

## Article

# Quality of Life Measured with the WHO-5 Wellness Index during Wildfire Season in Two Canadian Provinces—Cross-Sectional Study

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**Abstract:** Introduction: Wildfires impact large populations worldwide with increasing frequency and severity. In Canada, the fire season has affected more areas this year with potential implications for individuals' well-being and quality of life (QoL). Objective: This study aimed to explore data related to the well-being and QoL of individuals living in areas impacted by wildfires in two Canadian provinces. Methodology: A cross-sectional survey was used to collect data from the residents in the two provinces who subscribed to the Text4Hope mental health support service. Descriptive and inferential statistics were applied using World Health Organization Well-Being Index (WHO-5). Results: Out of 1802 Text4Hope subscribers, 298 responded to the baseline surveys, yielding a response rate of (16.5%). The mean score of QoL was (40.8/100 ± 20.7). Most respondents were from Alberta (84.2%), 40 years old or below (28.3%), females (85.2%), Caucasian (83.5%), in a relationship (56.4%), employed (63.6%), received diagnoses of depression (56.6%), and anxiety (52.9%). The overall prevalence of low QoL was (67.3%; 95% CI: 61.2–73.1%) that was mostly reported among subscribers who were from Nova Scotia (70.5%), 40 years old or younger (71.2%), other gender (83.3%), Black/Hispanic and other ethnicity (85.7% each), having high-school or less education (70.3%), not in a relationship (74.1%), and unemployed (73.6%). In terms of clinical factors, low QoL was most prevalent among those who received the diagnoses of depression (74%) and anxiety (74.3%), and those who have been receiving antidepressants (71.8%) or benzodiazepines (93.3%). Regarding wildfire-related factors, the highest prevalence of low QoL was reported among those living in a region that has recently been impacted by the wildfires (74.7%) and those who have been less frequently watching television images about the devastation caused by the recent wildfires (72.6%). The multivariate logistic regression analysis model predicting the low QoL including the various variables was statistically significant;  $X^2$  (df = 19; n = 254) = 31.69,  $p$  = 0.03. It was found that living in a region impacted by wildfires (37.9%) was the only significant predictor of low QoL (adjusted OR: 1.96; 95% CI: 1.05–3.65). Conclusions: The impact of wildfire on the QoL and well-being among people living in impacted regions is significant. It is empirical for the health authorities to support those who are disadvantaged by wildfire via running of screening programs to early identify mental health symptoms and addressing the living conditions of the survivors, along with the provision of innovative means of mental health support. This necessitates enhanced planning of the governments and health authorities to overcome such adverse psychological consequences of these events.



**Citation:** Shalaby, R.; Agyapong, B.; Obuobi-Donkor, G.; Dias, R.d.L.; Agyapong, V.I.O. Quality of Life Measured with the WHO-5 Wellness Index during Wildfire Season in Two Canadian Provinces—Cross-Sectional Study. *Fire* **2024**, *7*, 39. <https://doi.org/10.3390/fire7020039>

Academic Editor: Christine Eriksen

Received: 15 October 2023

Revised: 1 January 2024

Accepted: 22 January 2024

Published: 27 January 2024



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**Keywords:** wildfire; quality of life; Text4Hope; cross-sectional survey

## 1. Introduction

Major ecological disasters impact large populations worldwide with increasing frequency and severity [1,2]. In 2019, a total estimate of 396 disasters were reported globally,

affecting 95 million people, and resulted in 11,755 total deaths with a cost of nearly CAD 130 billion [2]. Such tragedies are partly attributed to global climate change that poses an ongoing risk to health, food availability, water supply, and economic development [3]. Climate change can result in rising temperature, alteration in wind speed and rainfall patterns, the necessary elements for wildfire flaming and dissemination [4]. Current estimates show significant implications of wildfire disasters globally; according to the World Health Organization (WHO), over two decades from 1998 to 2017, there were 6.2 million people impacted by wildfires and volcanic activities globally [5]. Furthermore, the mortality estimates from wildfire smoke range between 260,000 and 600,000 annual deaths [2].

