



Families and Children: Responses to Wildfires— Links to Community Resiliency

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Key Recommendations for Decision Makers

Disaster Preparedness

- Maintain an updated community disaster plan that follows disaster planning protocols.

After the Disaster

- Coordinate recovery efforts from local and provincial governments and the non-governmental sector to prevent duplication of efforts.
- Develop mechanisms to ensure that there are cross-ministry opportunities for collaboration and decision-making regarding the response to the fire.
- Set limits on the material donations that are provided to the community.
- Provide additional mental health services for all rural community members that experience wild-fires and psychological support for local leaders and stakeholders who are dealing with the wildfires for a full year following the fire.

Collect economic, social and health data in communities that experience wildfires for five years after the wildfire and then every 10 years for three more decades.

Fostering Healthy Families and Children

- Collect psychological data including information about family functioning and general coping processes from children and families every two years for a maximum of six years after the wildfire to assess for individual and family functioning.
- Provide additional services and resources for designated professionals (i.e., teachers, counsellors) to assist them in supporting families and children affected by the wildfire.
- Offer free sessions that address issues such as family decision making and financial planning, as well as sessions about the general recovery process from a wildfire.

Encourage parents to spend additional time with their children to provide factual information about the disaster and promote conversations about their feelings.

Fostering Community Resiliency

- Provide opportunities for celebrations to acknowledge the efforts of firefighters, local authorities, volunteers, and all community residents after the disaster.
- Provide opportunities for children and families to engage with, and support, one another through planned activities including sport events and entertainment such as music events.

Executive Summary

Natural disasters can be described as unpredictable, catastrophic events that have the potential to significantly impact the lives of individuals and families, as well as the overall functioning of communities. Globally, disasters are on the rise with wildfires increasing in numbers and intensity in part due to climate change.¹

Approach

A mixed methods study was conducted in order to link the findings of current understandings of resiliency in a community context to the effects of wildfires on families and children. We specifically examined the following research questions:

- (1) What are the social and emotional effects of wildfires on families and children—both short and long-term?
- (2) How is resiliency manifested within communities and what is the importance of resiliency for children and families after a wildfire?
- (3) Do children's concepts and understanding of resiliency differ from that of their parents? and if so, how?
- (4) What local and provincial supports and conditions contribute to the resiliency of children and families within communities that have experienced wildfires?

The May 2011 Slave Lake fires caused the evacuation of the entire population of the Town of Slave Lake, the Sawridge First Nation and a number of residents of the Municipal District of Lesser Slave River No. 124. There was one death of a helicopter pilot but no fatalities or major injuries occurred among area residents. The impact of these fires included the destruction or damage of 56 residences and one commercial building in the Municipal District communities. About one third of the town was affected with the loss of over 400 homes, three churches, 19 non-residential buildings, and the Government Centre, which included the municipal library, town administrative offices, and most of the regional provincial government offices.²

Data Collection

The study was conducted in collaboration with the communities that comprise the Slave

Lake area; a local advisory group was created and a community-based research assistant was hired. Extensive fieldwork and collection of the data were made possible through a postdoctoral fellow. Data collection included: interviews with 20 community stakeholders, 19 families and 17 children; a school survey at six months (T1, November 2011, n=160) and one year after the fire (T2, May 2012, n=164), and a household survey that was sent to all residents in the Slave Lake area, resulting in 550 useable responses.

Results

The interviews with stakeholders emphasized three particular issues related to the experience of firefighting, evacuation and recovery. First, the disaster was totally unexpected, but it did not result in fatalities or major injuries. Second, firefighters, local authorities, and leaders had to quickly make difficult decisions to save relevant infrastructure. Finally, the people and their commitment to their community are major strengths that will help with the ongoing recovery process. The interviews with families and children identified six main changes that the families underwent after experiencing the wildfires: (a) the creation of different life goals and priorities; (b) new routines; (c) changes in attitudes; (d) changes in interactions within family units; (e) changes in interactions with the community; and (f) new values and perceptions.

The school survey identified characteristics of students who were most at risk for emotional or behavioural trauma resulting from the disaster. In terms of Post-Traumatic Stress Disorder (PTSD) risk, the patterns were fairly consistent at both points in time (T1 and T2). The vast majority of those at risk were young (aged 7 to 10), in lower grade levels (grades 3 - 6), and interestingly, they did not experience the loss of their homes in the fire. The gender profile of PTSD risk is less consistent, and although the majority of those at risk are females at both points in time, the proportion is larger at time T2. In terms of the Strengths and Difficulties Questionnaire (SDQ), the profiles were also relatively consistent at both points in time. The majority of students at risk were younger (grades 3—6),

and in the 11 to 12 year old range. The majority of those with severe SDQ scores did not experience the loss of their homes in the fires. The gender profile of SDQ problems changes through time. At time T1, 70% of those with abnormal SDQ scores were female, but by time T2 this has declined to 46%, and males exhibited the majority of abnormal scores (54%).

The household survey identified that a greater proportion of residents were not prepared for disasters (55%); 82% felt overwhelmed by the suddenness and 90% felt overwhelmed by the severity of the wildfire event. Thirty-one percent of those who responded to the survey lost their home and another 12% lost their business or farm. Since the wildfires, the three most important changes cited as having greatest impact were their living arrangements, financial assets, and family relationships. Of the 326 respondents who answered the question about being close as a family, 56% indicated that they were about the same in terms of closeness whereas 35% indicated that they were closer. In terms of family cohesion, of the 321 who had responded to this question, 55% indicated that they were about the same in terms of being cohesive and 34% indicated that they were stronger as a family. Only 18% of respondents reported a child in the household. Of this group, 54% indicated that their child had difficulties with emotions, concentration, behaviour, or getting along with people. Only 8 out of 68 children in the household surveys exhibited some form of PTSD diagnosis based upon parental assessment.

