; Martin 2004:144). Neil Busch from American band Trail of Dead recalls his thoughts about the first time he saw slam dancing and explains it was:

‘…moshing in it’s most awe-inspiring and dangerous form…skinheads doing double back flips off the ten foot tall PA speaker stakes flanking the stage…the club was manic with excitement and violence, there was no clear distinction between bystander and dancer…it was a dangerous place to be’ (Ambrose 2001 p. 75).

Another view of moshing expressed in Ambrose (2001:9) sums up the attitude of many moshers - “I like to mosh, I like the violence, I like the violation of the (mosh) pit.”

Primarily there are two main divisions in the punk movement. The first is known as hardcore punk. This group was the original form of punk rock and where the term of ‘moshing’ originated to explain the behaviour at punk rock shows. The second subgroup is called ‘pop punk’. Ambrose (2001:6) considered the latter has its roots in the lighter end of punk and modern contemporary pop. The pop punk is not easily correlated to the origins of true punk with some of these performers having mainstream appeal and filling stadiums worldwide. It is from events involving this later genre of punk that many of the public health and safety problems arise (Ambrose, 2001:6).

However there are sub-groups that generally have a positive effect on crowd behaviour. One such sub-group is the hippy movement.
The Hippy Movement

Hippies as opposed to punks, come from considerably different origins. This term was used to explain a 1960s social movement adapted from a communal or 'drop out' lifestyle that embraced eastern religious philosophies and environmental conservation, preferred rural living and, like the punks, rejected the materialistic directions of society at the time (Tittley 1999, http://www.sonlfeafrica.com/model/subcult3.htm, 28/11/2004). Music was very prominent in this group and modern OMFs have their origins in the hippy movement. Commonly the hippies were into trance-like styles of music such as psychedelic rock or folk music (Farlex 2004, http://encyclopedia.thefreedictionary.com, accessed 20/09/2004). The hippy movement does not participate in moshing or other higher risk physical behaviours.

2.5.8 Summary

This section introduced OMFs, provided a historical perspective, and discussed the public health significance of these events citing recent incidents and a landmark Australian incident, sources of risks and the influences of youth culture on these risks. The next sections focus on crowd management.

2.6 Crowd management

This section introduces crowd management, understanding crowds including discussion on high-risk behaviours, crowd composition and introduces a new crowd behaviour model.

2.6.1 Introduction to crowd management

Davis, Yin and Velastin (1995:38) asserted that crowds at OMFs can become a significant problem with serious consequences without effective crowd management. Fruin (2002, http://www.crowdsafe.com.au, 01/07/2002) described crowd management as being 'the systematic planning for, and supervision of, the orderly movement and assembly of people'. Davis
Associates (2003:28-29) described the primary crowd management objectives as:

- to understand the potential dangers and problems that can rise from crowding;
- to provide appropriate management structures;
- to develop and maintain the integrity of a safe system of crowd management; and
- to ensure that there is a continuous focus upon the analysis and improvement of crowd safety provisions.

Wertheimer (2000b) and Tatrai (2001a) supported these objectives. Wertheimer (2000b: 4) added that crowd management for events covered risk assessment event promotion, anticipated crowd behaviour, ingress, egress, public amenities, emergency assistance, first aid, crowd capacity and configurations, artist responsibilities, concessions, public safety, security and the establishment and enforcement of safety rules. Additionally, crowd management must be both proactive and reactive, involve ongoing development and continued cooperation of staff and management (Wertheimer, 2000b:4).

Tatrai (2001a) considered successful crowd management could be discussed within the following themes: (a) understanding crowds, (b) good design features, and (c) good crowd management operations. The following sections are based on Tatrai’s features.

### 2.6.2 Understanding crowds

Event organisers and promoters need to be aware of the implications of attracting particular types of clientele. The HSE (1999:7) argued that event organisers and promoters must be aware of the history of the performers selected and the types of audiences they attract.
2.6.2.1 High risk behaviours
Moshing; crowd surfing; stage diving, crowd surges and swirling are the most common adverse crowd behaviours at OMFs reported in the literature reviewed (for example DoH, 2004). The term “moshing” was used to explain the bashing and slamming of bodies together and in most cases includes “crowd surfing” and “slam dancing” (Raineri, 2004:3). Crowd surfing is when a patron is held above the audience and carried, in some cases, considerable distances from their starting point.

Figure 2.4: crowd surfing

This introduces further potential for injury as many are dropped or fall on people or are assaulted (for example one patron was stabbed by a bunt object when crowd surfing at a festival) (see Figure 2.4). The area of maximum concern is approximately 30 metres from the front of the stage and direct view of the performers. This area is known as the “mosh pit” and is the focus of risk assessments and other management strategies (Cross 2004, http://www.artdata.net/wwwMETA/HandS.asp, 02/04/2004).

The HSE (1993, http://www.hse.gov.uk/pubns/indg142.htm, 03/04/2004) asserted that the management of crowds carries a great deal of responsibility and is very dependent on good systems and staff experience. Upton (2004a:3) found from his work that 5% of the crowd generate up to 75% of the energy released at an event. This 5% is generally made up of the patrons located at the front of the stage or the mosh pit. Based on Upton’s findings, controlling the effects of that 5% (mosh pit) becomes critical to improving public health outcomes at OMFs.
2.6.2.2 Crowd composition
Event organisers and promoters need to be aware of the types of crowds that performers attract (HSE, 1999:7). Concern for crowd composition has its foundation in youth culture. As discussed earlier, the greater the homogeneity in a crowd the greater the cohesion in the audience (Tatrai, 2001a:6). This homogeneity may be caused by gender, age bias or strong collective interest. The impact of this homogeneity can be exacerbated by consumption of alcohol and crowd mobility (eg. large standing areas or mosh pits) according to Arbon (2002) and Milsten et al. (2002). Alternatively encouraging a broad crowd demographic with a balance of gender and diversity of ages generally has positive calming effects on crowds. Events such as folk festivals attract a broad demographic and have considerably fewer issues for crowd safety (Tatrai, 2001a:6).

2.6.2.3 Impacts of social movements
Event organisers and promoters need to be aware of the types of behaviours that are associated with performers and their audiences (HSE 1999:7). There are behavioural factors related to social movements such as predisposition to violent crime, property destruction and sexual harassment. These behaviours are more likely in the presence of excessive consumption of alcohol and drugs and a predominance of young males (Van Stan, 2002:3; Vider, 2004:145).

For example, violence has been associated with hip-hop performances (CMS, 2002:1). Hip-Hop was founded in the Bronx in New York City and became a voice for disadvantaged Afro-American and Latino youth from that area (Blake, 2003:1). It has been common practice for members of these audiences to bring weapons to events. Consequently, risks associated with these events have been exacerbated by factors such as improper or deficient security planning and controls (eg. using metal detectors) (CMS, 2002:2). Other examples of behavioural issues include stage invasions, general disorder from male patrons and hysteria by female patrons associated with some artists (Upton, 2004a:2). To manage the issues associated with the different social movements, comprehensive event planning including effective risk
assessments must be undertaken for each event (Commons, Baldwin & Dunsire, 1999:435; LLD 1999:4).

2.6.2.4 Crowd behaviour theory
There are a number of useful theoretical constructs used to interpret crowd dynamics. Crowd densities are one of the critical concerns for crowd managers. Commonly, it was considered that people moved roughly like particles in a liquid – hence the use of terms like “crowd flow”. Other theorists suggest that crowds behave like gas molecules (Davis, Yin & Velastin, 1995). However Fruin (1993:4) said if this type of crowd movement were observed, crowd densities would be at about 7 persons per square metre and that is very dangerous. At this density, people can be lifted off their feet and propelled 3m or more with clothing torn off. It is often hard to breathe and the heat and thermo insulation from the surrounding human mass causes weakening and fainting. When densities are less and independent movement is permissible, Still (1999:2) suggested that there were clear patterns to movement within crowds. Still (1999:2) undertook an extensive crowd study at Wembley Stadium that changed contemporary understanding of crowds and found:

“...the same patterns recurring time and again: long chains of moving people would form spontaneously, persisting with almost military precision before fading away into randomness. The particular patterns of movement would vary in different parts of the Wembley complex, but [the movement patterns] would stay consistent in each part...the type of crowd made little difference, the same thing happened whether they were there to see Tina Turner or a football match.”

Crowds are also categorised according to the cohesion and organisation within. Generally, patrons attending music events are a collection of individuals sharing a common location and are generally without leadership or focus (Tatrai, 2001a:4; Vider, 2004). Tatrai (2001a:4) described this type of
crowd as a “collective group”. However, there are numerous variables that can unite these individuals into a “cohesive group”. These variables include sharing close proximity (eg. being in the mosh pit), similarity (eg. appearances), and shared interests or cooperative interaction (eg. love of punk music) (Turner, 1995 in Vider, 2004:146). Extreme reactions from crowds at OMFs are possible but rare. Vider (2004:162) who studied a particularly extreme crowd incident, the recent riots at Woodstock 1999, surmised that it was the strong shared social identity in that crowd which contributed to the extreme behaviour at that event. The complete transition undertaken by that crowd to ultimately rioting was not clear however drugs and alcohol along with discontent at the services and charges appeared particularly influential (Vider, 2004:154).

Fruin (2002, http://www.crowdsafe.com.au, 01/07/2002) developed a model to provide insight into the causes of crowd disasters, prevention and mitigation approaches. The elements of the model form the acronym “FIST”, which is a useful reminder that any crowd situation can quickly become threatening and potentially lethal. The acronym is defined as follows:

I. Force (F) of the crowd, or crowd pressure;
II. Information (I) on which the crowd acts or reacts – real or perceived;
III. Space (S) involved in the crowd incident – standing area, physical facilities etc;
IV. Time (T) duration of incidents, event scheduling, facility processing rates.

(i) Force
In crowd environments like many mosh pits or constricted passageways, the crowd can become like a liquid mass. The crowd forces generated can be impossible to resist or control. Davis Associates (2003:31) added there has been evidence of bent steel railings after several fatal crowd incidents indicating forces exceeding 4500 N (1000 lbs) occurred. Raineri (2004:5) said that the majority of crowd-related deaths were due to compressive asphyxia and not the “trampling” reported by the media. Forces are due to pushing and

Davis Associates (2003:32) indicated the specific factors that contributed to the generation of forces within crowds were: pushing, crowd surges, flow paths and the domino effect of these other factors occurring within a crowd.

(ii) Information
Fruin (2002, http://www.crowdsafe.com.au, 01/07/2002) considered that ‘information has many forms. It includes all means of communication, the sights and sounds affecting group perceptions, public address announcements, training, actions of personnel, signs and even ticketing” (p. 5).

Fruin (2002, http://www.crowdsafe.com.au, 01/07/2002) advised that crowd behaviour is affected by the provision of information and suggested that clear signposts and simple, audible public address messages are vital as poor communication can lead to confusion and crowd flow blockages. Also, individual patrons can be influenced by the behaviour of others around them. Leaders within crowds need to be identified and their effect neutralised or limited (HSE 1993, http://www.hse.gov.uk/pubns/indg142.htm, 03/04/2004).

(iii) Space

“configuration, capacity and traffic processing capabilities of assembly facilities determine degrees of crowding. Space includes standing and seating areas, projected occupancies and the practical working capacities of corridors, ramps, stairs, doors, escalators and elevators” (p. 5).

Considering the movement of people in the event is critical. Designing for crowd management requires that projected maximum occupancy levels be

(iv) Time

Fruin (2002, http://www.crowdsafe.com.au, 01/07/2002) provided a simple illustration of timing as the more gradual and lighter density arrival process before an event compared to the rapid egress and heavy crowd densities after an event. Raineri (2004:5) considered the rationale for time-based crowd management strategies in the control of pedestrian rates so that traffic flow does not exceed the capacity of any element of the venue. Examples of strategies include staggering start times for activities at the event or mixing up the line-up for the day so popular acts perform throughout the day. The objective of these temporal strategies is to keep pedestrian densities below critical levels.

Figure 2.5 provides a model to assist EHPs, event organisers and promoters to better understand crowd behaviour at OMFs. An explanation of each step within Figure 2.5 is:

Step 1 (Individual behaviour) and Step 2 (Crowd decision):

EMA (1999:87) suggested that crowd responses are a series of individual and collective behaviours where individuals communicate with one another to be collegial, reduce confusion and evaluate emotional responses. Based on decisions made at this stage, changes in the crowd behaviour occur.

Step 3 (Collective behaviour):

Tatrai (2001a:4) reported that there are three (3) main classifications for crowds. These are collective groups without leadership, groups with common interests, and mobs that are responsible for the extreme reactions in crowds. Each of these crowd classifications has implications for event planning and management. Importantly crowds can move readily between each
classification and the subcategories within them. Each of these crowd classifications has implications for event planning and management.

Step 4 (Consequences):
Figure 2.5 Crowd behaviour model (EMA 1999, Fruin 2002, http://www.crowdsafe.com.au, 01/07/2002 & Tatrai 2001a)

This figure is not available online. Please consult the hardcopy thesis available from the QUT Library
2.6.2.5 Impacts of the performers

Hill (2002, http://www.musicjournal.org/02liveevents.htm, 12/07/2004) reported that there was considerable ‘inconsistency in the way [the performers] tend to behave towards their audiences’ (p.2). The HSE (1999:7) considered it was important for event organisers and promoters to have knowledge of performers but there was evidence from the literature and media reports that this was not always the case. For example, Mike Upton, head of security at an OMF in England, learned quickly the effect that the American band, Guns and Roses, had on a heavy metal audience after two people died and many more were injured during their set (Upton, 1995a:7-9). Similarly, the promoters responsible for bringing American band Limp Biskit to Australia later claimed to have been unaware of the reputation of this band after an incident resulted in a death at the Big Day Out festival in Sydney 2001. However, both Ambrose (2001) and Vider (2004) identified the trail of destruction and mayhem caused by this band in America was well known and documented. As previously stated, knowledge of performers’ effects on audiences is vital to planning and operational processes for OMFs (Tatrai, 2001a:6).

2.6.3 Summary

This section introduced crowd management, understanding crowds including discussion on high-risk behaviours, crowd composition and introduced a new crowd behaviour model. The next section covers event management for OMFs.

2.7 Event management

There was considerable evidence in the literature reviewed detailing the features at OMFs that need to be managed in order to successfully reduce health and safety impacts. The principal areas identified were the crowd, staffing requirements (professional and voluntary), ingress, egress, first aid, traffic, emergency services, selection of venues and structures, fire safety, safe food and drink, people with special needs, waste management, sanitary facilities and camping. Understandably, it takes a large number of people to
staff OMFs and ensure safe operation. These include stewards, trained catering staff, waste management technicians, maintenance staff, administration people, security personnel, trained riggers and stage management staff (documented within planning resources such as EMA, 1999; HSE, 1999). For this research program, only crowd management and the use of volunteers in OMFs’ operations were of interest and discussed in detail.

2.7.1 Overview of the features of event management

The following are examples of the services required for each event:

- fire safety involves safe escape routes, fire fighting equipment and appropriate staff (numbers and capacity) (HSE 1999:21-30);
- first aid and medical services involves medical facilities, ambulances and appropriate staff (including mobile patrols) (Hodgetts & Cooke 1999:957);
- emergency management planning is required for structural faults, equipment or amusement ride failure or malfunction, bomb threats and crowd control (Department of Human Services [DHS] 2003:28);
- security and stewarding involving crowd control; guarding of back house, back stage, and front of stage areas; cash and equipment protection; and control of entry and exits (Ministry of Civil Defence & Emergency Management [MCDEM], 2003:36);
- environmental health services (eg. food, waste management, animal, pest or vermin management) (EMA 1999:31-42);
- public transport coordination, traffic management and parking control (EMA, 1995:198) and
- cleaning and maintenance services for ablution facilities, toilets and the general site (HSE 1999:80).

The infrastructure required at OMFs involve the provision of adequate numbers of toilets, showers, wash hand basins, food outlets, temporary structures (eg. marques and tents), camping areas; a water supply; a number of transport options (eg. to and from the site), emergency response
infrastructures (eg. watch towers for fires), electrical safety, noise management (eg. limiting sound levels and stage positions etc) and crowd management infrastructure (eg. DoH, 1995; EMA 1999, HSE, 1999 etc).

2.7.2 Managing crowds at OMFs

2.7.2.1 Design features
There was some discourse on design features in the guideline literature reviewed. Tatrai (2001a) and Raineri (2004) identified numerous other design considerations including selection of appropriate venues; minimising pinch points; maintaining ingress and egress control; locations of facilities (eg. toilets, alcohol service and drinking areas) and emergency services access. Within the literature reviewed there was consensus for most management approaches recommended for events. One explanation is the majority of documents reviewed used the HSE 1999 document as a reference point. However, there was a divergence of views on how best to manage the mosh pit areas and the use of barriers.

There was agreement on the use of front barriers at the stages supervised by security staff and the provision of water to that area (EMA, 1999; HSE, 1999). These barriers must be of sound construction and able to withstand 5 Kilo Newtons per metre and located no less than 1.0 metre from the front line of the stage (HSE, 1999:69). The discourse in the literature reviewed referred to the use of further barriers called “secondary barrier systems”. Some authors insist that these secondary systems are essential. Upton (2004a) was the most critical of current methods and argued it is necessary to segregate the mosh pit off from the rest of the crowd. This is a complex task and there are a number of options available. The HSE (1999:69) advised for any of these options to be effective each needs to be adequately staffed. The more complex the barrier system the more staff required supervising them and the greater the costs (refer to Appendix 1 for further details on the various barriers configurations).
Upton said that not all the barrier designs used to manage mosh pits have been successful. Upton (2004a) reported that a pod system used at a heavy metal event failed when “crowd members close to one of these objects got caught up in a crowd spin (or swirl) that eventually collapsed and three people died” (p. 3). Another system used at the Roskilde festival for over thirty years failed when a crowd crush incident occurred at the 2000 event resulting in nine deaths and numerous injuries. This system used a series of crush barriers or wave breakers to break up the energy of the crowd. However, in 2000 this method was shown to be ineffective and was decommissioned after that event (Upton, 2004a:3).

Upton (2004a:5) recommended that the following needed to be considered when making decisions about barrier configurations for OMFs and other events. These points were:

- Establish realistic capacity and densities throughout the event;
- Assess conditions by individual areas not the overall site (eg. to ensure clear sight lines to video screens not just stages);
- Risk assessments should include incline, drainage, grass coverage and hard standing features;
- An accurate assessment of the cultural behaviour and influences of the performers and their impacts on the crowd behaviour be undertaken; and
- Consideration for medical and security teams to respond, triage and retrieve victims of crowd incidents is important.