In Canada, the fire season extends from May through October, with more areas affected this year. The Canadian wildland fire management agencies report an annual investment between CAD 800 million and CAD 1.4 billion for wildland fire management, including fire preparedness, mitigation, response, and recovery expenses [6,7]. Since the beginning of the year and as of July 19, there have been 4241 wildfires with more than 800 active fires across Canadian provinces and territories [7]. In western Canada, the estimates reveal more than 27 million acres are burned, exceeding a previous record of approximately 17.5 million acres in 1995 [7]. Due to the wildfire situation, Alberta, a western Canadian province, declared a state of emergency on May 6 [8]. A similar situation was perceived in Nova Scotia, an eastern Canadian province; since May 2023, the province has experienced unprecedented wildfire activity in multiple areas, damaging homes, destroying large tracks of land, and forcing residents to evacuate, the situation that urged the declaration of the state of emergency on June 1st 2023 [9].

For years after such disasters, individuals sustain the endurance of several psychopathological consequences, particularly when compared to those who were not exposed [10]. According to the literature, more than one in three of those impacted usually experience depression, anxiety, low resilience, and post-traumatic stress disorder [4,11]. A recent scoping review reported the prevalence of PTSD in communities impacted by wildfires is growing statistically and clinically [4]. The PTSD rates can reach up to (60%) after three months and the symptoms may persist up to 10 years post-disaster at a rate of (7.6%) [4]. High similar rates were reported for depression, anxiety, and substance use disorders. People with a history of mental health conditions, such as anxiety or depression, were identified to be particularly at a high risk of developing mental health issues following a disaster [12,13].

In the same context, a wildfire disaster could affect the individual well-being in terms of mental safety and quality of life (QoL). QoL and well-being have been highly recommended to be studied in a consequence of wildfires [14]. The concept of QoL refers to the well-being of a population or individual, including positive and negative elements within their life at a specific point in time [15]. The World Health Organization, however, defines QoL as “an individual’s perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns” [16].

In the trauma mental health framework, witnessing smoke is considered to be an indicator of a perceived threat that can affect people’s stress and emotional well-being therefore their QoL [14]. Previous studies have suggested the short and long-term wildfire effects on individual health and well-being including negative post-disaster adjustment, increased stress levels, less social interactions, in addition to aggressive and violent behavior in relation to financial stressors due to the paucity of resources and destruction to homes and businesses [2,17]. In a study that examined the effects of the deadliest wildfire event in Australia (Black Saturday Bushfire, 2009) on individual well-being, the study reported a significant negative well-being effect valued at AUD 52,300 which was associated with the reduction in life satisfaction for individuals residing close to the wildfires [18]. “How safe the person feels” was the most negatively affected domain, particularly among those with low social support [18].

A number of factors were found to be closely associated with low QoL during wildfires. The exposure to and seeing smoke in the sky is perceived as a strong correlate with low QoL as it has triggered emotions of fear, concern, and distress, particularly after returning to the community, suggesting the long-lasting traumatic effects [19,20]. Other factors including individual old age, low education levels, female gender, those with damages to their property, and those already experiencing health inequities and premorbid mental illness were all associated with at least one domain (physical, psychological, or environmental) of the low QoL, according to the previous literature [2,17,21,22]. Some interventions such as the provision of accurate and timely information about air quality were found to result in beneficial practices that can produce a better health profile and QoL [23]. Additionally, it was found that the provision of social support for the evacuated can moderate the relation of fire stress to mental health at the time of the fire, with those who are receiving high social support having better mental health profile [24]. World Health Organization has emphasized upon the international guidelines that recommend all-level services from basic services to clinical care including mental health care needs to be made readily available as part of the health response [25].

In this study, the authors aimed to explore the data related to the psychological well-being of individuals who were living in areas impacted by wildfire. The study examined the relationship between personal and wildfire-related factors and individual well-being during the active wildfire in two impacted Canadian provinces, Alberta and Nova Scotia.