In conclusion, numerous issues arose for stakeholders, individuals and families that experienced the Slave Lake wildfires pointing to the need for multi-sectoral services and resources to help ensure successful recovery from disasters.

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“Any time there’s a catastrophic event it causes people to look at it hard; whether it means that they are going to become closer to their family, whether it means they are going to become a better person, or whether they are going to help others. It goes on in all of us.”

(Community Member)

Context

Natural disasters can be described as unpredictable, catastrophic events that have the potential to significantly impact the lives of individuals and families, as well as the overall functioning of communities. There has been a proliferation of information about disasters as a result of experiences such as 9/11 and Hurricane Katrina in the United States and the 2009 Black Saturday bushfire in Australia. Globally, disasters are on the rise with wildfires increasing in numbers and intensity in part due to climate change.¹ Generally, findings about wildfire impacts can be divided into information about: (a) community functioning after a wildfire;³⁻⁷ (b) the physical⁸ and mental health impacts on individuals who have experienced the wildfire⁹⁻¹⁰ and (c) those involved in firefighting;¹¹ and impacts on families and children.¹²⁻¹⁴

Community Functioning

There is a growing awareness of the need to address the social impacts of wildfires. For example, an Arizona-based study found there were both conflicts and agreements after the wildfire because of perceptions and experiences of firefighting and recovery.⁴ In particular, social cohesion was evident through the residents’ willingness to help one another in the rebuilding of their community, while conflict arose about the perspectives held about the firefighting techniques that were used. Carroll et al.⁵ noted similar conflict themes along with frustrations and criticism about inaccuracies in public information regarding the fires, the lack of local knowledge held by the firefighting team, and the excessive bureaucratic regulations imposed by not-for-profit agencies to assist local community members in need.

To date, we have conducted two studies in three communities that have experienced wildfires: (a) Crowsnest Pass, Alberta (Lost Creek Fire, 2003);¹⁵ (b) Barriere, British Columbia (McLure Fire, 2003); and (c) La Ronge, Saskatchewan (Mallard Fire, 1999).¹⁶ The Lost Creek Fire study identified both individual and community vulnerability and differing levels of risk among individuals and within the community. Individuals may experience vulnerability even though their community is reasonably resilient, while vulnerable communities may have residents who are low-risk.⁷ In all three fire events, our analysis of these communities' responses to wildfires identified several common themes, including the importance of communication during the event; the perception that the fire fighting tactics utilized were inappropriate;^{6-7, 16} the need for assistance in community recovery from external agencies; and, the importance of a pre-existing resilient community before a disaster occurs. There were also reports of more cohesion within the community and a sense of pride that they had survived such an ordeal.^{6, 16}

Physical and Mental Health Impacts on Individuals

Despite the numerous studies on disasters and their impacts on physical and mental health, few focus on wildfires. One exception is Rittmaster et al.⁸ who addressed physical health impacts related to poor air quality. Marshall et al.⁹ found that the people with the most severe exposure to the wildfire experienced the highest risk of psychopathology. Generally speaking, most disaster research focuses on mental health impacts and the short-term period soon after the disaster has occurred;¹⁰ in addition, a recent literature review on post-disaster relocation for any type of disaster concluded that mental health symptoms such as anxiety, depression, and sleep disorders are common occurrences among individuals who experience disasters. The studies we have conducted in wildfire communities have generally indicated that there are physical and mental health impacts as a direct result of experience of the wildfire.¹⁶

Disasters and Family & Youth Impacts

In a recent review of published literature on the impacts of disasters on the resiliency of individuals, families, and communities,¹⁷ the authors concluded that: a) severe psychological harm only

occurs in a minority of individuals; b) there are multiple outcomes including psychological resilience; c) the outcome from the disaster depends upon both risk and resilience factors; d) families, neighbourhoods and communities are placed at-risk after disaster; and, e) unexposed populations to the disaster have limited and transient effects. Furthermore, the authors¹⁷ caution that the available disaster research often employs a variety of study designs, uses different measurement scales (for disorders such as Post-Traumatic Stress Disorder {PTSD}), includes different age groups of children, does not collect detailed histories of individuals (such as mental health histories), and only collects data at one time period, usually soon after the disaster. Other authors¹⁸ agree that the time period of data collection among youth is crucial because of other variables such as dealing with multiple losses and relocation. These methodological issues have led to inconsistent results, and hampered generalizability of the findings. An interrelated issue is that there are three phases within the first year following a disaster that are important for understanding individual reactions and for planning research studies in terms of collecting data on disorders such as PTSD. The phases are: recoil (most of the initial distress is replaced by self-consciousness and an awareness of their past), post-impact (the survivors deal with the disaster and what happened), and initial recovery.¹⁹

Considering these cautions, a few studies are noted here. Yelland et al.¹² examined the association between disaster-related exposure and PTSD in 155 South Australian youth aged 8 to 18 years who had experienced a bushfire. The youth responded to questions about their perception about the threat of the fire, their experience of loss and life disruption, and completed the PTSD Reaction Index (PTSD-RI) for Children (Revised)²⁰ 11 to 15 months following the bushfires. The authors concluded that younger children may be more vulnerable to developing persistent PTSD symptoms and disaster-related factors such as continuing to experience disaster-related loss and life disruption, and having a greater perception of personal life threat contributed to PTSD symptoms. A 1994 bushfire in New South Wales, Australia, prompted an investigation of the impacts on children who experienced the loss of their school or homes¹³. Six months after the fire, 2,379 children in grades 4 to 12 completed a series of scales (e.g., Impact of Event Scale)²¹ to determine

their levels of post-disaster trauma. The authors found an association between the children's depressive symptoms and their earlier school grade, evacuation experience and emotional distress score. The authors concluded that children in the middle school years are most at risk for posttraumatic trauma after the experience of a wildfire which may be developmentally related. Another study conducted in a wildfire disaster area in Canberra, Australia, after the 2003 bushfire focused on a school-based program to screen for wildfire-related events including exposure and perception of threat.¹⁴ Six months after the disaster, the investigators employed the PTSD-RI and the Strengths and Difficulties Questionnaire (SDQ)²² with 222 children with an age range of 8 to 18 years. They found that students who were more severely exposed to the wildfire and primary school-aged children had higher PTSD-RI scores and that although girls reported greater levels of fear for themselves and their family members, they did not experience higher rates of psychopathology. There were no reports of studies that focused on family functioning post wildfire.