Commons, Baldwin and Dunsire (1999:435) argued that excessive control was too restrictive and limited expression for the patrons. Commons and his colleagues posed a good point however authors with more experience in the area, insisted that public safety needs to be the main priority for event
organisers and licensing authorities (eg. Upton, 2004a; Wertheimer (various); HSE, 1999; EMA 1999).

2.7.2.2 Operational features
There are two main groups involved in the crowd management operations. These are trained security guards and stewards. For the security providers there are operational standards and best practice approaches to security manpower ratios for events; requirements for training and experience; and stage barricades and related site infrastructure facilities (Tatrai, 2001a). Good crowd management requires good communication and coordination between the event organisers and the operational security staff (HSE, 1999:37). Additionally, it is important that all staff to be aware of the importance of maintaining crowd safety (HSE, 1993, http://www.hse.gov.uk/pubns/indg142.htm, 03/04/2004).

The HSE (1993, http://www.hse.gov.uk/pubns/indg142.htm, 03/04/2004) recommend that the following two areas must be addressed for effective crowd management operations to occur. Firstly, there needs to be adequate staffing capacity with (a) clear role and responsibilities, (b) documentation and review of all crowd management systems, and (c) adequately trained staff involved. Crowd safety teams at OMFs should have:

- Gained an understanding of the implication for crowd demographics and be aware of expected behaviour;
- Undertaken a risk assessment of crowd safety systems for effectiveness and appropriateness;
- Undertaken regular audits of the crowd safety systems during the event and have contingency plans in place;
- Set targets for crowd management; and
- Collaborated and communicated with key agencies such as the police and emergency services (HSE 1993, http://www.hse.gov.uk/pubns/indg142.htm, 03/04/2004).
Both the HSE (1993, http://www.hse.gov.uk/pubns/indg142.htm, 03/04/2004) and Upton (2004a:5) have indicated that knowledge of the crowd demographics and behaviours are important for both design and operational features for OMFs. Examples of some of the information required to assist crowd management includes:

- Age and gender (Arbon 2004; Milsten et al. 2002);
- Types and compatibility of social movements or cliques expected to attend (e.g. moshing at punk events (Ambrose, 2001:35; Keithley, 2003:125) or conflict between punks and skinheads (Kleg 1993:74)).
- Illegal drug or alcohol use - different social movements have their drugs of choice. For example, punks and glue sniffing or heroin; hippies and cannabis; ravers and the drug “ecstasy” (Forsyth, Barnard and McKeganey 1997:1317; Priddle, 2004, http://www.arasite.org/guestjpl.html, 28/11/2004).

These impacts have considerable implications for police, security, first aid and medical services at OMFs. Using rave events to further explain this, overdoses have occurred however are socially heterogenic and are generally free from violence (Parker & Auerhahn, 1998:78; Weir (2000:1844). Potentially there are major impacts for the first aid and medical services but a considerably reduced impact on security services at these events. Alternatively, punk events have major implications for both medical and security services. Overall Tatrai (2001a:6) considered that it is a matter of being aware of all the risks, undertaking an effective risk assessment and following up with appropriate management systems.

### 2.7.3 Volunteers

Volunteering means undertaking an activity where time is given freely to benefit another person, group or organisation but does not preclude the volunteers themselves also benefiting from undertaking this activity (Wilson, 2000:215). In Australia there are 4.4 million regular volunteers giving 700
million hours of work each year (Australian Bureau of Statistics, 2000) with
greater participation in the rural and regional areas (Volunteering Australia,
2003:1). The majority of this volunteering occurs in sports and recreation,
welfare and community (includes emergency management), training and
youth development, and religion settings (Flick, Bittman & Doyle, 2002:16).
The majority of work undertaken by volunteers can be broken down into three
main areas of customer services (eg. tour guides or roving ambassadors),
administrative duties (eg. data entry or envelope stuffing) and governance (eg.
working groups or board members) (Verve, 2004).

There was very limited discourse on volunteers working at OMFs in the
literature reviewed. However, there was considerably more literature available
on volunteers in emergency management. Emergency management
volunteers perform similar tasks and are exposed to similar risks as those
working at OMFs. Some emergency management volunteers are used for
services such as first aid, fire control, and parking and vehicle management
for OMFs. Consequently, these volunteers were of interest to this research.

A major area of risk for volunteer organisations’ effectiveness and volunteer
protection is the failure to achieve and maintain adequate skill and
competency levels among these volunteers (EMA, 2003:11). Training has
long been an important part of emergency management culture with authors
such as Fahey, Walker and Sleigh (2002) and Hughes and Henry (2003b)
considering that effective training contributed to organisations recruiting and
retaining their volunteers. It is considered essential that minimum standards
and competencies are a prerequisite for volunteer involvement in all
operational activities in emergency management (EMA, 2003:11) and yet
volunteers who receive no training are permitted to work at OMFs.

There are a variety of educational and training options available for
emergency management volunteers. These options range from full tertiary
degrees (Fuller, 2002:24), certificates and diplomas (EMA, 2003:11), to
specific organisational competencies-based training programs (ANGLICARE Emergency Services, 2003:5). These programs are required to be assessed against national industry a competency standard that permits recognition across states and territories. However, there have been criticisms that these standards do not encapsulate every area of the work undertaken by the emergency management sector (Alexander, 2003:122).

Templeman (2003:3) asserted that volunteers could no longer be amateurs: they must have training. As a result most Australian emergency service organisations have training programs to support their volunteers (EMA, 2003:11). The rural fire services (Hughes & Henry, 2003a), SES (Summers, 2001) and ambulance (Fahey, Walker & Sleigh, 2002) volunteers are exposed to continuous training programs. Additionally organisations such as ANGLICARE who have an involvement in emergency recovery services also have specific organisational training programs for their volunteers.

The volunteers working with ANGLICARE are engaged in a variety of emergency management activities including bushfires, storms, floods and draught relief, migrant support or major accidents (eg. the Glenbrook train disaster). This training has been used to develop essential skills with these volunteers and provides an understanding of all the responsibilities and roles for this volunteer population (ANGLICARE Emergency Services, 2003:5). The ANGLICARE training program is divided between workshops, refresher training, planning training and operational briefings. Critically, beyond these types of training programs, there were very limited training opportunities that could assist volunteers working at OMFs.

There was further discourse in the literature reviewed on volunteers that focused on organisational issues (Arbon, 1997), safety issues (Somerville, 2001), and management approaches (Howard, 1999a). There were also discussions on planning and operation of medical services, patient presentations and an innovative model for predicting patient and transport
rates (Arbon, 2003; Arbon, Bridgewater & Smith, 2001; Zeitz et al. 2002; Flavouris & Bridgewater, 1996). There was additional discourse in the literature that covered the recruitment and retention of volunteers in the emergency management sector (eg. Aitken, 2000 or Volunteering Australia, 2003).

It was evident in the literature reviewed that there was more accountability in the global volunteer sector (eg. US Department of Health & Human Services, 2003 etc). This increased accountability has been reflected within a summit on volunteering held in Canberra, 2001, titled ‘Value your volunteers or lose them’. This summit focused on strengthening volunteerism in the emergency management sector. Many organisations in attendance declared that they were struggling to maintain their volunteer capacity. Discussions at the summit covered issues for the protection of all volunteers including accessing training options, compliance with workplace health and safety requirements, and good public liability coverage (EMA, 2001a). This summit was well attended and a significant step forward for volunteering in Australia.

2.7.3.1 Volunteers working at OMFs
Volunteers working at OMFs carry out a variety of roles. Some organisations and many individuals volunteer to work at OMFs. The main volunteer roles are crowd control (eg. stewarding and marshalling traffic), administration and event operations (eg. medical services, water treatment operators and waste management). In Australia, the best-known volunteers at OMFs provide first aid with the majority working through the St John Ambulance (St John Ambulance Australia, 2001). Along with individuals, other volunteer organisations used at OMFs include the Rural Fire Services (Qld) and the State Emergency Services (Rural Fire Services, 2002, http://www.ruralfire.qld.gov.au, 01/02/2002; State Emergency Services 2002, http://www.emergency.qld.gov.au/ses/, 01/03/2002).

The motivations for individuals to volunteer are either based on “self-interest” or “altruism” according to Fahey, Walker and Sleigh (2002:6). Volunteers who
work at OMFs are more likely to be categorised as motivated by “self-interest” as attending the OMF is the main motivation for volunteering. Volunteers will receive free entry and some additional benefits that other patrons do not have access to (eg. back stage passes or access to other restricted areas). Fahey, Walker and Sleigh (2002:3) identified volunteer retention and training were both important to maintaining volunteer capacity. Aitken (2000:16) asserted that volunteering was closely related to the experience being interesting and enjoyable. This is the likely reason that volunteers continue volunteering at OMFs.

The reliance on volunteer staff may result in ineffective or inadequate service provision. This problem was demonstrated in 2000 during an incident at the Roskilde festival in Denmark where a number of patrons were killed and others injured in a crowd crush. Wertheimer (2001b:3) stated “last year (2000) the Roskilde Festival organisers found that their crowd management volunteers – through no fault of the volunteers themselves – were overwhelmed when critical crowd safety skills were needed most.” The festival organisers refuted this claim (Roskilde Festival Organisers, 2001: 7, http://www.roskilde-festival.dk/2001/english/nyt/151100.shtml, 18/04/2001). Regardless, the following year additional the festival provided training organisers but Wertheimer remained concerned at the inexperience of these volunteers (Wertheimer, 2001b:3).

2.7.3.2 Volunteer Training
As stated previously, knowledge of crowd safety systems was critical to the success of event management operations for OMFs (eg. HSE, 1999; DoH, 2004 or Tatrai, 2001a). This training is not provided through emergency management training programs. Au et al. (1993:86) have argued that all staff should have an awareness of crowd safety and recommended there should be no distinction between paid and volunteer staff on this matter. The literature generated by the HSE (1999) and DoH (2004) reflected this recommendation by stating competencies for stewards working with crowds at
events but did not distinguish between volunteers and paid staff. Some of the literature reviewed referred to “peer security” who are generally voluntary staff (EMA, 1999:9; FEMA, 2003:78). EMA (1999:9) and the FEMA (2003:78) documents clarified peer security staff as crowd monitors and event organisers were to provide guidelines for their activities and limits to their authority but there were no requirements for training.

Au et al. (1993:86) considered that there would a reduction in risks if the event staff were competently able to (a) to perform designated tasks, and (b) had awareness of problems that may arise and have some understanding of the control measures and (c) roles, responsibilities and contingency and emergency procedures. The HSE added that appropriate levels of competency could be achieved by gaining knowledge and through experience. They added there should also be some professional expertise in the mix to boost this competency (HSE, 1997 in HSE, 2003a: 19). There is no argument that training can be used to help develop this volunteer capacity. In terms of delivery, volunteers generally wanted training to be relevant, simple and interesting (Aitken, 2000; Health & Safety Laboratory, 2001). There were a number of training options identified in the literature, however, the training programs offered through the Glastonbury Festival were recognised as the benchmark (Glastonbury Festival Limited [GFL], 2001, http://www.glastonburyfestivals.co.uk/2001/stewardscertified.html, 21/07/2004).

The Glastonbury festival introduced formal training programs to increase volunteer capacity for the volunteer stewards at that event in 2001 (GFL 2001 http://www.glastonburyfestivals.co.uk/2001/stewardscertified.html, 21/07/2004; Ballinger 2002 http://money.guardian.co.uk/work/wageslavs/story/, 21/07/2004). For Queensland volunteers, there were a few training programs available through some OMFs documented in the literature reviewed. The Big Day Out festival introduced training for their volunteer crowd carers and Rave Safe volunteers have a training program.
Formal training for volunteers at the Glastonbury festival was introduced in 2000 and since then over 4600 places have been filled (ACCESS, 2003a:2). These training courses have been tailored to meet the expected level of responsibility, complexity and autonomy for each volunteer position. These training programs also meet the recommendations of the British Standard BS8406 that provides a framework for training and development for outdoor event staff. The content includes customer care, social skills, site rules, emergency procedures, reporting and communication (National Outdoor Events Association, 2004:2; ACCESS, 2003b:4). In addition to this training, all the volunteers receive induction training before deployment to their assigned positions (ACCESS, 2003b:4).

Another training option available has been offered to volunteers who are involved in a drug harm minimisation program called “Rave Safe”. These volunteers are called “peer helpers” and assist patrons experiencing difficulties with alcohol, drugs or other issues (eg. dehydration) (Queensland Health, 2002:2). This training includes an overview of duties, roles and tasks; and provides scenarios, the responses required and administrative requirements. First aid is also part of this training (Queensland Health, 2002:2). However, this program does not cover crowd behaviours and crowd management strategies, which is an issue for OMF volunteers as they carry out their duties in the crowds at these events.

Finally, there was a training program for the volunteers working at the Big Day Out in the role of “crowd care” volunteers (Creative Industries Pty Ltd, 2002:4). This program was introduced in 2002 with a range of responses to improve management of the event after the 2001 death. These volunteers are used to advise on the service issues, provide water and information for patrons as needed, observe and report on the crowd behaviours and provide additional support as required. This training program provides an understanding of the roles and responsibilities, chain of command, customer service and
occupational health and safety requirements (Creative Industries Pty Ltd, 2002:2).

2.7.4 Summary
This section included discussion on two key operational factors that have considerable implications on public health and safety at OMFs: crowd management and the use of volunteers. For crowd management, the discussion was further divided into three main areas that covered understanding crowds; design considerations and crowd management operations. For volunteers at OMFs the discussion included the use of and building capacity for volunteers. The next sections cover event planning for OMFs.

2.8 Event planning for OMFs
Effective event planning for OMFs is considered the best way to improve public health and safety outcomes at OMFs (documented in resources such as HSE, 1999; EMA, 1999). This section contains discussion on: (a) administration, (b) the implications, (c) variations and (d) guidance that event planning has on event safety.

2.8.1 Introduction to event planning
Planning for any event is a complex process and is undertaken to manage the hazards and risks associated with holding an OMF. Event organisers need to consider the overall scope of the event, risks to spectators and participants, community impacts, contingency planning and all the emergency support that may be required (FEMA, 2003; Cross (http://www.artsdata.net/wwwMETA/HandS.asp, 02/04/2004). Event planning is a regulatory requirement imposed by the licensing authorities.

Findings from an Australian study revealed gaps in knowledge of event planning within a group of event organisers operating on the Gold Coast in Queensland. However this group had the perception that they were still
running their event at a satisfactory standard which was a major concern for the researchers (Tavane & Johnson, 2001). Effective event planning is divided into two processes (1) the pre-event planning (Hanna, 1995:29) that will then inform the development of (2) event management plans or risk management plans (DoH, 2004:28; LLD, 1999:4).

2.8.2 Pre-event Planning
All the event resources including the DHS (2003) and DoH (2004) documents have highlighted the importance of pre-event planning. A key part of this planning process is the site section. This involves the clarification of access and egress; and identification of hazards, crowd movement, public health issues, numbers and infrastructure needs for medical care, police and security (DHS, 2003; EMA 1999). Identification and collaboration with the key stakeholders associated with the event and the development of contingency plans is also important (FEMA, 2003; Hanna 1995; LLD, 1999). It is during the development of the contingency plans that the risk assessments are undertaken for the event (Bridgend Events Safety Advisory Group, 2002). Negotiating and securing licenses and permits from the LGAs are also important in this process (Department of Human Services, 2003). Finally, Curd (http://www.adfq.org/curd.html, 02/12/2004) also suggested that event promotion and media management needed to be considered within this stage.

2.8.3 Event management plans
All the pre-event planning work undertaken is then documented in an event management plan. All events are different and have unique characteristics; the structure of the event management plan should reflect these features. This plan should consider the licensing and regulations that impact on the event; emergency response issues; and identifies staff and agencies responsible for identified hazards and risks, resources, expenses and jurisdictions (FEMA, 2003). These plans must be comprehensive, clear, complete with well-documented operations, and widely distributed to staff (LLD, 1999).
In Australia, the regulatory administration of events is the responsibility of LGAs. There are considerable local public health implications associated with OMFs and LGAs are mandated with the management of local public health impacts. These links between OMFs and LGA responsibilities include the provision of waste management and safe drinking water, food safety and sanitation services. Consequently, it is understandable that this level of government should be mandated to regulate these events. These licensing programs for OMFs are legislated through local laws in each LGA. These local laws are the principle regulatory tools for control of these events (eg. Brisbane City Council 1999). EHPs are the LGA officers who service these programs.

### 2.8.4 Implications

Essential to the success of managing the risks associated at OMFs is being able to ensure ‘that the resources are on-hand to deal with virtually any reasonable risk at that event’ (O'Connor, 2003:3, http://www.iaam.org/facility_manager, 25/05/2005) According to the literature reviewed, this can only be achieved through effective event planning (eg. EMA, 1999; FEMA, 2003). Wertheimer, a crowd management expert, has stated that the majority of the deaths and injuries that have occurred at OMFs could be linked back to poor event planning (eg. Wertheimer, 1993, 2000a, 2001 & 2002). Martin (2003, http://www.recmanagement.com/feature_print?fid=200304fe04, 20/05/2005) suggested that moderate but diligent planning was enough to provide noticeable increases in safety for patrons attending. However this has not always been the case.

There are a number of examples of the association between event planning and public safety. For example, Pretell (1997, http://pdm.medicine.wise.sdu/moncerrat.htm, 21/07/2004) reported that poor organisation led to five deaths at an event when an open auditorium with a capacity of 20 000 was filled with 100 000 people. Similarly there was a death, 140 injuries and environmental damage to Brighton Beach, England when 250 000 people attended an event where 60 000 people were expected (Hill, 2003,
Wertheimer (2002) reported incidents where people had been shot at rap and hip-hop shows because guns were not prevented from being brought into the events. A lack of emergency response had contributed to 53 deaths resulting from people escaping a hailstorm (Wertheimer, 2000a) and not prevented rioting at the Woodstock 1999 event (Ambrose, 2001).

In all these examples, the major contributing factor was poor event and emergency planning (CMS, 2001a). For example, Upton (1995b) reviewed an incident where three patrons were killed and found there had been insufficient consideration for crowd dynamics; contingency planning; systems design; crowd management; communication, and command and control procedures. Finally and most critically, there was no risk assessment undertaken as part of the event planning processes (Upton, 1995b:6).