## 2. Methodology

### 2.1. Study Setting and Design

This study was conducted in two Canadian provinces, Alberta and Nova Scotia, with a total population of 5,751,004, according to Statistics Canada 2023 [26]. A cross-sectional survey was used to collect the data from the residents in the two provinces using a self-administered questionnaire which was sent via REDCap [27]. The survey was part of two mental health support services Text4Hope Alberta (Text4Hope-AB) and Text4Hope Nova Scotia (Text4Hope-NS). The services have been provided to support the mental health of the residents in the two provinces during the attack of wildfire starting in March 2023. A daily supportive text message was sent for six consecutive months and was crafted within the cognitive behavioural therapy concepts. Subscribers can self-enroll by texting “HopeNS” or “HopeAB” to a phone number 393939; subsequently, the subscribers will receive a message confirming their subscription. The supportive text messages are sent once per day at 9 a.m. for six consecutive months. The service is free to end users and has received support from the provincial health authorities and academic institutions in both provinces. No incentives were offered to the subscribers, and responding to the survey was voluntary and not contingent on receiving supportive text messages.

### 2.2. Ethical Approval

The study received ethical approval from the Health Research Ethics Board of the University of Alberta (Pro00086163) and the Research Ethics Board at Nova Scotia Health (REB file #1028254). Informed consent was implied when respondents completed and returned the survey responses.

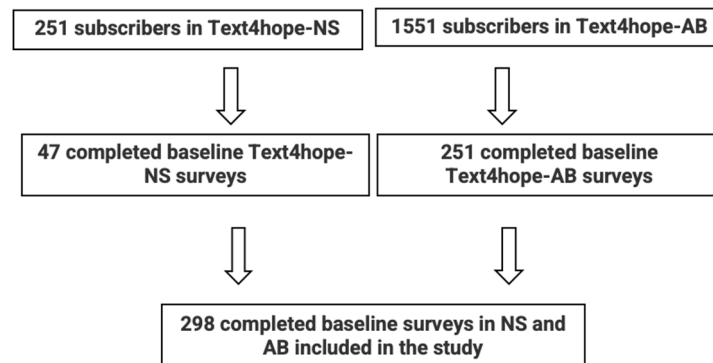
### 2.3. Data Collection

Data collection took place from 14 May to 23 June 2023. The survey questionnaire took about 5–10 min to complete, and it included a blend of questions that assessed sociodemographic information, including gender, age, ethnicity, marital status, employment status, educational status, and housing status. The questionnaire additionally included data related to the mental health status of the participants, including having a history of depression or anxiety or a history of receiving psychotropic medications, such as antidepressants and benzodiazepines. Information about the wildfires was also collected and included living in a region of Alberta or Nova Scotia that has recently been impacted by

the wildfires and the frequency of watching television images about the devastation caused by the wildfires in the two provinces. Additional questions were also collected in relation to the evacuation status, the losses attributed to the wildfires, and the support received during this time.

Figure 1 shows the total number of subscribers from 14 May to 23 June 2023. In Alberta, a total of 1551 subscribed to the service with a total of 251 provided complete responses at baseline (response rate = 16.2%). In Nova Scotia, a total of 251 subscribed to the service with a total of 47 responders providing complete responses at baseline (response rate = 18.7%).

$$\text{Total response rate} = (47 + 251) / (251 + 1551) = 16.5\%$$



**Figure 1.** Study flow chart.

#### 2.4. Outcome Measure

Well-being and quality of life were assessed using the 5-item World Health Organization Well-Being Index (WHO-5) [28,29], which consists of five positively worded items that reflect well-being. Participants are asked to report the presence of these positive feelings in the last 2 weeks on a 6-point Likert scale ranging from all of the time (5 points) to at no time (0 points). The WHO-5 items are (1) 'I have felt cheerful and in good spirits', (2) 'I have felt calm and relaxed', (3) 'I have felt active and vigorous', (4) 'I woke up feeling fresh and rested', and (5) 'My daily life has been filled with things that interest me' [29]. The scale has high clinometric validity and can be used as an outcome measure of the treatment effects [29]. In addition, the scale is a sensitive and specific screening tool for depression with a wide range of applicability across study fields [29].