Approach

Current studies reveal that the human response to disasters includes a myriad of physical and emotional reactions, as well as changes in social relationships. To link the findings of our current understandings of resiliency in a community context to the effects of wildfires on families and children, we conducted a mixed methods study that examined the following research questions:

- (1) What are the social and emotional effects of wildfires on families and children—both short and long-term?
- (2) How is resiliency manifested within communities and what is the importance of resiliency for children and families after a wildfire?
- (3) Do children's concepts and understanding of resiliency differ from that of their parents? and if so, how?
- (4) What local and provincial supports and conditions contribute to the resiliency of children and families within communities that have experienced wildfires?

The Slave Lake area includes the Town of Slave Lake, the Sawridge First Nation and part of the Municipal District of Lesser Slave River No. 124, with the hamlets of Canyon Creek, Widewater, and Wagner (see Figure 1). It is located in the heart of northern Alberta, 250 km northwest of Edmonton, on the eastern side of Lesser Slave Lake. The area is home to approximately 7,427 residents. The Town has 90%

of the area's population and acts as regional centre, with retail, education, health, financial, government, and transportation services. Oil and forestry industries are prevalent in the region. Tourism is increasing mainly due to the beautiful and road-accessible Lesser Slave Lake.²³⁻²⁶

The May 2011 Slave Lake fires (i.e., The Flat Top Complex) caused the evacuation to surrounding communities of the entire population of the Town of Slave Lake, the Sawridge First Nation and a number of residents of the Municipal District of Lesser Slave River No. 124. There was one death of a helicopter pilot but no fatalities or major injuries occurred among area residents. The impact of these fires included the destruction or damage of 56 residences and one commercial building in the Municipal District communities. About one third of the town was affected. The flames consumed over 400 homes, three churches, 19 businesses, and the Government Centre, which included the municipal library, town administrative offices, and most of the regional provincial government offices. Overall, the magnitude of this wildfire event is unprecedented in recent provincial or national history.²

The study was conducted in collaboration with the communities that comprise the Slave Lake area; ethical clearance was received from the University of Lethbridge. We developed a local advisory group that included four individuals from a range of communities and backgrounds to provide guidance and direction to the research team. Meetings with the local community advisory members, research personnel, and community members took place to discuss the progress of the research. A postdoctoral fellow (Pujadas Botey) was hired to collect the data; this individual was under supervision of the Principal Investigator (Kulig). Together they made the first field visit to Slave Lake in August 2011 in order to meet with local elected officials and community members and to observe the impacts of the fires. Dr. Pujadas Botey visited the community 13 times over an 8-month time frame to conduct interviews and fieldwork. Dr. Kulig accompanied her on three other occasions (November, 2011; March, 2012; September, 2012). A local research assistant was also hired to assist with the data collection process, particularly for the child interviews and for the school survey. This individual was prepared and

directly supervised by Dr. Pujadas Botey. All research personnel were required to sign a Statement of Confidentiality.

Data Collection

Interviews and Fieldwork

A first set of open-ended interviews was conducted with individuals involved in the evacuation, firefighting, and recovery efforts as a result of the Slave Lake wildfires. A purposive sample method combined with data saturation was used in selecting the 20 participants. Participants included local authorities, community support and volunteer coordinators, firefighters, policemen, teachers, pastors, mental health workers, and entrepreneurs. The sample included an equal number of men and women; the average age was 42 years and the average education level was 15 years. The sample represented different ethnicities (although 75% were Caucasian); the participants resided in different settlements in the area (although 85% lived in the Town of Slave Lake) and most worked full-time (90%).

A second set of open-ended interviews was conducted with families and children. Both snowball and opportunistic sampling were used to recruit participants, and data saturation was used to determine the sample size. Access to families included a variety of methods such as: individual referrals, placing notices in appropriate local newspapers, web pages, radio, television, as well as putting up posters and leaving flyers in community stores, recreation centres and government and mental health offices. In total we interviewed 19 families and 17 children. The interviews were initially conducted with the family unit to generate information about the wildfire experience from a family perspective. At least one of the parents and one child between 9 and 12 years old participated in the family interview. Once the family interview was completed, individual interviews were conducted with one child in the mentioned age group. This age group was considered most appropriate because children aged 9 to 12 can articulate their perspectives and they have not formally entered adolescence, which may alter their experience of the wildfires. If there was more than one child in this age range, then the parent(s) were asked to suggest the child who would be best able to describe their experience of the wildfires and their aftermath. While the child

was being interviewed, the parents were asked to respond to the Child Behaviour Checklist (CBCL),²⁷ a well recognized standardized measure to assess behavioral and/or emotional problems in children. It was employed in this study to assess the child's behaviour since the disaster.

In the family interviews, 18 mothers and 9 fathers participated. On average, the age of parents was 39 years, and their education level 14 years. They also represented different ethnicities (81% are Caucasian), resided throughout the study area (89% in the town), and most were employed full-time (79%). Families had an average of two children, who were 11 years old on average. Children participating in the interviews were 9 girls and 8 boys, with an average age of 11 years. In two of the families, two children initially agreed to be interviewed but then declined.