2.8.4 Variations in OMFs
There is considerable variation in the types, sizes and duration of OMFs. Milsten et al. (2002), Milsten et al. (2003) and Arbon (2003) have linked these and other variations to the presentations of injuries at OMFs. The differences in duration of OMFs are single day and multiple day events. Examples of single day events include the Big Day Out and the Livid Festival that visit major cities throughout Australia. Examples of multi-day events include the Woodford Folk, Roskilde and Glastonbury festivals. Examples of the different types include world music, country, folk, pop, heavy metal, punk and combinations of all these. The sizes of these events vary from the largest single event in Toronto, Canada with over 450000 people in attendance, to a few thousand people at smaller events such as the 4ZZZ fundraising events in Brisbane. There are, however, event-planning implications for all these variations.

As raised earlier, EMA (1999:xiii) warned that the inappropriate provision of infrastructure and essential services to meet the needs for each OMF has resulted in increased public health risks for festival patrons. The event
planning capacity of event organisers is the crucial element to address this concern. According to the findings of Au et al. (1993:8), experience with event planning has been relied on to organise these events. Based on the comments within EMA (1999) it would appear that little had changed since that 1993 report and unacceptable variations continue. The reducing reliance on individual experience and providing detailed guidance notes are seen as good methods to reduce these variations in event planning. It is also important that the assessment processes through LGAs are just as consistent. This is not to say that experience with these events is not important, however, experience cannot be relied upon as the sole resource in managing public health concerns at OMFs (Au et al. 1993:8).

An area of event planning and management that has been highlighted in literature was the limitations in emergency planning for Australian OMFs (EMA, 1999:xiii; Davies, 1998:14). Specifically, Davies (1998:14) pointed out that there was a lack of consultation on emergency management. EMA (1999:xiii) added that planning to respond to major incidents was not occurring. In addition, there is now concern about terrorism with Weir (2002a:1 & 2002b:1) reporting that OMFs are seen as high profile soft targets. This concern is valid as there have been reports of terrorist activities in other countries with deaths and injuries being reported at events (CMS 2002, http://www.crowdsafe.com/new.html, 27/08/2002). An exercise testing emergency response capabilities was undertaken at a venue in Washington DC in 1998. A mock bomb was detonated at a specially planned event and the response was analysed. This exercise highlighted the need for further development in the response to this type of threat (CMS, 1998:2).

In terms of improving the overall planning of OMFs there were a number of recommendations from the literature reviewed that were considered to improve the consistency of event planning and assessment processes. These recommendations were:

- carrying out extensive preparation prior to event;
- committing appropriate personnel and resources to support the event;
• use of good guidance information to guide the decision-making processes (eg. FEMA, 2003 or HSE, 1999 event planning guides) (EMA, 1999; DoH, 2004; HSE 1999; LLD 1999 etc).

2.8.5 Guidance and advice

'Planning is the basis for all successful events' (Northern Territory Government, 2003, p. 13). There was evidence within the literature reviewed that event organisers and licensing agencies would benefit from guidance about good event planning and management. There was also strong argument for improved event planning to achieve better health outcomes. Finally, resources were available to provide good, consistent advice useful for both industry and EHPs (eg. EMA, 1999; HSE, 1999; LLD, 1999; DoH, 2004).

Kemp, Hill and Upton (2004) found that a lack of formal qualification requirements has meant, 'operational planning for crowd safety is largely a generic exercise that depends on the planner's previous experience' (p. 20). Kemp, Hill and Upton (2004:20) did acknowledge that assistance was available in the form of published guidance. However, Arbon (2004:210) reported a lack of uniform standards within mass-gathering health guidelines. A review of the key guidance documents revealed considerable shared content and direction. Consequently, Arbon’s (2004:210) and particularly, Kemp, Hill and Upton’s (2004:20) observations suggest a stronger focus on experience and not the published guidance. There were key documents regularly identified within the literature reviewed.

The best-known and referenced guidance resource was the HSE (1999) document and was generally considered the most comprehensive and the international benchmark for event planning. The document commonly referred to as the “purple guide” provides guidance on minimum standards for events with essential reading for structures; sanitation; waste management; sound, noise and vibration; food, drink and water; requirements for people with special needs; and risk assessment (HSE 1999). This document is recognised
in other documents such as the events guide for Edinburgh in Scotland (City of Edinburgh Council [CEC], 2002).

In Australia, EMA (1999) developed guidelines that are generally seen as the current national benchmark. This manual provides a comprehensive overview of the issues to be addressed during the planning, management and operation of these events (DHS, 2003). Particularly valuable are the checklists included. These checklists are useful for promoters, licensing authorities, food vendors and catering staff to assist with event management to ensure the planning is comprehensive (EMA, 1999).

In Queensland, a publication by the LLD (1999) is considered the state benchmark. The principal purpose of this document focuses on the development of risk-based management plans for each event. The management plan framework addresses issues such as venue selection, safety regulation, public liability, event promotion, security, medical services, and the management of alcohol. This document has limitations and does not contain the level of detail needed. The use of this guide should be supported by more detailed guidance documents such as the one produced by EMA (1999).

There are many other documents available for event organisers and LGA EHPs to use for event planning and guiding operations. Examples of these other readily available guidelines are:

- ‘Guidelines for concerts, events and organised gatherings’ – draft document (DoH, 2004);
- ‘Safety planning guidelines for events’ for use in New Zealand (Ministry of Civil Defence & Emergency Management [MCD&EM], 2003);
- ‘Planning guide: events in Edinburgh’ for use in Scotland (CEC, 2002);
- ‘Special events contingency planning’ for use in America (FEMA, 2003);
All documents identified within this literature review have recommended the use of risk management in the planning and operations for OMFs (e.g., CEC, 2002; MCD&EM, 2003; EMA, 1999; HSE, 1999; LLD, 1999; Department of Human Services, 2003). Interestingly there were no case studies on successful event planning in the literature reviewed. One recognised method to improve event planning is through consultation with key agencies.

Comprehensive consultative processes with LGAs, state emergency services, and police, fire, medical and security services are recommended for OMFs (DoH, 2004). EMA (1999) also recommend engaging the patrons in these consultative processes. Potentially the patrons can contribute to the improvement of OMFs based on their experiences attending these and other events and the information could be included in post-event briefings. It would be beneficial to have mechanisms to gather and use information regarding the preferences and values that the public has regarding environmental health impacts.

The information from festival patrons could then be integrated into planning processes to improve public health outcomes and assist in determining the effectiveness of management strategies currently used (Ewan et al. 1994 in Strickland 1998:3). An example of this consultation was the extensive data collected by the Queensland Folk Festival during the Woodford Folk Festival and that information is used in the planning of subsequent events. This organisation reported that this was a valuable exercise for them (Jenkins, 2001:i). There were no formal studies involving patrons at OMFs published in the literature reviewed.

2.8.6 Summary
This section introduced event planning and covered variations in the types of OMFs and their implications and guidance for event planning. The next section provides a summary of the findings from reviewing the literature.
2.9 Literature review summary

There were many public health and safety hazards and risks at OMFs identified in the literature reviewed (e.g. EMA, 1999; HSE, 1999; Arbon, Bridgewater and Smith, 2001; Milsten et al. 2002; Milsten et al. 2003; Wertheimer, 2000a; 2001a & 2002). Consequently, there is considerable evidence to support the continued action to improve safety for OMFs. OMFs are approved and licensed in environmental health programs administered by LGAs in Australia. The aim of these licensing programs is to ensure that the event organisers deliver well-planned safe events (MCD&EM, 2003). Commonly it is the responsibility of EHPs to assess and manage OMFs on the behalf of the LGA. EHPs have this responsibility because of their expertise with risk management, licensing programs and legislative frameworks.

Public health and safety risks at OMFs can be managed by the provision of appropriate services (e.g. security and medical services) and infrastructure (e.g. food outlets and barrier systems). Both of these factors are readily affected by crowd variables such as age, crowd mobility and mood (Arbon, 2004; EMA, 1999; Tatrai, 2001a). The association between the services and infrastructure and crowd variables can only be managed by undertaking comprehensive event planning. The integration of risk assessment and management principles into the event planning process was seen as critical to guide the selection of strategies used at these OMFs (HSE, 1999:8).

It was strongly regarded that enhancing (1) event management and particularly (2) event planning would result in considerable improvements in public health outcomes for OMFs (e.g. EMA, 1999 and HSE, 1999). There were a number of discussion areas identified from the literature that contribute to the overall discussion on public health management at OMFs. These discussion areas included EHP and volunteer capacity; roles of LGAs, public health significance, crowd management; crowd composition, implications, variations, and guidance for event planning. Discussions on the effect of volunteer capacity on event management and strategies to enhance event planning were considered of particular importance to this research.
The first area of detailed discussion was on volunteer capacity. Volunteer staffs are often responsible for the provision of essential services at OMFs (for example crowd management) even though they are generally not professionals in the area nor do they have adequate training. These volunteers are not aware of and lack the capacity to deal with all the risks associated with these positions. Au et al. (1993:86) reported that it was important for all staff at events to have knowledge of the issues related to crowd control and operations. Training was considered the best method to improve volunteer capacity and to assist these volunteers to complete the assigned tasks successfully (ACCESS, 2003a:2). There was very limited evidence of training programs for volunteers at OMFs in the literature reviewed. (Hence, the need for the two Volunteer studies.)

The next detailed area of discussion was on enhancing event planning. The discourse in the literature on event planning was limited to three main topic areas: (1) planning for emergency medical services at mass gatherings (eg. Arbon 2003), (2) criticisms of current event planning (eg. Davies, 1998 and most of the literature by Wertheimer), and (3) guidance and advice (eg. HSE, 1999 and EMA, 1999). All authors who commented on event safety (eg. EMA, 1999 and Wertheimer, 2000a, 2001 & 2002) argued strongly that good, comprehensive event planning was essential to provide good event management and minimise the public health and safety risks at OMFs.

There are considerable variations and inconsistencies in event planning to date (Arbon, 2004:210; EMA, 1999:xiii). Additionally there have been numerous incidents that have been linked to poor quality event planning (eg. Wertheimer, 2003a; 2003b). This is despite the availability of numerous resources that could contribute to building event-planning capacity for both the event organisers and EHPs. Two documents that were highly recommended were the ‘event safety guide’ or ‘Purple’ guide for the HSE (1999) and the ‘Safe and Healthy Mass Gatherings’ manual by EMA (1999) (Tatrai, 2001a:1).
Using the guidance material identified and undertaking the consultative processes recommended would contribute to capacity building in event planning processes for both event organisers and licensing authorities. However, a review of the literature on the topic showed that there were areas where this advice could be enhanced. For example, there were no case studies reporting on effective event planning or consumer-based studies published in the literature. *(Hence, the need for the Leadership case study and Consumer-based study.)*

In terms of event management and planning, poor crowd management was considered the major factor affecting public health and safety at OMFs. To control crowds successfully it is necessary to have a good understanding of the audience, and good design features and management operations for each event (Tatrai 2001a). Competent, capable staff members to implement these strategies at OMF were also important (HSE, 1999). Crowd management was an area where traditionally EHPs have not had great involvement, choosing to leave this area to the police and emergency services. However, there has been a lack of leadership in this area and potentially EHPs are well placed to assume this role. There were also some gaps identified in the event guidance literature that may affect EHPs’ decisions to assume this new role. *(Hence the need for the Influences on behaviour and safety study.)*
CHAPTER 3.0 METHODOLOGY

This chapter will report on research methods and design used for the studies reported in this thesis. The information in this chapter has been presented in the following three main headings:

- **Introduction to the research process** (which includes the research objectives, research questions and an overview of the research methodologies);
- **Shared methodology processes** (which include study type, study designs, survey methods, pilot testing, reliability and validity); and
- **Individual methodological processes** (which include survey instruments, target populations, and data analysis processes for each study).

### 3.1 Introduction to the research process

The major areas discussed under this heading are the research objectives and the research questions.

#### 3.1.1 Object of the thesis

The aim of this research program was to enhance event planning and management at OMFs and add to the body of knowledge on volunteers, crowd safety and quality event planning for OMFs. This aim was formulated by the following objectives:

1. To investigate the ability of volunteers to contribute successfully to public health and emergency management at OMFs;

2. To identify the key factors that can improve public health and safety at OMFs; and
3. To identify priority concerns and influential factors that are most likely to have an impact on crowd behaviour and safety for patrons attending OMFs.

3.1.2 Research Questions
To achieve the objectives of the research program the following questions were formulated:

1. What are the awareness levels and skills of volunteers contributing to public health management at OMFs and how can these be enhanced or supported?

2. What were the main public health and safety risks confronting the Glastonbury festival and how well were these risks managed?

3. What are the main public health concerns that people have in relation to attending OMFs?

4. What are the main influences on crowd behaviour and public safety at OMFs?

3.1.3 Theory use: theoretical lens or perspective
Creswell (2003:137) considered that mixed methods research did not necessarily require a theoretical base to guide the studies being undertaken. However Creswell (2003:137) does recommend the use of a theoretical lens or perspective. This may be derived from the social sciences or an advocacy / participatory lens, such as gender, race, class, life style or critical perspective. It was up to this researcher to decide if or what theoretical lens would cover the entire research program design. This researcher has rejected the suggested perspectives raised by Creswell (2003) in favour of a “professional” perspective or more specifically, an “Environmental Health” perspective.
The decision-making processes guiding the studies undertaken were founded within the researcher’s experiences, skills and knowledge gained from extensive involvement within the environmental health profession. As result, the studies have drawn on researchers background with environmental management particularly (a) risk management and (b) planning and assessment processes. This perspective was acknowledged by each of the expert groups and academic supervisory staff involved with the studies.

3.1.4 Overview to the research methodologies
As discussed earlier, there has been limited published research on event planning that can benefit EHPs and volunteer capacity to work at OMFs. The key pieces of research published in these areas are:

- For event planning, the key studies have been undertaken by Arbon (2002 & 2004); Commons, Baldwin and Dunsire (1999); Lakin, Brown & Williams (2001); Milsten et al. (2002); and Milsten et al. (2003);
- For volunteer capacity, the majority of the research investment has focused on volunteers in emergency management such as volunteer ambulance and fire fighters. Studies undertaken by Fahey, Walker and Sleigh (2002) and Hughes and Henry (2003a) are excellent examples of this research. Arbon (2002) and Zeitz et al. (1996) published the only research that has focused on volunteers and public events; and
- For environmental health research, there have been very few published studies linking environmental health and OMFs. Lakin, Brown & Williams’ (2001) study covers both event planning and environmental health.

As a result, it has been assumed that the areas studied in this research program were relatively new fields of inquiry.

Each study in the program was guided by a structured research methodology that allowed a logical flow and defined criteria for each piece of work (Crafty 1998; Patton 1990; Brewer & Hunter 1989). The enquiry in this research program has focused predominantly on mixed methods (both quantitative /
qualitative research techniques) (Creswell 2003:15-16). Using a strategic enquiry described by Creswell (2003) as concurrent procedures that involved converging “quantitative and qualitative data in order to provide a comprehensive analysis of the research problem” (p.16). When used in combination, the two data sets result in a more complete analysis and do complement each other (Creswell, Fetters & Ivankova, 2004:7).

Morse (1991 in Creswell 2003:218) argued that this approach allows qualitative data to be used to describe aspects of a quantitative study that cannot easily be quantified. Specifically, quantitative methods isolate and identify the factors associated with variations observed at a given time while qualitative methods gain insight into the processes and events that have lead to these variations (Borkan, 2004:4).

3.2 Shared methodological processes
Each of the studies in this research program was carried out in the setting being researched, OMFs, with the participants being recruited directly from each of the events. The studies were set at three OMFs – two in Australia and one in England.

3.2.1 Type of research - exploratory research
Hedrick, Bickman and Rog (1993:44) described exploratory research as a category of research termed descriptive research that provides a “picture of a phenomenon as it naturally occurs” (p. 47). The World Health Organisation (2001) and Hedrick, Bickman and Rog (1993:45) both reported that it was common for this research to be less structured and not test a hypothesis or casualty. Exploratory research has been mostly associated with areas of research where limited previous work had been undertaken (Hedrick, Bickman and Rog 1993:45). Henry (1993) considered that “exploratory research is generally undertaken to provide an orientation or familiarisation with the topic under study” (p. 48). This type of research is commonly used for the early or pilot stages of larger research projects (Henry, 1993:48). Little is known about
the areas chosen for this research program so the use of an exploratory research framework was considered appropriate.

A number of study designs are considered appropriate for the collection of data for exploratory research. Based on the limitations of resources available and difficulties in accessing each of the target populations for each study, cross-sectional study designs were employed for all the studies (Henry, 1993).

The leadership case study (Study 3) was an exception and conceptualised as an exploratory case study (Yin, 1994:3). This study utilised multiple methods for the collection of qualitative and quantitative data that included the collection of reports, media articles and other relevant documentation and a survey of key LGA staff.

3.2.2 Study design

3.2.2.1 Cross sectional
Cross-sectional design method has been used extensively in this research program. The WHO (2001:45) depicted these studies as focusing on a single part of a given population at a given time. Henry (1993) and other authors recommended the use of cross-sectional designs for studies where probability based methods are not possible. The two main reasons preventing the use probability based methods for this research program were (a) no or incomplete population data available and (b) limited resources available.

Hedrick, Bickman and Rog (1993:47) considered this design appropriate when there are limited resources available to the researcher and it is not possible to clearly identify the population to be studied. The benefits of this type of study are easily implemented, relatively low cost, and yields results within a short time frame and are good for gathering information on opinions and attitudes (Daly, Kellehear & Gliksman, 1997:24; Hedrick, Bickman & Rog, 1993:47; Minichiello, Sullivan, Greenwood & Axford, 1999:213). Importantly authors have reported using this design successfully for public health research (as
reported by authors such as Daly, Kellehear & Gliksman, 1997). For example, one research area where cross-sectional studies had been used extensively was drug use studies in homeless populations where it is very difficult to obtain a probability-based sample.

In summary, the rationale for use of cross-sectional study designs in this research program was based on the following:

- The research program was undertaken with limited funding and opportunities to access to the target populations; and
- Complete details of each population being studied were not available to the researcher.

Hedrick, Bickman and Rog (1993) and WHO (2001) reported that a variety of data collection methods could be used for cross-sectional studies. This includes the method chosen for this research program: survey methods.

### 3.2.2.2 Study design - case study methods

In addition to the use of cross-sectional study designs, case methods were used for the leadership case study (Study 3). The OMF investigated was treated as a single case study as described in Yin (1994:47). Yin (1994) and Kerr, Taylor and Heard (1998) suggested that comprehensive data collection and analysis process was needed for this type of case study. The collection of data for the study involved the collection of key documents, specifically media articles; formal organisational and LGA documents (Yin, 1994:13); and the use of survey instruments (Sarantakos, 1998:56).

