Cogent Social Sciences

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/oass20

Occurrence of fatalities in mountaineering: The case of Mt. Kenya

Nkatha Muthomi, Lucy-Joy Wachira & Shikuku Willy Ooko

To cite this article: Nkatha Muthomi, Lucy-Joy Wachira & Shikuku Willy Ooko (2023) Occurrence of fatalities in mountaineering: The case of Mt. Kenya, Cogent Social Sciences, 9:1, 2220534, DOI: 10.1080/23311886.2023.2220534

To link to this article: https://doi.org/10.1080/23311886.2023.2220534

Published online: 15 Jun 2023.

Muthomi et al., *Cogent Social Sciences* (2023), 9: 2220534
https://doi.org/10.1080/23311886.2023.2220534

cogent social sciences

SPORT | RESEARCH ARTICLE

Occurrence of fatalities in mountaineering: The case of Mt. Kenya

Nkatha Muthomi[1]*, Lucy-Joy Wachira[2] and Shikuku Willy Ooko[3]

Received: 13 September 2020
Accepted: 30 May 2023

*Corresponding author: Nkatha Muthomi, Department of Recreation and Sports Management; School of Hospitality, Tourism and Leisure Studies; Kenyatta University, P.O. Box 43844, 00100, Nairobi, Kenya
E-mail: muthomi.hellen@ku.ac.ke

Reviewing editor:
Mike Rayner, University of Portsmouth, Portsmouth, United Kingdom

Additional information is available at the end of the article

Abstract: A fatality is the most detrimental incident that can occur in mountaineering. It is important to study previous cases and learn from circumstances surrounding fatal incidences in programmes sharing some common elements. This paper is set to investigate the occurrences of fatal incidences in mountaineering, the case of Mt. Kenya. It captures the qualitative findings on fatality occurrences. Respondents consisted of porters, guides, instructors, facilitators and key stakeholders involved in outdoor adventure activities on Mt. Kenya. The study used snowballing approach to identify the participants. Focus group discussions involving 52 respondents were conducted, in-depth interviews took place with four key informants and additional records were sought through desk reviews. The study found out that occurrence of fatalities was not well documented in a structured database. Deep grieving and regrets were noted. Predisposing factors leading to fatalities during mountaineering included; The "I MUST summit mentality", lack of proper acclimatization, lack of visitor education, and lack of early diagnosis of

Nkatha Muthomi

ABOUT THE AUTHORS

Nkatha Muthomi is a Lecturer in the School of Hospitality, Tourism and Leisure Studies, Kenyatta University, Kenya. Her research interests include outdoor pursuits, specifically in outdoor activities fitness, mountaineering, hiking, and safety in outdoor adventure.
Lucy-Joy Wachira is a lecturer at Kenyatta University, Department of Physical Education, Exercise and Sport Science, Kenyatta University, Kenya. Her research interests include prehospital emergency care, injury prevention and management in exercise and outdoor adventure recreation activities.
Shikuku Willy Ooko works as an outdoor adventure education leader with diverse clients. He is a Wilderness Emergency Medical Technician and registered with the US National Registry of EMT. He previously worked with the National Outdoor Leadership School both as an instructor and an administrator. Currently, his time is devoted to the Janam Peace Building Foundation with special interest in outdoor adventure and mountaineering safety.

PUBLIC INTEREST STATEMENT

Risk management in mountaineering is characterized by improvisation, limited resources, and delayed evacuation to definitive care, which are all hazards that can lead to health deterioration and fatalities. Studies of fatal incidents are a necessary component of fatality prevention. This paper investigated the occurrences of fatal incidences on Mt. Kenya. Data on fatalities is always sensitive; therefore, it is not possible to get optimal numbers of the cases. However, the situation and circumstances of each individual case of a fatality can be used as lessons in the analysis of common elements on mountain climbing, and hence prevention of future mountaineering fatalities. Of public interest, while handling climbers, is that the leaders should be aware of the predisposing factors leading to fatalities during mountaineering. These include: The 'I MUST summit mentality'; lack of early diagnosis of altitude sicknesses; lack of visitor education and lack of proper acclimatization.

altitude sicknesses. With the inherent risks and dangers that lead to fatalities in the mountaineering industry, the study recommends the need for providers to be keen on risk assessment and management as well as develop response strategies for various eventualities.