The interviews with stakeholders and with families and children proceeded after requesting consent of participants. At the beginning of the interviews, demographic information was collected and thereafter the interview was conducted using interview guides. Interviews were held in a mutually agreeable place such as their home or classroom in the local college that provided privacy. Before the interviews commenced, arrangements were made to refer any participants who experienced an untoward emotional reaction during or after the interview to local mental health personnel. Interviews with stakeholders were conducted between September and October 2011 and interviews with families and children took place between September and December 2011. On average, interviews with stakeholders took 62 minutes, 57 minutes with families, and 31 minutes with the individual children.

All interviews were audiotaped, transcribed, and subsequently analyzed using ATLAS-Ti. Thematic analysis was used to generate codes, categories, and themes relevant to the research questions. Once the initial themes were generated they were discussed with the advisory members to ensure that the local context was considered, thereby appreciating the full meaning of the data. A variety of approaches were used to establish rigor and trustworthiness²⁸ in the study, including hiring a local research assistant, working as a team to analyze the data, and providing sufficient details in all reports

and publications.

We had originally intended to use photovoice as another component of the qualitative data collection with the families; this strategy was to allow for the families to express the changes they experienced within their community. However, it proved difficult to implement because of the busy schedules of the families and consequently we did not have sufficient photo submissions for analysis.

During their various visits to the community, the postdoctoral fellow and PI informally collected data. For example, they attended community events such as the town hall meetings that were held after the fires. They observed general interaction in the community at stores, businesses and the like which allowed for frequent interaction with community members. They also held meetings with advisory board members and key people in the community. All data collected through fieldwork complemented data gathered using the other components of the data collection, and led to a richer understanding of the community and its recovery.

Surveys

School-Based Survey. A school survey was also conducted at two points in time: six months (T1, November 2011) and twelve months (T2, May 2012) respectively, after the Slave Lake wildfires. We accessed students aged 8 to 18 years within the three local school systems (public, Catholic and private). The research team provided input into the questionnaire design which consisted of three sections namely: Demographic Information, PTSD-RI for Children and Adolescents – DSM IV (Revision), and the Self-Reported SDQ for children and adolescents between 11 and 19 years old. sections namely: Demographic Information, PTSD-RI for Children and Adolescents – DSM IV (Revision), and the Self-Reported SDQ for children and adolescents between 11 and 19 years old. PTSD is an anxiety disorder characterized by reliving a psychologically traumatic situation, long after any physical danger involved has passed, through flashbacks and nightmares. The University of California at Los Angeles PTSD-RI is one of the most widely used instruments for the assessment of traumatized children and adolescents.

The 48-item instrument is designed for use with youth aged 7 to 18 years of age to assess a child's exposure to 26 types of traumatic events and to assess PTSD diagnostic criteria. A total PTSD severity score can be calculated as well as severity scores in the Re-experiencing Criteria (PTSD Criterion B), Avoidance/numbing criteria (PTSD Criterion C), and Increased Arousal Criteria (PTSD Criterion D). In addition to scores on these criteria, the coding structure of the instrument determines if each respondent meets a threshold criterion for each of the areas.

The SDQ is a widely used brief instrument for reliably assessing child mental health problems. The SDQ can be completed by youth aged 11 to 16. The 25 items cover five subscales relating to emotional problems, peer problems, behavioural problems, hyperactivity, and prosocial behaviour. Responses to the first four subscales are combined to create a Total Difficulties Score (TDS). The TDS and subscale scores can be classified as normal, borderline, and abnormal. A license was obtained to use SurveyMonkey,²⁹ an online survey site to allow for easy access by participants who had earlier been assigned a unique identification code. A total of 160 and 164 students took part in the survey that was administered at T1 and T2.

Participants were students from grades 3 to 12 (typically 8 to 18 years old) who were enrolled in public and private schools in Slave Lake. We worked with the school personnel to determine the best strategy for administering the survey; parents were informed through school meetings, websites and newsletters. Letters were sent home to parents explaining the project and including a consent form for return. Once we had all returned parental consent forms and assent forms from the students, we organized participants in groups of 10 to 15 for completing the survey the dates and times arranged with the different schools. With each school we scheduled one day for administering the survey in November 2011 and in May 2012.

For anonymity purposes, participants were assigned a unique identification number that was provided to them the first day of the administration of the survey. On the days of survey administration, the school personnel helped us call the different groups of participants to the computer lab for completing the survey. We aided participants in grades 3 and 4 by reading out loud the survey instructions and questions.

We made ourselves available to all groups to answer any questions participants might have about to the survey. Local counsellors and mental health professionals were available in the event a child had an emotional reaction to completing the survey. The school survey at time T1 yielded n=160 useable responses and at time T2 yielded n=164 useable responses. The data from the completed surveys were analyzed using frequency distributions, percentages and cross-tabulations for all variables using SPSS 19 software.³⁰

Household survey. Questionnaire development for the household survey was an iterative process based upon our experiences from the previous household survey used in Barriere and La Ronge,³¹⁻³² combined with findings and recommendations from other recent disaster research,¹⁷⁻¹⁹ input from local advisory board members and our intention to focus on the impacts of the disaster on families and children. We included specific scales including the General Inventory Questionnaire for Disasters, the Index of Perceived Community Resilience (IPCR),³³ scales related to Social Relations, and the PTSD Index for DSM-IV³⁴ Parent Version for the respondents that identified having a child between the ages of 7 and 12 years residing within the household. The survey included a section on demographics and a map to allow the respondents to identify where they lived at the time of the fires.

The sample frame of households through the AdMail system³⁵ included all individuals (those dwelling in houses, apartments, and on ranches and farms) within the relevant postal codes for the Town of Slave Lake, the Municipal District of Lesser Slave River No. 124, and the Sawridge First Nations. Local advertising (i.e., radio, newspaper, and cable television community announcements) were all used to advertise the household survey. Individuals within the community took it upon themselves to access social media to encourage the community members to complete the survey. Each questionnaire included a Toonie (\$2) as an incentive and for an additional incentive, if the respondents desired, they could provide their name and contact information to be entered in a draw for a \$25 gift certificate. A total of 2,877 surveys were sent through AdMail but according to the local postal clerks, 2,777 would be the more accurate

number given the loss of apartments and homes and the permanent departure of 100 people from the community. The questionnaires included self-stamped and addressed envelopes which were returned to the University of Lethbridge. Six weeks after the surveys were sent, postcard reminders were distributed through AdMail to the 2,877 households listed in this system.