Scoring of the scale is calculated by totaling the figures of the five answers to obtain a raw score ranging from 0 to 25, where 0 represents the worst possible and 25 represents the best possible quality of life. To obtain a percentage score, the raw score is multiplied by 4, where a percentage score of 0 represents the worst possible, whereas a score of 100 represents the best possible quality of life [30]. A summed raw score of <13 or a percentage of ≤50% indicates poor mental well-being and is an indication for testing for depression under ICD-10 [29–31]. In this study, we used the cut-off score of <13 as an indicator of a poor QoL and well-being.

#### 2.5. Sample Size Estimation

With a total population of 5,232,018 (969,383 in Nova Scotia and 4,262,635 in Alberta) as of the 2021 census [32], a 95% confidence interval, and a ±5% margin of error, the sample size needed for prevalence estimates for low quality of life was 385.

#### 2.6. Statistical Analysis

Distribution of study variables including sociodemographic, clinical, and wildfire-related factors were presented against the educational status of the respondents using frequency and percentages. Chi-squared analysis ( $\chi^2$ ) was used to determine the prevalence of low QoL by categorical variables including sociodemographic, clinical, and wildfire-related factors.

Multivariate logistic regression analysis was used to explain the association between the prevalence of low QoL and the covariates. Spearman correlation analysis was run between the covariates to exclude any high inter-correlations ( $r_s \geq 0.7$ ). Adjusted odd's ratios and 95% confidence intervals (CIs) of independent variables were reported. The SPSS Version 28 [33] was used for analysis. There was no imputation of missing data and complete responses were reported and statistical test significance was considered with  $p < 0.05$ .

### 3. Results

Table 1 demonstrates the distribution of the socio-demographic and clinical characteristics and wildfire-related items in relation to the education level of the respondents. From the table, the majority of respondents were from Alberta (250/297, 84.2%) and were 40 years old or below (28.3%) with a mean age of 43 years. The respondents were predominantly females (85.2%), Caucasian (83.5%), in a relationship (married, cohabiting, or common-law, 56.4%), and employed (63.6%). Regarding clinical characteristics, more than half of the respondents reported having received a diagnosis of depression (56.6%) and anxiety (52.9%), while (39.1%) reported having received antidepressant medication and (5.4%) were on benzodiazepines.

**Table 1.** Demographic profile, clinical characteristics, and wildfire-related items across the educational status of the respondents.

Variables	High-School or Less Education n (%)	Post-Secondary Education n (%)	Total n (%)
Province			
NS	7 (13.7)	40 (16.3)	47 (15.8)
AB	44 (86.3)	206 (83.7)	250 (84.2)
Age			
Mean (SD)	44.71 (18.83)	49.15 (12.60)	48.38 (13.93)
Age categories			
≥60 y	13 (25.5)	59 (24.0)	72 (24.2)
50–59	12 (23.5)	68 (27.6)	80 (26.9)
40–49	8 (15.7)	53 (21.5)	61 (20.5)
≤40 y	18 (35.3)	66 (26.8)	84 (28.3)
Gender			
Male	14 (27.5)	24 (9.8)	38 (12.8)
Female	37 (72.5)	216 (87.8)	253 (85.2)
Other	0 (0.0)	6 (2.4)	6 (2.0)
Ethnicity			
Caucasian	36 (70.6)	212 (86.2)	248 (83.5)
Indigenous	7 (13.7)	11 (4.5)	18 (6.1)
Asian	3 (5.9)	8 (3.3)	11 (3.7)
Black/Hispanic	1 (2.0)	8 (3.3)	9 (3.0)
Other	4 (7.8)	7 (2.8)	11 (3.7)
Relationship status			
In a relationship	15 (29.4)	152 (62.0)	167 (56.4)
Not in a relationship	36 (70.6)	93 (38.0)	129 (43.6)
Employment status			
Employed	27 (52.9)	162 (65.9)	189 (63.6)
Unemployed	24 (47.1)	84 (34.1)	108 (36.4)
History of having mental health diagnosis from a health professional *			
Depression	30 (58.8)	138 (56.1)	168 (56.6)
Anxiety	29 (56.9)	128 (52.0)	157 (52.9)

Table 1. Cont.

