

**Public Perceptions of High-Rise  
Building Safety and Emergency  
Evacuation Procedures  
Research Project**

*Final Report*

Prepared by:

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*NuStats*



THE  
FIRE PROTECTION  
RESEARCH FOUNDATION

**FIRE RESEARCH**

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## FOREWORD

A concern in the fire safety community in light of the events of September 11, 2001 is that the public's attitudes towards emergency notification and evacuation procedures may have changed and that current assumptions about occupant behavior in this regard may no longer be valid. In response to a recommendation by the NFPA Highrise Building Safety Advisory Committee, NFPA commissioned the Foundation to carry out a survey of high-rise building occupants to explore their general knowledge of high-rise building safety and emergency evacuation procedures, and their attitudes and perceptions toward them. 244 residential building occupants located in Chicago, New York City, and San Francisco, and 228 commercial building occupants located in Boston, Chicago, Detroit, Houston, Los Angeles, Miami, and Philadelphia were surveyed. This report summarizes the results of that study.

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The content, opinions and conclusions contained in this report are solely those of the author.

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Building Safety and Emergency  
Evacuation Procedures  
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National Fire Protection Association

FIRE PROTECTION RESEARCH FOUNDATION

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# PUBLIC PERCEPTIONS OF HIGH-RISE BUILDING SAFETY AND EMERGENCY EVACUATION PROCEDURES

*Final Report*

July 2007



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NuStats

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# EXECUTIVE SUMMARY

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The National Fire Protection Association commissioned NuStats, LLC, to conduct the Public Perceptions of High-Rise Building Safety and Emergency Evacuation Procedures survey. The survey was conducted among 244 residential building occupants located in Chicago, New York City, and San Francisco, and 228 commercial building occupants located in Boston, Chicago, Detroit, Houston, Los Angeles, Miami, and Philadelphia. The margin of error is  $\pm 6.4$  percent for the residential occupant survey and  $\pm 6.6$  percent for the commercial occupant survey.

The survey explored the following:

- General knowledge of high-rise building safety and emergency evacuation procedures,
- Attitudes and perceptions about high-rise safety and emergency evacuation procedures, and
- Factors, such as personal evacuation experience, which contribute to the knowledge, attitudes and perceptions about high-rise safety and emergency evacuation procedures.

One of the major hypotheses of the research was the belief among life safety professionals that perceptions about how occupants might respond to emergency situations in buildings has changed, largely in light of the events of September 11, 2001, and that current assumptions about occupant behavior in this regard may no longer be valid. NFPA technical committees and others will use the results of the study to develop more appropriate occupant notification and communication strategies and to build evacuation and occupant relocation strategies, emergency responder strategies, and education programs and messages.

## KEY FINDINGS

The NuStats study uncovered the following highlights:

**The events of September 11, 2001, heightened occupants concerns about safety in high-rise buildings.**

- Commercial building occupants were more likely to report this than residential occupants (56 percent and 35 percent, respectively).

**The top two safety concerns (among all respondents) were “car crash” and “building / house fire.”**

- “Being in a car crash” ranked as the top concern among all survey respondents.
- The second highest concern among resident occupants is being injured in a fire in a building fire; among commercial occupants, it is being injured in a single-family home fire.

**Commercial occupants know the drill, residential occupants don’t.**

- Eight in ten (83 percent) commercial building respondents reported they participated in a fire drill within the last year, compared to 19 percent of residential building respondents.

**Fire drills are beneficial.**

- The value of fire drill experience cannot be overstated. Respondents are generally in agreement that fire drills are beneficial with 89 percent of commercial occupants and 80 percent of residential occupants reporting this belief.

**Building occupants want more fire drills.**

- The most frequent top-of-mind suggestion to building management to improve safety was “more fire drills” (11 percent of commercial and 18 percent of residential occupants).

Almost all occupants (98 percent commercial and 95 percent residential) know where the fire exits are.

- Awareness of alternative exits was slightly lower than awareness of fire exit, with 87 percent of commercial occupants and 88 percent of residential occupants reporting they knew whether their building had an alternative exit in their building.

Commercial occupants know more about evacuation procedures in their building than residential occupants (93 percent compared to 57 percent).

- Still, commercial occupants also reported higher levels of knowledge on whether their buildings had pull stations (67 percent) compared to residential occupants (57 percent).
- But, a higher percentage of residential occupants reported knowing more whether or not their building had new occupant orientation compared to commercial occupants (51 percent and 36 percent, respectively).

Residential occupants report being more personally prepared for an emergency than commercial occupants.

- Ninety-four percent of residential occupants said they possessed appropriate footwear compared to only 56 percent of commercial occupants.
- Seventy-six percent of residential occupants reported having a flashlight or glow stick compared to 30% of commercial occupants.

Most people think a fire is the most likely cause of a building evacuation.

- Out of six possible events, commercial and residential occupants ranked fire as the most likely cause of a building evacuation.<sup>1</sup>

In keeping with conventional wisdom, during a fire, most occupants (80 percent of commercial and 73 percent of residential) believe using elevators is never safe.

- In contrast, about a quarter of all respondents believe that going to the roof is a possible alternative to using the stairs – a strategy some safety personnel consider dangerous and unwise except in a last resort situation.

During a building evacuation using the stairwell, one-third will stop and let people exiting from another floor go ahead of them; most will wait 1-2 minutes.

- During a building evacuation using the stairwell, only one-third of respondents in both surveys reported they would stop and let persons exiting from another floor go ahead of them (31 percent of residents and 35 percent of commercial respondents). And most respondents in both surveys reported one or two minutes is the longest they would stop and wait due to congestion (51 percent of residential and 58% of commercial respondents).
- Residential occupants (particularly with fire drill experience and those that live on lower floors) are more likely to a) ignore a false alarm “because they know it’s false” or b) open their door to evacuate even if there is smoke outside that door. These occupants have a false sense of security that could lead to potentially dangerous behavior during an emergency.

Very few persons have concern over privacy issues if their exit stairwells were equipped with video cameras.

- About nine out of ten respondents (89 percent) reported they would not be concerned at all over privacy issues if the exit stairwells in their building were equipped with video cameras to permit monitoring of stairwells during evacuations.

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<sup>1</sup> Respondents were asked to rank six events in the order they felt they are most likely to cause an evacuation in their building. The events included fire, power failure, earthquakes, bomb, chemical or biological incident, and high winds.

## RECOMMENDATIONS

### Messages and Outreach / Public Education Efforts to the Public who Reside / Work in High-rise Buildings

- Dispel existing misinformation among the public, particularly residential high-rise occupants, e.g., do not go to the roof during a fire unless it is the only alternative.
- Retrain / change behaviors. If safety personnel and first responders agree that high-rise occupants can use elevators during a fire, there needs to be a major effort to retrain behavior among the general public.
- Provide updated information and fill in the gaps. Communicate new or updated safety / evacuation procedures. Education programs should incorporate targeted messages for certain occupants:
  - ✓ Counter the potential “false sense of security” among residential occupants who may have tendencies to exhibit undesirable evacuation behaviors. Messages should emphasize general fire prevention and safety, such as do not open a door if there is fire outside of it.
  - ✓ Appeal to heightened concerns for building safety by referring to the events of September 11, 2001, or by citing examples of other well-known building fires. This kind of reference resonates with respondents. Position the information as lessons learned that would help save others.
- Seek unique outreach venues to reach the older members of the public such as medical and senior centers and associations.

### Messages and Outreach / Public Education Efforts to Building Owners and Managers

- Provide updated information and fill in the gaps, e.g., updated emergency evacuation procedures (e.g., whether or not to use an elevator or go to the roof during an evacuation or await notice from an official before evacuating); information on fire prevention.
- Emphasize the importance of and need for routine fire drills to high-rise occupants, particularly in the residential buildings. Possibly mandate at least one fire / evacuation drill per year. Messaging could include the belief that high-rise building occupants believe fire drill experience is beneficial.
- Provide more information sharing and new occupant training on building evacuation procedures.



# INTRODUCTION

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## BACKGROUND

NuStats, a PTV Group Company, under contract to the Fire Protection Research Foundation (FPRF), conducted a survey to explore public knowledge and perceptions of high-rise building safety and emergency procedures. The surveys were conducted with occupants of commercial and residential high-rise buildings using a number of modes for administration including mail survey and telephone interviews for residents and mail and web surveys for commercial occupants. The data was collected from November 2006 through March 2007.

The National Fire Protection Association (NFPA) has the practical mission of generating and disseminating knowledge-based regulatory and policy guidance, action strategies, stakeholder education, and public communications regarding building fires, their danger, and specifically disaster emergency egress. The empirical understanding of emergency egress is complex, and requires a multi-disciplinary methods approach that includes behavioral science, planning, engineering, and statistical science. This study's focus – the perception and attitudes of building residents regarding their building's safety and their anticipated behavior in the event of an emergency situation – is of value to NFPA Technical Committees and others concerned with high-rise fire safety.

## SURVEY OBJECTIVES

The focus of this study is to examine the current attitudes and perceptions of occupants of high-rise structures to the occurrence of emergency scenarios, how they think they might become aware of such emergency situations, their understanding of emergency procedures and how they might respond. A number of life safety professionals believe that perceptions about how occupants might respond to emergency situations in buildings has changed, largely in light of the events of 9/11, and that current assumptions about occupant behavior in this regard might no longer be valid. NFPA technical committees and others will use the results of the study to develop more appropriate occupant notification and communication strategies and to build evacuation and occupant relocation strategies, emergency responder strategies, and education programs and messages.

The main goals of the survey were to:

- Assess general knowledge of high-rise building safety and emergency evacuation procedures,
- Explore current attitudes and perceptions about high-rise safety and emergency evacuation procedures, and
- Understand how personal evacuation experience, building height, respondent demographics and other factors may contribute to these knowledge, awareness and perceptions.

Some questions to be answered through the research were – Which emergency notification tools and evacuation procedures are high-rise building occupants most familiar with? What are occupants' perceptions of personal or building safety during a fire in relation to other emergency situations? What factors (e.g., past experience, training/drills, etc.) contribute most to increased knowledge and awareness of building safety and evacuation procedures?

This report details the answers to these and other questions. It also provides some insight and conclusions that can be used in planning and creating communications strategies and education programs on high-rise building safety and emergency preparedness.



# SURVEY METHODS

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In establishing the general framework or methodology for the survey, NuStats worked closely with NFPA and the Project Technical Panel (e.g., on sample design / selection criteria for building types and height, the survey questionnaire, and the protocols for recruiting participants). This section provides an overview of the study methodology, including the study design, sample design, and questionnaire design.

## OVERVIEW

Identifying and selecting the building and occupants for this study required consideration of several characteristics: (1) the building use (residential or commercial), (2) the building height, and geographic location (e.g., San Francisco, Chicago, and New York City). The study design called for an examination of high-rise buildings from the perspective of building tenants and those that managed the buildings and held some level of responsibility for the building emergency evacuation processes (e.g., appointed fire or floor warden).

The final study design excluded interviews with building owners/managers and designated Fire Marshals. Despite efforts to obtain buy-in and support from local chapters of the Building Owner and Manager Association and city Fire Marshals, NuStats encountered reluctance and refusal to participate in interviews or to assist with recruitment of residential and commercial tenants by building owners and managers. The source of this reluctance cited most frequently by building owners/managers was two-fold: (1) distrust in the true purpose of the study (e.g., they would be cited for building code violations) and (2) suspicion that the study would ultimately result in increased regulation or more building codes. As a result, obtaining the contact information for the Fire Marshals designated for each building or tenant lists was not possible. Therefore, structured interviews with building owners/managers and designated Fire Marshals were excluded from the study design.

## FINAL STUDY DESIGN

This study involved the collection of data that constituted a statistically representative sample of building occupants and buildings and, therefore, required a two-stage sample design. The first stage included the selection of the sample frame for buildings in three cities that were pre-selected by the Project Technical Panel: the cities of San Francisco, Chicago and New York. The second stage included the selection and recruitment of businesses and residents to participate in the survey. Each is briefly reviewed below.

### *Building Sample Frame*

The first stage of sampling involved generating a universe of buildings from which the surveyed buildings would be randomly selected and thus would comprise the sample frame from which survey participants would ultimately be selected. It was determined that municipal boundaries in the study's three cities would define the geographic areas from which the inventory would be drawn and eligible buildings would be 20 stories or greater.

What follows is the process used to create the sample frame.

- Identify the universe (or inventory) of eligible buildings and key information elements using Internet sources (<http://www.emporis.com/en/> and <http://www.skyscraperpage.com/>).
- Verify the inventories and check for significant omissions by the Project Technical Panel and Fire Marshals in each city.

- Stratify the buildings in the inventory by height (20 to 30 stories and 40 or more stories) and additional stratification of buildings by use (commercial and residential).<sup>2</sup> In the sample frame, a building of 40 or more stories was characterized as “Taller” while a building of 20 to 30 was characterized as “Shorter”
- Review the age of buildings (older—pre-1980 or newer—post-1980).

The resulting inventory of buildings were then sampled based upon their height (shorter (A) and taller (B)) and age (older (A) and newer (B)) as indicated in the Table 1.

TABLE 1: BUILDING SAMPLE DESIGN

	San Francisco (S)		Chicago (C)		New York (N)	
Codes	Shorter	Taller	Shorter	Taller	Shorter	Taller
Older	SAA	SBA	CAA	CBA	NAA	NBA
Newer	SAB	SBB	CAB	CBB	NAB	NBB

Using the sample design in Table 1, residential and commercial buildings were selected at random to comprise the sample frame. A total of twelve buildings comprised the residential building sample frame and eleven comprised the commercial sample frame.

Ultimately, the participant sample frame resulted from the following efforts:

- For the residential sample, a total of 1,764 of listed addresses and telephone numbers of households within the residential building sample frame were purchased. Data collection was first conducted by mail (including a reminder mailing to increase participation) and, finally, telephone interviews conducted with non-respondents. This effort resulted in a total of 244 completed residential surveys. Weights were applied to this data set to account for not having captured the sample design mix of building heights/age/location in the final sample.
- For the commercial sample, the sample frame contained in Table 3 only generated six of the 228 completed surveys. The remainder was the result of successful NFPA recruitment of one company, AON, with offices located in several states. A point of contact within AON distributed and collected paper surveys to employees in Boston, Chicago, Detroit, Houston, Los Angeles, Miami, and Philadelphia.

## QUESTIONNAIRE DESIGN

Between September and November 2006, NuStats and the NFPA Project Technical Panel went through several draft versions of the questionnaire before a final survey instrument was approved. The questionnaire was essentially identical for both residential and commercial building occupants with the exception of one question (Question 1g which pertained only to commercial tenants) and included vernacular sensitive to each audience.

The questionnaire was initially developed as a self-administered paper version and minor modifications were made to the introductions and instructions to accommodate web and telephone (Computer Assisted Telephone Interviewing) administration modes. NuStats conducted a pre-test of the instrument for the purpose of reviewing the questions for content understanding and flow and to assess the time it would take respondents to complete the survey. In addition, NuStats pre-tested the instrument by telephone with 3 Houston area tenants who worked in high-rises. The pretest yielded information that led to minor text changes and the removal of a small number of questions. A copy of the paper version of the questionnaire is contained in Appendix A.

<sup>2</sup> Hotel and residential use was treated as one use.

## ANALYSIS

The majority of data were analyzed using SPSS. Results are based on various statistical testing procedures such as comparing mean scores and tests for significance. The results of this study are accurate within a margin of error that varies by survey and level of analysis.

- For the residential study, the margin of error on the sample as a whole (244) is +/- 6.4 percent at the 95 percent confident level.
- For the commercial study, the margin of error on the sample as a whole (228) is +/- 6.6 percent.

A set of nine variables comprised the focus of this analysis. They include a combination of demographic and core questions:

- 1) Geography Cities of San Francisco, Chicago, and New York and Building Height<sup>3</sup>
- 2) Building Height<sup>4</sup> (20 to 39 floors or 40 floors or greater)
- 3) Occupant Floor, *Question 26*, (1-19, 20-40, or 41 or higher)
- 4) Respondent Age, *Question 30*, (less than 35, 35-60, 61 or older)
- 5) Respondent Gender
- 6) Respondent Health Status, *Question 32*, (excellent, good, fair/poor)
- 7) Respondent Limited, *Question 33*, Conditions (no or yes)
- 8) Experience, *Question 21 and 23*, (none, alarm only, drill)

However, most of the analysis and data presented in this report is based upon the sample “as a whole.” Very few findings on the above variables are reported. This is due to due to high margins of error (low sample sizes) associated with each variable.