Authors such as Yin (1994) and Hamel, Dufour and Fortin (1993) have argued that case methods are appropriate for this type of research. These authors explained that case methods:

- are useful when attempting to explain why a phenomenon has achieved particular outcomes;
are the most appropriate approach to use in the study when the researcher has little or no control over the events being studied;

allow for the containment of the individual populations used in the studies;

allow for the investigation of contemporary issues in a real-life context; and

allow for the inclusion of both qualitative and quantitative research methods.

3.2.3 Survey instruments
The research program was made up of a number of different studies and each required different survey instruments to collect data. The design and questions used in these survey instruments were developed in accordance with good research practice. The research instruments for these studies were compared against existing instruments and incorporated recommendations from literature to improve flow, design and the questions within (eg. Fowler, 1993; Arsham, 2000; Marshall, 1993). Fowler (1993:58) for instance recommended that a good self-administered instrument should be self-explanatory, limit the use of open-ended questions, use consistent messages throughout, be typed and laid out in a manner that seems clear and uncluttered, keep skip patterns to a minimum, have no redundant information for the participants, and must be field tested before use.

The rationale for the selection of this data collection method was:

- It was not possible (due to limited resources, time and opportunity) to undertake interviews, focus groups or other more complex data collection methods as described by authors such as Yin (1994);
- The organisations that agreed to participate in the studies did not want the data collection processes to be too intrusive for the staff involved (Glastonbury, Woodford and Livid festivals). This meant there was only a small window of opportunity to access participants for each of the studies.
Additionally the researcher often was given indirect access or limited access to the populations being studied.

3.2.4 Reliability and validity
Common sources of error that need to be controlled are caused by problems with reliability and validity.

3.2.4.1 Reliability
Reliability means that when the study is repeated under similar conditions the inferences should be similar (WHO, 2001:12). Fowler (1993:100) argued that for a survey instrument to be successful and reliable the meaning of the questions should be the same for everyone and guidance information that will fully prepare the reader to answer the questions and generate the type of answers that are useful to the study.

For each study, a number of strategies were used to improve reliability. Initially, an understanding of the literature of the area and the characteristics of the target population was gained (Daly, Kellehear & Gliksman, 1997:21). This was principally achieved through discussions with key personnel involved at each event being studied (eg. the volunteer trainer at the Glastonbury Festival (Study 2) and the head trainer for the security guards at the Livid Festival (Study 5)). This information helped to minimise the use of inappropriate words, terms or clauses and maximise the use of appropriate specialised words (Fowler, 1993:69-75). Guidance resources from authors such as Fowler (1993) and examples of successful survey instruments were used to guide the development of the questions, design and layout of each survey instrument. Finally there was an expert team convened for each study and their expertise guided the first incarnations of the documents. The expert teams consisted of a minimum of two academic staff and one expert from industry (eg. security trainer for the study that involved the event security staff).

All the survey instruments included guidance information to lead the study participants through each section and question. The following is an example
of the type of guidance information provided (the complete list of survey instruments can be found in Appendices 4 through to 7).

“For all the questions in Sections 3.1 and 3.2, you need to reflect on your experience at the 2004 Glastonbury festival and give your opinion of the effectiveness of the overall event and service provision for the 2004 festival. Please attempt all the questions” (Study 3 – Appendix 5).

Notably, due to the exploratory nature of these research studies the test-retest method of improving reliability was not used for these instruments. It is however recommended that this test be undertaken for future research as an important imperative to improve the performance of the survey instruments.

3.2.4.2 Validity
This section will focus on levels of measurement to improve validity. Validity is the extent that the answer given is a true measure and means what the researcher wants or expects it to mean (Fowler, 1993:87). Fowler (1993:100) favoured the use of closed questions in self-administered surveys. Based on this advice the majority of questions used required closed responses involving combinations of nominal (eg. male or female) and ordinal responses (eg. levels of experience or influence etc) (Fowler, 1993:81).

Kookier (1995 in Daly, Kellehear & Gliksman, 1997:27) disagreed with Fowler (1993:100) and recommended the use of open-ended questions to improve the validity of responses given. As a result, some questions allowed for open-ended responses in addition to the closed ones. In each survey instrument, direction was given for study participants to complete the closed question with the choice to add comments or details. The following is an example of this type of question and further examples can be found in Appendices 4 through to 7.
“Have you had any experience in the area of public health or emergency management (eg. Volunteer Fire Services, SES, nursing etc)?

Yes ☐ No ☐

If you answered "Yes" to the above question, please indicate what experience you have" (Studies 1 and 2 – Appendix 4).

There were a limited number of questions that needed to very flexible so only open-ended questions were deemed appropriate. The following is an example of an open-ended question used in the volunteer survey instrument:

“Please list any hazards to the health of the public that you believe might affect festival patrons in the area/s you have been or are working in at this festival?” (Studies 1 and 2 – Appendix 4).

### 3.2.5 Pilot testing

All of the survey instruments developed for the research program were field pilot tested prior to use in each study. The purpose of field-testing the survey instruments was to determine if the data collection protocols and the survey instrument would work under realistic conditions (Fowler 1993:100). Fowler (1993:102) suggested that the survey instruments should be tested before use to:

a. determine if the instructions were clear and easy to follow;
b. determine if the questions were clear; and
c. determine if there were problems understanding what answers were expected.

To test these three factors, each instrument was given to a small group of potential participants for them to complete (eg. security staff from another organisation were used in Study 5). After each trial, findings were compiled and the instruments were modified based on the feedback then returned to the expert group convened for each study before finalisation. Henry (1993) and other authors considered this to be good research practice.
3.3 Individual methodological processes

Details of each study in the research program will be discussed in this section. The studies will be discussed in the following order:

Studies 1 and 2 - Volunteer studies;
Study 3 - Leadership case study;
Study 4 - Consumer-based study; and
Study 5 - Influences on behaviour and safety study.

In this section, each of these studies will then be discussed in terms of:

1. survey instrument / s used;
2. target population;
3. data collection procedures; and
4. method of data analysis used.

3.3.1 Volunteer studies (Studies 1 & 2)

Two studies were undertaken to investigate volunteer capacity for public health and emergency management at two large OMFs, one in Europe and one in Australia. The OMF in Europe had formal volunteer training programs while the Australian OMF did not. The studies involved the collection of self-report data using a single survey instrument and collected data on the knowledge and understanding of public health and emergency management for each study festival.

3.3.1.1 Survey instrument

Importantly, EMA (2003:10) found that generally volunteers prefer to be engaged in active work and were generally reluctantly undertaking administrative work. Anecdotally, the completion of a survey instrument was likely to be undertaken with the same reluctance. Consequently, the volunteer survey instrument was designed with this in mind. It was easily to read and complete and used a combination of open-ended and closed questions. This was to allow the respondent some flexibility in the amount of information they were comfortable providing while still contributing to the collection of meaningful data (Fowler, 1993:100).
The instrument could be completed within 5 to 10 minutes and was composed of three sections. The first section collected basic demographic information. The second section of the questionnaire related to the identification of public health hazards, management strategies used and their role in managing these hazards at the festival. The final section of the instrument focused on emergency management planning and the volunteer’s confidence dealing with emergency situations.

An expert group of OMF staff (eg. volunteer coordinator) and researchers also contributed to the questionnaire development. Prior to the study the instrument was piloted with a small sample of volunteers (n=5) and modified before its use.

3.3.1.2 Target population
“The target population is that collection of individuals... about which we want to make inferences” (Morton, Hebel & McCarter, 1990:73). The populations targeted for these two studies were volunteers working at multi-day OMFs. These particular volunteers were targeted as they have more responsibilities than volunteers at single-day OMFs. Two OMFs (an Australian and a European OMF) were selected based on volunteer training opportunities and agreed to participate in the studies. The OMF in Europe had formal volunteer training programs while the Australian OMF did not. Finally, there have been no formal studies undertaken into the capacity of these volunteers to undertake these tasks.

3.3.1.3 Data collection procedures
Agreement on the amount of access permitted by the researcher was negotiated on arrival at each site. Due to security concerns, access to the volunteers was only permitted through volunteer coordination staff at each of the events.

For the European study, the volunteer coordinator was solely responsible for the distribution of the survey instrument to the volunteer population. The
volunteer coordinator distributed the questionnaire on the second day of the three-day festival and the collection process was undertaken over the subsequent two days. The volunteer coordinator was requested only to approach volunteers who had received training. Fifty volunteers agreed to participate in the study through this method.

For the Australian study, the festival was divided into three sections: the main festival, the camping area and the performer area. Study participants were recruited through a central location in each area where volunteer activities were being coordinated. Volunteers were encouraged to participate in the project by local volunteer coordinators and, where possible, the researchers. The volunteer coordinators distributed the questionnaire on the second day of the six-day festival and the collection process was undertaken over the subsequent two days. Seventy-five volunteers agreed to participate in the study through this method.

3.3.1.4 Methods of data analysis used
The data from the two studies were managed in a computerised database (Statistical Package for Social Sciences). Statistical testing was limited to bi-variate analysis (Pearson Chi-Square) as this level of analysis generated findings appropriate for these studies. The results have been presented in a descriptive form in tables showing counts and percentages. Where appropriate, discussion of results is based on contextually or notable associations (greater than a difference of 10% in figures within tables) and/or statistically meaningful (p=0.05 or lower) differences∗.

3.3.2 Leadership case study (Study 3)
The Glastonbury festival arguably provides a good practice model for successful management of health and safety issues for large OMFs. The success of this event has been linked directly to the licensing process administered by the Senior Environmental Health Practitioners (SEHPs) within

∗ Details supporting the associations reported within journal articles can be found in Appendix 9.
the Mendip District Council (MDC). The research involving this event used case study methods (Yin 1994).

3.3.2.1 Survey instruments
The data for this study was collected using a single survey instrument and the acquisition of artefacts and reports (Yin, 1994:83).

Key informants
The survey instrument used to collect self-report data was divided into two main sections that were:

(a) The first section of the instrument was administered in two phases: (1) after the 2000 festival and again (2) after the 2004 festival. This section of the questionnaire was divided into three parts: (1) demographic data, (2) public health hazards and (3) the identification of the most significant public health hazard, the corresponding level of risk value and the key control measures used.

(b) The second section was only used for the 2004 data collection phase. These questions were broken into two further parts: (1) identification of the best and worst public health and safety features, and (2) rating the overall management of the festival (eg. site layout, fire safety & emergency planning etc) as suggested in The Event Safety Guide (HSE, 1999:iii). Part 2 was not offered to all the study participants, only those who had coordination responsibilities.

Written records and artefacts
The additional data used in the study involved the collection of literature and other forms of evidence. These records and artefacts included media articles, MDC reports, journal articles, non peer-reviewed reports and photographs from the festival that documented the transition of public health and safety for the Glastonbury festival between 2000 and 2004 (Yin, 1994:83).
3.3.2.2 **Target population**
The population targeted for this study was the MDC SEHPs who had key responsibilities in the regulatory processes for the 2000 / 2004 events. The majority of key informants had remained the same for the two phases. The level of experience working at the festival varied from the very experienced (+20 years) to the relatively inexperienced (-2 years). However all the study participants in both phases were considered accomplished professionals in their own right.

The participants for these components of the study were:

(i) Post 2000 festival: Ten of the SEHPs (83%; n=10) from a possible twelve (N=12) staff members agreed to participate; and

(ii) Post 2004 festival: Nine of the SEHPs (82%; n=9) from a possible eleven (N=11) staff members agreed to participate. From this sample, five (N=5) staff were targeted and agreed to participate in the management review for the study.

This questionnaire was pilot tested with LGA staff regulating an OMF in Australia. The results from the pilot were analysed and the questionnaire was modified prior to use.

3.3.2.3 **Data collection procedures**
The data collection process followed the three principles offered by Yin (1994). Firstly, multiple sources were used. For this study, self-report survey data and a collection of relevant documents were used. Then a case study database was developed to manage the information collected as recommended by Yin (1994:36). This helped to control the type and amount of written evidence collected. The findings from the 2000 survey data provided the structure for this database. Finally, a chain of evidence was maintained. These strategies were used to increase the reliability of the evidence collected (Yin, 1994:36-37).
The first phase was undertaken after the 2000 festival. For that phase of the study, the MDC managers provided the researcher with a list of potential participants and all were given a copy of the survey instrument to complete.

The second phase of the study was conducted the same as the first phase with participants identified in the same manner. Only the members of the MDC management team were instructed to complete the final section. These were the SEHPs from the Gold (Strategic) and Silver (Operational) teams. Electronic reminders (email) were given to MDC staff one week after the hard copies were distributed with a second reminder given a week after that. No further attempts were undertaken after the two reminders were given.

**3.3.2.4 Method of data analysis used**

The data was analysed using content analysis methods (Berg, 2003:241; Marshall & Rossman, 1995:114). Content analysis has been described as “a technique for making inferences by objectively and systematically identifying specified characteristics of messages” from within the data collected (Marshall & Rossman, 1995:98). A particular benefit to using this analysis method was that this allowed the data collected to be transferred into a more quantitative form (Berg, 2003). This made the data more manageable for the researcher.

Berg (2003:241) provided the foundation of the data analysis process used in this study:

1. The data collected from the first phase survey instrument was formed into basic codes. These codes were then used to guide and interpret the documentation subsequently collected. The second phase data survey data was also linked into this process;
2. These codes were then organised into themes;
3. The material was then sorted into these themes; and
4. Smaller sets of generalisations were determined (Berg, 2003:241).
3.3.3 Consumer-based study (Study 4)
This study was undertaken to identify the level of concern for public health issues at OMFs and determine if the experience of attending OMFs has some effect on these levels of concern.

3.3.3.1 Survey instrument
The survey instrument for this study was designed to be completed in a short period and was divided into three sections to collect basic demographic data, the participant’s experience at OMFs and twenty-five key questions about the public health issues. These questions were developed from the event planning guides produced by EMA (1999) and HSE (1999), a review of material from the media and a discussion group of a small sample of students who had recently visited OMFs (n=10). The instrument used a three-point scale for the participants to rate their level of concern. The issues were categorised into the broad themes of (a) Facilities and Services, (b) Public Safety and (c) Personal Protection (refer to Appendix 7).

3.3.3.2 Target population
Anecdotal evidence indicated that the demographic of festival patrons is similar to that of the alternative street magazines and the national youth network radio service "Triple J". The greater proportion of these readers and listeners are in the 18 to 25 age group and have an interest in popular culture. These two mediums promote extensively to university students among others. It is for this reason that university students were targeted.

For this study, the participants were recruited exclusively from the Queensland University of Technology while attending classes in the School of Public Health. It was assumed that this cohort would have a heightened awareness of public health issues, which was considered particularly useful for this exploratory research (even though generalisability of the findings was likely to be limited - Daly, Kellehear & Gliksman, 1997:25). One hundred and twenty-three students agreed to participate in the study with 75.0% being students between the ages of 18 and 25 years of age.
3.3.3.3 Data collection procedures
The data was collected exclusively from the student population over two consecutive days of classes. The researcher negotiated access to the students with the lecturing staff and then provided a short overview of the study before distributing the instrument to the students. The completed responses were collected at the end of each class by the researcher.

3.3.3.4 Method of data analysis used
The data from this study was managed in a computerised database (SPSS). Statistical testing was limited to bi-variate analysis (Pearson’s Chi-squared were used) as this level of analysis generated findings appropriate for these studies. The associations between variables were summarised in tables showing counts and percentages. Discussion of results is based on contextually (greater than a difference of 10% in figures within tables) and statistically meaningful (eg. p=0.05 or lower) differences. The results have been presented in a descriptive form in tables showing counts and percentages.

The degree of concern was considered overall, by gender and by whether or not the study participants had experience of attending OMFs. Comments within the results regarding gender or experience were only included where differences existed.

3.3.4 Influences on behaviour and safety study (Study 5)
The study reported focuses on the factors influencing high-risk crowd behaviour and safety at OMFs held in Australia. The study participants were well trained; specialised security staff experienced with OMFs, and had been selected for this study based on their proximity to the patrons and involvement in crowd management.
3.3.4.1 Survey instrument
This survey instrument was divided into three main sections. The participants were asked to give their perceptions on the public health concerns, the factors influencing crowd behaviour and safety, and personal reflections about experiences of providing security services for OMFs. The questions were developed from a review of the literature documenting injuries at OMFs (e.g. Wertheimer, 2000a; 2001; 2002; Arbon, 2002; Milsten et al. 2002; 2003 and Zeitz et al. 2002) (refer to Appendix 3). Some basic demographic data was collected from the participants (training and experience only).

3.3.4.2 Target population
The participants of this study were recruited from a single organisation based in Sydney who specialise in crowd management at mass gatherings. From this one organisation, only management, senior and regular security staff members were targeted. All the staff members targeted participated; forty-four in total.

3.3.4.3 Data collection procedures
The survey instrument was given to the security guards as they completed their shift at the Livid Festival (Sydney 2003). The guards were required to return equipment borrowed and sign off at the end of their shift. This was when the instrument distributed. The completed responses were given directly to the researcher. This allowed for an informal assessment of staff participating in the study. This method allowed the researcher to observe and confirm that all the key staff from that company had participated in the study.

3.3.4.4 Data analysis used
The data from this study was managed in a computerised database (SPSS). Very limited statistical analysis was used for this study (frequencies and summary information). The results have been presented in a descriptive form in tables showing counts and percentages.
3.4 Ethical Considerations

This research program has been deemed exempt from ethical clearance as each study meets with the criteria for Level 1 (low risk) research. However, the research program was guided by a number of relevant ethical principles from the QUT’s Code of Conduct for Research (http://www.qut.edu.au/admin/mopp/D/D_02_06.html, 31/05/2005).

3.4.1 Ethical clearance sought:

Exemptions from full ethical clearance [Level 1 (Low Risk)] approval by the University Human Research Committee has been given for the following projects:

(a) "Environmental Health impacts of OMFs (a consumer study)" (QUT Ref No 2138H) from 6 March 2001 to 6 March 2002. This clearance covered Study 4 – Consumer-based study.

(b) "The assessment of the existing skills and knowledge base of emergency and public health management among volunteers and their capacity to respond to an emergency at a mass gathering" (QUT Ref No 2496H) 26 February 2002 to 26 February 2003. This clearance covered Studies 1 and 2 - Volunteer studies.

(c) "Perceptions of priority public health hazards and successful management at large OMFs" (QUT Ref No 3830H). This clearance covered Study 3 – Leadership case study and Study 5 - influences on crowd behaviour and safety study (or Article 6). The application had been delayed and was submitted after the fact on 20 December 2004. Subsequent correspondence received from the Chair, University Human Research Ethics Committee (UHREC) and stated, “I wish to confirm that your projects could not be provided with ethical approval as data collection had already taken place and the Committee does not provide retrospective approval. However, the Chair has advised that, had
your applications been provided for consideration prior to data collection, they would have been approved as Level 1 (Low Risk) projects”.