Subjects: Sport and Leisure Studies; Sport and Leisure Management; Tourism

Keywords: Subjects; mountaineering; outdoor leadership; recreation and tourism; outdoor adventure; sports and recreation; outdoor adventure safety; incident; occurrence; fatality; mountaineering; high altitude

1. Introduction

Participation in mountaineering has continually been increasing over the years and is becoming a popular recreational activity, with associated fatalities also being noted (Christen & Lacsina, 1999; Iserson, 2013; Schön et al., 2020). Mountaineers have to cope with the physical hazards of elevated altitudes and resulting concerns which include hypothermia, long days of hiking, and altitude sicknesses; Acute Mountain Sickness (AMS), High Altitude Pulmonary Edema (HAPE), and High Altitude Cerebral Edema (HACE) (B. Huey & Eguskitza, 2001).

Though not a daily occurrence, fatalities happen in mountaineering as recorded in various studies. For example; on Denali, there has been cases of occurrences with 96 deaths for 103 years from the year 1903 to the year 2006 (McIntosh et al., 2008) and 99 deaths from the year 1978 to the year 2014 (Wickens et al., 2015); at Aconcagua, there were 33 fatalities from the year 2001 to the year 2012 (Westensee et al., 2013); on Mount Rainer, from the year 1977 to the year 1997, there were 50 fatalities (Christen & Lacsina, 1999); on Mt. Kilimanjaro, from the year 1996 and the year 2003, there were 25 reported fatalities (Lawrence & Reid, 2016); and at Mt. Everest, there have been 213 fatalities from the year 1951 to the year 2010 (Bastien et al., 2014). Studies also indicate that this phenomena is a continuous concern (Niedermeier et al. (2020). Literature on eight thousander peaks shows that fatalities are common in mountaineering with some of the following death rates: Mt. Everest (6.0%), Mt. Makalu (8.9%), Mt. Kangchenjunga (14.5%), Mt. K2 (29.5%), Mt. Dhaulagiri (15.7%), Mt. Annapurna (38%) (Chang, 2018).

In outdoor adventure pursuits, there is a deliberate inclusion of activities that may contain threats to an individual's health or life (Ewart, 1989). As Hann (2009) observed, there is a need for concerted efforts to ensure that participants experience the risks and thrills of adventure activities without exposure to unnecessary danger. When a serious injury or death occurs in outdoor adventure activities, it becomes a tragedy for all involved; the practitioners, the state, and the participants (Hann, 2009). According to Brookes (2002), the study of fatal incidents is one of the necessary components of fatality prevention. It is noted that fatal incidents can also occur in programmes that seemed expertly run right up to the time tragedy arrived. There is, therefore, a need to build knowledge of fatality prevention by analyzing patterns or common elements in the incidents. This will ensure that lessons are learnt and some incidences are never repeated.

Fatalities are the less frequent risks but the most detrimental incident that can occur in outdoor activities (Hogan, 2002). Outdoor leaders need to be careful in planning so that they do not only concentrate on the multitude of the less serious possibilities while not considering the rare but serious incidents which cause fatalities (Brookes, 2002). Therefore, death or serious injury to persons involved should be right at the top of the things outdoor adventure practitioners want to avoid. Brookes (2007) asserts that fatality prevention requires a specific effort to enquire and learn from fatalities in programmes sharing some common elements. The author further notes that a programme that has been running for years without incident is not proof that fatality prevention strategies are adequate. Thus, practitioners in the outdoor adventure industry ought to be intentional on how to prevent or how to manage situations that can lead to fatalities.

According to Brookes (2016), as much as fatalities are outlier events in the outdoor adventure practice, when they happen, this brings into question the practices and purposes of the industry. Therefore, an understanding of past fatal incidents and knowledge of the situations and environments in which outdoor adventure is practised should assist in the prevention of future incidents (Brookes, 2016). A fatality that has occurred in the outdoor adventure practice can be elaborated on and the magnitude best spelt out from the feelings and the experiences of those affected. Therefore, the purpose of this study was to provide a phenomenological description of the fatality occurrences in mountaineering, the case of Mt. Kenya, by seeking to establish the circumstances and context of reported fatality cases.