A sample of 550 respondents took part in the household survey conducted from May to June, 2012. The data were entered into a database with ACCESS[®] software using double-entry techniques to decrease errors. Cronbach's alpha was applied to address reliability of the survey instrument. Initial analysis included assessment of data quality using cross-tabulations and histograms to look for outliers. Frequency distributions, percentages, cross-tabulations, Correlations, Exploratory factor analysis, parametric and non-parametric tests were completed for all variables using SPSS 19 software³⁰. Stratified analyses using chi-square statistics was used to describe the findings and to assess potential differences on key variables such as age and gender.

The study we conducted was not without challenges or limitations. Individuals graciously gave us their time, but it was evident that participating in the study was "one more thing" they were attending to while trying to rebuild their lives and communities. Ensuring the correct sample size for the household survey was difficult given the lack of opportunity for the AdMail site to be updated since the wildfires. The interviews were completed over a time period that extended four to seven months following the fires. This time period represents a specific point in the recovery processes of the families and communities. Given the dynamic nature of recovery, responses to the questions we asked may be different if they were posed to the stakeholders and families at different time periods since the fires. Collecting data during specific time periods after a disaster may enhance our understanding about the impacts of a wildfire and the recovery from such an event. One other limitation we faced was that we lacked baseline data for the community including its levels of resiliency and cohesiveness pre-disaster; comparisons before and after the wildfires are therefore based upon perceptions of those with whom we interacted and interviewed. In addition, we

did not have information about the mental health status of the children and functioning level of the families before the wildfire. The responses we received from the participants may in some instances be related to other issues in their lives.

Results

Interviews with stakeholders. Stakeholders emphasized three particular issues related to the experience of firefighting, evacuation, and recovery. First, the disaster was totally unforeseen, but it did not result in fatalities or major injuries. Although people were aware that the fire was putting in danger houses and other structures in the Municipal District and that it was getting closer to the town, the evacuation happened unexpectedly. Despite its suddenness, everybody managed to safely leave the community. This reinforced that all communities need to ensure that their disaster plans are up-to-date. Second, firefighters, local authorities, and leaders had to quickly make difficult decisions to save what was left in the town and part of the area. Emotional involvement and many logistical setbacks such as lack of communication, lack of power and lack of water had to be overcome in order to save critical infrastructure including the schools and the hospital. Finally, stakeholders showed confidence when talking about recovery. These comments were made despite the challenge of inventing a recovery process to fit their unique circumstances. This process required coordinating local and provincial governments (both between and within different ministries), private industry, insurance companies and non-governmental groups such as The Red Cross. The local authorities felt overwhelmed with the magnitude of issues that needed to be addressed (i.e., removal of destroyed structures and vehicles, development of temporary housing). One particularly challenging issue was the large volume of material donations that ultimately led to infrastructure (i.e., space for storage) and capacity problems (i.e., the need for volunteers). Even though there were a number of challenges and the interviews were conducted early on in the community's recovery, the stakeholders emphasized that the community was already showing its resiliency. They emphasized that the people and their commitment they have to their community are major strengths for the area.

Family Interviews. Families in the Slave Lake area experienced many changes following the fires. Families lived in temporary housing including campgrounds and hotels; schools were cancelled for the remainder of the school year and some of the mothers did not continue working in order to address all of the issues post-wildfire. According to the interviews the coping process of families is characterized by six main changes:

- 1. Different life goals and priorities.** Families had the new goal of recovery, which they expressed as ‘going back to normal life.’ This goal represented a constant worry added to their daily life, and was slowly achieved by following a step-by-step process that involved a sequence of particular actions such as getting children back to school, having temporary housing, dealing with insurance companies, and rebuilding their houses.
- 2. New routines.** Obvious changes in the community, the fact that some families were relocated after the fires, and a new prioritization order that parents imposed to recover (i.e., deciding to rebuilding, dealing with the insurance company, dealing with builders) resulted in many changes in family routines. Children were particularly affected by these changes. Parents were extremely busy and did not have the time and energy to deal with the specific needs of children.
- 3. Changes in attitudes.** Parents and children experienced different changes. There was a group of parents highly stressed and concerned about the future of their families, and another group of parents that had a strong feeling of guilt, shame, and sadness after surviving the fires without major material losses. In contrast, children in general were reported as being unaffected.
- 4. Changes in interactions within families.** Some families felt a stronger emotional bonding among family members and shared a sense of internal strengths as a family. Other families experienced the need to have family members physically close fearing an emergency. Still other families were emotionally further apart and had difficulties interacting among family members. Difficulties may result in irritability, mental health issues, marriage breakups, domestic violence, and substance abuse.

5. Changes in interactions with the community. Families experienced stronger relationships with their close social networks. They engaged in deeper conversations, got together more often, and felt more involved in each other's life. However, families also found their interactions with other people in the community more difficult. Communication was problematic and conversations sometimes led to ill-tempered reactions.

6. New values and perceptions. Families had a different perception of what the important things are in life. Most had a greater appreciation of their families and attributed a lower value to material possessions. Some families also put a higher weight in human relationships and developed a stronger sense of solidarity with less fortunate people in the community.

The CBCL responses revealed that only one girl was in the borderline clinical range; all other participating children had scores within the normal range. What is unclear was whether or not the one girl would have scored within the borderline range regardless of the disaster.