### 3.4.2 Ethical principles followed for each study:
Daly, Kellehear and Gliksman (1997:31) asserted that the participants have the right to be informed of the purpose of the studies, funding sources, allegiances and how the data is to be used. The following was the information provided to each study participant for each study undertaken:

(a) Each survey instrument commenced with a cover sheet covering a brief introduction and purpose to the research, guidance notes and contact details for general or ethical enquiries;

(b) Participation in the studies was voluntary;

(c) The data collected for all the studies was de-identified to prevent individuals from being identified when reporting findings;

(d) The data have been stored in a secure place and the primary research data being retained for a minimum of five years, and

(e) Other ethical recommendations have been followed in terms of managing authorship arrangements and publications.

### 3.5 Summary
All the studies undertaken in this research program were considered exploratory research (Henry, 1993). Cross-sectional study designs were used extensively for this research (WHO, 2001). Additionally one study also utilised a case study methodology (Yin, 1994). A structured research process was used to guide each study. This provided a logical flow and defined criteria for the steps undertaken within each study (Crafty, 1998; Patton, 1990; Brewer & Hunter, 1989). The enquiry in this research program has focused on predominantly quantitative research techniques supported by basic qualitative or descriptive enquiry. Survey methods were used to collect the majority of the data for each study.
Survey instruments had to be developed for each study and care was taken to ensure that meaningful data was collected. The developmental process for each instrument involved the formation of an expert team to guide the process, using empirical information on the survey design and testing of the instruments prior to use within the research.

The following chapters, Chapters 4 and 5, contain each journal article developed using the findings from each study. Chapter 6 covers methodological limitations and Chapter 7 covers the discussion and conclusions.
CHAPTER 4.0: VOLUNTEER CAPACITY

4.1 Introduction

The first two projects of the thesis research portfolio will assess the level of awareness of and involvement in public health and emergency management at two large OMFs. One OMF has a formal volunteer training program and the other does not. The findings from both studies were reported separately in two peer review journal articles and then a detailed comparison was reported in a third article. This chapter contains the following articles:


These articles are not available online. Please consult the hardcopy thesis available from the QUT Library.
CHAPTER 5.0 EVENT PLANNING CAPACITY

5.1 Introduction

This part of the research reported within this thesis involved a series of studies that firstly, investigated the leadership in event planning using a case study methodology and then two other studies were designed to gain a better understanding of the links between crowds and event planning at OMFs.

There numerous resources available to support good event planning however there are limited examples of complete case studies documented. The first study reported in this part of the thesis involved the identification of a good example of successful event planning and determining the main reasons for the success of that event. The Glastonbury Festival in England was selected for this study (Leadership case study).

The next two studies in this part of the thesis have also had a focus on planning however these projects were developed to gain a better understanding of the links between crowd management and crowd safety. The first study in this series was developed to identify the priority concerns for consumers regarding attending OMFs (Consumer-based study). The next study was developed to identify the factors mostly likely to impact on crowd behaviour and safety (Influence on behaviour and safety study).

These three studies have been published in the Environmental Health journal in the form of the following articles:


These articles are not available online. Please consult the hardcopy thesis available from the QUT Library.
CHAPTER 6.0 METHODOLOGICAL LIMITATIONS

Fowler (1993) suggested that researchers are not really interested in study participants other than to make inferences about the wider population being studied. This refers to the generalisability of findings or improving external validity. Authors such as Daly, Kellehear & Gliksman (1997:28) advised that this depended largely on a number of factors such as (a) the quality of the study design, (b) sample selection and (c) the way the study was conducted. There were also unique issues associated with the individual studies identified in this section.

6.1 The quality of the study design

All the studies undertaken in this research program used cross-sectional study design within their data collection processes. Hedrick, Bickman and Rog (1993) and Daly, Kellehear and Gliksman (1997) warned that findings from these types of studies should not be extrapolated to the general population being studied or used to make causal inferences.

The rationale for using this method was based on: (1) the difficulty in determining the actual population characteristics, (2) the research had to be undertaken in a timely manner, (3) it was not always possible to have direct access to the target populations and (4) there was uncertainty regarding the on-site dissemination and collection of the survey instruments. Importantly, the determination of causation was not an objective for any of these studies.

6.2 Sample selection

Fowler (1993:14) said that within a simple random sample, each member of the target population has an equal chance of being chosen to participate in the study. It was not possible to use probability-sampling methods for the studies in this research program. Study participants for all the studies were recruited using a convenience sampling method.
The main limitation in using this sampling method is the impact on external validity. There are difficulties determining the representativeness of the samples collected and the generalisability of the findings was likely to be limited (Daly, Kellehear & Gliksman, 1997:25). Fowler (1993:51) suggested that response rates for these studies should be assumed to be very low and it would be unlikely that the samples collected this way would be truly representative of the wider target population. The studies also relied on self-report data.

There are a number of methodological and process limitations associated with using self-administered or self-report data. Firstly, the researcher is not present to address questions and contribute to quality control. Good reading and writing skills are needed from the study participants. The survey instruments need to be well designed to assist the study participants. Fowler (1993:100) warned that open-ended questions could result in data that is not useful. Additionally reliance on self-report data is likely to be affected by a number of biases such as an underestimation of the problems being investigated or selection of participants who have a vested interest in participating (Daly, Kellehear & Gliksman 1997:26).

Small sample sizes were also a problem for the studies undertaken and can present a number of statistical issues including concerns about the precision of estimates (eg. Morton, Hebel & McCarter 1990 or Pedhenour & Schmelkin 1991). Daly, Kellehear and Gliksman (1997:23) considered that sample size was within the control of the researcher. However it is argued that this was not the case for the studies undertaken and given the circumstances surrounding each (access, timing, limited resources and distance) the size of each sample was very difficult to control.

6.3 The way the study was conducted

The choice of data collection process is directly related to the sample frame, research topic, characteristics of the sample, and availability of staff and facilities. All these factors have implications for response rates, question form
and survey design (Fowler 1993). Given these impacts, Daly, Kellehear and Gliksman (1997:28) argued that research must also be feasible and able to be completed with the resources and opportunities available.

Each study in this research program had unique issues. The main issues were raised and discussed in earlier sections including rules about access, negotiation of dissemination, data collection timeframe and collection strategies (Fowler 1993). Some additional issues included difficulties with consent, continued cooperation and interest (eg. volunteer coordination staff providing reminders for volunteers), and staff changes (eg. data collection covered numerous shift changes). Each of these issues was managed using the most appropriate method for each study environment.

6.4 Limitations and the individual studies

6.4.1 Volunteer studies
The target populations for each of the volunteer studies were volunteers working at each study festival. The researcher did not have access to the festivals volunteer databases for comparisons. Anecdotally these volunteers come from the wider festival patron populations and there was data available on these demographics. Consequently the samples were compared against this data.

The sample collected for the Australian volunteer study appeared similar to the festival population estimates published in Queensland Folk Federation (2002). Regardless, Fowler (1993:47) said that resulting samples collected could look rather similar to probability sample data but warned it was actually not likely. Deviations from the volunteer population were more evident for the English study sample with over sampling of the older age and female volunteers identified.
The WHO (2001:13) recommended the collection of larger samples to help minimise the impact of the bias caused by this sampling approach. Both samples collected were the logistic maximums possible given: (a) the researcher was not able participate directly in the recruitment or data collection processes, (b) volunteer coordination staff undertook the recruitment and collection of the completed instruments task in addition to their own busy schedules, and (c) there were very strict time limitations.

6.4.2 Leadership case study
This study was different from the others undertaken in this research program. This study focused on the Glastonbury Festival and the transition in public health and safety that occurred at that festival. It has tried to identify the decisions undertaken, why they taken, how they were implemented, and with what result (Yin 1994:7). Yin (1994:6) added that this type of enquiry favoured the use of case studies. This study also included a repeat survey that could constitute a longitudinal component. The majority of participants targeted for the study were included for both phases of the study.

6.4.3 Consumer-based study
The most significant impacts for this study were similar to the volunteer studies of cross-sectional survey design, sample size, convenience sampling technique and reliance on self-report data (Fowler 1993). An addition impact for the consumer-based study was the potential to frame the target audience clearly. Henry (1993:84-86) explained the population targeted could be selected from individuals, groups or other elements from the wider population. The selection process was difficult and a compromise was needed. It was determined that students from the School of Public Health undergraduate program would be suitable. It was also recognised that these students may have heightened awareness of public health issues but this was considered useful for exploratory research (Daly, Kellehear & Gliksman, 1997:25).
6.4.4 Influences on behaviour and safety study
The most significant impacts for this study were similar to the volunteer studies and consumer-based study (cross-sectional survey design, sample size, convenience sampling technique and reliance on self-report data). However the population targeted for the study was management, supervisors and regular security guards used by ACES Security in Sydney that were working at the Livid Festival in 2003. It was confirmed that all of the target population for this study participated. This strengthened the study however the sample size was still small and consequently had implications about the precision of estimates (Morton, Hebel & McCarter 1990:73; Pedhenour & Schmelkin 1991).
CHAPTER 7.0  DISCUSSION AND CONCLUSIONS

7.1  Review of research aim and objectives

The main aim of the research program reported in this thesis was to contribute to event planning and management of public health issues at OMFs. Firstly by advocating for increased capacity for volunteers working at OMFs based on findings from the volunteer studies. Secondly by supporting EHPs by contributing to the body of knowledge on quality event planning, crowd safety and behaviour at OMFs. An extensive review of the literature was undertaken to guide and inform the research and five studies were conceptualised, completed and reported to meet this aim.

Each study was designed to help achieve specific objectives under the research aim. Two volunteer studies were undertaken to investigate the capacity of volunteers working at OMFs to contribute to public health and emergency management. Findings showed that training and retention were important in strengthening volunteer capacity. Another study was undertaken to describe the steps undertaken at the Glastonbury Festival to improve public health and safety at that event. This study demonstrated, among other things, the effectiveness of the licensing program administered by the Mendip District Council. The final two studies identified the highly influential factors and priority concerns that affect crowds while attending OMFs. The highly influential factors included pinch points, overcrowding, security staff capacity and crowd demographics while the priority concerns included safety in the mosh pit, access to water and sun protection. It was considered that all of the objectives of this research program have been achieved.

As these studies were designed to contribute to evidence-based practice, it was important that the findings reach their target audiences: (a) volunteer organisations for the volunteer capacity studies, and (b) EHPs for the event planning capacity studies. Peer-reviewed journals were determined to be the
best method of achieving this. In addition to disseminating the findings, the peer review process would also assist in validating the findings of the studies. The process would confirm that the findings were (a) meaningful and (b) contributed to the evidence base for the intended audiences. All of the studies in this research program have been published in appropriate journals. This shows that the reviewers were satisfied that the findings met these two criteria.

7.2 Significance of the research

A review of the literature identified two main factors important to this research. These were (1) the need for a continued focus on public health and (2) there were gaps within the existing evidence base. There continues to be public health and safety concerns facing patrons and staff at OMFs as indicated by publications by EMA (1999); HSE (1999); Arbon, Bridgewater and Smith (2001); Milsten et al. (2002) and Wertheimer (2000a; 2001; 2002). Additionally there are emerging issues such as terrorism (eg. FEMA, 2003 and Weir, 2002a, 2002b), and the size and number of events continues to grow (EMA, 1999:xiii). There was evidence that further public health research was required. The two areas selected for this research program were volunteer capacity and event planning capacity for EHPs.

For volunteer capacity, there was very limited research involving volunteers working at OMFs. There was discourse on volunteers in emergency management. Emergency management volunteers undertake similar tasks to those working at OMFs so it was possible to draw comparisons between the two volunteers groups. Authors such as Eburn (2003) and EMA (2003) explained that maintaining adequate capacity among these volunteers was critical. Consequently, there are numerous tailored training programs available to emergency management volunteers with examples reported in EMA (2003); Hughes and Henry (2003a); Summers (2001) and Fahey, Walker and Sleigh (2002). Minimum expectations must be attained prior to operational deployment (EMA, 2003:12) and yet the same does not apply to volunteers at Australian OMFs. Given the support for emergency management volunteers, it
was evident that advocacy and support for capacity building was needed for volunteers at OMFs.

For event planning, there were gaps in that evidence base. The literature on event planning at mass gatherings was categorised into a number of themes. The first category was research undertaken (eg. Arbon, 2003 or Milsten et al. 2003). The majority of this work focused on the planning and implementation of emergency medical services at events. The second category was criticisms of current event planning (eg. Davies, 1998 or most of the literature by Wertheimer). The third category was numerous event-planning resources (eg. HSE, 1999 and EMA, 1999). There was, however, very little research or literature found that focused directly on EHPs and their work with OMFs.

7.3 Volunteer Capacity

The volunteers working at OMFs are often responsible for many of the essential services. Work has included participation in waste management and crowd control. The majority of these volunteers do not have professional experience or training to assist with these duties. Consequently, they may not be aware of the risks associated with these roles at OMFs for both themselves and the public. Au et al. (1993:86) suggested that all staff at OMFs needed to have an appropriate knowledge of crowd management and operations. These authors added that basic expectations for staff at OMFs should be: (a) adequate skills to perform designated tasks, (b) awareness of potential problems and some understanding of control measures, and (c) an awareness of roles and responsibilities in contingency and emergency procedures (Au et al. 1993:86). The HSE (1997 in HSE, 2003:19) considered that this basic capacity would be best achieved through a combination of experience and knowledge. It was the discussion provided by Au et al. (1993) and HSE (1997) that guided the two volunteer capacity studies. The volunteer studies are Study 1 or Australian study, and Study 2 or European study.
7.3.1 Review of results

Au et al. (1993) recommended that all staff at OMFs have adequate skills and awareness of public health and emergency management at that event. This was the measure of acceptability used for these studies.

(a) Adequate skills to perform designated tasks

All the participants in the European study had received the festival training with an additional 72% (n=36) reporting other capabilities gained through professional and volunteering experience. Comparatively only 36% (n=27) of the Australian cohort reported receiving training that related to their volunteer positions and 50% (n=37) reported other capabilities.

(b) Awareness of problems and control measures

The majority of the participants in the European study identified public health hazards (92% n=46) that they were likely to encounter at the study festival including vehicle movements, waste management, aggressive behaviour and fire hazards. Understanding of control measures for these hazards was lower with only 67% (n=31) of the cohort able to identify control measures for these hazards. The participants who reported only having received the festival training responded very poorly to this question. Notably, study participants who also had experience volunteering at this and other festivals had better understanding of control measures*. These findings show an apparent weakness to relying on training as the sole source of capacity building for volunteers at OMFs. This provides a good argument to encourage the retention of experienced volunteers.

Many of the participants in the Australian study identified public health hazards (71%, n=53) at their OMF and listed sun exposure, vehicle movements and fire among the hazards they could encounter. Similar to the European study, understanding of control measures for these hazards was lower with 62% (n=33) of that cohort able to identify control measures for

* Refer to Appendix 9 for further details of these associations.
these hazards. Interestingly unlike the study participants in the European study understanding of control measures was not linked to previous volunteering experience reported*.

(c) Awareness of emergency management procedures

The European study cohort had very good of awareness of emergency management at the study festival. Awareness of the festival EMP was not correlated to previous experience volunteering at that festival but was covered within the training provided by that festival. Not surprisingly, knowledge of emergency coordination was correlated to previous experience volunteering at the study festival*. Alternatively, only a quarter of the volunteers at the Australian festival had awareness of emergency management and that was considered low. The differences within the findings from the two studies support the success of the training programs used at the European festival.

The majority of the European study cohort also considered they could respond confidently to an emergency situation if it arose. Potential emergencies likely to be encountered at this study festival included injuries from crowd crushes, fire hazards and a variety of medical conditions. Any of these incidents could have potentially serious implications for the patrons involved.

Some participants in both studies were unable to identify a person responsible for emergency coordination [60.0% (n=45) for the Australian study and 20.0% (n=10)]. This was a particular concern in the Australian study however population based studies would be needed to confirm if this was an endemic problem within these volunteer populations.

* Refer to Appendix 9 for further details of these associations.
7.3.2 Implications for practice

(a) Training for volunteers
Overall, the European participants reported higher levels of knowledge and involvement for public health and emergency management than the volunteers in the Australian festival. The notable difference between the two study cohorts was the formal training offered at the European study festival. As stated earlier, the European participants had particularly good knowledge of emergency management for that festival. Emergency management was a significant component of the training offered and the influence of this was evident. Based on the findings of these two studies, it is recommended that volunteers working at OMFs in Australia be given the same training opportunities that these European volunteers were given.

(b) Volunteer retention
Generally, participants from both study cohorts with volunteering experience demonstrated better knowledge for key knowledge variables than those who reported having no training and those with only training. Volunteering experience was particularly correlated with knowledge of public health control measures. It was encouraging to find that half of each study cohort had previous experience volunteering at OMFs. These findings indicate that the festival organisers would get considerable benefits from encouraging individuals to continue volunteering at these events.

(c) Emergency management and OMFs
The profile and amount of emergency management planning for the Australian festival was considerably less than the European festival. EMA (1999:xiii) and Davies (1998:14) both suggested the issue was endemic for events in Australia. This lower profile for emergency management is likely to impact on volunteering knowledge. At the European festival, emergency management and improved volunteer capacity were considered closely related and mutually
beneficial. Consequently, it is recommended that emergency management for Australian events needs to be improved.

7.3.3 Implications for further research

(a) Standardised training programs

A significant challenge for event organisers is to achieve the level of volunteer capacity as described by Au et al. (1993), HSE (2003) and others (eg. DoH, 2004 and EMA, 1999). Very few events in Australia have introduced training programs and those that do have training use individual curriculum. The training programs at the Glastonbury Festival were specifically designed to meet the needs of that festival and are recognised by the NCFE, the national training body. England also has a national code of practice, which establishes a standardised training curriculum for that country. The core elements of the Glastonbury training course are health and safety issues, emergency first aid, radio procedures; fire safety, customer care, crowd control and team work (GFL, 2002 http://www.glastonburyfestivals.co.uk/2001/stewardscertified.html, 21/07/2004).

Based on the findings of the European study, it is recommended that a pilot training program be developed, trialled and evaluated for volunteers working at Australian OMFs. The HSE (2002:9) recommend that training of this type likely to focus on young people should be interactive and incorporate modern techniques and technologies. This program should be modelled on the core components of the Glastonbury program. Further, it is suggested that additional consideration be given to the development of a national code of practice for the industry.