Variables	High-School or Less Education n (%)	Post-Secondary Education n (%)	Total n (%)
History of receiving psychotropic medications *			
Antidepressants	23 (45.1)	93 (37.8)	116 (39.1)
Benzodiazepines	5 (9.8)	11 (4.5)	16 (5.4)
Living in a region of AB/NS that has recently been impacted by the wildfires			
No	34 (66.7)	151 (61.4)	185 (62.3)
Yes	17 (33.3)	95 (38.6)	112 (37.7)
Having had to evacuate from home due to the recent wildfires in AB/NS			
No	11 (64.7)	77 (81.1)	88 (78.6)
Yes	6 (35.3)	18 (18.9)	24 (21.4)
Having lost any property as a result of the wildfire			
No	15 (88.2)	94 (98.9)	109 (97.3)
Yes	2 (11.8)	1 (1.1)	3 (2.7)
Having received support from family and friends in relation to the recent wildfires			
Some-to-absolute support	7 (41.2)	44 (46.3)	51 (45.5)
Limited-to-no support	10 (58.8)	51 (53.7)	61 (54.5)
Having received support from the government of Alberta in relation to the recent wildfires			
Some-to-absolute support	2 (11.8)	17 (17.9)	19 (17.0)
Limited-to-no support	15 (88.2)	78 (82.1)	93 (83.0)
Having received support from the Red Cross in relation to the recent wildfires			
Some-to-absolute support	2 (11.8)	4 (4.3)	6 (5.4)
Limited-to-no support	15 (88.2)	90 (95.7)	105 (94.6)
Watching television images about the devastation caused by the recent wildfires in AB/NS			
Less frequent (Maximum once/week)	21 (42.0)	112 (45.5)	133 (44.9)
More frequent (At least every other day)	29 (58.0)	134 (54.5)	163 (55.1)
WHO-5 Mean (SD)	38.70 (25.21)	41.14 (19.86)	40.79 (20.69)

\* Multiple responses were reported.

A total of 113 (37.9%) of the respondents reported living in a region of Alberta or Nova Scotia that has recently been impacted by the wildfires; of them, 24 (21.45%) had to evacuate from home due to the wildfires and 3 (2.7%) reported having lost any property as a result of the wildfires. In relation to the support received during the wildfires, a large proportion of participants have mentioned that they had received some to absolute support from family and friends (45.5%), and to a lesser extent from the Government of Alberta (175) and Red Cross (5.4%), and (55.1%) reported frequent watching television images about the devastation caused by the recent wildfires in Alberta or Nova Scotia (daily or every other day). The mean score of QoL was (40.8/100 ± 20.7)

Table 2 demonstrates the prevalence of low QoL and their relevant factors among study participants. Due to the high inter-correlation among the variables related to the evacuation, the losses attributed to the wildfires, the support received during this time, and living in a region of AB/NS that has recently been impacted by the wildfires, the analysis included only the latter variable to avoid redundancy.