School Survey. Detailed discussions about the findings are found in the *Report of the School Survey, Slave Lake, AB*³⁶ and therefore only the highlights are presented here. On average, the scores for most of the different features of PTSD were well below half of the scale range but a substantial share of children meets certain PTSD criteria symptoms. For instance, at time T1 55% of students meet the Re-Experiencing criteria, 16% met the Avoidance criteria, and 36% met the Increased Arousal criteria. By time T2 a decline in the prevalence of meeting these criteria was evident, with 37% meeting the Re-Experiencing criteria, 9% meeting the Avoidance criteria, and 32% meeting the Increased Arousal criteria. The survey cannot determine if time alone or some other intervening factor accounted for the decline in PTSD symptoms. Results from the survey at T1 and T2 also illustrate that only a small minority of students are at high levels of risk for PTSD diagnosis. The majority present symptoms that are not likely to result in any PTSD diagnosis (64% and 79% respectively for T1 and T2). Full PTSD diagnosis is likely for only 12% and 8% of students from surveys T1 and T2 respectively.

On the school surveys, students were asked if their homes burned in the fires. One might expect some connection between burn status (burn vs. non-burn) and a range of different PTSD symptoms. The results do indicate burn status is a differentiating feature. At time T1, 20% of the students indicated that their homes had burned in the fires. Students whose homes burned present significantly higher mean scores on every facet of PTSD and a significant positive association ($p < 0.05$) between burn status (house burned) and meeting the threshold values for the Re-Experiencing, Avoidance, and Increased Arousal criteria. By time T2 a number of changes were evident. 19% of students at T2 claimed their house burned down. The significant differences in mean severity scores for all of the PTSD features were still evident, and while the association between burn status and meeting the threshold for Re-Experiencing still held, the significant association between burn status and meeting the threshold for Avoidance and Increased Arousal were no longer evident. As shown above the PTSD instrument also classifies individuals by likely diagnosis. At time T1 the data shows a significant association between burn status and diagnosis category ($X^2= 6.22, p < 0.05$). However, by time T2 this association no longer held.

As with the PTSD outcomes, one might expect some connection between burn status (burn vs. non-burn) and a range of different difficulties encountered by children as noted through the SDQ. The data from the two surveys shows that there are important impacts of burn status on many features of SDQ in the early stages after the fires (T1), but that most of this impact has waned by time T2. At time T1, burn status was associated with significant differences in four features of SDQ. For instance, students whose homes burned had significantly ($p < 0.05$) higher scores on the Conduct Problem scale (3.5 burn vs. 2.9 no burn), the Hyperactivity scale (5.8 burn vs. 4.7 no burn), the TDS (17.5 burn vs. 13.5 no burn), and the Impact score (1.7 burn vs. 0.3 no burn). By time T2, all of these significant differences were no longer evident, although the Peer Problem Scale emerged was significantly different by burn status, with scores of 5.0 vs. 4.3, respectively, for those whose homes had burned vs. those whose home did not.

Both data sets were examined to explore the characteristics of students who are most at risk for

emotional or behavioural trauma resulting from the disaster. In this regard, we focused only on those students where the data indicates a Full PTSD Diagnosis is likely, and those whose overall TDS were classified as being within the abnormal range of scores. In terms of PTSD risk, we find the patterns are fairly consistent at both points in time. The vast majority were young (aged 7 to 10), and in lower grade levels (grades 3 - 6). Interestingly, however, the majority of those most at risk of PTSD did not experience the loss of their homes in the fires. The gender profile of PTSD risk was less consistent, and although the majority was female at both points in time, the majority was larger at time T2.

In terms of SDQ risk, the profiles are also relatively consistent at both points in time. SDQ items were only administered to those aged 11 and over, but the data also showed that the majority of students were younger (grades 3 - 6), and in the 11 to 12 year-old range. As with the PTSD findings, the majority of those with severe SDQ scores did not experience the loss of their homes in the fires. The gender profile of SDQ problems changed over time. At time T1, 70% of those with abnormal SDQ scores were females, but by time T2 this has declined to 46%, and males exhibited the majority of abnormal scores (54%).

Household Survey. Detailed discussion and analysis of the household survey is available in the *Report of the Household Survey: Slave Lake, AB*³⁷ with only the highlights noted here. The majority of the respondents were married (65%) and female (69%). Of the entire sample, 42% had an income of \$100,000 or more and 26% had college or a non-university diploma with 21% having at least one university degree. Forty-five percent of respondents indicated that they had no chance to prepare themselves beforehand for the disaster, while the majority (82%) were overwhelmed by the suddenness of the disaster impact. A larger percentage (90%) said they were overwhelmed by the severity of the disaster impact; 47% thought it was possible that they would die because of the wildfires. Of our sample, 31% lost their homes, 12% lost their businesses or farms and 54% lost their neighbourhood. It took about 15 days before people were able to get back to their usual activities. Twenty-five percent declared a loss of capacity to earn a living through loss of job or work due to their workplace being closed, place of work destroyed, equipment burnt, town restrictions and

blockades.

Since the wildfires, the top three changes with the greatest impact were their living arrangements, financial assets and family relationships. At the time of the survey, the change was still ongoing for 40% of the respondents. Of the 326 respondents who answered the question about being close as a family, 56% indicated that they were about the same in terms of closeness, 35% indicated that they were closer while 9% indicated that they were more distant. In terms of family cohesion, of the 321 who had responded to this question, 55% indicated that they were about the same in terms of being cohesive, 34% indicated that they were stronger as a family whereas 11% said that they were weaker as a family.