(b) Population based studies for volunteers

Both studies undertaken on volunteer capacity were exploratory, descriptive studies and did not use population based sampling methods. As a result, the
findings of these studies have not been directly extrapolated to the wider volunteer populations at these festivals. It is recommended that future research use population based sampling methods to increase generalisability to the wider volunteer populations.

7.4 Event Planning Capacity
Comments in publications by EMA (1999), Wertheimer (2000a; 2001; 2002) and others have identified good event planning as the critical component to the provision of effective and safe OMFs. There has been evidence of considerable variations and inconsistencies in event planning (Arbon, 2004:210; EMA, 1999:xiii) with numerous incidents attributed to this (eg. Wertheimer, 2003a & 2003b). It is the event organisers who have the greatest responsibility to provide safer OMFs. EHPs have the responsibility of directing these event organisers to achieve this through the administration of LGA event licensing programs.

It was commonly considered that public health and safety risks were negatively correlated to poor service and/or inadequate infrastructure provision. These factors were then directly linked to poor event planning. Risk management was the principle tool used to improve the event planning processes (DoH, 2004:32; HSE, 1999:8). Oosthuizen (2001) and others warned of errors in those processes. These errors were due to numerous factors including the availability of data, common gaps in available information and poor exposure data (EnHealth Council, 2002:9). Three studies undertaken within this research portfolio were designed to impact on event planning by increasing the existing evidence base and support risk management processes for OMFs.
7.4.1 Review of results

(a) Leadership case study

The Glastonbury Festival in recent years has become internationally recognised as a very successful and safe OMF. Central to this metamorphosis was the public entertainment licence program administered by the Mendip District Council and coordinated by their SEHPs. In 2004, the Glastonbury festival was recognised by the English parliament and rewarded with national and international awards. Interestingly that year, the SEHPs still considered that the event could be better. When asked to comment and rate on the management operations of twenty-two different areas for the 2004 event, the SEHPs indicated thirteen of these could be improved. However, none of these were rated lower than moderately well managed (middle ranking). The key factors considered by the SEHPs that contributed to the improvements in the event licensing process were:

(1) **Control of patron numbers at the event:**

In 2000, the Glastonbury festival experienced its worst public safety risks caused by the inundation of unauthorised patrons into the event. After the 2000 event, the MDC prosecuted the event organiser and stated that for another event license to be issued security of the sites and security services provided would need to be drastically improved. This caused the event organisers to take 2001 off to review the strategies and return in 2002 with a much-improved event. Outstanding features in that change were a new security fence to prevent unauthorised entry, greater professional security presence and increased coordination between all the Government agencies and festival management.

(2) **Management of the issues affecting the surrounding areas:**

The 2002 event had affected the surrounding area through fish kills in the waterways, noise nuisances generated and security concerns for the
neighbouring villages (for example houses in Pilton village were broken into). The festival management were fined for polluting the waterways by the National environmental authority. In 2003, in response to these issues, additional measures were introduced including increased security and new environmental protection strategies to reduce water pollution. After the latest changes, the 2003 festival had no significant breaches of the licence conditions. However, there were some noise issues late at night.

(3) The event management having public health and safety for the event on their agenda:

The event management, under the guidance of the MDC, have been very proactive improving health and safety for the festival. This can be best demonstrated through the continued commitment to improvement at the event. For the 2004 event, further improvements were introduced such as increased coordination for disabled services, increased cleaning services and improvements in the management of vehicle movements in the site. There were also further developments at the planning stage for the festival including the installation of permanent water pipes and more water reservoirs. Heavy rains tested the 2004 event, however, the SEHPs considered that these impacts were well managed. Overall the 2004 event was considered the safest event yet.

(4) Maintenance of communication and cooperation:

The management and operation of an event the size of the Glastonbury festival is very complex. Similarly, the regulation of this event is just as complex. By the 2003 event, cooperation with the multi-agency partnership and with the festival organisers was considered exemplary and has continued to develop in 2004.
(5) Establishment and maintenance of a presence through professional and comprehensive monitoring of the event:

The MDC provide extensive pre-event consultation as part of the event licensing process and provide monitoring programs to ensure licence conditions are met during the festival. The SEHPs who have coordinated the Council involvement are very experienced professionals and the work undertaken has been of a very high standard. The monitoring program involves the assessment and collection of data on matters such as the numbers of patrons on site and in the camping areas, food borne illness, sanitation, drinking water quality, solid waste disposal and noise complaints. Other data collected includes injury and crime data. Since 2002, the majority of these areas have either not been a major concern or have improved dramatically.

(b) Consumer-based study

The second study identified the priority concerns that consumers have about attending OMFs. The intention of this information was to inform the event planning processes and EHPs of the consumer perceptions of risks at OMFs. These participants identified a wide range of public health issues of high concern, including access to drinking water, toilets and safe food; safety exiting the venues; the size of the crowds; and personal protection issues such as being grabbed or having items lost or stolen. The study participants commonly discussed safety in the mosh pits.

Almost half of the study participants (47.0%, n=58) identified safety in the mosh pit as a high concern. One respondent said 'it is dangerous; a lot of my friends have been hit and badly cut from being in the mosh pit'. Another stated 'It is a nightmare if you fall down and get stood on' and one female respondent revealed that she had 'lost her top by being in the mosh pit'. Additionally, the mosh pit was also associated with being grabbed, first aid, being struck, crowd sizes, losing valuables and alcohol consumption. As a result, safety in the mosh pit was probably the most important public health issue for the study participants.
This study also revealed different levels of concern between attenders and non-attenders. Overall the study participants who reported having attended OMFs reported a reduced the level of concern for many of the public health issues canvassed within this study*. One potential explanation was that current event planning and management was having an effect on reducing concern for the consumers who had attended OMFs.

(c) Influence on behaviour and safety study

The final study reported in this chapter was conceptualised to identify the main influences on crowd behaviour and safety while in the mosh pits of OMFs. This study follows the previous consumer-based study. This study was undertaken at the Livid Festival (Sydney) and focused on the highly skilled security guards working at that event. These professionals were selected to provide insight into crowd impacts because of their proximity to and good understanding of crowds. The findings of this study were intended to inform event-planning operations and provide additional evidence to support EHPs working with LGA event licensing programs.

The study participants considered performance and group mentality were the most common triggers for higher risk crowd behaviours at OMFs (eg. crowd surfing or swirling). Clearly these two factors were interrelated. In terms of the performance, it was recognition of songs, the tempo and rhythm or the combination of these that were considered to change the behaviour of the crowd. Milsten et al. (2002) research supported these findings and explained that tightly packed crowds at rock events were particularly problematic. The study participants considered the common management strategies were a good security presence, safety barrier systems and alcohol management.

Particularly influential variables affecting the public health and safety of patrons while attending OMFs were: (1) composition of the crowd (particularly a bias towards males), common interests (extreme appearances), younger audiences or a combination of these factors (heterogenetic crowds were

* Refer to Appendix 9 for further details of these associations.
considered much less problematic); (2) drugs and alcohol (particularly excessive amounts of alcohol being consumed); (3) the type of performances (particularly heavy metal, hardcore punk and rap performances); (4) the venue configurations (particularly overcrowding, inadequate emergency planning, hot humid air temperature, pinch points and use of general admission areas); and (5) the security staff (in particular adequate numbers, training and experience), poor communication and effective management of entry / exits / ticketing areas.

7.4.2 Implications for practice

(a) Leadership case study
Research using case study methods can focus on the explanation of contemporary events within a real life context (Berg, 2003:241; Yin 1994:13). The Glastonbury festival case study has explored the changes undergone at that event to improve public health and safety. The key factors that influenced and shaped that change were identified and discussed with the intention of providing an example of leadership in event planning and management.

(b) Consumer-based study
Detailed planning and a comprehensive consultation process have been shown to improve management strategies and produce successful events (LLD, 1999:4). Numerous authors recommended increased risk communication in the event planning process. Current approval processes for events direct the event organisers to estimate and evaluate public health risks, yet without direction consultation with consumers, event organisers may not be aware of their priority risks. This study provided insight into the effect that experience attending has on reducing risk perception and identified the areas of priority concern that consumers have regarding OMFs. This information was intended to increase the knowledge of priority concerns and the perceived effect of the control measures for EHPs and event organisers.
(c) Influence on behaviour and safety study
EHPs may not have adequate knowledge of event planning processes or crowd management for OMFs. Event planning must reflect the level of risk at each event for control measures to be effective. There are numerous public health and safety factors common to the majority of OMFs and these are discussed generally in resources such as the EMA (1999) or HSE (1999) event planning guides. However EHPs would gain additional benefit from the identification of the factors that are highly influential. The participants in this study identified these factors.

There were two main implications for practice from this study. Firstly, the factors identified to be highly likely to influence crowd behaviour and safety should be highlighted in early discussions between EHPs and event organisers. Secondly, these factors should also be highlighted within the application approval processes. In this way, EHPs can confirm that an appropriate level of consideration has been given to the relative risks within the event planning process.

7.4.3 Implications for further research

(a) Leadership case study
The literature review revealed there were no formal case studies on the success of licensing programs or event planning for OMFs published in contemporary literature. It is recommended that case study research be used to build the evidence base on successful event licensing and event planning cases to assist EHPs involved with OMFs.

(b) Consumer-based study
The review of the literature revealed a lack of published research in this area and a number of research opportunities were identified. Further research opportunities that would contribute to a better understanding of the effectiveness or short falls of planning approaches in relation to OMFs were:
• To gain a better understanding of festival patrons’ risk perceptions while attending OMFs and the effects of this risk perception on choices made;

• To evaluate the planning approaches used at a number of different OMFs using comparisons of assessment, event, police, security and emergency service personal perceptions;

• To ascertain the level of concern related specifically to a given event and clarify the impact of management strategies using pre and post testing on the festival patrons attending that event.

**(c) Influence on behaviour and safety study**

There is evidence available identifying the characteristics of mass gatherings that impact on public health and safety, and authors such as Arbon (2002) and Milsten et al. (2002) have led the discussion on these. However, Arbon (2004:210) has also stated that many of the characteristics that have been identified using the example of crowd mood and its effect on public health and safety risks have not been well researched. Crowd mood was also identified as one of the principle motivators in changes in crowd behaviour in the study undertaken in this research program. Consequently, there remains considerable opportunity for further research to further quantify the effect of crowd mood.

### 7.5 Summary of the research program

Figure 7.1 shows how the findings from this research program will have an impact on the management of OMFs and contributes to the reduction of public health risks. Davies (1998:14) considered that crowds at mass gatherings were the principle hazard. Davis, Yin and Velastin (1995:38) added that these crowds can become a substantial problem with serious consequences if not managed successfully. Therefore, crowd management is a priority issue for EHPs, event organisers and volunteer advocacy agencies such as EMA and Volunteering Australia. The main tool used in the planning of effective crowd
management is risk management and in particular, risk assessments (eg. EMA, 1999 and HSE, 1999). The crowd behaviour model discussed earlier (refer to Figure 2.5) and the five research studies undertaken can all be used to assist risk assessment processes for OMFs.

The following and Figure 7.1 are a brief summary of the findings from this research portfolio and their links into the event planning and management of public health impacts at OMFs:

- Findings from the Volunteer studies, Leadership case study and Influence on behaviour and safety study (particularly the main influences on public safety findings) have an impact on the management of the consequences and limiting the effects of collective behaviour.
  - Increased volunteer retention and introduction of formal training will assist volunteers to fulfil their roles and responsibilities at OMFs.
  - The leadership case study demonstrated how effective the event licensing programs could be, especially when both the LGA and event organisers have public health and safety high on their agendas.
  - The influences on crowd behaviour study identified preventing overcrowding, increasing emergency management planning and reducing pinch points as important influences on public safety at OMFs and need to be highlighted.

- The findings from the Consumer-based study contribute to a better understanding of the individual behaviour by providing insight into the knowledge and experiences that individuals bring with them when attending an OMF. Numerous public health factors were considered of higher concern for both experienced and inexperienced people with safety in the mosh pit being the main public health concern.

- Some of the findings from the Influence on behaviour and safety study (particularly the influences on crowd behaviour findings) contribute to improved understanding of crowd decision-making processes. The key factors identified were crowd demographics and the types of performances.
**Figure 7.1: Linking it all together**

- **Volunteer organisations**
  - Capacity Building
  - Risk management
    - Event Planning
    - Event Management
  - Licensing programs within LGAs
  - Environmental health
  - Volunteer organisations

- **Crowds**
  - Individual behaviour
  - Crowd decisions
  - Collective behaviour

- **OMFs**
  - (Public health hazards & risks)

- **Consumer issues**: mosh pit safety; access to food, water & first aid; throwing items; rubbish, crowd sizes; alcohol; sun safety; losing valuables; being grabbed & safety exiting venues.

- **Influences on behaviour**: males; young patrons; extreme appearances; types of performances.

- **Influences on public safety**: overcrowding; lack of EM; crowd mobility; pinch points; security (Nos, training, poorly managed ticket, entry & exits areas).

- **Leadership case study**: Nos; PH agenda; communication & monitoring presence.

- **Consumer based study**

- **Influences on crowd behaviour & safety study**
APPENDIX 1 – VARIOUS BARRIER CONFIGURATIONS IN USE

<table>
<thead>
<tr>
<th>Description of the barrier system</th>
<th>Diagrams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front of stage barrier – used at all events</td>
<td><img src="image" alt="Diagram" /></td>
</tr>
<tr>
<td>The “D” shape barrier system: a barrier surrounds the mosh pit area with egress and ingress managed by security personnel (Raineri, 2004:6). Upton (2004a:3) recommended for very large crowds that it is necessary to use double or triple “D” systems. This system was used extensively at the Big Day Out events.</td>
<td><img src="image" alt="Diagram" /></td>
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</table>
The “finger” barrier system: a barrier runs perpendicular to the stage, is connected to the front of stage barrier and divides the mosh pit laterally. A version of this type of system was used at the Livid Festival in 2003 (refer to diagram opposite).

A single straight barrier also managed by security staff that is located approximately 30 to 50 metres from the front barrier and running parallel to the stage dividing the crowd in half however it is possible to move freely around this barrier, from side to the other. This system limits the crowd pressure through to the front of the stage. This system was used successfully for the Home Bake Festival in Sydney.
Another system is used to divide the general admission area into two completed separated sections with their own entrances, exits and associated services (Upton, 2004a) and is an advanced version of the option above. This method was used successfully at the Wave Aid Concert in 2004.

The final and most advanced method to date, the mosh pit is divided into four (4) unique, penned zones. Each of these zones would have specific capacities (maximum of 500 patrons) with their own ingress, egress and emergency evaluation systems and self-contained in terms of facilities, welfare and concessions (Upton, 2004a). This system was used successfully at the Roskilde Festival in recent years.
APPENDIX 2 – WOODFORD FOLK FESTIVAL, WOODFORD, QUEENSLAND

This festival is an annual event in Queensland's southeast corner organised by the Queensland Folk Federation (See Figure 2 for location). The festival is held over six days with daily attendances ranging from 10,000 and 15,000 people (approximate annual total attendance of 90,000 people). This festival has developed into the largest folk festival in the world and the largest community driven cultural / arts festival in Australia (Queensland Folk Federation, 2002).

The festival site covers a 2 km² area with infrastructure and services provided including: camping grounds, ablution and toilet facilities, emergency treatment facilities, water and sewage treatment, food and alcohol outlets, entertainment venues and child care. The Woodford Folk Festival is held at a permanent site with public health and emergency management strategies upgraded annually. The volunteers at the festival are categorised into trade volunteers and causal volunteers. The Woodford Folk Festival has up to 350 trade volunteers and up to 1000 causal volunteers. These volunteers are responsible for the majority of operational activities undertaken and are integral to the successful and safe function of the festival.

To be a trade volunteer it is necessary to be over the age of 18 years, have been a patron at the festival at least once and preferably have experience in the area of interest. These volunteers work a minimum of six 5-hour shifts at any section of the festival. This ranges from bar work and customer service to
plumbing and bus driving. The volunteers also sign an agreement before commencing work outlining the commitment to volunteering at the festival. They are also expected to comply with supervisor’s directions and workplace health and safety requirements. A season ticket, full support to undertake work activities, access to cheap and free extras (for example lounge with coffee and biscuits, massages) and a special party at the end of the festival are the rewards for volunteers (Queensland Folk Federation, 2002).

*WFF has numerous markets and activities for patrons*
APPENDIX 3 – GLASTONBURY FESTIVAL, PILTON, SOMERSET, ENGLAND

(1) Volunteers

The Glastonbury Festival is located in Somerset County adjoining the village of Pilton (see the map in Figure 2.9). This festival has been operating since 1970 when between 1000 and 2500 people turned up to see artists such as Marc Bolan, T.Rex and Al Stewart perform at what was then called the Worthy Farm Festival. The event changed its name to the Glastonbury Festival for the following year and an English music tradition was born. In 2004 the event catered for 150,000 people in a site that covers a massive 700 acres and is enclosed by a 5-mile steel perimeter fence. The festival patrons have access to more than 800 traders and 250 performers on four main stages, ten large marquees and numerous other stages (MDC 2000; Lakin, Brown & Williams, 2001).

The Glastonbury Festival like the Woodford Folk Festival relies on a massive army of volunteers to assist with the operation of the event, undertaking tasks from crowd stewarding and campsite supervision to waste management. There are 2000 volunteers involved in stewarding roles. The volunteers are generally associated with volunteer organisations in the community including parent and citizens associations affiliated with local schools, through to international groups such as the Oxfam organisation.

For example, the Oxfam organisation annually provides up to 1300 volunteers to work at this festival. The volunteers raise funds for Oxfam through their work at the Glastonbury Festival (Oxfam, 2004). Volunteers need to be at
least 18 years of age, capable of standing for long periods and be prepared to complete a minimum of three 8-hour shifts at the festival (Oxfam, 2004). Oxfam volunteer duties involve working the pedestrian and the vehicle gates, directing traffic, meeting and greeting festival goers, answering questions about the site and services, and giving directions (Oxfam, 2004).

Additionally volunteer stewards work at campsites or in support roles (such as the control centre). These volunteers have access to training to assist with undertaking work at the festival. Additionally they receive briefings on workplace health and safety requirements before deployment to their positions (ACCESS, 2003). Basic training is provided at a variety of venues across Britain and the prospective volunteers are strongly encouraged to attend this course.

The Glastonbury is one of the premier OMFs in Europe for health and safety. The training for their volunteers contributes to this reputation and was the reason for selection in this research.