*The Tables and Figures in this report reflect weighted residential and unweighted commercial survey data, unless noted otherwise. A discussion of the weighting of the residential sample is contained in Appendix B.*

## LIMITATIONS OF THE RESEARCH

### *Residential Building Occupant Survey*

In the residential component of the study, households without a listed address and telephone number did not participate in the survey. Therefore, persons without a listed address or home phone service at the time of the survey were excluded from the study universe. NuStats has found, through past experience, that non-telephone households are episodic as opposed to chronic.<sup>5</sup>

Income was not a demographic variable included in our survey, but buildings that represented “public or low-income housing” were excluded from our sample frame.

### *Commercial Building Occupant Survey*

With the majority of commercial building occupant survey respondents being from a single company, Aon, the potential for bias exists. This introduces a number of biases to the commercial study data:

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<sup>3</sup> Geography is used as a variable for the residential occupant survey only.

<sup>4</sup> Because the buildings in the commercial survey were not from our original sample frame, NuStats researched the height and age of the survey respondent buildings to derive these data.

<sup>5</sup> With few exceptions, the condition of having no phone available is episodic – with these households moving through periods of time with phone service, then without phone service, and later with phone service.

- ✓ Aon specializes in risk management, reinsurance and human capital management consulting. While most of the commercial building occupant survey respondents were located in offices specializing in risk management consulting, they reflect the opinions of diverse positions with the office thereby reducing the potential for bias introduced due to subject matter expertise.
- ✓ Aon was among the many companies located in the World Trade Center during the September 11, 2001 tragedy. While the New York office was not included in this study, this event likely heightened Aon employee's concern, overall, regarding building safety.

Additionally, the impact of residing in the Los Angeles building on the perceptions of the occupants is a potential source of sensitivity to risk attitudes.



# KEY FINDINGS OF RESIDENTIAL BUILDING SURVEY

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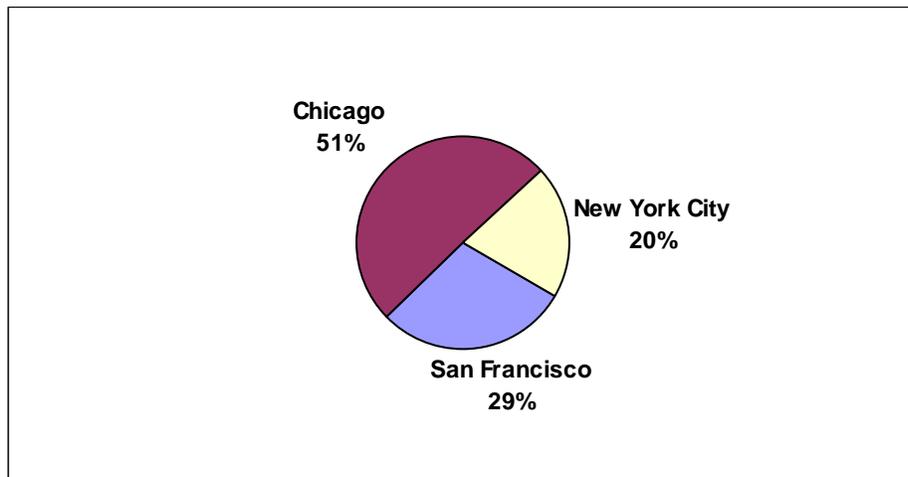
This section of the report presents the current attitudes and perceptions of residential occupants of high-rise structures on their understanding of emergency procedures and preparedness, how they think they might become aware of such emergency situations, and how they might respond or how they have responded to an emergency situation or fire drill in the past. It is organized into four key sections:

- 9) Demographics
- 10) Basic Knowledge of Building Safety and Emergency Preparedness
- 11) Perceptions about Emergency Preparedness and Evacuation Procedures
- 12) Behavior During an Emergency Evacuation

## GEOGRAPHIC DISTRIBUTION

The three geographic areas of interest for the study are the cities of San Francisco, Chicago and New York. As shown in Figure 1, the majority of respondents were in Chicago (51 percent) followed by San Francisco (29 percent) and New York City (20 percent).

FIGURE 1: RESPONDENTS BY GEOGRAPHIC LOCATION, UNWEIGHTED



## BUILDING PARAMETERS

Several factors relating to the building height and the floor on which an individual resides could be influential in individual's inclination, knowledge or awareness levels related to emergency preparedness and evacuation procedures. As shown in Figure 2, over two-thirds of the buildings were 40 stories or greater in height.

FIGURE 2: BUILDING HEIGHT, UNWEIGHTED

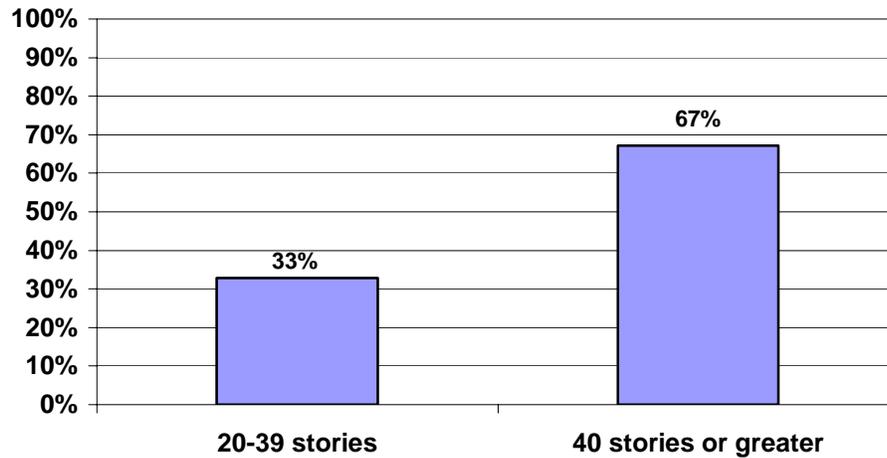
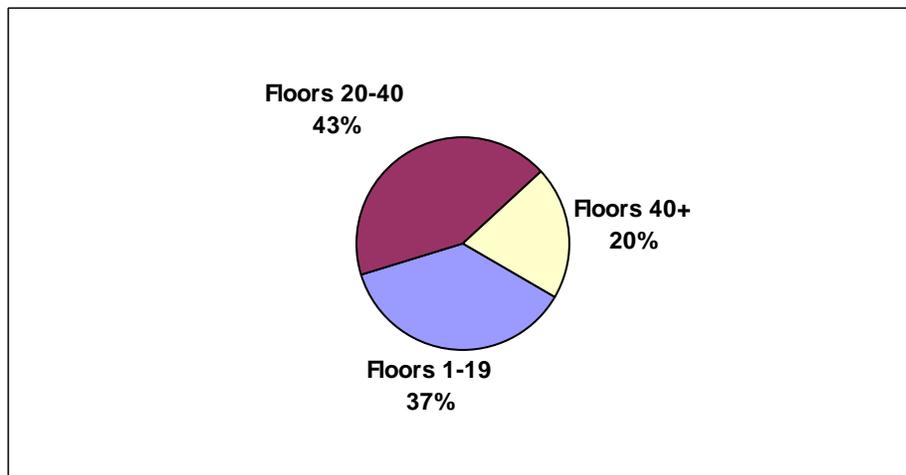


Figure 3 shows that most respondents in the study lived within the 20<sup>th</sup> and 40<sup>th</sup> floors (43 percent) or lower (37 percent). Only about one in five lived on or above the 40<sup>th</sup> floor.

FIGURE 3: RESPONDENT RESIDENCE BY FLOOR, UNWEIGHTED

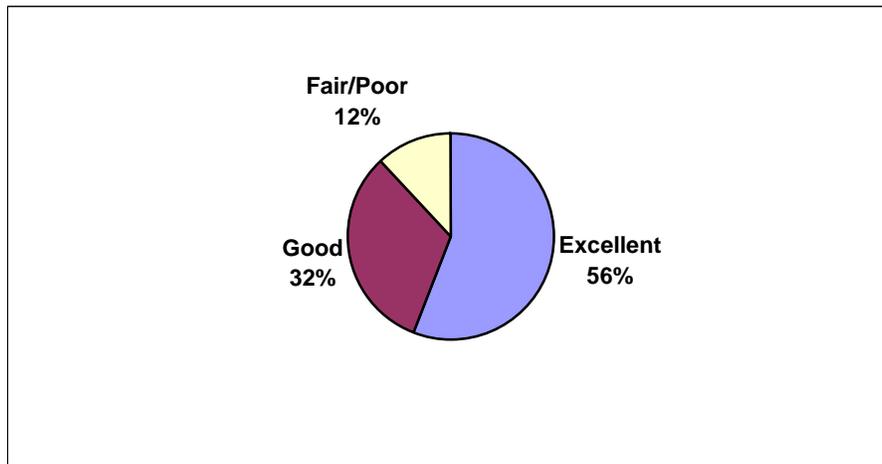


### *Respondent-specific demographics*

The study assessed the potential influence of respondent gender, age, health status, and past experience with alarms or emergency situations on knowledge and awareness levels. Overall, slightly more females (52 percent) than males (48 percent) participated in the survey. While most respondents were between the ages of 35-60 (47 percent), the study captured the opinions of nearly equal numbers of residents under the age of 30 and greater than fifty (28 percent and 25 percent).

In regards to health status, as shown in Figure 4, over half of respondents reported being in excellent health with another third (32 percent) reporting to be in good health. Twelve percent reported their health status as fair or poor.

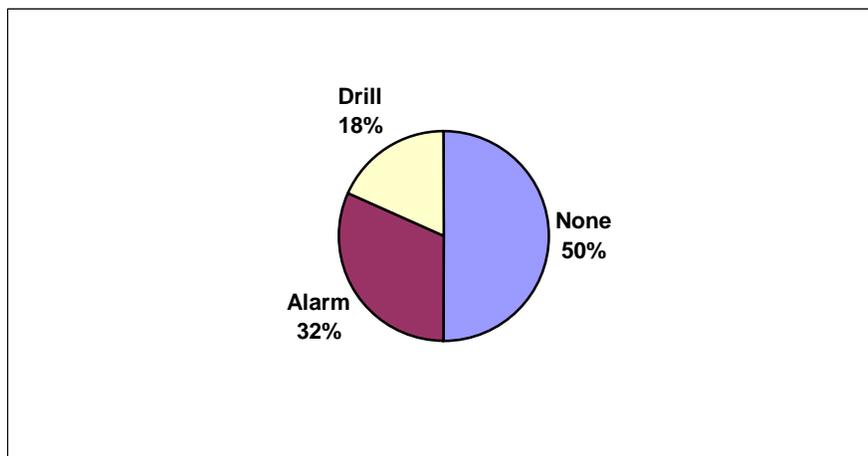
**FIGURE 4: RESPONDENT HEALTH STATUS, UNWEIGHTED**



About 14 percent reported to having a limited condition (e.g., difficult to clearly hear alarms or spoken instructions or a physical condition that would make it difficult to walk out of the building).

Respondents reported whether or not they had experienced either a real or false fire alarm or participated in a fire drill within the last year. Half of all respondents had not participated in either a fire alarm or fire drill. About one-third (32 percent) reported experiencing a fire alarm (either false or real).

**FIGURE 5: RESPONDENT EXPERIENCE WITH ALARMS OR DRILLS, UNWEIGHTED**



## BASIC KNOWLEDGE OF EMERGENCY PREPAREDNESS AND EVACUATION PROCEDURES

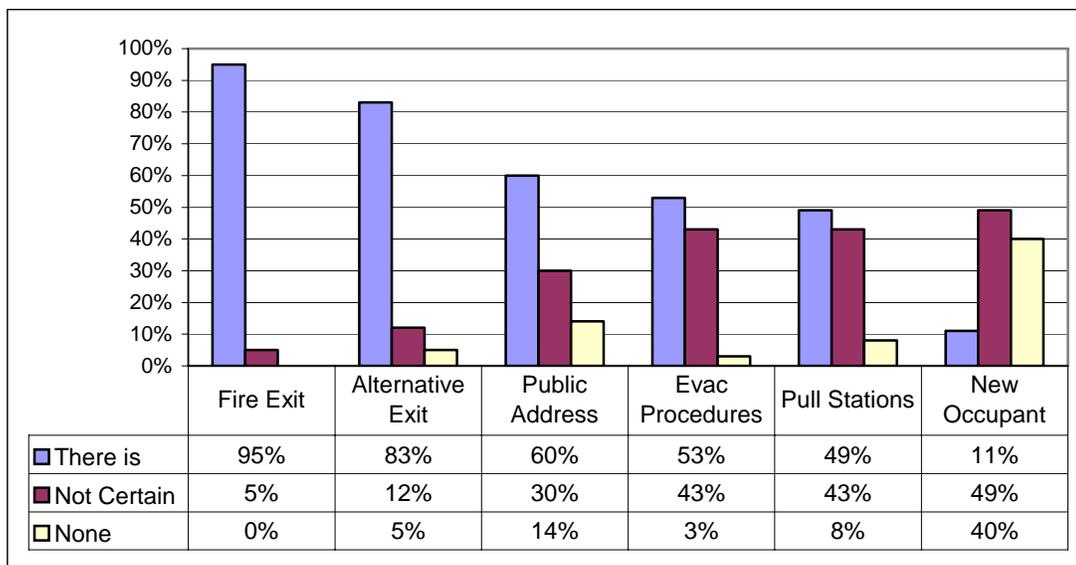
Residential high-rise building occupants reported their levels of knowledge and awareness on a number of items related to building evacuation procedures and emergency readiness or preparedness. This section highlights the key themes that emerged from the analysis of their responses. The Tables and Figures in this section reflect weighted data.

*Overall, high-rise building residents know the locations of fire exits and alternative exits.*

Respondents were queried about their personal awareness of a number of emergency preparedness systems and tools. Emergency preparedness can be assessed on a number of factors including knowledge and awareness of a building’s notification systems (alarm or public address/voice communication system), evacuation routes, and familiarity with emergency evacuation plans or procedures.

As shown in Figure 6, nearly all respondents (95 percent) reported being familiar with the nearest fire exit and most residents (88 percent) were also aware whether or not there was an alternative exit or stairs. In comparison, they also reported less knowledge of their building’s evacuation procedures (56 percent), pull stations that activate the alarm (57 percent), and new occupant fire safety orientation (51%).

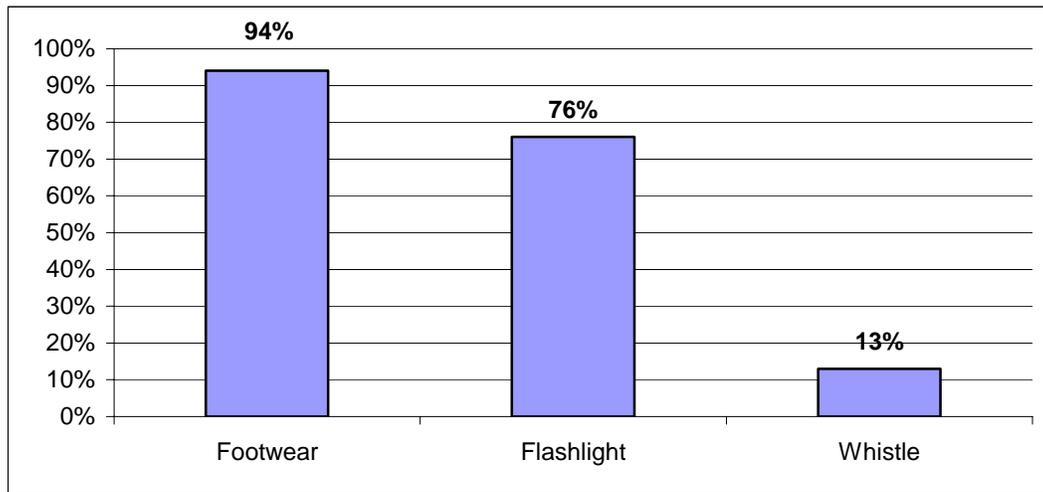
FIGURE 6: KNOWLEDGE OF EMERGENCY PREPAREDNESS SYSTEMS



*There is a mixed availability of appropriate “personal” emergency preparedness tools.*

When asked about whether three items of emergency preparedness equipment were readily available to them in the event of a building evacuation, nearly all respondents reported having appropriate footwear (94 percent) and a smaller number (78 percent) reported to having a flashlight or glow stick (see Figure 7 on the following page). Only about one out of five residents (18 percent) reported having a whistle readily available to them.