Within the group of respondents, only 18% (n = 93) had a child in the household who was between the ages of 7 and 12 years. Of this group, 54% (n = 50) indicated that this child had difficulties with emotions, concentration, behaviour, or getting along with people. The parents completed the PTSD RI for this child. This instrument includes two screening sections (Criterion A1 and Criterion A2). In terms of the A1 screening questions, based on parental assessment the majority of the children felt afraid (54%), feared injury (58%), feared someone would die (73%), or feared someone would be injured (74%). In terms of the A2 screening questions, according to parental assessment, 75% of the children felt terrified, 51% felt helpless, and 69% felt confused. Based on parental assessment, no children exhibited symptoms for which a full PTSD diagnosis was likely, while 8 out of 68 children referenced in the household survey exhibited symptoms for which a Partial PTSD diagnosis was likely. However, based on parental assessment, 32% of the children met the PTSD Re-experiencing (B) criterion; just over 2% met the avoidance (C) criterion, while 23% met the Increased Arousal (D) criterion. Parental assessments of their children resulted in a mean overall PTSD Severity Score of 11.8, a value that is considerably lower than what students reported in the school survey (mean of 22.0 at T1 and 17.2 at T2).

The survey also included questions about community social relations. In this regard, 30% reported being no more or less satisfied with the community, 19% said that they were a little more satisfied and

28% indicated that they were much more satisfied. Prior to the fires, 22% indicated that the Slave Lake area was no more or less desirable, 27% indicated it was a little more desirable and 26% said it was the most desirable compared to other communities they have lived in. In addition, 51% noted that people can still be trusted (38% responded that you cannot be too careful in dealing with people) and that people living in their community are more often friendly, welcoming, and supportive.

Previous research has shown that community cohesion (i.e., sense of community, attraction to live in the community and interaction within the community³⁸) is an important correlate of community resiliency (i.e., the ability to move forward and reach a higher level of functioning³³). The household survey included 18 items to measure Buckner's Index of Cohesion.³⁸ These items allow for the measure of an overall Cohesion Index (an average of all 18 items), as well as three subscales of cohesion—namely Psychological Sense of Community, Neighbourhood Attraction, and Neighbouring. The household survey also included questions from which to measure an IPCR, which we have developed from previous work on wildfire communities. The details of this 11-item index are provided elsewhere.³³ All 11 items are used to compute an overall IPCR score, but previous analysis of these 11 items has also shown that the IPCR measures three separate structures or subscales of resiliency—namely, Leadership and Empowerment; Community Engagement; and Non-Adverse Geography.

All items used to compute Buckner's³⁷ cohesion measures are scored on a Likert scale from 1 to 5. The overall Cohesion score is computed as the average of 18 items, the PSOC subscale as an average of 9 items, the Neighbouring subscale an average of 5 items, and the Attachment subscale as an average of 3 items. Therefore the overall cohesion index and the each of the subscales ranges in value from a minimum of 1 to a maximum of 5.

Data from the household survey showed that the mean overall cohesion score for the sample was 3.6 (n=485) out of a maximum possible score of 5.0, the mean PSOC score was 3.7, the mean Neighbouring score was 3.4 (max of 5.0), and the mean Neighbourhood Attraction score was 3.5. These values are

reasonably consistent with our findings in other communities; although the overall cohesion scores and all of the subscale scores are marginally lower than findings in other communities (e.g., Barriere and LaRonge)³¹⁻³²

Data from the household survey showed that the IPCR scores, which can range from 11 to 55, were normally distributed with a mean of 37.3 and a standard deviation of 6.5. These are also fairly consistent with findings from Barriere and LaRonge which had mean IPCR scores of 40.7 and 38.1 respectively. As in other studies of this kind, the Slave Lake household survey data showed a strong correlation between overall levels of resilience (i.e., IPCR score) and overall measures of social cohesion ($r=0.67, p<0.05$). Similarly, all of the subscales of cohesion had significant correlations with IPCR, including PSOC ($r=0.64, p<0.05$), Neighbourhood Attraction ($r=0.54, p<0.05$), and Neighbouring ($r=0.55, p<0.05$). These findings reinforce the key linkage between cohesion and resilience, and underscore the important social basis for perceived community resilience.

Finally, the participants were asked to rate their health; 39% rated it very good, with an additional 16% rating it as excellent. Importantly, 70% reported their health status to be “about the same” as before the wildfire and 31% rated their life stress as high with another 15% rating their life stress as very high.

Conclusions

The mixed methods study reported here generated information from several sources and offers a greater understanding of the impacts of wildfires on families and children and on community resiliency in general. Through our findings we learned that there are multiple stresses and issues that impact the everyday lives of families and children as they attempt to restore a normal balance. The household survey results indicated that just over a third of the respondents reported being both stronger and closer as a family. Despite the severity of the disaster, based upon parental assessments in the household survey and self-reports in the school survey, there were few children who exhibited a Full Diagnosis of PTSD. Gender and burn status were factors that impacted these results. Importantly, the parental assessment scores of their children on the

PTSD scales were lower than those self-reported by the children who participated in the school survey. The CBCL—also completed by the parents-- indicated there were no difficulties among the children that participated in the interviews. These findings may suggest that parents underestimate the impact of the wildfires on their children. This is further supported by the interview findings where we learned about the many challenges the families were facing. In some instances, it was clear that the families did not have the energy to invest in being parents because of the need to make decisions about rebuilding their homes and their lives. The results on family-child impacts may also be related to the time at which the data were collected. Future research that includes longitudinal studies with this population for several years after the disaster to determine any possible ongoing issues within families would be recommended. Finally, the findings speak to the necessity of “returning to normal” for all involved—children, families and community residents. Activities such as school and clubs were suspended in the community due to the severity of the event and staffing issues (a number of teachers lost their homes). However, children who were living in temporary housing (hotels, campgrounds) would have benefited from activities including completion of the regular school year in order to help them and their families return to a normal routine post-wildfire.

The majority of respondents in the household survey were overwhelmed by the suddenness and severity of the wildfires. The interviews include many examples of personal survival stories and disbelief that such a disaster occurred in their community and to their family. The student responses in the school survey highlight the challenges of dealing with the wildfires. Numerous services have been made available to the community residents but consideration needs to be given to the provision of additional mental health and social support services for residents and local authorities well after the disaster has passed. Recovery is an individual process that needs continual assessment and assistance possibly for years after the disaster. Longitudinal research that assesses such a population would further enhance our understanding of recovery processes post-disaster.