(2) Leadership case study
During the 2000 festival, there was an unprecedented insurgence of patrons without tickets and created the most dramatic public health concern associated with the festival (Avon & Somerset Constabulary, 2000, http://www.avsompol.co.uk/report/, 01/03/2001). This coupled with the 26 deaths at a festival in Europe were the catalysts for the licensing authority Mendip District Council to cancel the 2001 festival. 2002 saw the return of the festival along with a substantially improved security strategy and a virtually impenetrable 3-metre high, 5-km long fence surrounding the festival site (MDC, 2000; MDC, 2002).
Mud was a major concern in 2004

The festival in 2002 was well managed with regard to gatecrashers however there were other incidents. As access for a number of groups previously allowed entry into the festival was limited, a number of illegal activities occurred. These included public drunkenness, theft, and illegal rave parties that resulted in considerable community concerns. The police were involved in the control of numerous incidents in the surrounding areas that were directly attributed to the Glastonbury Festival. The festival management invested resources into limiting the access to the immediate areas surrounding the festival site however many of these disturbances occurred beyond the festival area. Additionally, there were environmental infringements that occurred in the festival that led to the festival management being charged under the environmental legislation (MDC, 2003).

The festival application for 2003 was rejected by the MDC on the grounds of the concerns raised subsequent to the previous year’s festival. The application was reviewed and resubmitted in February 2003 and approval was given for the festival. The 2003 festival had approval for 150 000 patrons and staff (E-festivals, http://www.efestivals.co.uk/festivals/glastonbury/2003/, 01/03/2003).

It was widely recognised that the 2004 festival was very successful with even the English parliament acknowledged this success (House of Commons, http://www.publications.parliament.uk/pa/cm/cmedm/40705e01.htm, 21/07/2004). Many of the operational strategies remained from 2003 with some notable additions such as better coordination for disabled services; improvements in the management of vehicle movements and protective guards for the wheels of the vacuum vehicles that collect the sullage (the most common vehicle movements in the site); and enhanced emergency planning
for the event (MDC, 2004a). The 2004 event saw the return of the rains, which had significant implications for the successful operation of the event.

The Glastonbury festival was chosen for inclusion in this research as a model of good planning. Surprisingly the success of the event has occurred in a three-year period. Even Paul Wertheimer, who is usually very critical of the majority of events he reports on, offered accolades to the staff at the Mendip District Council for this incredible success (Wertheimer, 2000a). It was the commitment and cooperation shown by the Mendip District Council and the event organisers to improving public health and safety that has made the Glastonbury Festival an excellent environmental health case study on leadership in event planning.
APPENDIX 4 – LIVID FESTIVAL, SYDNEY, AUSTRALIA.

The Livid festival, first held in Brisbane in late 1989, has become one of the biggest rock festivals and is certainly the longest running in Australia. The music program includes a number of international, national and locally recognised bands performing on four main stages. Additionally there are food and market stalls, skating and extreme sporting events, installations and sculptures, performance art, and the showing of independent films (Stafford, 2004:172).

Attendance at the Livid Festival varies considerably and has been as high as 50 000 people for a number of years. This event has traditionally been linked with performances and crowds that have created wild mosh pits (Artfield, 2000). Attendance at the Sydney 2003 event was down and so was the temperature, changing the dynamics of that particular event.

In 2003, the ACES security company who specialise in crowd safety at events provided the security and crowd safety. This organisation is considered one of the best for this type of event. The organisation encourages continual professional development for staff and provides additional services in risk assessment and risk management for large mass gatherings (ACES, 2004).

This event was chosen to be included in this research because of the ACES security company. The managers of this company permitted this researcher to undertake a study using their staff. The focus of this study was to gain a better understanding of the factors that are most likely to have an adverse effect on the crowd. This research builds on previous work based on injury presentation data by Arbon, Bridgewater and Smith (2001), Milsten et al. (2002) and others.
APPENDIX 5 – VOLUNTEER SURVEY INSTRUMENT

Volunteers
At
Woodford Folk / Glastonbury Festival

Thank you for helping with this study

Your involvement in this research is anonymous, de-identified and voluntary. Any information you offer will be placed into a data bank and will remain confidential.

What is this survey about?

This survey is part of a research project investigating the role of volunteers in the management of public health and emergency management at the Glastonbury Festival.

This project is endorsed by the Queensland University of Technology, Australia.

If you have any questions about this survey or the research, please ask the researcher.

This project is being conducted in accordance with the conditions of ethics approval issued by the Queensland University of Technology Human Research Ethics Committee. If you have any questions of concerns please ask.
Section 1: Demographic Information

Q1 Age
- 20 yrs & under
- 21-30 yrs
- 31-40 yrs
- 41-50 yrs
- 51 yrs & older

Q2 Gender
- Male
- Female

Q3 What is your usual employment?
__________________________________________________________________________
__________________________________________________________________________

Q4 How many times have you volunteered to work at the (insert event name) Festival?
- First time
- Second time
- Third time
- Fourth time
- More than four times

Q5 Have you volunteered for other festivals?
- Yes
- No

If you answered "Yes" to the above please indicate which festival/s and the work you undertook while you were there.
__________________________________________________________________________
__________________________________________________________________________

Q6 Do have any experience in the area of public health or emergency management (eg. Volunteer Fire Services, State Emergency Services, nursing etc)?
- Yes
- No

If you answered "Yes" to the above please indicate what experience you have.
__________________________________________________________________________
__________________________________________________________________________

Section Two: Risk Management Questions

Q1. Please indicate in the table below the area/s of this festival that you have been / are working in and the type of work you have / are doing in each of these area/s?

<table>
<thead>
<tr>
<th>Areas of the festival you are working in / have worked in?</th>
<th>Work you have / are doing at the festival?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q2. Please list any hazards to the health of the public that you believe might affect festival patrons in the area/s you have been or are working in at this festival?

1. __________________________________________________________
2. __________________________________________________________
3. __________________________________________________________
4. __________________________________________________________
5. __________________________________________________________

Q3. From the list in Q2, please indicate the hazard you consider is the most likely to affect the health of the public at this festival by ticking the appropriate numbered box below?

1  2  3  4  5

Please continue over the page
**IMPORTANT:** The remaining questions in this section relate to the hazard that in your view is the most likely to affect the health of the public.

Also, please feel free to provide additional comments in the spaces provided.

Q4 Do you know how this hazard is managed at this festival?  
Yes ☐  No ☐

Q5 Do you know your role in the management of this hazard?  
Yes ☐  No ☐

Q6 Have you been given any specific training to assist your role in the management of this or other hazards?  
Yes ☐  No ☐

---

**Please continue over the page to Section 3**

Section 3 Emergency Management Questions

Q7 Do you know if there is an emergency management plan for the Glastonbury Festival?  
Yes ☐  No ☐  Don't Know ☐

*(If you answered Q7 with 'Yes' continue on to Q8. If you answered with 'No' then precede directly to Q9)*

Q8 Do you know your responsibilities under this plan?  
Yes ☐  No ☐

Q9 In the case of an emergency, who is responsible for coordinating activities in the areas you have worked / are working in?  
Don't Know ☐

Q10 If an emergency situation arose, how well do you think you would be able to deal with the situation?  
Not at all 1  2  3  4  5  6  7 Very Well

What is the most likely emergency situation that you may have to deal with?

Q11 Please add any general comments regarding hazards to the health of the public or emergency management at festivals like this one?

---

*Thank you for your help with the research.*
Glastonbury Festival 2004: Key informants

Thank you for helping with this study
Your involvement in this research is voluntary. Any information you offer will be placed into a data bank and will remain confidential.

What is this research about?

The data from this survey will contribute to a research project into the health professional’s perceptions of public health and safety at this year’s festival. This research project is part of a larger research portfolio investigating public health management at outdoor music festivals.

The Queensland University of Technology, Australia, has endorsed this research project. This project is being conducted in accordance with the conditions of the ethics approval issued by Queensland University of Technology Human Research Ethics Committee.

If you have any questions or concerns, please phone the secretary of the Human Research Ethics Committee in Australia on 0011 61 7 3864 2902. If you have any questions about this questionnaire or the research, please ask the researcher, Cameron Earl.

Section 1: Demographic information

Work areas:  Bronze □  Silver □  Gold □

Role / s at the 2004 festival:

__________________________________________________________

Section 2: Public health hazards

a. What do you think is / was the main public health and safety hazard at the 2004 festival?

__________________________________________________________

b. Why is this hazard the most important?

__________________________________________________________

c. How do you rate the risk associated with this hazard at the 2004 festival?

   (Lowest Risk) 1  2  3  4  5 (Highest Risk)

   __________________________________________

d. How has/is this public health hazard been/being managed at the 2004 festival?

   __________________________________________
Section 3: Perceptions of the 2004 Glastonbury festival

For all the questions in Sections 3.1 and 3.2, you need to reflect on your experience at the 2004 Glastonbury festival and give your opinion of the effectiveness of the overall event and service provision for the 2004 festival.

Section 3.1 level of satisfaction with the overall event

1. In terms of public health and safety, how good was the overall event this year?
   (very poor) 1 2 3 4 5 (very good)

2. Indicate the best thing / s about this year’s festival?
   ________________________________________________________________
   ________________________________________________________________

3. Indicate the worst thing /s about this year’s festival?
   ________________________________________________________________
   ________________________________________________________________

Section 3.2: level of satisfaction of services for the 2004 festival

The following questions relate to your opinion on the effectiveness of the event and service provision in terms of health and safety.

Please attempt as many of these questions that you can and answer by putting a cross x or tick √ to indicate the level of effectiveness (1 very ineffective to 5 very effective).

If your response is less than 5 (very effective) then please feel free to indicate how that service could be improved.

If you are unable to comment then indicate N/A (Not Applicable).

1. The layout of the festival? N/A □
   (very ineffective) 1 2 3 4 5 (very effective)
   How could this be improved?
   ________________________________________________________________

2. Fire safety services? N/A □
   (very ineffective) 1 2 3 4 5 (very effective)
   How could this be improved?
   ________________________________________________________________

3. Emergency planning? N/A □
   (very ineffective) 1 2 3 4 5 (very effective)
   How could this be improved?
   ________________________________________________________________
4. Communication systems? N/A ☐
   (very ineffective) 1     2     3     4  5 (very effective)

   How could this be improved?
   _______________________________________________________

5. Crowd management inside the festival? N/A ☐
   (very ineffective) 1     2     3     4  5 (very effective)

   How could this be improved?
   _______________________________________________________

6. Crowd management at the entry and exit points? N/A ☐
   (very ineffective) 1     2     3     4  5 (very effective)

   How could this be improved?
   _______________________________________________________

7. Crowd management for Pilton and the surrounding areas? N/A ☐
   (very ineffective) 1     2     3     4  5 (very effective)

   How could this be improved?
   _______________________________________________________

8. Transport arrangements for patrons, to and from the festival? N/A ☐
   (very ineffective) 1     2     3     4  5 (very effective)

   How could this be improved?
   _______________________________________________________

9. Management of vehicle movements within the festival site? N/A ☐
   (very ineffective) 1     2     3     4  5 (very effective)

   How could this be improved?
   _______________________________________________________

10. Management of parking areas? N/A ☐
    (very ineffective) 1     2     3     4  5 (very effective)

    How could this be improved?
    _______________________________________________________

11. Construction & maintenance of structures & installations?  N/A ☐

(very ineffective) 1 2 3 4 5 (very effective)

How could this be improved?
______________________________________________________________

12. Food safety?  N/A ☐

(very ineffective) 1 2 3 4 5 (very effective)

How could this be improved?
______________________________________________________________

13. Alcohol management?  N/A ☐

(very ineffective) 1 2 3 4 5 (very effective)

How could this be improved?
______________________________________________________________

14. Management of the water supply?  N/A ☐

(very ineffective) 1 2 3 4 5 (very effective)

How could this be improved?
______________________________________________________________

15. Maintenance of the toilets and showers?  N/A ☐

(very ineffective) 1 2 3 4 5 (very effective)

How could this be improved?
______________________________________________________________

16. Collection and disposal of sewage?  N/A ☐

(very ineffective) 1 2 3 4 5 (very effective)

How could this be improved?
______________________________________________________________

17. Waste management?  N/A ☐

(very ineffective) 1 2 3 4 5 (very effective)

How could this be improved?
______________________________________________________________
18. Noise and sound management?

(very ineffective) 1  2  3  4  5 (very effective)

How could this be improved?

___________________________________________________________________________

19. Management of amusements and other special effects?

(very ineffective) 1  2  3  4  5 (very effective)

How could this be improved?

___________________________________________________________________________

20. Management of the campgrounds?

(very ineffective) 1  2  3  4  5 (very effective)

What could be improved?

___________________________________________________________________________

21. Medical services?

(very ineffective) 1  2  3  4  5 (very effective)

How could this be improved?

___________________________________________________________________________

22. Environmental management?

(very ineffective) 1  2  3  4  5 (very effective)

How could this be improved?

___________________________________________________________________________

23. Information and welfare services?

(very ineffective) 1  2  3  4  5 (very effective)

How could this be improved?

___________________________________________________________________________

24. Services for people with special needs and children?

(very ineffective) 1  2  3  4  5 (very effective)

How could this be improved?

___________________________________________________________________________

Thanks for your help with this study; it is very much appreciated.
APPENDIX 7 – CONSUMER-BASED STUDY SURVEY INSTRUMENT

Priority public health issues associated with attending outdoor music festivals

Thank you for helping with this research

Your involvement in this research is anonymous, de-identified and voluntary. Any information you offer will be placed into a data bank and will remain confidential.

What is this survey about?

This survey is part of a research project that will assist with planning for public health issues at future events, through a better understanding of the priority public health concerns that the public health about attending outdoor music festivals

This project has been endorsed by the Queensland University of Technology, Australia. It is being conducted in accordance with the Universities Code of Conduct for Research. If you have any questions or concerns regarding the manner that this research is being conducted please contact the secretary of the Human Research Ethics Committee on (07) 3864 2902. If you have any questions about this survey to the research, please ask the researcher: Cameron Earl

Section 1 Demographics

1.1 Age:

17 years and younger界面 China 18-19 yrs界面 China 20-21yrs界面 China 22-23yrs界面 China 24-25yrs界面 China 26-30yrs界面 China 31-35yrs界面 China 36-40yrs界面 China 41-45yrs界面 China 46-50yrs界面 China 51+yrs界面 China

1.2 Gender:

Female界面 China Male界面 China

1.3 Have you ever attended an outdoor music festival? Yes界面 China No界面 China

If you have replied with “yes” to the above question please list the most recent outdoor festivals that you have attended (please list a maximum of 3 events):
__________________________________________________________________________
__________________________________________________________________________

Please turn to the next page (page 1 of 4)

Section 2 Public health issues at outdoor music festivals

Before you answer the next questions, think back to the most recent outdoor event you have attended or (if you have not been to an event) read or heard about an outdoor music festival. Keep this in mind as you answer the following questions

Section 2.1 Public safety issues:

Please rate your level of concern for the following public safety issues and provide comments in the space provided to explain the level of concern you give each issue.

<table>
<thead>
<tr>
<th>Public Safety Issues</th>
<th>Level of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
<tr>
<td>ITEMS BEING THROWN INTO THE CROWD?</td>
<td>1</td>
</tr>
<tr>
<td>Comments on items being thrown:</td>
<td></td>
</tr>
<tr>
<td>YOUR SAFETY IN THE MOSH PIT?</td>
<td>1</td>
</tr>
<tr>
<td>Comments on safety in the mosh pit:</td>
<td></td>
</tr>
</tbody>
</table>
HAVING A LARGE CROWD AT THE EVENT?

Comments on crowd sizes:
___________________________________________________________________________

THE EFFECT OF BEHAVIOUR RESULTING FROM ALCOHOL CONSUMPTION?

Comments on alcohol consumption:
___________________________________________________________________________

THE EFFECT OF BEHAVIOUR RESULTING FROM THE CONSUMPTION OF DRUGS?

Comments on drug consumption:
___________________________________________________________________________

THE EFFECT OF SECURITY STAFF ON THE EVENT?

Comments on security staff:
___________________________________________________________________________

EASY ACCESS BETWEEN STAGES AND VENUES WITHIN THE EVENT?

Comments on access within the venue:
___________________________________________________________________________

Any other issues on public safety that you are aware of?

Comments:
___________________________________________________________________________

Please turn to the next page (page 2 of 4)

Section 2.2 Facility and service issues:
Please rate your level of concern for the following facility and service issues and provide any comments in the space provided to explain the level of concern you give each issue.

<table>
<thead>
<tr>
<th>Facilities and Services</th>
<th>Level of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High  Med  Low</td>
</tr>
<tr>
<td>ACCESS TO SAFE FOOD WHIL...</td>
<td></td>
</tr>
<tr>
<td>Comments on safe food:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>LONG WAITING TIMES FOR DRINKS, FOOD AND TOILETS WHILE AT THE EVENT?</td>
<td></td>
</tr>
<tr>
<td>Comments on waiting times for drinks etc:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>EASY ACCESS TO TRANSPORT WHEN LEAVING THE EVENT?</td>
<td></td>
</tr>
<tr>
<td>Comments on access leaving the event:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>EASY ACCESS TO FIRST AID (IF REQUIRED) DURING THE EVENT?</td>
<td></td>
</tr>
<tr>
<td>Comments on access to first aid:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>EASY ACCESS TO TRANSPORT TO GET TO THE EVENT?</td>
<td></td>
</tr>
<tr>
<td>Comments on access to transport to get to the event:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
LONG WAITING TIMES TO ENTER THE EVENT? 1 2 3
Comments on waiting to enter the event:
___________________________________________________________________________

EASY ACCESS TO CHILL OUT OR REST AREAS WHILE AT THE EVENT? 1 2 3

Any other issues on facilities or services that you are aware of? 1 2 3
Comments:
___________________________________________________________________________

Please turn to the next page (page 3 of 4)

Section 2.3 Personal protection issues:
Please rate your level of concern for the following personal protection issues and provide comments in the space provided to explain the level of concern you give each issue.

<table>
<thead>
<tr>
<th>Personal Protection Issues</th>
<th>Level of Concern</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
</tr>
</tbody>
</table>

HAVING VALUABLES STOLEN WHILE AT THE EVENT (EG. YOUR WALLET OR PURSE)?

Comments on having valuables stolen:
___________________________________________________________________________

LOSING VALUABLES WHILE AT THE EVENT (E.G. YOUR WALLET OR PURSE)?

Comments on losing valuables:
___________________________________________________________________________

GETTING SUNBURNT DURING THE EVENT?

Comments on getting sunburnt:
___________________________________________________________________________

BEING ABLE TO SAFELY LEAVE THE EVENT?

Comments on safety leaving:
___________________________________________________________________________

BEING ABLE TO SAFELY ARRIVE AT THE EVENT?