**FIGURE 7: POSSESSION OF EMERGENCY PREPAREDNESS EQUIPMENT**

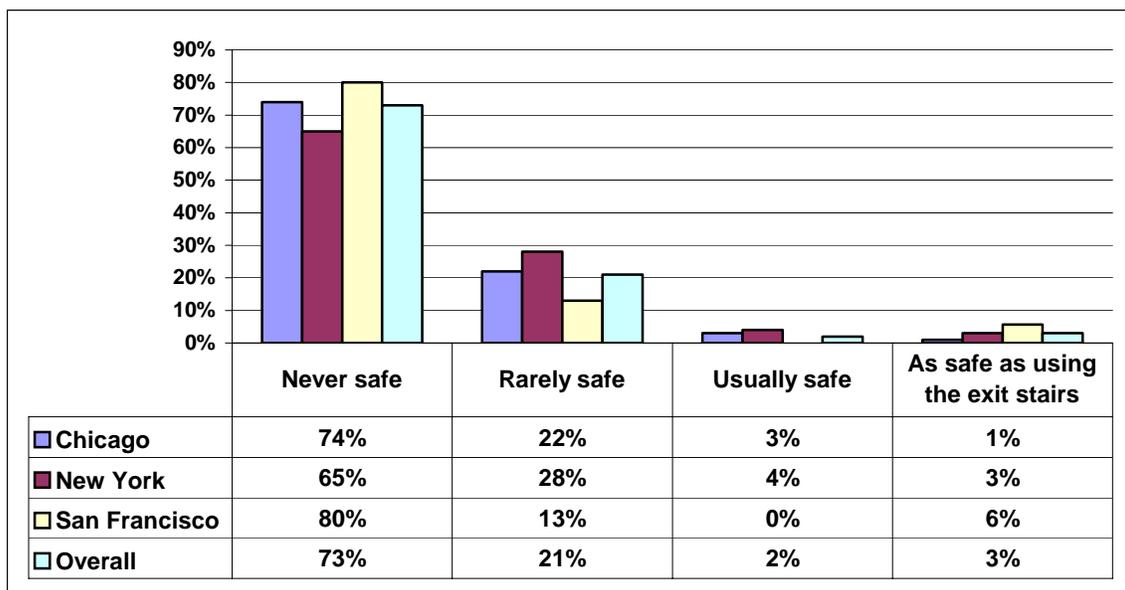


*Most residents of high-rise buildings believe elevators are never safe to use during an emergency situation.*

Prior to September 11, 2001, public education on emergency evacuation procedures stressed the avoidance of using elevators in lieu of exit stairwells. With the recent emergency situations requiring building evacuations (including those of September 11) officials are reconsidering if and when elevators may be appropriate to use during building evacuations. This survey assessed residents’ familiarity levels with building evacuation procedures particularly as it relates to using elevators.

When asked whether or not they believed elevators were safe to use during an evacuation of their building, most residents (73 percent overall) believed “it was never safe.” As shown in Figure 8, there was some variation in responses according to city of residence, but these are not statistically different.

**FIGURE 8: BELIEF THAT ELEVATORS ARE SAFE TO USE DURING AN EMERGENCY SITUATION**



## OPINIONS ABOUT EMERGENCY PREPAREDNESS AND BUILDING EVACUATION READINESS

The previous section reported on the respondents’ knowledge levels related to emergency preparedness procedures and systems related to evacuations and protecting them in the case of an emergency situation. This section focuses on their perceptions or opinions on emergency preparedness and building evacuations, in general. A focus of many of these questions was on fire emergency situations and their likely behavior in an emergency situation.

### *Residents of high-rise buildings believe they are prepared for a fire; and, their building is, too.*

Respondents were queried on their levels of agreement with a series of statements regarding building safety and emergency preparedness, particularly in the scenario of a fire in their building. Table 2 presents these data as a mean score with 1 being strongly disagree and 5 being strongly agree. The statements are presented in the order of those in which respondents reported higher levels of agreement to lower levels of agreement.

**TABLE 2: OPINIONS ON BUILDING SAFETY AND EMERGENCY PREPAREDNESS**

STATEMENT	ALL
Once a year, I would be willing to walk completely out of my building during a fire drill.	4.2
I am willing to walk completely out of the building in a full evacuation drill.	4.2
I am prepared to take necessary action in case of a fire in my building.	4.0
I take fire drills in our building very seriously.	3.6
I can get out quickly if there is a fire in my building.	3.4
I am well informed regarding safety procedures in my building in the event of a fire.	3.3
As a general rule, my neighbors take fire drills very seriously.	3.2
I am concerned about non-fire events in my building such as earthquakes, power outages, tornadoes, or deliberate attacks.	3.2
I have neighbors who are not prepared for a building emergency.	3.1
I am concerned about fires in my building.	3.0
I waited until I was told to leave the building in our last fire drill.	2.8
I think my building is not prepared for a serious fire.	2.4
I have ignored a fire alarm because I was sure it was false.	2.4

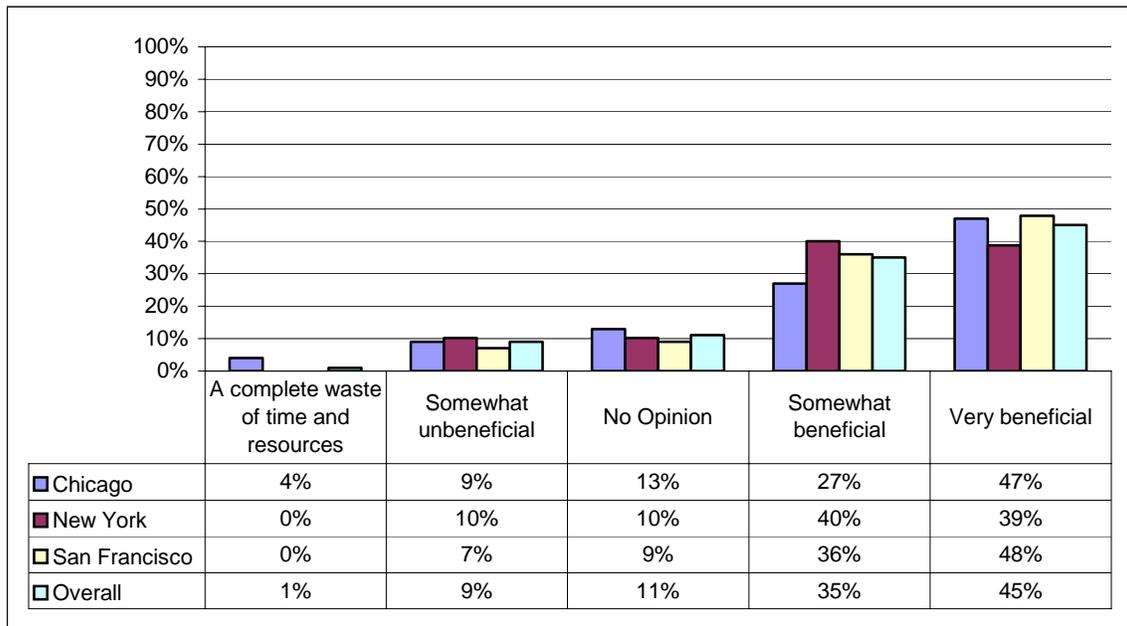
\*Values are based on a scale of 1 to 5 with 1 being strongly disagree and 5 being strongly agree.

From the table above, we can make several general observations. Most notably, with an average of 3.0, respondents did not indicate strong levels of concern about fire in their buildings. This might be explained, partially, by their perceived levels of preparedness in the case of a fire in their building. Respondents believe they are prepared to take action in the case of a fire event in their building (mean score = 4.0) and with a mean score of 2.4, they tend to disagree with the statement that their building “is not” prepared for a serious fire. Persons with previous fire drill experience are even more likely to disagree with this statement (mean score = 1.9) than those without previous drill experience (mean score = 2.6)

### *Residents value evacuation drills and feel they take fire drills more seriously than their neighbors*

In general, residential occupants of high-rise buildings view evacuation drills to be very beneficial. As shown in Figure 9 on the following page, eight out of ten respondents (80 percent) believe these drills are somewhat or very beneficial.

**FIGURE 9: OPINIONS ABOUT THE BENEFIT OF FIRE DRILLS**



Below Table 3 presents an observation about fire drill readiness among residents. While respondents were more likely agree with the statement that they take fire drills seriously than their neighbors (mean scores of 3.6 compared to 3.2), a few still admit they have ignored a fire alarm because they were certain it was false.

**TABLE 3: OPINIONS ON FIRE DRILL READINESS**

OPINIONS ABOUT FIRE DRILL READINESS	ALL
I am willing to walk completely out during a fire drill.	4.2
I take fire drills very seriously	3.6
My neighbors take fire drills very seriously	3.2
I waited until I was told to leave the building in our last fire drill.	2.8
I have ignored a fire alarm because I was sure it was false.	2.3

\*Values are based on a scale of 1 to 5 with 1 being strongly disagree and 5 being strongly agree.

Still, experience is a factor for building attitudes regarding fire drills. Those with previous experience report stronger agreement with the statement that they take fire drills very seriously compared to those with no drill experience (mean scores of 3.8 and 3.6, respectively).

*Fire ranks as the event respondents believe will most likely cause an evacuation in residential buildings; still, they are more concerned about being in a car crash than being injured in a building fire.*

Respondents were asked to rank six events in the order they felt they were most likely to cause an evacuation of their building with 1 being the event most likely to cause and evacuation and 6 being the least likely. As shown in Table 4, fire ranked as the event residents felt would cause a building evacuation to occur.

**TABLE 4: LIKELINESS OF EVENTS TO CAUSE A BUILDING EVACUATION**

EVENT	RANKING BY ALL
Fire	1.8
Power Failure	3.0
Bomb	3.7
High Winds	3.9
Earthquake or Hurricane	4.1
Chemical or Biological Incident	4.5

Respondents also ranked their level of concern for safety in regard to four scenarios with 1 being the highest level of concern and 4 being the lowest. As shown in Table 5, being in a car crash tops the concern respondents have regarding their personal safety, followed by being injured in a building fire.

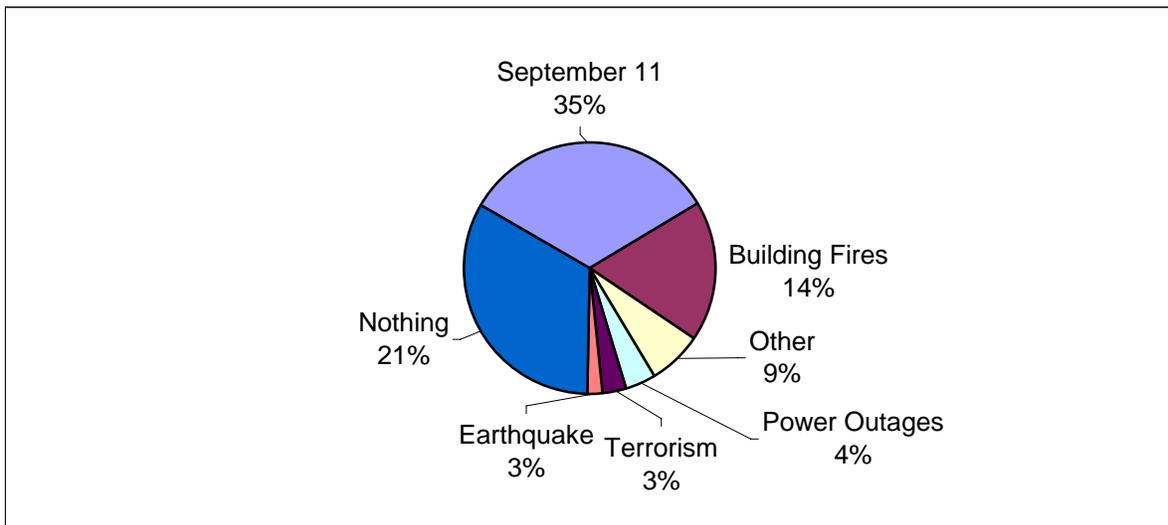
**TABLE 5: CONCERN FOR SAFETY AMONG FOUR SCENARIOS**

SCENARIO	RANKING BY ALL RESPONDENTS
Being in a car crash	1.2
Being injured in a building fire	2.4
Being injured in a single-family home fire	2.5
Being struck by lightning	3.9

*About one-third of respondents believe the September 11 event heightened their concerns about safety in high-rise buildings.*

Respondents were asked to provide their top-of-mind thoughts regarding any events or previous experiences that might have heightened their concern for safety in high-rise buildings. As shown in Figure 10, the event of September 11 was mentioned by just over one-third of respondents.

FIGURE 10: EVENTS OR EXPERIENCE THAT HEIGHTENED CONCERN FOR BUILDING SAFETY



Other events that heightened respondent concern for building safety include:

- Notable building fires (cited by name) such as the LaSalle building or the Cook County building fire,
- Knowledge of building fires without mentioning the building or fire event (“a couple of fires in Chicago” or “a fire we had six months ago,”
- Personal experiences with fire alarms, drills and false alarms,
- Knowledge of accidents involving airplanes hitting buildings (“The Yankees guy flying into a building on 70<sup>th</sup> street” or “airplane hitting a building”), and
- Even though the vast majority of respondents reported they would not use elevators in the case of an emergency evacuation, several respondents mentioned elevator problems (“elevators taken out of service” or “elevators being repaired), which made them consider what would happen if there were a fire in their building.

**PERCEPTIONS OF LIKELY BEHAVIORS DURING AN EMERGENCY SITUATION OR BUILDING EVACUATIONS**

While the previous section addressed respondents’ attitudes on safety and emergency preparedness from a number of perspectives, this section addresses their perceptions of their behaviors during an emergency situation or evacuation.

*The majority of respondents have never completely walked out of their building.*

When asked how long it would take to walk completely out of the building from their residence without using an elevator, the average time reported was about 13 minutes. As shown in Table 6, when asked about the last time they walked out of the building without using an elevator, just less than half of residents reported they had never walked completely out of their building. About one-third of respondents felt the time was about what they expected compared to those who felt it was longer (16%) or shorter (5%) than they expected.

**TABLE 6: PERCEPTION OF THE TIME TO WALK OUT OF BUILDING WITHOUT USING AND ELEVATOR**

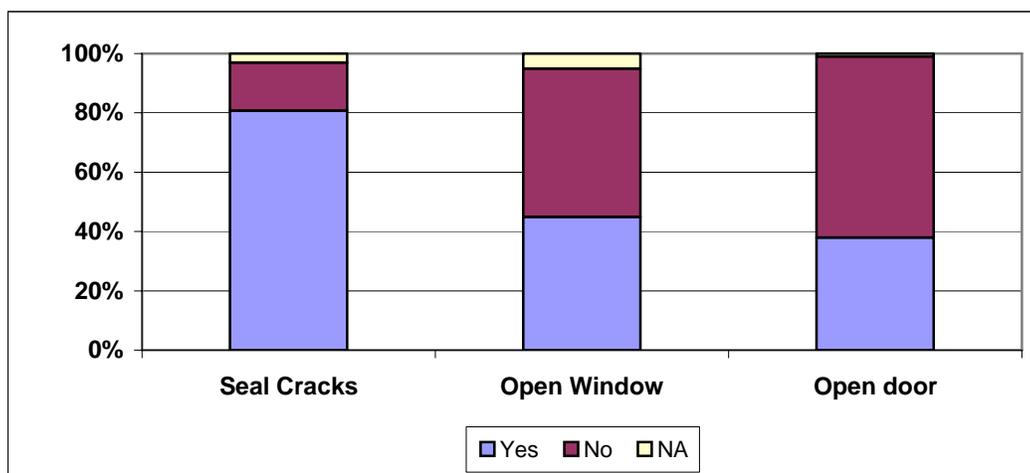
RESPONSE	PERCENTAGE
Never walked out of the building without using the elevator	46%
About what was expected	32%
Somewhat longer than expected	10%
Much longer than expected	6%
Somewhat shorter than expected	4%
Much Shorter than expected	1%

*In the event of a fire, most respondents will seal the door if trapped, and not open the door with smoke on their floor.*

Respondents were asked a series of questions to gauge their opinions on their response to an emergency situation caused by a fire in their buildings.