**Table 2.** Association analysis of demographic, clinical, and wildfire characteristics against low QoL.

Variables	Prevalence N (%)	Low QOL	
		Adjusted Odd's Ratio (95% CI)	
<b>Overall</b>	171 (67.3)		
<b>Province</b>			
NS	31 (70.5)		1 (Ref)
AB	140 (66.7)		0.66 (0.28–1.59)
<b>Age categories</b>			
≥60 y	36 (59.0)		1 (Ref)
50–59	46 (70.8)		1.78 (0.75–4.23)
40–49	37 (67.3)		1.63 (0.67–3.98)
≤40 y	52 (71.2)		1.24 (0.53–2.91)
<b>Gender</b>			
Male	19 (63.3)		1 (Ref)
Female	147 (67.4)		1.32 (0.53–3.25)
Other	5 (83.3)		1.92 (0.17–21.56)
<b>Ethnicity</b>			
Caucasian	141 (65.9)		1 (Ref)
Indigenous	11 (68.8)		0.99 (0.30–3.30)
Asian	7 (70.0)		1.67 (0.37–7.55)
Black/Hispanic	6 (85.7)		2.55 (0.26–24.98)
Other	6 (85.7)		2.45 (0.24–24.85)
<b>Education level</b>			
High School or Lower Education	26 (70.3)		1 (Ref)
Post-secondary Education	145 (66.8)		1.08 (0.45–2.59)
<b>Relationship status</b>			
In a relationship	91 (62.3)		1 (Ref)
Not in a relationship	80 (74.1)		1.46 (0.79–2.70)
<b>Employment status</b>			
Employed	107 (64.1)		1 (Ref)
Unemployed	64 (73.6)		1.71 (0.87–3.38)
<b>History of having mental health diagnosis of depression from a health professional</b>			
No	60 (57.7)		1 (Ref)
Yes	111 (74.0)		1.93 (0.95–3.90)
<b>History of having mental health diagnosis of anxiety from a health professional</b>			
No	64 (58.2)		1 (Ref)
Yes	107 (74.3)		1.49 (0.79–2.81)
<b>History of receiving Antidepressant medications *</b>			
No	97 (64.2)		1 (Ref)
Yes	74 (71.8)		0.97 (0.49–1.95)
<b>History of receiving Benzodiazepines medications</b>			
No	157 (65.7)		1 (Ref)
Yes	14 (93.3)		4.12 (0.49–34.54)
<b>Living in a region of AB/NS that has recently been impacted by the wildfires</b>			
No	97 (62.6)		1 (Ref)
Yes	74 (74.7)		1.96 (1.05–3.65)
<b>Watching television images about the devastation caused by the recent wildfires in AB/NS</b>			
Maximum once/week	85 (72.6)		1 (Ref)
At least every other day	86 (62.8)		0.60 (0.32–1.10)

\* Multiple responses were reported.

The overall prevalence of the low QoL was 67.3% (95% CI: 61.2–73.1%). The prevalence of low QoL varied across the different categories of socio-demographic factors, clinical characteristics, and wildfire-related factors. The highest prevalence was reported among Nova Scotian subscribers (70.5%), those who were 40 years old or younger (71.2%), other gender (83.3%), Black/Hispanic and other ethnicity (85.7% each), having high-school or lower education (70.3%), not in a relationship (74.1%), and unemployed (73.6%). In terms of clinical factors, a high prevalence of low quality of life was reported among people who have received a diagnosis of depression (74%) or anxiety (74.3%) compared to those who did not. Similar results were reported for those who have received antidepressants and benzodiazepines (71.8% and 93.3%, respectively). Regarding wildfire-related factors, the highest prevalence of low QoL was reported among the participants who reported living in a region of AB/NS that has recently been impacted by the wildfires (74.7%) and those who have been less frequently watching television images about the devastation caused by the recent wildfires in AB/NS (72.6%).

The multivariate logistic regression analysis model predicting the low QoL including the various variables was statistically significant;  $X^2$  (df = 19; n = 254) = 31.69,  $p$  = 0.03, accounting for 11.7% (Cox and Snell R<sup>2</sup>) to 16.3% (Nagelkerke R<sup>2</sup>) of the variance, and correctly classified 69.7% of the cases. The model showed that living in a region of AB/NS that has recently been impacted by the wildfires was the only significantly related factor to the low QoL. People who reported living in a region of AB/NS that has recently been impacted by the wildfires were about two times more likely to show lower QoL, compared to those who were not living in these regions (adjusted OR: 1.96; 95% CI: 1.05–3.65).

#### 4. Discussion

The present study explored the prevalence and the correlates of individual well-being and QoL and personal, psychosocial, and fire-related factors among those who were living in Alberta and Nova Scotia Canadian provinces at the time of the recent wildfire. Study participants were the cohort recruited from Text4Hope-AB and Text4Hope-NS subscribers, the services that have supported mental health in the two communities during the wildfire season. The study indicated a high prevalence of low QoL and well-being among the participants during the wildfire season, where more than one in two (67%) of the study participants have experienced poor QoL. The study also highlighted the evidence of the association between the state of living in a region impacted by wildfire and the individual psychological well-being and low QoL. It was found that those who were living in the areas impacted by wildfire were almost two times more likely to experience a worse well-being and QoL compared to those who did not live in these regions.