Despite the wildfires and the numerous inter-related challenges, the interviews and household

surveys indicated there is a commitment to the communities in the area. A third of the household survey respondents were no more or less satisfied with the community since the wildfire. Overall, the respondents perceived the community to be friendly, welcoming, and supportive. The stakeholder interviews indicated a dedication to rebuild and move forward. The interviews revealed that the Slave Lake town and area is considered resilient and that it is a place that will successfully move forward by addressing the challenges they have faced because of the wildfires. The respondents to the household survey support these findings generated through the interviews. One example is that the respondents reported a normal range on the IPCR. In addition, there was a link between cohesion and resiliency comparable to the other communities we have studied³³. Examining cohesion and resiliency over an extended time post-wildfire would be helpful in understanding the dynamic nature of these processes. Helping communities to maintain and enhance their cohesion levels is an important policy consideration since it is linked to building and maintaining resiliency.

In conclusion, understanding the impacts of wildfires on families and children is in its infancy. The mixed methods study reported here offers insights and perspectives that can be considered for future research on the topic. Simultaneously, continuing to examine resiliency within communities that are challenged by adversity will also enhance our understanding of topics vital to disaster planning and mitigation. In this way, we can identify services and policies that will be useful for health and human services, community development and disaster management.

Key Recommendations for Decision Makers

Disaster Preparedness

- Maintain an updated community disaster plan that follows disaster planning protocols.

After the Disaster

- Coordinate recovery efforts from local and provincial governments and the non-governmental sector to prevent duplication of efforts.
- Develop mechanisms to ensure that there are cross-ministry opportunities for collaboration and decision-making regarding the response to the fire.
- Set limits on the material donations that are provided to the community.
- Provide additional mental health services for all rural community members that experience wild-fires and psychological support for local leaders and stakeholders who are dealing with the wildfires for a full year following the fire.

Collect economic, social and health data in communities that experience wildfires for five years after the wildfire and then every 10 years for three more decades.

Fostering Healthy Families and Children

- Collect psychological data including information about family functioning and general coping processes from children and families every two years for a maximum of six years after the wildfire to assess for individual and family functioning.
- Provide additional services and resources for designated professionals (i.e., teachers, counsellors) to assist them in supporting families and children affected by the wildfire.
- Offer free sessions that address issues such as family decision making and financial planning, as well as sessions about the general recovery process from a wildfire.

Encourage parents to spend additional time with their children to provide factual information about the disaster and promote conversations about their feelings.

Fostering Community Resiliency

- Provide opportunities for celebrations to acknowledge the efforts of firefighters, local authorities, volunteers, and all community residents after the disaster.
- Provide opportunities for children and families to engage with, and support, one another through planned activities including sport events and entertainment such as music events.

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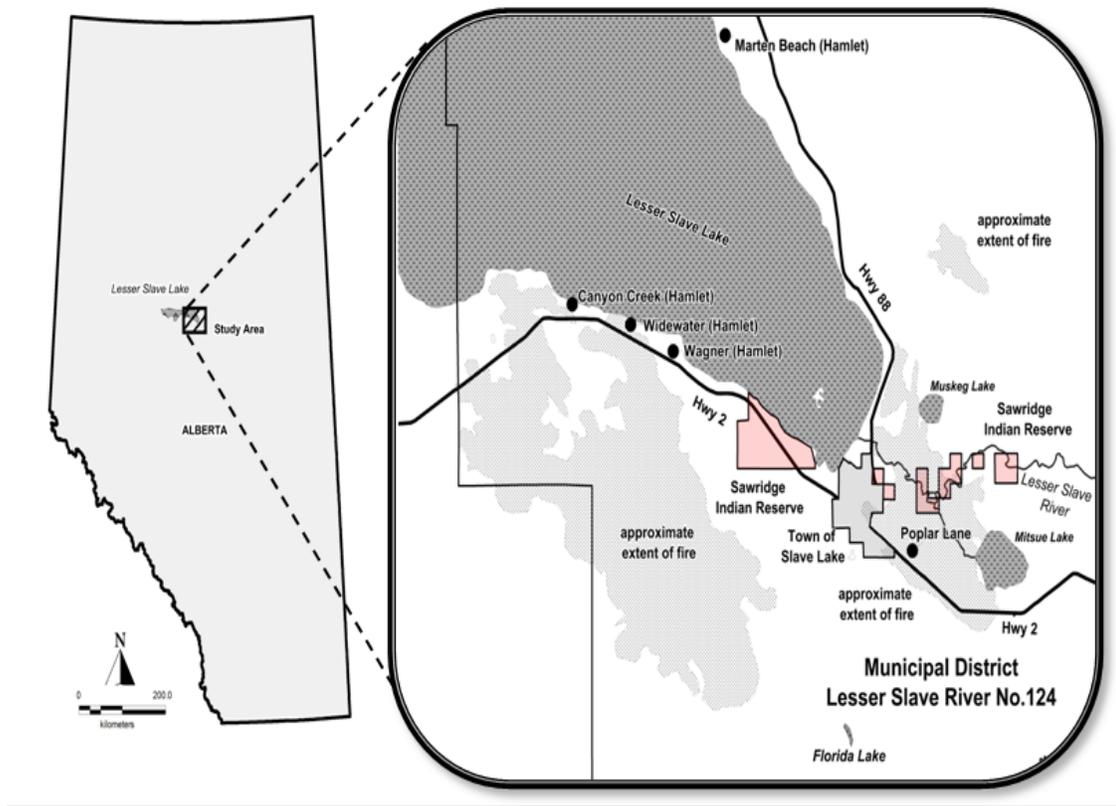


Figure 3 Slave Lake Study Area