- If significant smoke was outside their door, two-thirds (61 percent) of respondents indicated they would not open the door to evacuate, and most would isolate themselves in a room and seal cracks to keep the smoke out. See Figure 11.

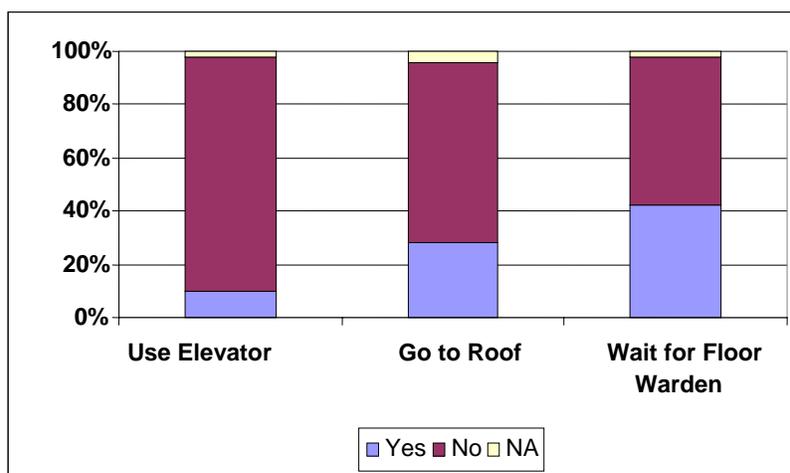
**FIGURE 11: BEHAVIORS DURING A SMOKE EVENT**



As presented in Figure 12, respondents' possible actions in the event of an actual fire in their building include:

- If a fire alarm were to go off on their floor, 58 percent of residents would not wait for a floor warden or public address system to tell them to leave while 40 percent indicate they would.
- Seventy percent of residents believe that going to the roof was not a possible alternative to evacuating down the stairs; however, one-quarter (25%) believed it was.
- If they knew a fire was not on their floor, 91 percent stated they would not use the elevator compared to 8 percent who said they would.

FIGURE 12: ACCEPTABLE ALTERNATIVE TO USING STAIRWELLS DURING AN EVACUATION

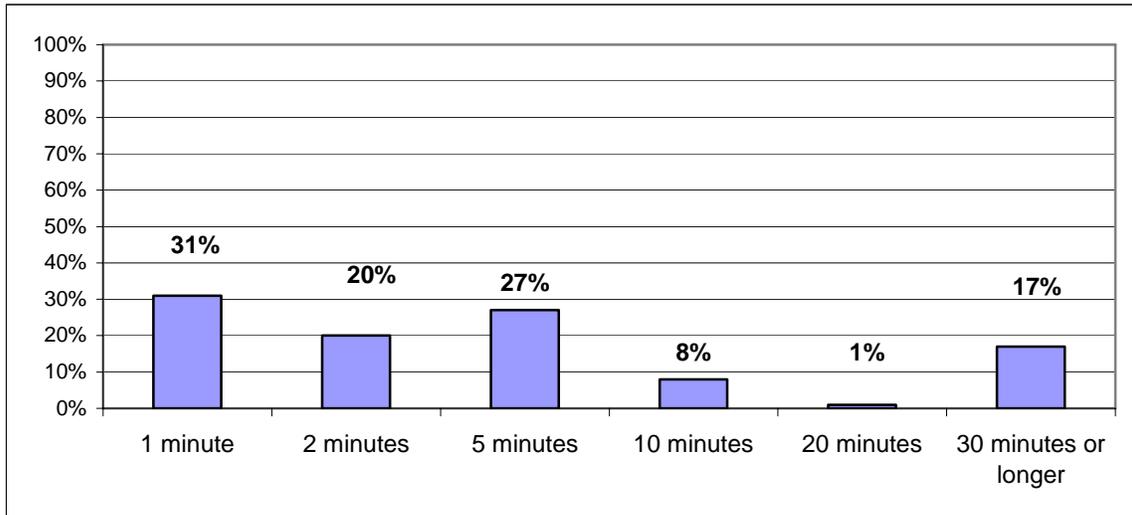


*During an evacuation using the stairs, just under one third of respondents would stop and let one or two persons exiting from lower floors go ahead—but, they would not wait very long if stopped due to congestion.*

Just under one-third (31 percent) of respondents believed they would stop and let persons exiting from another floor go ahead of them if evacuating the building using the stairwells. Another 31 percent reported it would depend on their level of awareness about the fire (18 percent) or on the directions they received from authorities (12 percent).

However, when asked what the longest delay in minutes they would be willing to wait if they stopped on the stairs due to congestion during an evacuation, just over half reported 1 or 2 minutes (31 percent and 20 percent, respectively). See Figure 13 on the following page.

FIGURE 13: LONGEST DELAY WILLING TO WAIT IF STOPPED IN STAIRWELL DURING AN EVACUATION



When asked about their level of concern over privacy issues if the exit stairwells in their building were equipped with video cameras to permit monitoring of stairwells during evacuations, about nine out of ten respondents (89 percent) reported they would not be concerned at all. Of the remaining, 7 percent reported they would be somewhat concerned and 3 percent would be very concerned.

*Few respondents experienced evacuation drills or fire alarms in the past year.*

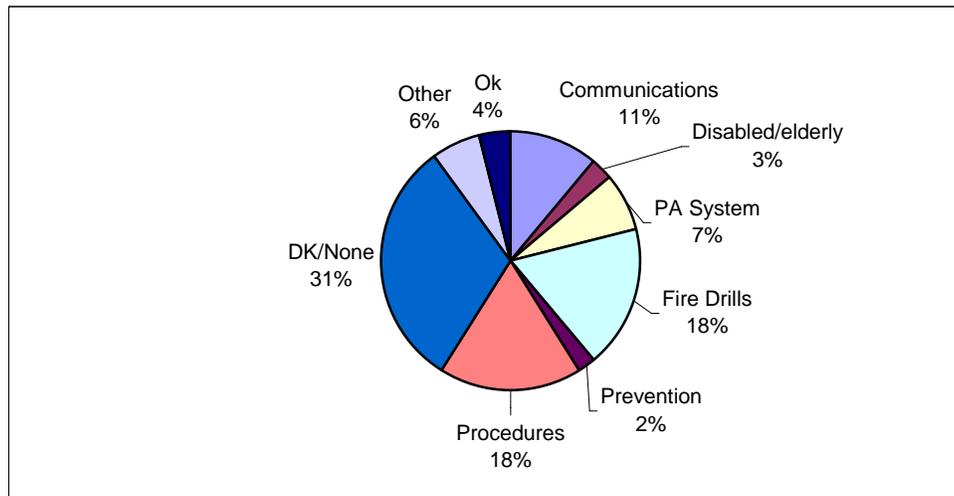
In the past year, eight out of ten (81 percent) of the residential respondents had not experienced an evacuation or fire drill. Of the 19 percent that had experienced an evacuation or fire drill, about half (8 percent) had experienced only one.

Compared to evacuation or fire drills, more respondents had experienced a real or false fire alarm. Overall, 44 percent of respondents reported experiencing one or more fire alarms in the past year. Only 7 percent of those fire alarms were real; the remaining were false alarms.

*Respondents want more drills and more information on their building evacuation procedures.*

A final question posed to respondents was to provide top-of-mind recommendations for their building management to take regarding their safety. As shown in Figure 14, of the respondents who expressed an opinion, respondents requested more fire drills and information on their building evacuation procedures. One third had no comment.

FIGURE 14: RECOMMENDATIONS FOR BUILDING MANAGEMENT



Regarding procedures, respondents requested to have maps of exit routes posted and/or distributed more frequently, for management to hold more frequent meetings to review procedures with residents, and several respondents requested that random checks be performed to “test” residents on their knowledge levels regarding evacuation procedures.

Another top recommendation was for management to increase communications and provide information on fire prevention and emergency evacuations through management letters, newsletters, and by posting floor plans and signage around the building and on bulletin boards. Several persons recommended this information be provided in multiple languages.

About seven percent of the recommendations were specifically requesting a public announcement system for communicating with occupants during an emergency situation.



# KEY FINDINGS OF COMMERCIAL BUILDING SURVEY

This section of the report presents the current attitudes and perceptions of commercial occupants in high-rise structures regarding their understanding of emergency procedures and preparedness, how they think they might become aware of such emergency situations, and how they might respond or how they have responded to emergency situations or fire drills in the past. It is organized into four key sections:

- 1) Demographics
- 2) Basic Knowledge of Building Safety and Emergency Preparedness
- 3) Perceptions about Emergency Preparedness and Evacuation Procedures
- 4) Behavior During an Emergency Evacuation

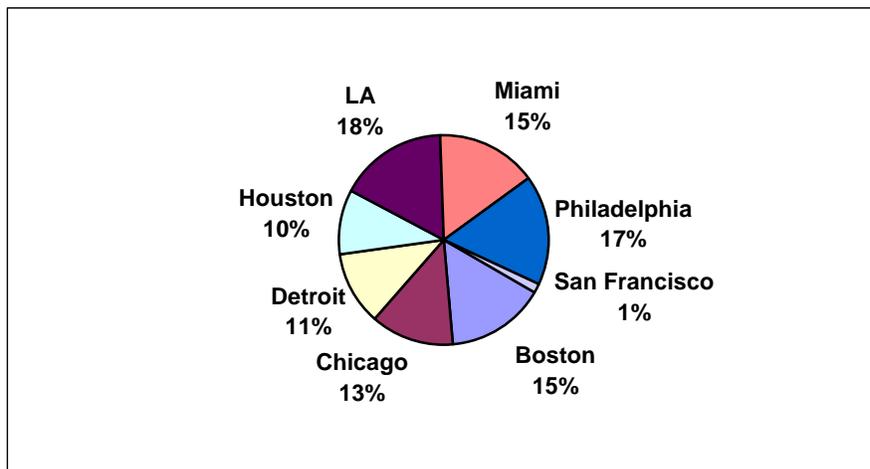
## DEMOGRAPHICS

A total of 228 commercial building occupants participated in the survey. This section provides an overview of the participants in terms of their geographic distribution, building parameters, and respondent-specific demographics. Many of these characteristics were used as variables for analysis in this report.

### *Geographic Distribution*

As shown in Figure 15, survey participants worked in high-rise buildings located in eight cities including Boston, Chicago, Detroit, Houston, Los Angeles, Miami, Philadelphia, and San Francisco. Most participants were employees of a single company (Aon) with several offices nationwide. Most participants were in Los Angeles (18 percent) and Philadelphia (17 percent). Only 1 percent was in San Francisco, but these were not Aon employees.

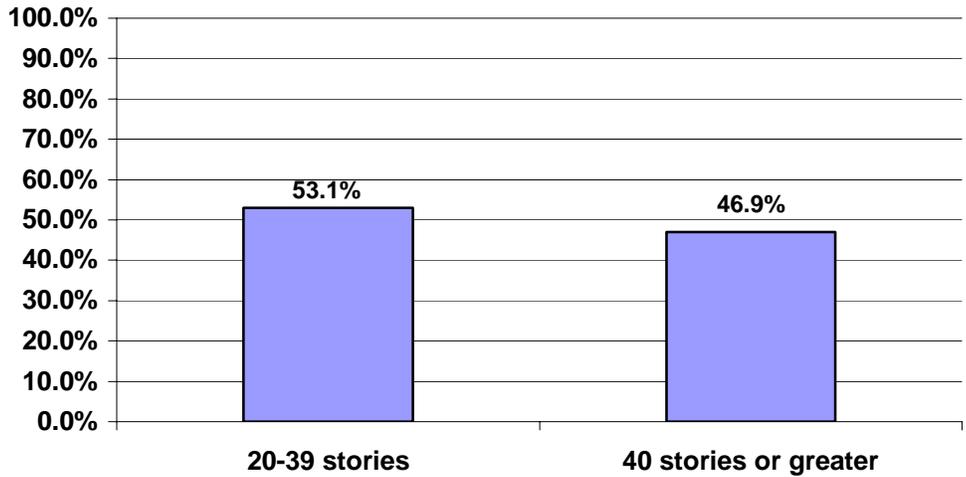
FIGURE 15: RESPONDENTS BY GEOGRAPHIC LOCATION



### *Building Parameters*

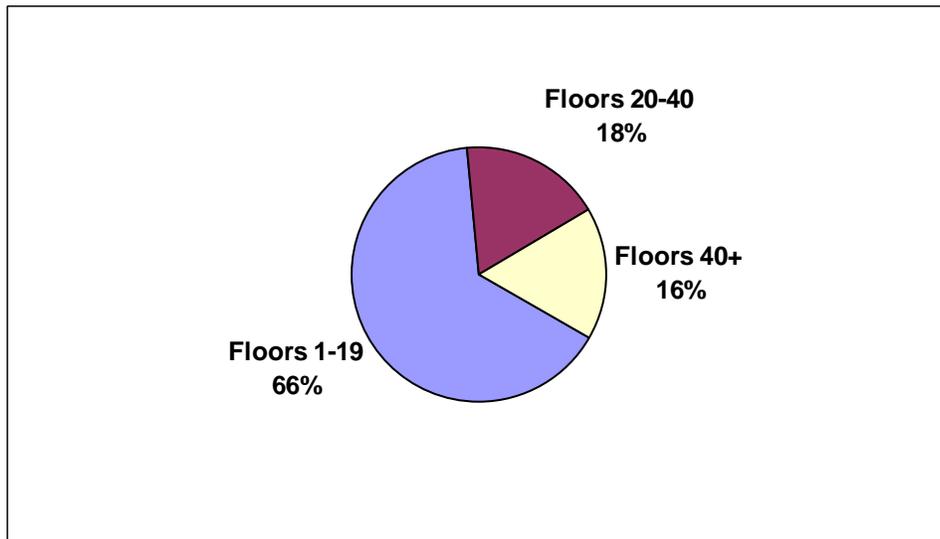
As shown in Figure 16 on the following page, occupants were equally distributed between working in taller and shorter buildings.

**FIGURE 16: BUILDING HEIGHT**



Just over two-thirds (66 percent) of the survey participants worked on floor 19 or lower as shown in Figure 17.

**FIGURE 17: RESPONDENT OFFICE BY FLOOR**

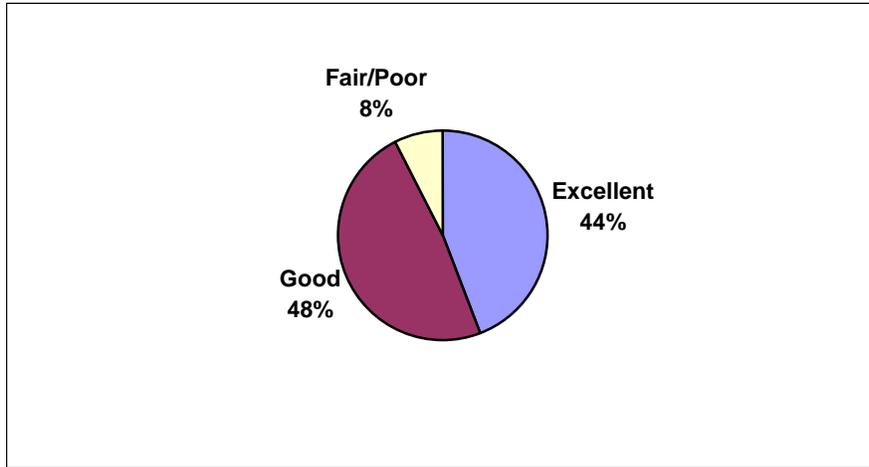


*Respondent-specific demographics*

The study assessed the potential influence of respondent age, health status including mobility limitations, and past experience with alarms or emergency situations on knowledge and awareness levels.

In regards to health status, as shown in Figure 18 on the following page, only eight percent of respondents reported they were in fair or poor health.