While personality, health inequities, and health adversities can explain a significant portion of the variability in subjective well-being, life events can also influence long-term levels [17,34,35]. Aligned with our findings, other studies confirmed the evident relationship between living in impacted areas during the disaster and the progression of mental illness. A comparative control study compared mental health symptoms in two different communities, Fort McMurray, the community which was impacted by wildfire in 2016, and Red Deer, a control community which did not suffer a similar trauma [36]. The results demonstrated that mental health symptoms were significantly higher in the Fort McMurray population in terms of depression, suicidal thoughts, self-esteem, and QoL [36]. Another study examined the long-term impact of wildfire that occurred in a rural Greek community in 2007 [22]. The authors examined the QoL three years after the disaster comparing those who were affected by a wildfire to another matching individuals who were not affected by the wildfire [22]. The results found that the individuals who were afflicted by wildfires had a lower QoL on three main domains (physical, psychological health, and environment) compared to controls [22]. Comparable findings are usually obtained during similar crises. In a robust adjusted analysis run on 952 individuals, the study reported that the participants with high levels of exposure to the earthquakes had higher rates of mental disorder than that of those cohort members who were not exposed [10].



The smoke resulting from the wildfire has been implicated in health adversities reported after exposure. Two reviews examining the wildfire impacts on mental health suggested that exposure to wildfire smoke may have physical and mental health impacts post-exposure [4,14]. Impacts to mental well-being include a loss of a sense of place, and eco-anxiety and eco-grief which refer to anxiety and grief related to a changing climate [2]. The literature also indicated the heightened risk for mental health after the exposure to chronic and persistent episodes of smoke events [14,37]. For example, an increased mental health hospitalizations was reported during a 1987 California smoke event and similarly an increase in mental illness-related physician visits were reported during the 2003 wildfire season in British Columbia [38,39]. According to the recent review, qualitative studies could disclose a wider range of impacts and potential pathways connecting wildfire smoke with mental health and well-being [14]. This included interacting levels of individual, social, living and working conditions, and ecological factors [14,24]. The literature also suggested the relationship between ill health and well-being following exposure to wildfire smoke among vulnerable communities such as rural and Indigenous populations; this may be explained by the proximity of these communities to wildfires, reduced access to services, and higher levels of comorbidities [14].

A number of factors were suggested in the literature that aimed to curb the development and progression of mental health impacts after natural disasters. For example, enhancing mental health literacy, improving access to mental health care resources that are culturally relevant, integrating mental health parameters into climate change and health assessments, supporting psychosocial adaptation to a changing climate, community preparedness, and government and non-governmental assistance were amongst the most impactful support lines that can be proposed during disasters [2,17,40,41].

The present study is a part of a provincial-level project, Text4Hope. The project has been aiming to provide mental health support during crisis times using a daily supportive text message. Text4Hope messages were designed by mental health therapists, psychologists, psychiatrists, and mental health patients, and aligned with the framework of cognitive behavioural therapy. Evidenced-based research provides robust evidence of the effectiveness of supportive text messaging programs in mitigating psychological problems in diverse populations [42,43]. Text4Support has also demonstrated clinical effectiveness in reducing the risk of harm to self and other harm symptoms after six months of intervention in an RCT [44]. During the COVID-19 pandemic, the Text4Hope program reduced stress, anxiety, and depression symptoms, along with suicidal ideation among the general public in Alberta, Canada [45,46]. The Text4Hope-Addiction program also significantly improved standardized measures for craving, anxiety, and depression in subscribers [47]. Several text-based population-level messaging programs have reported high user satisfaction rates of well over 80% and 75% of respondents have reported they felt connected to support systems [43,48,49]. Over 75% have also endorsed an improvement in their ability to manage anxiety, depression, and general life issues, suggesting an improvement in their resilience and mental health literacy [49]. Text services have proved to be economical, scalable, and accepted by the general population as well as patients with mental illness. Prior evidence supports the development and the incorporation of such services into the conventional mental health services particularly during crisis times. Despite the devastation and adverse effects on mental health, emergencies have shown to be opportunities to build sustainable mental health systems for all those who are in need [25].