Comments on safety arriving:
___________________________________________________________________________

BEING ATTACKED WHILE AT THE EVENT?

Comments on being attacked at the event:
___________________________________________________________________________

BEING GRABBED WHILE AT THE EVENT?

Comments on being grabbed at the event:
___________________________________________________________________________

GETTING INTO A FIGHT AT THE EVENT?

Comments on getting into a fight at the event:
___________________________________________________________________________
| BEING CONCERNED ABOUT YOUR OWN BEHAVIOUR WHILE ATTENDING THE EVENT (E.G. DRINKING TOO MUCH OR TRYING A NEW DRUG) WHILE AT THE EVENT? | 1 | 2 | 3 |
| Comments on your behaviour: |
| Any other issues on personal protection that you are aware of? | 1 | 2 | 3 |
| Comments: |

Thank you for taking the time to complete the survey and being part of the study (page 4 of 4)
APPENDIX 8 – INFLUENCE ON BEHAVIOUR AND SAFETY STUDY

SURVEY INSTRUMENT

Influences of high-risk behaviour on public safety at music events

Thank you for helping with this research
Your involvement in this research is anonymous, de-identified and voluntary. Any information you offer will be placed into a data bank and will remain confidential.

What is this survey about?
This survey is part of a research project that will assist with planning for public health and emergency management issues at future events, through better understanding of the influence of high-risk behaviour (eg. crowd surfing, moshing and stage diving).

This project has been endorsed by the Queensland University of Technology, Australia. It is being conducted in accordance with the Universities Code of Conduct for Research. If you have any questions or concerns regarding the manner that this research is being conducted please contact the secretary of the Human Research Ethics Committee on (07) 3864 2902. If you have any questions about this survey to the researcher, please ask the researcher: Cameron Earl

Section 1

1. Please indicate what you consider to be the major public safety risks to crowds at music events?

__________________________________________________________________________
__________________________________________________________________________

2. Do you think there are differences in supervising crowds associated with music events and the other security work you do?

No ☐ Yes ☐ (please indicate the differences in the space below)

__________________________________________________________________________
__________________________________________________________________________

Section 2

Based on your experiences and knowledge of musical events, please indicate the level of influence the following have on public safety at these events. Indicate your answer by marking the appropriate box ☒

The following questions relate to the influences of makeup of crowds

A crowd of mostly young people ☒ High ☒ Some ☒ Low ☒
A crowd of mostly young males ☒ High ☒ Some ☒ Low ☒
A crowd of a variety of age groups ☒ High ☒ Some ☒ Low ☒
A crowd of mostly extreme appearances (eg. punk like appearance or a rough looking crowd – bikers) ☒ High ☒ Some ☒ Low ☒

The following questions relate to the influences of the venues

A lot of physical barriers to control crowd movement ☒ High ☒ Some ☒ Low ☒
Not enough physical barriers to control crowd movement ☒ High ☒ Some ☒ Low ☒
The use of “standing room only” (mosh pits) areas for the audience at events ☒ High ☒ Some ☒ Low ☒
“Pinch points” that restrict crowd movement ☒ High ☒ Some ☒ Low ☒
Little emergency planning at the event ☒ High ☒ Some ☒ Low ☒
Overcrowding of venues and events ☒ High ☒ Some ☒ Low ☒
Lack of available water for patrons ☒ High ☒ Some ☒ Low ☒
The following questions relate to the influences of drugs and alcohol

Alcohol being available at the venue
High □ Some □ Low □

Patrons drinking excessively during events
High □ Some □ Low □

Use of stimulant drugs by the patrons (e.g. cocaine or speed)
High □ Some □ Low □

Use of drugs that slow the patron’s ability to react (e.g. LSD or heroin)
High □ Some □ Low □

The following questions relate to the influences of the security staff

Poorly managed entry and exit areas
High □ Some □ Low □

Poorly managed ticketing areas
High □ Some □ Low □

Poor communication between security and other event staff
High □ Some □ Low □

Security staff too forceful or not forceful enough
High □ Some □ Low □

Use of poorly trained or inexperienced security staff (e.g. volunteers)
High □ Some □ Low □

Not enough security staff to manage the crowd
High □ Some □ Low □

The following questions relate to the influences of the performance

Country and western
High □ Some □ Low □

Contemporary pop music
High □ Some □ Low □

Punk, thrash, hard core etc
High □ Some □ Low □

Power pop
High □ Some □ Low □

Heavy Metal
High □ Some □ Low □

Rap
High □ Some □ Low □

Dance, techno etc
High □ Some □ Low □

Section 3

Please think back to your most recent security job at a music event that involved the patrons crowd-surfing and moshing. Keep this event in mind as you answer the following questions.

What was the type of performance at that event (e.g. heavy metal)?

What were the crowd management strategies used for that event?

What do you think made the crowd start to crowd surfing and/or moshing?

What do you think was the most important factor that influenced the behaviour of the crowd at that event?

How long have you worked in the security industry?
Year ________ Months ____________

What specific training have you received to assist you with crowd management at music events?

Thank you for taking the time to complete the survey and be part of this survey.
APPENDIX 9 – CHI-SQUARED TABLES

Appendix 9 supports the results stated within the journal articles that involve Chi-Square calculations.

Note: that notable associations are a difference of 10% or greater between variables of interest.

(a) Volunteer study 1 – Australian study

Factors affecting level of confidence (article 1, page 22)

1. Training experience (notable association)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Not confident</th>
<th>Undecided</th>
<th>Confident</th>
<th>Quite confident</th>
<th>Very Confident</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training</td>
<td>2 (8.0%)</td>
<td>3 (12.0%)</td>
<td>4 (17.0%)</td>
<td>6 (25.0%)</td>
<td>9 (38.0%)</td>
<td>24 (100.0%)</td>
</tr>
<tr>
<td>No training</td>
<td>4 (10.0%)</td>
<td>10 (23.0%)</td>
<td>11 (26.0%)</td>
<td>6 (15.0%)</td>
<td>11 (26.0%)</td>
<td>42 (100.0%)</td>
</tr>
<tr>
<td>All</td>
<td>6 (9.0%)</td>
<td>13 (20.0%)</td>
<td>15 (23.0%)</td>
<td>12 (18.0%)</td>
<td>20 (30.0%)</td>
<td>66 (100.0%)</td>
</tr>
</tbody>
</table>

Missing data = 9

df = 4 ; p = 0.483

2. Knowledge of both public health and emergency management (notable association)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Not confident</th>
<th>Undecided</th>
<th>Confident</th>
<th>Quite confident</th>
<th>Very Confident</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>1 (5.0%)</td>
<td>3 (17.0%)</td>
<td>3 (17.0%)</td>
<td>4 (22.0%)</td>
<td>7 (39.0%)</td>
<td>18 (100.0%)</td>
</tr>
<tr>
<td>No knowledge</td>
<td>5 (38.0%)</td>
<td>3 (23.0%)</td>
<td>2 (16.0%)</td>
<td>3 (23.0%)</td>
<td>0.0</td>
<td>13 (100.0%)</td>
</tr>
<tr>
<td>All</td>
<td>6 (9.0%)</td>
<td>6 (20.0%)</td>
<td>5 (23.0%)</td>
<td>7 (18.0%)</td>
<td>7 (30.0%)</td>
<td>31 (100.0%)</td>
</tr>
</tbody>
</table>

Missing data = 9

df = 4 ; p = 0.159
(b) Volunteer study 2 – European study

1. Knowledge of public health control measures (notable associations) (Article 2, page 33)

<table>
<thead>
<tr>
<th>PH control measures</th>
<th>Experience volunteering at other festivals</th>
<th>TOTALs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Experience</td>
<td>No experience</td>
</tr>
<tr>
<td>Knowledge</td>
<td>75.0% (n=23)</td>
<td>25.0% (n=7)</td>
</tr>
<tr>
<td>No knowledge</td>
<td>53.0% (n=6)</td>
<td>47.0% (n=5)</td>
</tr>
<tr>
<td>TOTALS</td>
<td>71.0% (n=29)</td>
<td>29.0% (n=12)</td>
</tr>
</tbody>
</table>

Missing data = 9

df = 1; p = 0.411

<table>
<thead>
<tr>
<th>PH control measures</th>
<th>Experience volunteering at the study festival</th>
<th>TOTALs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Experience</td>
<td>No experience</td>
</tr>
<tr>
<td>Knowledge</td>
<td>60.0% (n=18)</td>
<td>40.0% (n=12)</td>
</tr>
<tr>
<td>No knowledge</td>
<td>38.0% (n=4)</td>
<td>62.0% (n=7)</td>
</tr>
<tr>
<td>TOTALS</td>
<td>54.0% (n=22)</td>
<td>48.0% (n=19)</td>
</tr>
</tbody>
</table>

Missing data = 9

df = 1; p = 0.165

2. Understanding of responsibilities within the EMP (Article 2, page 34)

<table>
<thead>
<tr>
<th>Understanding of responsibilities within the EMP</th>
<th>Awareness of the EMP</th>
<th>TOTALs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>No knowledge</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>95.0% (n=37)</td>
<td>5.0% (n=2)</td>
</tr>
<tr>
<td>No</td>
<td>50.0% (n=2)</td>
<td>50.0% (n=2)</td>
</tr>
<tr>
<td>TOTALS</td>
<td>91.0% (n=39)</td>
<td>9.0% (n=4)</td>
</tr>
</tbody>
</table>

Missing data = 7

df = 1; p = 0.000
3. Previous experience volunteering at the study festival and knowledge of emergency coordination (notable association) (Article 2, page 34)

<table>
<thead>
<tr>
<th>Knowledge of emergency coordination</th>
<th>Experience volunteering at the study festival</th>
<th>TOTALs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Experience</td>
<td>No experience</td>
</tr>
<tr>
<td>Yes</td>
<td>90.0% (n=35)</td>
<td>10.0% (n=4)</td>
</tr>
<tr>
<td>No</td>
<td>73.0% (n=4)</td>
<td>27.0% (n=2)</td>
</tr>
<tr>
<td>TOTALS</td>
<td>87.0% (n=39)</td>
<td>13.0 (n=6)</td>
</tr>
</tbody>
</table>

Missing data = 7

df = 1; p = 0.118

(c) Capacity building for volunteers at OMFs (notable association) (Article 3)

1. Level of confidence and training programs (Article 3, page 22)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Not confident</th>
<th>Undecided</th>
<th>Confident</th>
<th>Quite confident</th>
<th>Very Confident</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic Training</td>
<td>1 (4.0%)</td>
<td>1 (4.0%)</td>
<td>4 (16.0%)</td>
<td>5 (20.0%)</td>
<td>14 (56.0%)</td>
<td>24 (100.0%)</td>
</tr>
<tr>
<td>Advanced training</td>
<td>0</td>
<td>1 (4.0%)</td>
<td>7 (29.0%)</td>
<td>7 (29.0%)</td>
<td>9 (38.0%)</td>
<td>25 (100.0%)</td>
</tr>
<tr>
<td>All</td>
<td>1 (2.0%)</td>
<td>2 (4.0%)</td>
<td>1 (22.0%)</td>
<td>12 (24.0%)</td>
<td>23 (48.0%)</td>
<td>49 (100.0%)</td>
</tr>
</tbody>
</table>

Missing datum = 1

df = 4 ; p = 0.522

(d) Consumer based study – article 5

1. First Aid (Article 5, page 59)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Low concern</th>
<th>Moderate concern</th>
<th>High concern</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>37 (30%)</td>
<td>31 (25%)</td>
<td>54 (45%)</td>
<td>122 (100%)</td>
</tr>
<tr>
<td>Attenders</td>
<td>25 (37%)</td>
<td>19 (26%)</td>
<td>25 (37%)</td>
<td>68 (100%)</td>
</tr>
<tr>
<td>Non-attenders</td>
<td>13 (22%)</td>
<td>12 (21%)</td>
<td>29 (57%)</td>
<td>54 (100%)</td>
</tr>
</tbody>
</table>

Missing datum = 1

df = 2 ; p=0.045
2. Throwing (Article 5, page 60)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Low concern</th>
<th>Moderate concern</th>
<th>High concern</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>33 (27%)</td>
<td>25 (21%)</td>
<td>63 (52%)</td>
<td>122 (100%)</td>
</tr>
<tr>
<td>Attenders</td>
<td>23 (34%)</td>
<td>14 (21%)</td>
<td>30 (45%)</td>
<td>68 (100%)</td>
</tr>
<tr>
<td>Non-attenders</td>
<td>10 (18%)</td>
<td>11 (21%)</td>
<td>33 (61%)</td>
<td>54 (100%)</td>
</tr>
</tbody>
</table>

Missing datum = 1

df = 2 ; p=0.035

3. Crowd size (Article 5, pages 60 & 61)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Low concern</th>
<th>Moderate concern</th>
<th>High concern</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>36 (29%)</td>
<td>42 (35%)</td>
<td>44 (36%)</td>
<td>122 (100%)</td>
</tr>
<tr>
<td>Attenders</td>
<td>24 (35%)</td>
<td>24 (35%)</td>
<td>20 (30%)</td>
<td>68 (100%)</td>
</tr>
<tr>
<td>Non-attenders</td>
<td>12 (23%)</td>
<td>18 (33%)</td>
<td>24 (44%)</td>
<td>54 (100%)</td>
</tr>
</tbody>
</table>

Missing datum = 1

df = 2 ; p=0.025

4. Items stolen (Article 5, page 61)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Low concern</th>
<th>Moderate concern</th>
<th>High concern</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>30 (24%)</td>
<td>30 (24%)</td>
<td>62 (52%)</td>
<td>122 (100%)</td>
</tr>
<tr>
<td>Attenders</td>
<td>20 (30%)</td>
<td>18 (26%)</td>
<td>30 (44%)</td>
<td>68 (100%)</td>
</tr>
<tr>
<td>Non-attenders</td>
<td>10 (18%)</td>
<td>12 (22%)</td>
<td>32 (60%)</td>
<td>54 (100%)</td>
</tr>
</tbody>
</table>

Missing datum = 1

df = 2 ; p=0.027

5. Items lost (Article 5, page 61)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Low concern</th>
<th>Moderate concern</th>
<th>High concern</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>36 (30%)</td>
<td>26 (21%)</td>
<td>60 (49%)</td>
<td>122 (100%)</td>
</tr>
<tr>
<td>Attenders</td>
<td>21 (37%)</td>
<td>18 (26%)</td>
<td>29 (42%)</td>
<td>68 (100%)</td>
</tr>
<tr>
<td>Non-attenders</td>
<td>15 (18%)</td>
<td>8 (22%)</td>
<td>31 (58%)</td>
<td>54 (100%)</td>
</tr>
</tbody>
</table>

Missing datum = 1

df = 2 ; p=0.015

a. gender

<table>
<thead>
<tr>
<th>Variables</th>
<th>Low concern</th>
<th>Moderate concern</th>
<th>High concern</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>26 (34%)</td>
<td>35 (45%)</td>
<td>16 (21%)</td>
<td>77 (100%)</td>
</tr>
<tr>
<td>Males</td>
<td>15 (61%)</td>
<td>5 (21%)</td>
<td>4 (18%)</td>
<td>24 (100%)</td>
</tr>
</tbody>
</table>

Missing data = 22

\[ df = 2 \; ; \; p=0.023 \]

b. experience

<table>
<thead>
<tr>
<th>Variables</th>
<th>Low concern</th>
<th>Moderate concern</th>
<th>High concern</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>46 (39%)</td>
<td>33 (28%)</td>
<td>40 (33%)</td>
<td>119 (100%)</td>
</tr>
<tr>
<td>Attenders</td>
<td>26 (39%)</td>
<td>25 (19%)</td>
<td>29 (42%)</td>
<td>66 (100%)</td>
</tr>
<tr>
<td>Non-attenders</td>
<td>20 (38%)</td>
<td>8 (15%)</td>
<td>31 (47%)</td>
<td>53 (100%)</td>
</tr>
</tbody>
</table>

Missing data = 5

\[ df = 2 \; ; \; p=0.036 \]

7. Being grabbed (Article 5, page 62)

a. gender

<table>
<thead>
<tr>
<th>Variables</th>
<th>Low concern</th>
<th>Moderate concern</th>
<th>High concern</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>26 (34%)</td>
<td>35 (45%)</td>
<td>16 (21%)</td>
<td>77 (100%)</td>
</tr>
<tr>
<td>Males</td>
<td>15 (61%)</td>
<td>5 (21%)</td>
<td>4 (18%)</td>
<td>24 (100%)</td>
</tr>
</tbody>
</table>

Missing data = 22

\[ df = 2 \; ; \; p=0.023 \]

b. experience

<table>
<thead>
<tr>
<th>Variables</th>
<th>Low concern</th>
<th>Moderate concern</th>
<th>High concern</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>46 (39%)</td>
<td>33 (28%)</td>
<td>40 (33%)</td>
<td>119 (100%)</td>
</tr>
<tr>
<td>Attenders</td>
<td>26 (39%)</td>
<td>25 (19%)</td>
<td>29 (42%)</td>
<td>66 (100%)</td>
</tr>
<tr>
<td>Non-attenders</td>
<td>20 (38%)</td>
<td>8 (15%)</td>
<td>31 (47%)</td>
<td>53 (100%)</td>
</tr>
</tbody>
</table>

Missing data = 5

\[ df = 2 \; ; \; p=0.036 \]
8. Safety leaving the venue (Article 5, page 62)

a. gender

<table>
<thead>
<tr>
<th>Variables</th>
<th>Low concern</th>
<th>Moderate concern</th>
<th>High concern</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>27 (34%)</td>
<td>25 (33%)</td>
<td>25 (33%)</td>
<td>77 (100%)</td>
</tr>
<tr>
<td>Males</td>
<td>12 (50%)</td>
<td>4 (17%)</td>
<td>8 (33%)</td>
<td>24 (100%)</td>
</tr>
</tbody>
</table>

Missing data = 22

df = 2 ; p=0.045

b. experience

<table>
<thead>
<tr>
<th>Variables</th>
<th>Low concern</th>
<th>Moderate concern</th>
<th>High concern</th>
<th>TOTALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>44 (36%)</td>
<td>32 (26%)</td>
<td>46 (38%)</td>
<td>122 (100%)</td>
</tr>
<tr>
<td>Attenders</td>
<td>25 (36%)</td>
<td>25 (36%)</td>
<td>18 (28%)</td>
<td>68 (100%)</td>
</tr>
<tr>
<td>Non-attenders</td>
<td>19 (35%)</td>
<td>7 (13%)</td>
<td>28 (52%)</td>
<td>54 (100%)</td>
</tr>
</tbody>
</table>

Missing datum = 1

df = 2 ; p=0.027
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