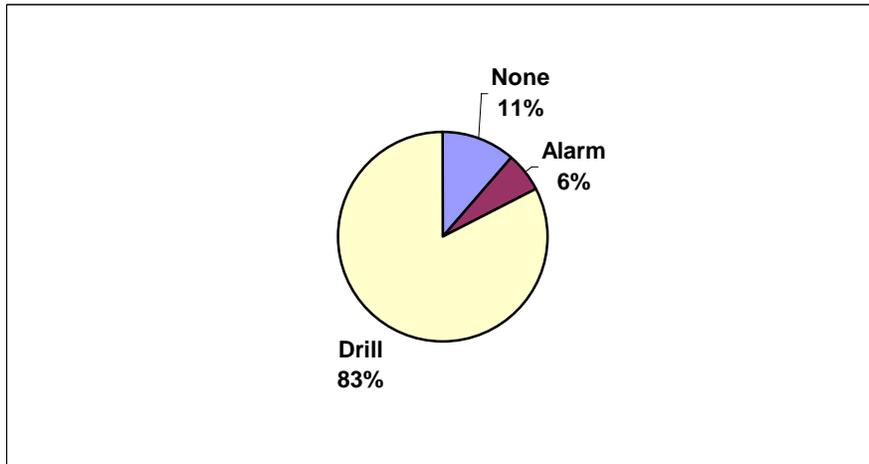
**FIGURE 18: RESPONDENT HEALTH STATUS**



*Personal Experience with Fire Alarms or Drills*

Most survey respondents (83 percent) also reported they had experienced a fire or evacuation drill in their building and six percent had experienced a real or false alarm. Eleven percent had not experienced either a drill or an alarm in the past year (see Figure 19).

**FIGURE 19: RESPONDENT EXPERIENCE WITH ALARMS OR DRILLS IN THE PAST YEAR**



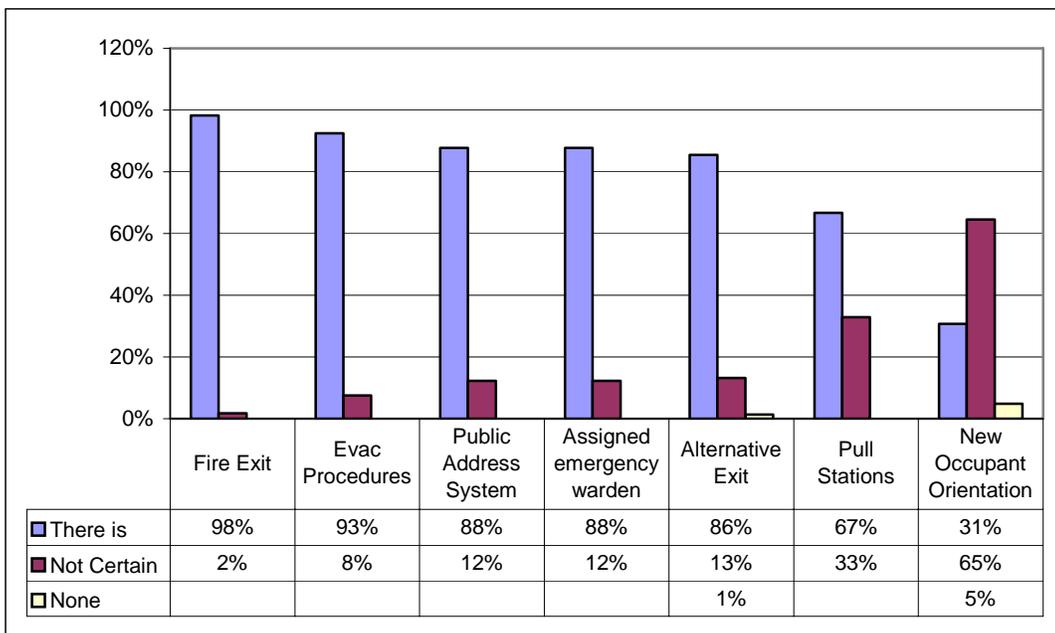
## BASIC KNOWLEDGE OF EMERGENCY PREPAREDNESS AND EVACUATION PROCEDURES

This section highlights the key themes that emerged regarding commercial high-rise building occupants' knowledge and awareness levels on a number of items related to building evacuation procedures and emergency readiness or preparedness.

*Commercial building occupants were aware of most evacuation tools and procedures, but few were aware of new occupant training.*

As shown in Figure 20 on the following page, respondents were relatively familiar with, and aware of, their buildings' evacuation tools and procedures (fire exits, public address system). Still, two-thirds (67 percent) were aware of pull stations and just over one-third (36 percent) knew whether or not new occupant orientation was offered.

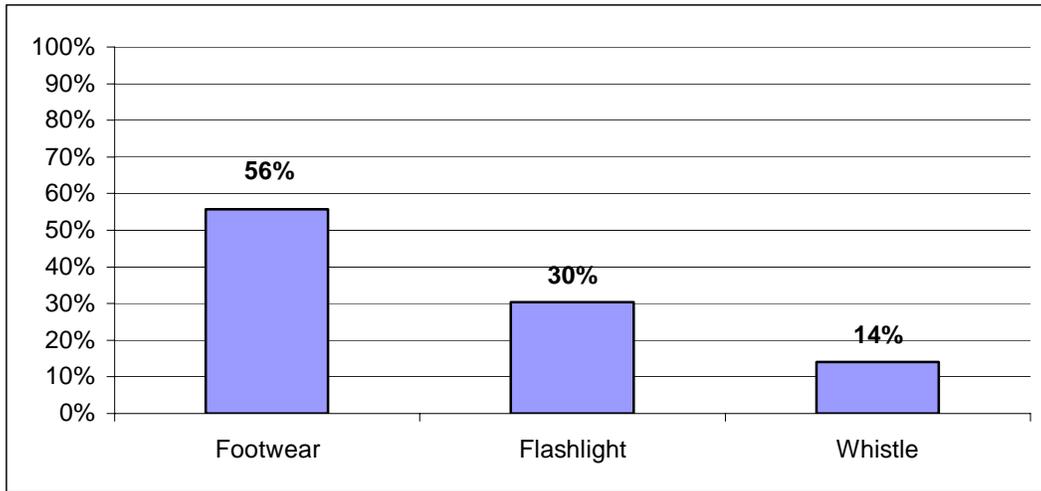
FIGURE 20: KNOWLEDGE OF EMERGENCY PREPAREDNESS SYSTEMS



*Few commercial building occupants possess emergency preparedness equipment; those that do, occupy offices on higher floors.*

Commercial building respondents reported whether the following three items of emergency preparedness equipment were readily available to them in the event of a building evacuation: appropriate footwear, a flashlight or a whistle. While just over half (56 percent) of respondents reported having appropriate footwear, a smaller number (30 percent) reported having a flashlight or glow stick. Few (14 percent) reported having a whistle readily available to them (see Figure 21).

FIGURE 21: POSSESSION OF EMERGENCY PREPAREDNESS EQUIPMENT



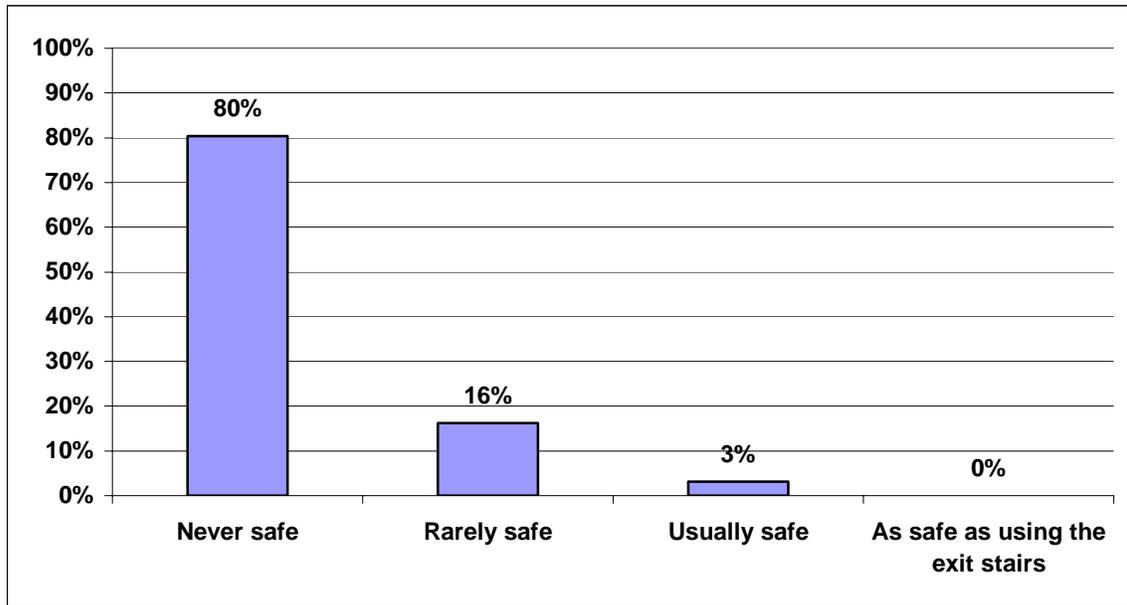
Still, persons whose offices were located in taller buildings or on floor levels 20 or greater, were more likely to report having any of these items:

- Persons who worked in a building with 40 or more floors (36 percent), or worked on floors 20-40 (46 percent) and on floors higher than 41 (35 percent) reported having a flashlight or glow stick readily available.
- Persons whose offices were located on floors 20-40 (29 percent) or those who were 61 years or older (29 percent) reported having a whistle available.
- Persons whose offices were located on floors 20-40 (68 percent) or those 61 years or older (71 percent) reported having appropriate footwear available in the case of an emergency in their building.

*Most commercial high-rise building occupants report that it is never safe to use an elevator during an emergency situation.*

When asked whether or not they believed elevators were safe to use during an evacuation of their building, most commercial building occupants (80 percent overall) believed “it was never safe.” While none of the commercial building survey respondents reported that “using the elevator was as safe as using the exit stairs,” just over 10 percent of persons whose office was located on floor 41 or higher reported it was “usually safe” and 32 percent reported it was “rarely safe.”

**FIGURE 22: BELIEF THAT ELEVATORS ARE SAFE TO USE DURING AN EMERGENCY SITUATION**



#### OPINIONS ABOUT EMERGENCY PREPAREDNESS AND BUILDING EVACUATION READINESS

The previous section reported on the respondents’ knowledge levels related to emergency preparedness procedures and systems related to evacuations and protecting them in the case of an emergency situation. This section focuses on their perceptions or opinions on emergency preparedness and building evacuations, in general. A focus of many of these questions was on fire emergency situations and their likely behavior in an emergency situation.

*Commercial building occupants of high-rise buildings believe they are prepared for a fire; and, their building is, too*

Commercial building occupants were queried on their levels of agreement with a series of statements regarding building safety and emergency preparedness, particularly in the scenario of a fire in their building. Table 7 on the following page presents these data as a mean score with 1 being strongly disagree and 5 being strongly agree. The statements are presented in the order with the statements that the respondents reported the highest levels of agreement at the top.

**TABLE 7: OPINIONS ON BUILDING SAFETY AND EMERGENCY PREPAREDNESS**

STATEMENT	MEAN
I am willing to walk completely out of the building in a full evacuation drill.	4.5
I am prepared to take necessary action in case of a fire in my building.	4.3
I take fire drills in our building very seriously.	4.2
I am well informed regarding safety procedures in my building in the event of a fire.	4.0
As a general rule, my neighbors take fire drills very seriously.	3.6
I can get out quickly if there is a fire in my building.	3.5
I am concerned about non-fire events in my building such as earthquakes, power outages, tornadoes, or deliberate attacks.	3.3
I am concerned about fires in my building.	3.1
I have neighbors who are not prepared for a building emergency.	3.0
I waited until I was told to leave the building in our last fire drill.	2.5
I think my building is not prepared for a serious fire.	2.3
I have ignored a fire alarm because I was sure it was false.	1.8

The data in the Table above presents several general observations—most of which are similar to those of the residential survey. With an average of 3.1, respondents did not indicate strong levels of concern about fire in their buildings and are only slightly more concerned about non-fire events (mean score = 3.3). Furthermore, they also believe they are personally prepared to take the necessary action in case of a fire in the building (mean score = 4.3), and they tend to disagree with the statement that their building “is not” prepared for a serious fire (mean score = 2.3).

*Commercial building occupants value fire drills and feel they take fire drills more seriously than their neighbors do.*

In general, commercial building occupants of high-rise buildings view fire drills to be very beneficial. As shown in Figure 23, on the following page, nearly nine out of ten respondents (89 percent) believe first drills are somewhat or very beneficial.

FIGURE 23: OPINIONS ABOUT THE BENEFIT OF FIRE DRILLS

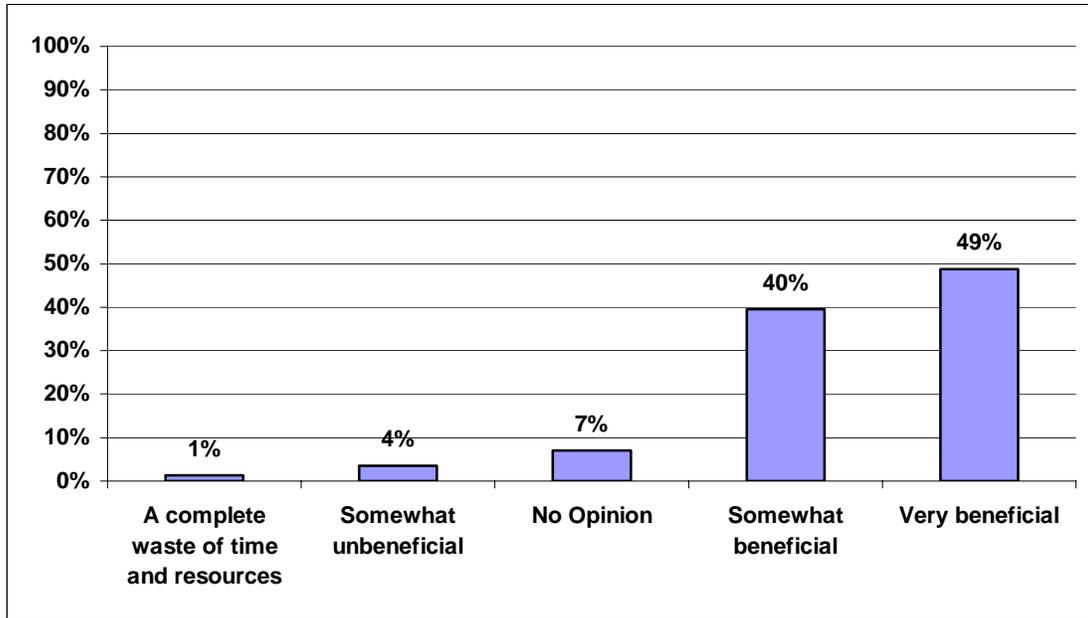


Table 8, below, presents survey respondents’ opinions about fire drill readiness. Similar to the residential survey findings, more respondents were likely agree with the statement that they take fire drills more seriously than their neighbors do (mean scores of 4.2 compared to 3.6).

TABLE 8: OPINIONS ON FIRE DRILL READINESS

STATEMENT	MEAN
Once a year, I would be willing to walk completely out of my building during a fire drill.	4.4
I take fire drills in our building very seriously.	4.2
As a general rule, my neighbors take fire drills very seriously.	3.6
I waited until I was told to leave the building in our last fire drill.	2.5
I have ignored a fire alarm because I was sure it was false.	1.8

While most survey respondents did not agree with the statement “I have ignored a fire alarm because I was sure it was false,” about 11 percent said they did agree with the statement.

*Fire ranks as the event respondents believe will most likely cause an evacuation in commercial buildings.*

Respondents were asked to rank six events in the order they felt they were most likely to cause an evacuation of their building (See Table 9). Fire ranked as the event commercial building occupants would most likely expect to cause a building evacuation to occur with a mean score of 1.9, followed, nearly equally, by a power failure (mean score = 2.8) and a bomb (mean score = 2.9).

**TABLE 9: EVENTS LIKELY TO CAUSE A BUILDING EVACUATION**

SCENARIO	RANKING BY ALL
Fire	1.9
Power Failure	2.8
Bomb	2.9
Biological Incident	4.2
High Winds	4.3
Earthquake	4.8

\* Values of 1 reflect the event most likely and 6 equals the even least likely to cause a building evacuation.