A number of limitations are suggested in this study. While response rate reported in this study was comparable to other similar studies [45], the low response rate represents a limitation of the generalizability of the current results to the whole communities in the two provinces, affecting the external validity of the study. Furthermore, only 298 respondents were obtained, which is less than 80% of the required sample size. This may jeopardize statistical power for drawing meaningful conclusions. Potential strategies to enhance response rates in future studies could involve more personalized recruitment approaches, improved survey design, or the use of incentives that can improve engagement and hence

the response rates. Additionally, while self-report measures are common in psychological research, the potential for bias such as recall bias or inaccuracies in participants' responses could affect the precision of the results which may need to be backed up with clinical psychological assessment. Participants of the study represent a subgroup of the cohort who subscribed to receive Text4Hope service; thus, there is a heightened possibility of selection bias that this cohort may have experienced an increasing toll of psychological stress due to the wildfires in the two provinces, which could have resulted in the skewness of the data. Finally, the study was a cross-sectional design lacking the temporal relationship for long-term follow-up data. In addition, there could be other potential confounders that were not controlled for that collectively may restrict the ability to draw conclusions about the lasting effects of wildfire exposure on mental health.

## 5. Conclusions

This study explored the significant relationship and negative impact of living in a region impacted by wildfire and the psychological well-being and QoL. The design of the present study, however, may not establish a causation relationship. Future longitudinal studies that use control population are still needed to establish this relationship. The Canadian estimates of total injuries among the civilians and firefighters between 2015 and 2021 were 7863 with a total number of deaths of 1162 in the same time period [50]. The lower QoL and negative consequences of the increasing wildfires necessitate enhanced planning of the governments, policymakers, and health authorities to address such impacts. The timely support of those who are impacted by wildfire is necessary and could be applied through the following recommendations. Firstly, it is empirical to address the living conditions of wildfire survivors aiming to support and improve their perceived QoL. Secondly, it is essential to run enhanced programs that can screen for symptoms of mental illness or jeopardized well-being among those who were directly impacted by wildfires. This can help in early identifying and addressing such conditions before fulminating into overt health conditions. Finally, supporting mental health could be achieved via innovative treatments using online mental health support which can sustain the connection between the people and the healthcare systems and close the treatment health gap that emerges during crisis times. The goal is to overcome the adverse psychological consequences of these events using economic, scalable, and culturally accepted means of support.

**Author Contributions:** Conceptualization: V.I.O.A.; data curation: R.S., B.A., G.O.-D., R.d.L.D. and V.I.O.A.; formal analysis, R.S. and V.I.O.A.; funding acquisition, investigation and project administration: V.I.O.A.; methodology: R.S. and V.I.O.A.; supervision: V.I.O.A.; writing—original draft: R.S.; writing—review and editing: R.S., B.A., G.O.-D., R.d.L.D. and V.I.O.A. All authors have read and agreed to the published version of the manuscript.

**Funding:** This study was supported by grants from the Alberta Mental Health Foundation, the Global Psychological eHealth Foundation, and the QEII Foundation. The funder had no role in the design and conduct of the study, collection, management, analysis, interpretation of the data; preparation, review, and approval of the manuscript; or the decision to submit the results for publication.

**Institutional Review Board Statement:** The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Health Research Ethics Board of the University of Alberta (Pro00086163) and the Research Ethics Board at Nova Scotia Health (REB file #1028254).

**Informed Consent Statement:** Informed consent was implied if subscribers completed the online survey and submitted responses, as approved by the University of Alberta and Nova Scotia Health Research Ethics Board.

**Data Availability Statement:** The data that support the findings of this study are available from the corresponding author, Vincent Agyapong, upon reasonable request.

**Acknowledgments:** Support for the project was received from Alberta Health Services and Nova Scotia Health Authority.

**Conflicts of Interest:** The authors declare no conflicts of interest.

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