Even so, being injured in a building fire was not highly ranked as a concern for survey respondents. As shown in Table 10, being in a car crash was the biggest personal safety concern for respondents, followed by being in a single-family home fire.

**TABLE 10: CONCERNS FOR SAFETY AMONG FOUR SCENARIOS**

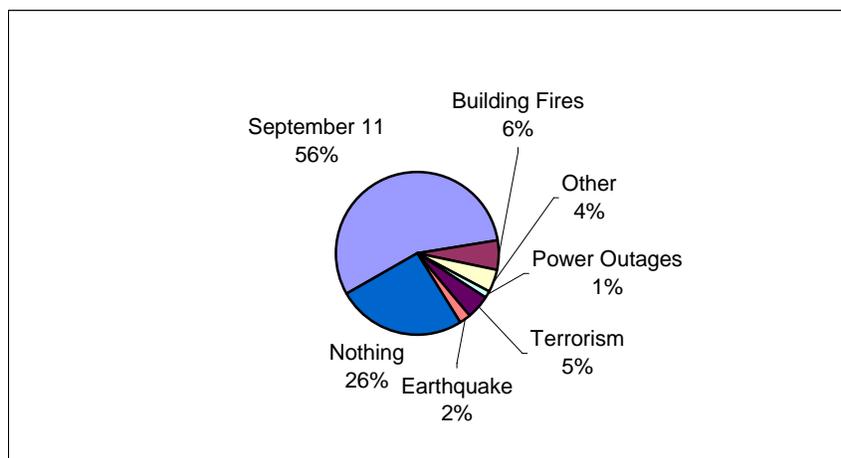
SCENARIO	RANKING BY ALL RESPONDENTS
Being in a car crash	1.0
Being injured in a single-family home fire	2.3
Being injured in a building fire	2.8
Being struck by lightning	3.9

\*Values of 1 reflect the event most likely and 4 equals the scenario least likely to cause concern for safety.

*Over half of survey respondents believe the September 11 event heightened their concerns about safety in high-rise buildings.*

Respondents were asked to provide their top-of-mind thoughts regarding any events or previous experiences that might have heightened their concern for safety in high-rise buildings. While just over a quarter of respondents could not readily recall an event or personal experience that has heightened their concern, as shown in Figure 24, the events of September 11, 2001 were mentioned by over half of the respondents.

**FIGURE 24: EVENTS OR EXPERIENCE THAT HEIGHTENED CONCERN FOR BUILDING SAFETY**



Anecdotally, other events that heightened respondent concern for building safety included:

- Building fires noted by name (“Cook County fire” and the “Loop Fire”) and other generic references to building fires (“fires in other buildings” and “I know this building had a serious fire two years ago”).
- Terrorism related or unrelated to September 11 (“I was evacuated from the workplace due to a bomb squad in the complex,” “Shootings in the Ogilvie Building,” “I heard that our building is the tallest in the area and that we have had plane threats” and “bomb scare after 9-11”).
- References of concerns related to using exit stairwells during an evacuation (“Being on the 56<sup>th</sup> floor with limited exits,” and “It is difficult to go down twelve floors using the stairs”).

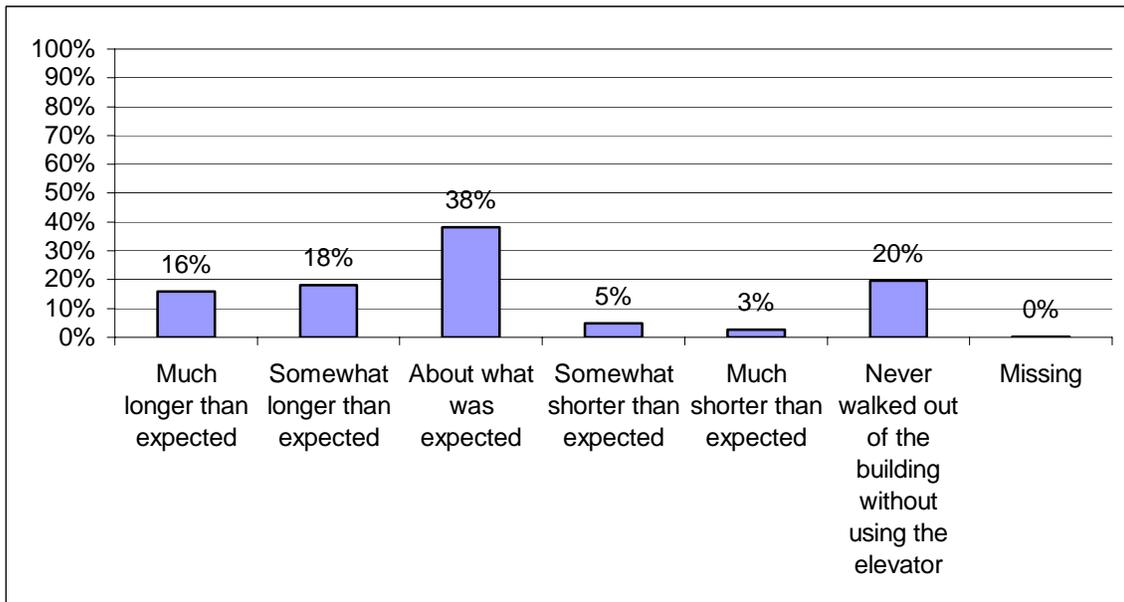
**PERCEPTIONS OF LIKELY BEHAVIORS DURING AN EMERGENCY SITUATION OR BUILDING EVACUATIONS**

While the previous section addressed respondents’ attitudes on safety and emergency preparedness from a number of perspectives, this section addresses their perceptions of their behaviors during an emergency situation or evacuation.

*Most respondents believe the time it takes to walk out of their building is consistent with their expectation of how long it would take.*

When asked how long it would take to walk completely out of the building from their office without using an elevator, the average time reported was about 14 minutes. As shown in Figure 24, when asked about the last time they walked out of the building without using an elevator, about one-in-five or 20 percent reported they had never walked out of the building without using an elevator. Of the people who had walked out of their building, well over one-third (38 percent) reported the time it took was “about what was expected.” Over 30 percent found it took longer than expected, which is four times more likely than reporting it took less time (8 percent) than expected.

**FIGURE 25: PERCEPTION OF THE TIME TO WALK OUT OF BUILDING WITHOUT USING AN ELEVATOR**



*In the event of a fire, most respondents will seal the door if trapped, and not open the door if there is smoke on their floor.*

Respondents were offered a number of scenarios that could happen in the event of an actual fire in their building along with a possible action they could take in response. They indicated whether or not they would be likely to take the action.

They were presented with two different smoke-related scenarios. First, they were asked to consider their actions if a significant amount of smoke were outside their door. Three-fourths (75 percent) of the respondents indicated they would not open the door to evacuate.

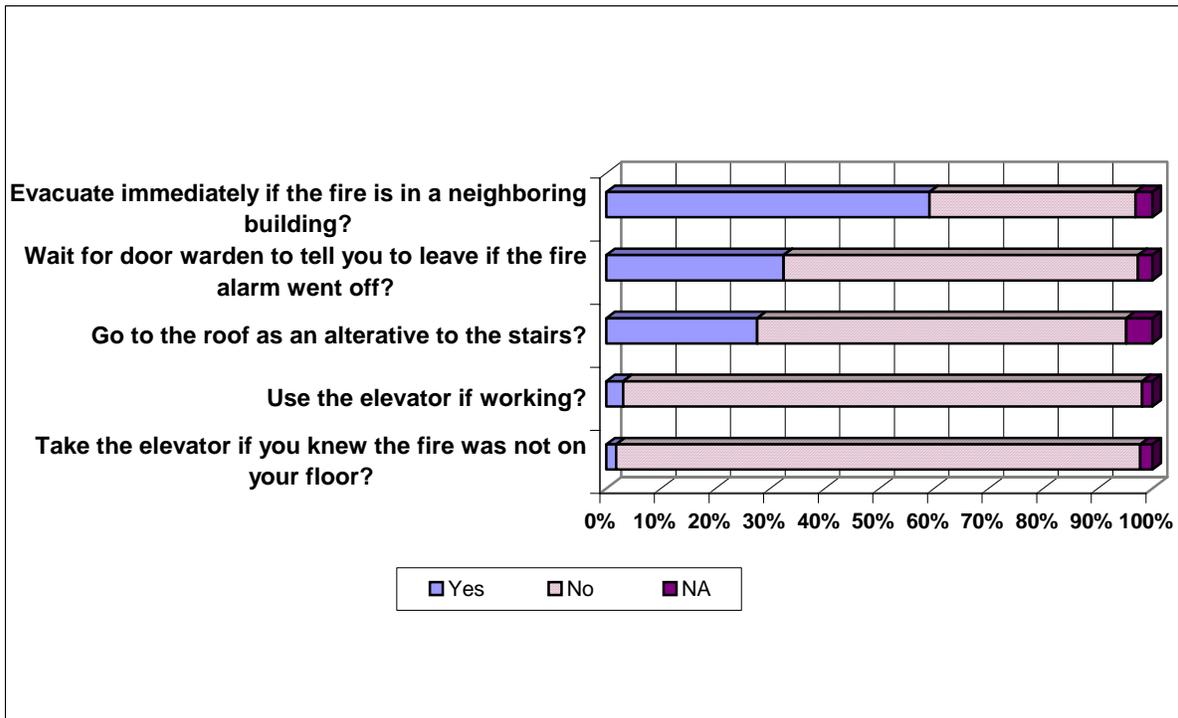
When presented with the second smoke related scenario (If trapped on your floor during a fire, would you isolate yourself in a room and seal the cracks to keep smoke out?), over two-thirds reported they would. The only variation among respondents was observed among those with fair/poor health status: fifty-three percent reported they would take this action.

Respondents were also presented with five scenarios related to fire or emergency evacuation responses in general. The findings for each were varied:

- ✓ Most (59 percent) would evacuate the building if the fire was in a neighboring building,
- ✓ About two-thirds (64.9 percent) would not wait for a floor warden or public address system to tell them to evacuate their floor,
- ✓ Just over one quarter (27.6 percent) believed that going to the roof was a possible alternative to evacuating down the stairs.

Consistent with other responses related to elevator use during an emergency, relatively few commercial building respondents would consider using the elevator during a fire emergency.

**FIGURE 26: BEHAVIORS DURING AN EVACUATION EVENT**



*During an evacuation using the stairs, about one third of respondents would stop and let one or two persons exiting from lower floors go ahead.*

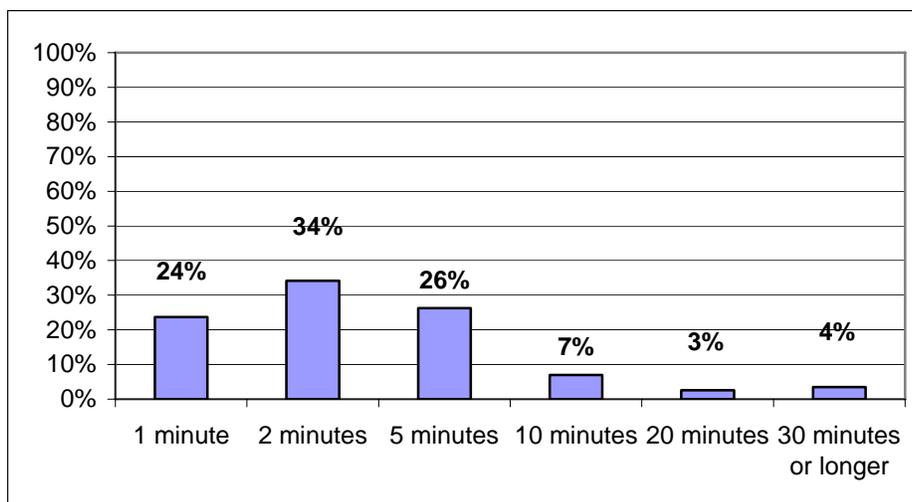
Just over one-third of respondents (35 percent) reported, if evacuating using stairwells, they would stop and let one or two persons exiting from another floor go ahead of them if evacuating the building using the stairwells. About twelve percent felt they would continue exiting and another nine percent reported they would stop and let everyone go ahead of them.

The remaining respondents were not certain what they do if confronted with this situation. Of these persons 16 percent said it would depend on their level of awareness about the emergency situation and another ten percent felt it would depend upon the directions they received from the authorities. Eighteen percent did not know what they would do.

*During an evacuation, respondents would not wait very long if stopped in a stairwell due to congestion*

When asked for the longest delay in minutes they would be willing to wait if they stopped on the stairs due to congestion during an evacuation, just over half reported 1 or 2 minutes (24 percent and 34 percent, respectively).

**FIGURE 27: LONGEST DELAY IN STAIRWAY EVACUATION DUE TO CONGESTION**



When asked about their level of concern over privacy issues if the exit stairwells in their building were equipped with video cameras to permit monitoring of stairwells during evacuations, about nine out of ten respondents (85 percent) reported they would not be concerned at all.

*Commercial Building respondents experienced evacuation or fire drills while fewer experienced a fire alarm.*

In the past year, over three-fourths (83 percent) of the respondents had experienced an evacuation drill, while most had only experienced one (41 percent) or two (25 percent).

Compared to fire or evacuation drills, fewer respondents had experienced a real or false fire alarm. Overall, 48 percent of respondents reported experiencing one or more fire alarms in the past year, with most experiencing one (17 percent) or two (18 percent). One in eleven had experienced a real fire alarm.

*Respondents want more drills and more information on their building evacuation procedures*

Finally, respondents were asked to provide top-of-mind safety recommendations for their building management to consider. Just under half (48 percent) provided recommendations. Of those, as shown in Table 11, respondents requested more fire drills and information on their building evacuation procedures.

**TABLE 11: RECOMMENDATIONS FOR BUILDING MANAGEMENT**

Recommendation	Percentage
Fire Drills	11%
Evacuation Procedures	7%
Communications	7%
Disabled Assistance	0.4%
Doing a good job	3%
Stairwell Information	0.4%
Fire prevention Information	0.4%



## CONCLUSIONS AND RECOMMENDATIONS

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This section summarizes the conclusions and recommendations drawn from the residential and commercial building occupant surveys.

The events of 9/11 heightened concerns about safety in high-rise buildings, more so for commercial occupants.

- The events of September 11, 2001 heightened concern about safety in high-rise buildings among all survey participants, but to a different extent between commercial and residential respondents. Commercial building occupants were more likely to report a heightened concern: 56 percent compared to 35 percent of residential occupants.
- News or awareness of building fires in general was the next cited event with 14 percent of residential occupants reporting this compared to six percent of commercial occupants.

The top two safety concerns (among all respondents) were “car crash” and “building / house fire.”

- “Being in a car crash” ranked as the top concern among all survey respondents.<sup>6</sup>
- The second highest concern among residential occupants is being injured in a fire in a building fire; among commercial occupants, it is being injured in a single-family home fire.

Commercial occupants are more likely to know about emergency evacuation procedures than residential occupants.

- Residential survey participant’s awareness of other elements of emergency evacuation tools and procedures are much lower than commercial building occupants. For instance, 93 percent of commercial occupants reported being aware of their building’s evacuation procedures compared to only 56 percent of residential building occupants. This observation could be explained by the fact that commercial building occupants are more likely to have reported that they participated in a fire drill within the past year than were residential building occupants (83 percent of commercial respondents had drill experience compared to only 19 percent of residential building occupants).

Almost all occupants (98 percent commercial and 95 percent residential) know where the fire exits are.

- Awareness of alternative exits was slightly lower than awareness of fire exit, with 87 percent of commercial occupants and 88 percent of residential occupants reporting they knew of an alternative exit in their building.

Commercial occupants know more about evacuation procedures and emergency notification tools in their building than residential occupants (93 percent compared to 56 percent).

- Still, commercial occupants also reported higher levels of knowledge on whether their buildings had pull stations (67 percent) compared to residential occupants (57 percent). But, a higher percentage of residential occupants reported knowing more whether or not their building had new occupant orientation compared to commercial occupants (51 percent and 36 percent, respectively).

---

<sup>6</sup> Respondents were asked to rank four scenarios in the order they think is most likely to happen to them. The scenarios included: being injured in a car crash, being injured in a building fire, being injured in a single-family home fire and being struck by lightning.

### Residential occupants report being more personally prepared for an emergency than commercial occupants.

- While residential occupants were not as aware of emergency evacuation procedures as were commercial occupants, residential occupants claim to be more “personally” prepared. For example, they have the following items readily available to them: appropriate footwear and a flashlight or glow stick. Ninety-four percent of residential occupants said they possessed appropriate footwear compared to only 56 percent of commercial occupants.
- Among both study populations, those who were age 61 or older, persons with limiting conditions/disabilities, and commercial respondents located in buildings with 40 or more floors were even more likely to possess these items.

### High rise building occupants consider fire drills beneficial.

- The value of fire drill experience cannot be overstated. Respondents are generally in agreement that fire drills are beneficial with 89 percent of commercial occupants and 80 percent of residential occupants reporting this belief.

### The top suggestion by building occupants to improve safety was more fire drills.

- When asked to provide top-of-mind suggestions to their building management about the actions they should take to improve the safety of their high-rise building, more fire drills was the most frequently provided recommendation among commercial and residential occupants (11 percent and 18 percent, respectively).

### Most people think a fire is the most likely cause of a building evacuation.

- Fire is the event respondents believed it was the most likely to cause a building evacuation. Out of six possible events, commercial and residential occupants ranked fire as the most likely cause of a building evacuation.<sup>7</sup>
- Commercial building occupants rated fire as 1.9 while residential building occupants rated it as 1.8.
- There was also little variation reported by respondents regarding scenarios that would cause concern for their safety. “Being in a car crash” ranked as the top concern with a ranking of 1.0 by commercial occupants and 1.2 by residential occupants.

### In keeping with conventional wisdom, during a fire, most occupants believe using elevators is unsafe.

- Survey respondents share the belief that, in general, elevators are not safe to use during emergency situations, as reported by 73 percent of residential respondents and 80 percent of commercial respondents. When presented with possible actions they might take during a building evacuation, there was some variation between residential and commercial survey respondents.
- In contrast, one quarter (28 percent of commercial and 25 percent of residential) believe that going to the roof is a possible alternative to using the stairs – a strategy some safety personnel consider dangerous and unwise except in a last resort situation.

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<sup>7</sup> Respondents were asked to rank six events in the order they felt they are most likely to cause an evacuation in their building. The events included fire, power failure, earthquakes, bomb, chemical or biological incident, and high winds.

During a building evacuation using the stairwell, one-third will stop and let people exiting from another floor go ahead of them; most will wait 1-2 minutes

- During a building evacuation using the stairwell, only one-third of respondents in both surveys reported they would stop and let persons exiting from another floor go ahead of them (31 percent of residents and 35 percent of commercial respondents). And most respondents in both surveys reported one or two minutes is the longest they would stop and wait due to congestion (51 percent of residential and 58% of commercial respondents).
- Residential occupants (particularly with fire drill experience and those that live on lower floors) are more likely to a) ignore a false alarm “because they know it’s false” or b) open their door to evacuate even if there is smoke outside that door. These occupants have a false sense of security that could lead to potentially dangerous behavior during an emergency.

## *Recommendations*

### *Communication and Messaging for Occupants who Reside / Work in High-rise Buildings*

- People have misconceptions—wrong information—on very basic building evacuation procedures. This includes whether or not it is appropriate to use an elevator or go to the roof during a fire emergency evacuation and whether or to wait for information on an emergency prior to exiting the building. Messaging and communication to residential and commercial occupants should dispel existing misinformation among the public, particularly residential high-rise occupants, e.g., do not go to the roof during a fire unless it is the only alternative.
- The fire protection industry is currently evaluating whether some emergency and evacuation procedures should change as a result of 9/11 and other high-rise fire events. For procedures that change, the industry will need to consider the prevailing public knowledge on the procedures so that strong public education efforts can be crafted to achieve the desired knowledge shift and appropriately affect behavior. People will need to be retrained on appropriate fire evacuation procedures, such as whether it’s permissible to use elevators during a fire.
- Provide updated information and fill in the gaps. Communicate new or updated safety / evacuation procedures. Education programs should incorporate targeted messages for certain occupants:
  - ✓ Counter the potential “false sense of security” among residential occupants who may have tendencies to exhibit undesirable evacuation behaviors. Messages should emphasize general fire prevention and safety, such as do not open a door if there is fire outside of it.
  - ✓ Appeal to heightened concerns for building safety by referring to the events of September 11, 2001, or by citing examples of other well-known building fires. This kind of reference resonates with respondents. Position the information as lessons learned that would help save others.
- Recent events and personal experiences are among the greatest contributors to heightening concerns and awareness about building safety. Future messaging for public education efforts should refer to these events as they resonate strongly with respondents.
- The study suggests a “false sense of security” may contribute to undesirable and likely dangerous evacuation behaviors among residential building occupants. For instance, persons experienced with fire drills and alarms are more likely to ignore a fire alarm and persons residing on lower floors are more likely to open their door to evacuate if there is smoke outside their door. Future communications strategies should consider messaging to counter these attitudes.

### *Communication and Messaging for High-rise Building Owners and Managers*

- Provide updated information and fill in the gaps, e.g., updated emergency evacuation procedures (e.g., whether or not to use an elevator, go to the roof during an evacuation, or await notice from an official before evacuating); information on fire prevention.
- Provide more information sharing and new occupant training on building evacuation procedures.
- The value of fire evacuation drills cannot be overstated. Experience with fire evacuation drills and fire alarms—false or real—contributed to increased awareness of emergency procedures and readiness for emergency situations that required building evacuations. This study indicated all respondents believe drills are beneficial, yet the vast majority of residential respondents had not participated in a fire drill within the past year. Therefore, it is recommended to focus education efforts on encouraging (or possibly mandating) residential building managers to hold routine fire evacuation drills – at least once a year – in high-rise buildings and to systematically inform high-rise occupants on building evacuation procedures.
- Communications to both residential and commercial building owners / managers should include messaging that incorporates building occupant views on their perceived value of and their desire for evacuation drills.
- Seniors, persons with frail health and those with limiting conditions or disabilities are slightly more knowledgeable and prepared for emergencies than the average building occupant. Still, they report high levels of concern regarding their safety in buildings due to fires and other emergency situations. Public education strategies should include opportunities to connect with these residents through venues such as the medical profession, senior centers, and senior associations.



# APPENDIX A: QUESTIONNAIRES

## Residential Questionnaire



THE FIRE PROTECTION RESEARCH FOUNDATION

### Study of Public Perceptions of Emergency Evacuation Procedures

The Fire Protection Research Foundation requests YOUR help in improving fire safety practices, procedures, codes and standards in high rise buildings. Your participation is voluntary and your participation is appreciated. Responses to these questions should be based upon your experiences related to living in this building.

#### Part A: General Knowledge and Attitudes about Building Safety and Emergency Evacuations

1. For each of the following items, please indicate your level of awareness by marking one box for each item, using the category that best fits your personal awareness with each.

Mark only one box for each.

	I know there is	I am not certain	There is none
a. Emergency public address system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Nearest fire exit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Building evacuation procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. New occupant fire safety orientation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Alternative stairs or exits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Pull stations that activate the fire alarm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. To the best of your knowledge, what location are you supposed to go to in the event of a fire in your building?

3. To what extent do you believe elevators are safe to use if you were to evacuate your building in an emergency?

<input type="checkbox"/> Never safe	<input type="checkbox"/> Usually safe
<input type="checkbox"/> Rarely safe	<input type="checkbox"/> As safe as the exit stairs

4. Indicate your level of agreement with each of the following statements.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
a. I am concerned about fires in my building.	<input type="checkbox"/>				
b. I think my building is not prepared for a serious fire.	<input type="checkbox"/>				
c. I am prepared to take necessary action in case of a fire in my building.	<input type="checkbox"/>				
d. I am well informed regarding safety procedures in my building in the event of a fire.	<input type="checkbox"/>				
e. I take fire drills in our building very seriously.	<input type="checkbox"/>				
f. I have ignored a fire alarm because I was sure it was false.	<input type="checkbox"/>				
g. I waited until I was told to leave the building in our last fire drill.	<input type="checkbox"/>				

Mark only one box for each.

Continue →

h. I can get out quickly if there is a fire in my building.

i. I have neighbors who are not prepared for a building emergency.

j. I am willing to walk completely out of the building in a full evacuation drill.

k. I am concerned about non-fire events in my building such as earthquakes, power outages, tornadoes, or deliberate attacks.

l. Once a year, I would be willing to walk completely out of my building during a fire drill.

m. As a general rule, my co-workers take fire drills very seriously.

Mark only one box for each.

5. Rank the following scenarios in the order you think is most likely to happen to you with 1 being the most likely event and 4 being the least likely.

- \_\_\_\_\_ Being injured in a building fire
- \_\_\_\_\_ Being injured in a single-family home fire
- \_\_\_\_\_ Being struck by lightning
- \_\_\_\_\_ Being in a car crash

6. Approximately how much time would it take you to walk completely out of the building from your living space without using the elevator? This would be while other people are evacuating.

Record time (minutes): \_\_\_\_\_

7. Consider the last time you walked out of the building without using the elevator and indicate which of the following best reflects your perception of the amount of time it took to get out.

- Much longer than expected
- Somewhat shorter than expected
- Somewhat longer than expected
- Much shorter than expected
- About what was expected
- Never walked out of the building without using the elevator

Mark only one box.

Continue →

8. Do you have any of the following emergency preparedness equipment readily available to you in the event of a building evacuation?

Mark yes or no for each.

	Yes	No
a. Flashlight or glow stick for illumination .....	<input type="checkbox"/>	<input type="checkbox"/>
b. Whistle .....	<input type="checkbox"/>	<input type="checkbox"/>
c. Appropriate footwear .....	<input type="checkbox"/>	<input type="checkbox"/>

Continue ➤

9. Which of the following best describes your opinion about evacuation drills in your building relative to their educational benefits?

Mark only one box.

- A complete waste of time and resources
- Somewhat unbeneficial
- No opinion
- Somewhat beneficial
- Very beneficial

**Part B: Perceptions About Building Evacuation**

10. If a special elevator were provided that is officially posted as being safe for use in an emergency, would you use it during an emergency for your evacuation?

- Yes
- No
- It depends on the emergency

11. If you started to evacuate your building in an emergency, how confident would you feel if an authority figure like a first responder or a floor warden told you it was safe to return to your floor?

- Very confident
- Somewhat confident
- Not confident at all

12. If you had to evacuate in a drill or in a real emergency, what would you take with you?

\_\_\_\_\_

13. If you took time to collect items before evacuating in a drill or in a real emergency, specify how much time you would spend collecting these items:

Record time (minutes): \_\_\_\_\_

14. The following are possible actions that people might take in the event of an actual fire in the building. Think about each one and indicate by marking the correct response for whether you would likely do it (YES), you would not likely do it (NO), or it doesn't apply (NA).

Mark only one box for each.

	Yes	No	NA
a. If you became aware there was significant smoke outside the door to your apartment, would you open the door to evacuate? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. If the fire alarm on your floor goes off, would you wait for a floor warden or public address system to tell you to leave? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. If an elevator is working during an emergency due to fire, would you use the elevator to get out? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Continue ➤

Yes No NA

Mark only one box for each.

d. If you know the fire is not on your floor, would you take the elevator? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Going to the roof is a possible alternative to evacuating down the stairs? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. If trapped on your floor during a fire, would you isolate yourself in a room and seal the cracks to keep smoke out? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. If there is a fire with smoke on your floor, would you open a window to let in fresh air? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. If a neighboring building is on fire, would you evacuate your building immediately? .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15. Rank the following events in the order you feel they are most likely to cause an evacuation in your building with 1 being the most likely event and 6 being the least likely.

- |                                       |                     |
|---------------------------------------|---------------------|
| _____ Fire                            | _____ Earthquake    |
| _____ Bomb                            | _____ Power failure |
| _____ Chemical or biological incident | _____ High Winds    |

16. Indicate any events or previous experiences that may have heightened your concern about safety in high-rise buildings in recent years.

\_\_\_\_\_  
\_\_\_\_\_

17. Assume you are walking down the exit stairs in an evacuation and you notice other people, from lower floors, waiting to enter the exit stairwell. Which of the following best describes what you would do?

Mark only one box.

- I would stop and let them all go ahead of me.
- I would continue exiting so they could enter the stairwell after I pass.
- I can't say one way or another what I would do.
- It would depend on the directions I received from authorities.
- It would depend on my level of awareness about the emergency situation.
- I would stop and let one or two go ahead of me and then continue.

18. What is the longest delay in minutes you would be willing to wait, if you were stopped on the stair due to congestion, as you were walking down the exit stairs in an evacuation?

Mark only one box.

- |                                    |   |
|------------------------------------|---|
| <input type="checkbox"/> 1 minute  | <input type="checkbox"/> 10 minutes           |
| <input type="checkbox"/> 2 minutes | <input type="checkbox"/> 20 minutes           |
| <input type="checkbox"/> 5 minutes | <input type="checkbox"/> 30 minutes or longer |

19. What would be your level of concern over privacy issues if the exit stairwells in your high-rise building were equipped with video cameras to permit monitoring of stairwells during evacuations at the building's emergency command center. The cameras would be positioned or digitally processed so that no individual's identity can be determined.

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> Very concerned | <input type="checkbox"/> Somewhat concerned | <input type="checkbox"/> Not at all concerned |
|---|---|---|

Continue ➔

20. What actions would you recommend to your building management to take regarding your safety and that of your neighbors in your high-rise building?

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**Part C: Personal Experience with Evacuations in the Building**

21. How many **evacuation drills or fire drills** have you experienced in your building in the past year?

Number of Drills: \_\_\_\_\_

- Zero ➔ If ZERO, skip to Question 23. ➔

22. Consider the **most recent evacuation drill or fire drill** you experienced and answer the questions that follow.

a. What floor level were you on when you started to evacuate? Specify floor level: \_\_\_\_\_

b. Did you have to evacuate the building entirely or did you go to an assigned floor?

- Evacuated the building entirely  
 Evacuated to an assigned floor  
 Neither

c. How many floors did you have to go down to evacuate? Specify # of floors: \_\_\_\_\_

d. To evacuate, did you use the stairs, the elevator, or both?

- Stairs     Elevator     Both

e. What were the major difficulties you experienced during that evacuation, if any?

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Continue ➔

23. How many **fire alarms** have you experienced in your building in the past year?

Number of Fire Alarms: \_\_\_\_\_

- Zero ➔ If ZERO, skip to Question 26, page 4.

24. Of the **fire alarms** you experienced in the last year, how many were false versus real emergencies?

Number of False Alarms: \_\_\_\_\_

Number of Real Emergencies: \_\_\_\_\_

25. Consider the **most recent fire alarm** you experienced and answer the questions that follow.

a. What floor level were you on when you started to evacuate? Specify floor level: \_\_\_\_\_

b. Did you have to evacuate the building entirely or did you go to an assigned floor?

- Evacuated the building entirely  
 Evacuated to an assigned floor  
 Neither

c. How many floors did you have to go down to evacuate? Specify # of floors: \_\_\_\_\_

d. To evacuate, did you use the stairs, the elevator, or both?

- Stairs     Elevator     Both

e. What were the major difficulties you experienced during that evacuation, if any?

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<b>Part D:</b>	<b>Background and Contact Information</b>
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26. On what floor do you reside?  
Floor: \_\_\_\_\_
27. How long have you lived in this building?  
(specify the months and years)  
Years: \_\_\_\_\_ Months: \_\_\_\_\_
28. If it were possible, would you prefer not to live in your high-rise building?  
 Yes  No
29. If it was possible, what is the highest floor you would prefer to occupy in your building?  
Highest Floor: \_\_\_\_\_
30. What is your age?  
 Less than 18 years  35 to 44 years  
 18 to 24 years  45 to 60 years  
 25 to 34 years  61 and older
31. Are you:  
 Male  Female
32. As it relates to your ability to evacuate from your floor, would you say your overall physical condition is:  
 Excellent  Fair  
 Good  Poor

33. Do you have a condition that would make it difficult for you to clearly hear alarms or spoken instructions in an emergency?  
 Yes  No
34. Do you have a physical condition that would make it difficult for you to walk out of your building in the event of an emergency evacuation?  
 Yes, for all stair usage  
 Yes, for less than 3 stories of stair usage  
 Yes, for 3 to 20 stories of stair usage  
 Yes, for 20 to 40 stories of stair usage  
 Yes, for more than 40 stories of stair usage  
 No
35. If yes on Question 34:  
a. What is the nature of that condition?  
\_\_\_\_\_  
\_\_\_\_\_  
b. In case you could benefit from assistance for your evacuation, how many people in your building would be available to assist you in any fashion?  
 1  3  None  
 2  4 or more  I don't know

Mark only one box.

Continue ➤

**Current Contact Information** (please provide in case we need to contact you)

Name: \_\_\_\_\_  
 Last Name  First Name  M.I.

Address: \_\_\_\_\_  
 Street Address  Apt. #

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Phone: (     ) \_\_\_\_\_ - \_\_\_\_\_ Best time to call: \_\_\_\_\_ AM / PM

Cell Phone: (     ) \_\_\_\_\_ - \_\_\_\_\_ Best day(s) to call: M Tu W Th F Sa Su Any day

Email: \_\_\_\_\_

**On behalf of the Fire Protection Research Foundation, thank you for participating in this important study!**

Your answers along with other building occupants will help to improve building safety practices and procedures and help provide educational information to high-rise building occupants. When you have completed the survey, place it in the postage-paid envelope and drop it in any public mailbox.

Commercial Questionnaire



THE FIRE PROTECTION RESEARCH FOUNDATION

**Study of Public Perceptions of Emergency Evacuation Procedures**

The Fire Protection Research Foundation requests YOUR help in improving fire safety practices, procedures, codes and standards in high rise buildings. Your participation is voluntary and greatly appreciated. Responses to these questions should be based upon your experiences related to working in this building.

**Part A: General Knowledge and Attitudes about Building Safety and Emergency Evacuations**

**1.** For each of the following items, please indicate your level of awareness by marking one box for each item, using the category that best fits your personal awareness with each.

Mark only one box for each.

	I know there is	I am not certain	There is none
a. Emergency public address system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Nearest fire exit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Building evacuation procedures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. New occupant fire safety orientation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. Alternative stairs or exits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Pull stations that activate the fire alarm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Assigned fire or floor emergency warden or evacuation coordinator on your floor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**2.** To the best of your knowledge, what location are you supposed to go to in the event of a fire in your building? \_\_\_\_\_

**3.** To what extent do you believe elevators are safe to use if you were to evacuate your building in an emergency?

Mark only one box.

<input type="checkbox"/> Never safe	<input type="checkbox"/> Usually safe
<input type="checkbox"/> Rarely safe	<input type="checkbox"/> As safe as the exit stairs

**4.** Indicate your level of agreement with each of the following statements.

Mark only one box for each.

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
a. I am concerned about fires in my building.	<input type="checkbox"/>				
b. I think my building is not prepared for a serious fire.	<input type="checkbox"/>				
c. I am prepared to take necessary action in case of a fire in my building.	<input type="checkbox"/>				
d. I am well informed regarding safety procedures in my building in the event of a fire.	<input type="checkbox"/>				
e. I take fire drills in our building very seriously.	<input type="checkbox"/>				
f. I have ignored a fire alarm because I was sure it was false.	<input type="checkbox"/>				
g. I waited until I was told to leave the building in our last fire drill.	<input type="checkbox"/>				

Continue ↗

	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
h. I can get out quickly if there is a fire in my building.	<input type="checkbox"/>				
i. I have co-workers who are not prepared for a building emergency.	<input type="checkbox"/>				
j. I am willing to walk completely out of the building in a full evacuation drill.	<input type="checkbox"/>				
k. I am concerned about non-fire events in my building such as earthquakes, power outages, tornadoes, or deliberate attacks.	<input type="checkbox"/>				
l. Once a year, I would be willing to walk completely out of my building during a fire drill.	<input type="checkbox"/>				
m. As a general rule, my co-workers take fire drills very seriously.	<input type="checkbox"/>				

Mark only one box for each.

**5.** Rank the following scenarios in the order you think is most likely to happen to you with 1 being the most likely event and 4 being the least likely.

- \_\_\_\_\_ Being injured in a building fire
- \_\_\_\_\_ Being injured in a single-family home fire
- \_\_\_\_\_ Being struck by lightning
- \_\_\_\_\_ Being in a car crash

**6.** Approximately how much time would it take you to walk completely out of the building from your office space without using the elevator? This would be while other people are evacuating.

Record time (minutes): \_\_\_\_\_

**7.** Consider the last time you walked out of the building without using the elevator and indicate which of the following best reflects your perception of the amount of time it took to get out.

Mark only one box.

- Much longer than expected
- Somewhat shorter than expected
- Somewhat longer than expected
- Much shorter than expected
- About what was expected
- Never walked out of the building without using the elevator

Continue →

- 8.** Do you have any of the following emergency preparedness equipment readily available to you in the event of a building evacuation?
- |  | Yes                      | No                       |
|--|--------------------------|--------------------------|
| a. Flashlight or glow stick for illumination ..... | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Whistle .....                                   | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Appropriate footwear .....                      | <input type="checkbox"/> | <input type="checkbox"/> |
- Continue ➤**

Mark yes or no for each.

- 9.** Which of the following best describes your opinion about evacuation drills in your building relative to their educational benefits?
- A complete waste of time and resources
  - Somewhat unbeneficial
  - No opinion
  - Somewhat beneficial
  - Very beneficial

Mark only one box.

<b>Part B:</b>	<b>Perceptions About Building Evacuation</b>
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- 10.** If a special elevator were provided that is officially posted as being safe for use in an emergency, would you use it during an emergency for your evacuation?
- Yes
  - No
  - It depends on the emergency
- 11.** If you started to evacuate your building in an emergency, how confident would you feel if an authority figure like a first responder or a floor warden told you it was safe to return to your floor?
- Very confident
  - Somewhat confident
  - Not confident at all
- 12.** If you had to evacuate in a drill or in a real emergency, what would you take with you?
- \_\_\_\_\_
- 13.** If you took time to collect items before evacuating in a drill or in a real emergency, specify how much time you would spend collecting these items:
- Record time (minutes): \_\_\_\_\_
- 14.** The following are possible actions that people might take in the event of an actual fire in the building. Think about each one and indicate by marking the correct response for whether you would likely do it (YES), you would not likely do it (NO), or it doesn't apply (NA).

Mark only one box for each.

- |   | Yes                      | No                       | NA                       |
|---|--------------------------|--------------------------|--------------------------|
| a. If you became aware there was significant smoke outside the door to your apartment, would you open the door to evacuate? .....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b. If the fire alarm on your floor goes off, would you wait for a floor warden or public address system to tell you to leave? ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c. If an elevator is working during an emergency due to fire, would you use the elevator to get out? .....                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**Continue ➤**

- |  | Yes                      | No                       | NA                       |
|--|--------------------------|--------------------------|--------------------------|
| d. If you know the fire is not on your floor, would you take the elevator? .....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e. Going to the roof is a possible alternative to evacuating down the stairs? .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f. If trapped on your floor during a fire, would you isolate yourself in a room and seal the cracks to keep smoke out? ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| g. If there is a fire with smoke on your floor, would you open a window to let in fresh air? .....                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| h. If a neighboring building is on fire, would you evacuate your building immediately? .....                                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Mark only one box for each.

- 15.** Rank the following events in the order you feel they are most likely to cause an evacuation in your building with 1 being the most likely event and 6 being the least likely.

- |                                       |                     |
|---------------------------------------|---------------------|
| _____ Fire                            | _____ Earthquake    |
| _____ Bomb                            | _____ Power failure |
| _____ Chemical or biological incident | _____ High Winds    |

- 16.** Indicate any events or previous experiences that may have heightened your concern about safety in high-rise buildings in recent years.
- \_\_\_\_\_
- \_\_\_\_\_

- 17.** Assume you are walking down the exit stairs in an evacuation and you notice other people, from lower floors, waiting to enter the exit stairwell. Which of the following best describes what you would do?

- I would stop and let them all go ahead of me.
- I would continue exiting so they could enter the stairwell after I pass.
- I can't say one way or another what I would do.
- It would depend on the directions I received from authorities.
- It would depend on my level of awareness about the emergency situation.
- I would stop and let one or two go ahead of me and then continue.

Mark only one box.

**18.** What is the longest delay in minutes you would be willing to wait, if you were stopped on the stair due to congestion, as you were walking down the exit stairs in an evacuation?

Mark only one box.

- |                                    |   |
|------------------------------------|---|
| <input type="checkbox"/> 1 minute  | <input type="checkbox"/> 10 minutes           |
| <input type="checkbox"/> 2 minutes | <input type="checkbox"/> 20 minutes           |
| <input type="checkbox"/> 5 minutes | <input type="checkbox"/> 30 minutes or longer |

**19.** What would be your level of concern over privacy issues if the exit stairwells in your high-rise building were equipped with video cameras to permit monitoring of stairwells during evacuations at the building's emergency command center. The cameras would be positioned or digitally processed so that no individual's identity can be determined.

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> Very concerned | <input type="checkbox"/> Somewhat concerned | <input type="checkbox"/> Not at all concerned |
|---|---|---|

Continue ➤

**20.** What actions would you recommend to your building management to take regarding your safety and that of your co-workers in this high-rise building?

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<b>Part C:</b>	<b>Personal Experience with Evacuations in the Building</b>
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**21.** How many **evacuation or fire drills** have you experienced in your building in the past year?

Number of Drills: \_\_\_\_\_

- Zero ➔ If ZERO, skip to Question 23. ➤

**22.** Consider the **most recent evacuation or fire drill** you experienced and answer the following questions:

a. What floor level were you on when you started to evacuate? *Specify floor level:* \_\_\_\_\_

b. Did you have to evacuate the building entirely or did you go to an assigned floor?

- Evacuated the building entirely  
 Evacuated to an assigned floor  
 Neither

c. How many floors did you have to go down to evacuate? *Specify # of floors:* \_\_\_\_\_

d. To evacuate, did you use the stairs, the elevator, or both?

- Stairs     Elevator     Both

e. What were the major difficulties you experienced during that evacuation, if any?

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Continue ➤

**23.** How many **fire alarms** have you experienced in your building in the past year?

Number of Fire Alarms: \_\_\_\_\_

- Zero ➔ If ZERO, skip to Question 26, page 4.

**24.** Of the **fire alarms** you experienced in the last year, how many were false versus real emergencies?

Number of False Alarms: \_\_\_\_\_

Number of Real Emergencies: \_\_\_\_\_

**25.** Consider the **most recent fire alarm** you experienced and answer the following questions:

a. What floor level were you on when you started to evacuate? *Specify floor level:* \_\_\_\_\_

b. Did you have to evacuate the building entirely or did you go to an assigned floor?

- Evacuated the building entirely  
 Evacuated to an assigned floor  
 Neither

c. How many floors did you have to go down to evacuate? *Specify # of floors:* \_\_\_\_\_

d. To evacuate, did you use the stairs, the elevator, or both?

- Stairs     Elevator     Both

e. What were the major difficulties you experienced during that evacuation, if any?

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## APPENDIX B: RESIDENTIAL WEIGHTING

The purpose of weighting the FPRA Evacuation Study data was balance the proportion of survey records with regard to city (city2) and building height (height) to help identify what factors (other than city and height) have a significant affect on (1) knowledge and attitudes about building safety and emergency evacuations, (2) perceptions about building evacuation behaviors, and (3) personal experience with evacuations a particular building.

For the calculation of weights, two independent variables were used – city of building (city2) and height of building (height). The first step in the process was the creation of a matrix that identified the number of survey records by city and building height. These data are shown in Table B1 below.

**TABLE B1: SUMMARY OF SURVEY DATA – CITY BY HEIGHT - UNWEIGHTED**

Building Height	City			Total
	Chicago	New York	San Francisco	
20 - 40 Stories	14	25	41	80
40+ Stories	110	24	30	164
Total	124	49	71	244

Table 1 was then used to identify proportions (of the total) for each cell. These data are shown in Table B2 below.

**TABLE B2: SUMMARY OF SURVEY DATA – CITY BY HEIGHT**

Building Height	City		
	Chicago	New York	San Francisco
20 - 40 Stories	0.057377	0.102459	0.168032787
40+ Stories	0.4508197	0.098361	0.12295082

Next, an “equal proportion matrix” was created that that displayed what the distribution of surveys by city and height would be if an equal proportion of surveys were collected from each cell. This is shown in Table B3 below.

**TABLE B3: EQUAL PROPORTIONS MATRIX**

Building Height	City		
	Chicago	New York	San Francisco
20 - 40 Stories	0.1667	0.1667	0.1667
40+ Stories	0.1667	0.1667	0.1667

Finally, the actual weights were created by dividing the Table B3 cell values by the Table 2 cell values. The products is shown in Table B4 below:

**TABLE B4: WEIGHT FACTORS FOR FPRA EVALUATION SURVEY DATA**

Building Height	City		
	Chicago	New York	San Francisco
20 - 40 Stories	2.9053429	1.626992	0.992068293
40+ Stories	0.3697709	1.694783	1.355826667

Table B5 below provides a summary of survey records by city and building height. Due to rounding associated with the weighting process, the final number of weighted surveys is actually 246, two more surveys than were actually collected. The final weight factor is the final variable in the data file and called ht\_city\_weight.

**TABLE B5: SUMMARY OF SURVEY DATA – CITY BY HEIGHT - WEIGHTED**

Building Height	City			
	Chicago	New York	San Francisco	Total
20 - 40 Stories	41	41	41	123
40+ Stories	41	41	41	123
Total	82	82	82	246

# APPENDIX C: RECRUITMENT LETTERS

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Date

<<First name>> <<Last name>>  
<<Address>>  
<<City>>, <<St>> <<zip>>

Dear <<First name>>,

The Fire Protection Research Foundation requests your help with the **Study of Public Perceptions of Emergency Evacuation Procedures**. This study examines the opinions and experiences of persons who live and work in high-rise buildings. The information collected from this study will be used by the foundation and others in developing more appropriate occupant notification and communication strategies, building evacuation and occupant relocation strategies, emergency responder strategies, and education programs and messages. We have contracted with NuStats, a research organization, to administer the survey.

Your building has been selected at random to participate in this study. Please take 10 minutes to complete the enclosed survey and mail it back in the postage-paid envelope. Your participation in this study is voluntary and your individual responses will be kept confidential. The information you provide will be used for research purposes only.

Again, we appreciate your assistance with this important study. If you have any questions you may call Adella Santos, of NuStats, at 1-800-447-8287 extension 2274 or email her at [dsantos@nustats.com](mailto:dsantos@nustats.com).

Sincerely,



Kathleen Almand, *Executive Director*  
Fire Protection Research Foundation

**Study of Public Perceptions of Emergency Evacuation Procedures**



c/o NuStats  
3006 Bee Caves Road, Suite A-300  
Austin, Texas 78746

Commercial Letter



February 13, 2007

Dear XXXXXXXX,

The Fire Protection Research Foundation requests your and your company's help with the **Study of Public Perceptions of Emergency Evacuation Procedures**. This study examines the opinions and experiences of persons who work in high-rise buildings. The information collected from this study will be used by the foundation in developing more appropriate occupant notification and communication strategies, building evacuation and occupant relocation strategies, emergency responder strategies, and education programs and messages. We have contracted with NuStats, an independent research organization, to administer the survey.

Your company was selected at random to participate in this study. We request your help by completing the survey yourself using the following link: <http://callisto.nustats.com/Start/HIGHRISE/HIGHRISEW.HTM> and emailing the web survey link to one or more other persons in your office. Participation in this study is voluntary and all individual responses will be kept confidential. The information your employees provide will be used for research purposes only.

Again, we greatly appreciate your assistance with this important study. If you have any questions, please call Mia Zmud, of NuStats, at 1-800-447-8287 extension 2224 or email her at [mia@nustats.com](mailto:mia@nustats.com). Thank you very much for your time and assistance.

Sincerely,



Kathleen Almand, *Executive Director*  
Fire Protection Research Foundation

**Study of Public Perceptions of Emergency Evacuation Procedures**



c/o NuStats  
3006 Bee Caves Road, Suite A-300  
Austin, Texas 78746