2. Materials and methods

The process, experience and event of a fatality are best elaborated as qualitative phenomena with sentimental attachments. Therefore, the study used hermeneutic phenomenology research design to collect accounts from different respondents on their experience with occurrence of fatalities on Mt. Kenya. The design was helpful in allowing the respondents to articulate the issue of fatality as it affected their lives, in their own words, in a way that made sense to them. This paper also captures the qualitative data on fatality occurrences according to the opinions and practice of outdoor adventure practitioners in various capacities as porters, guides, instructors and facilitators on Mt. Kenya. It also captures the experiences and opinions of other stakeholders involving the programme participants and relatives of fatality victims.

The study used snowballing approach to identify the participants. This sampling procedure was suitable to select respondents from all groups and designations of respondents since there were no records indicating the population size. Table 1 shows the demographic information of the interviewees, with the focus group discussions having 52 respondents, in addition to the 4 key informants who included a parent to a deceased participant, a medical doctor in a hospital close to the Mountain, a long serving outdoor facilitator and a rescue officer.

Ethical approval for conducting the study was obtained from Kenyatta University Ethics Review Committee (KUERC), Application No: PKU/590/I676. A research permit was obtained from the National Commission for Science, Technology and Innovation (NACOSTI), Ref. No. NACOSTI/P/17/78169/19735. The data collection took place between November 2017 and October 2018. The respondents were briefed about the objective of the study, and their informed consent was taken for participation.

Focus group discussion guide on the practitioners' encounters with fatality occurrence was used to get their experiences and opinions on fatality occurrences on Mt. Kenya. They focused on individual experience with a fatality, what respondents considered to be the cause of the fatality, possible solutions, and how they handled the fatality incident(s) (Table 2). In order to gain insight to the personal experiences with fatality occurrences, the key informant interviews were semi-structured, which allowed the respondents to give their personal perspective of the events of the fatality occurrences.

The researchers pre-arranged meetings for various focus groups which included porters and guides, outdoor adventure facilitators/teachers/managers and rescue officers. Interview guides were used to guide with the interviews for the key informants. The identified key informants were contacted and meetings scheduled at suitable locations convenient to the respondents for in-depth interviews. Permission to audio-record was sought before the sessions began, and conversations were recorded with the full knowledge from the respondents. All recorded data was later transcribed for data analysis. A desk review was also conducted to review records and documents from key institutions in Kenya.

The authors booked appointments and travelled to various venues which were convenient to the respondents. Some were contacted in Nanyuki, near Mt. Kenya, and others in Nairobi city, Kenya.

cogent social sciences

Table 1. Demographic information of interviewees

1) Focus group discussions	Category	N
Age	Below 30	15
	30–39	19
	40–49	14
	50–59	4
Gender	Male	48
	Female	4
Years of Working Experience	Below 2 yrs	6
	2–6 yrs	14
	7–11 yrs	11
	12–16 yrs	11
	Above 16	10
Designation/Responsibility	Teacher	5
	Outdoor Adventure Facilitator	6
	Team-Building Instructor	2
	Guide	11
	Director/Trustee	1
	Institution Management	2
	Parks & Forests Authorities	15
	HOD/Program Supervisor	3
	Any other (Driver)	1
	Managers	6
	Total	**52**
2) Key Informants	Parent to a deceased participant	1
	Medical doctor in a hospital close to the Mountain	1
	Long serving outdoor facilitator	1
	Rescue officer.	1
	Total	**4**

The investigating team included the researchers, who were the moderators and they guided the conversations. Meetings were scheduled on various dates that had consensus from the group members, and lasted between 1 hour and 3 hours. After scheduled appointments, four focus group discussions were held with the following respondents: 15 parks and forests authorities; 11 guides; 14 team-building instructors, outdoor adventure facilitators, teachers and driver; 12 program supervisors, institute management, director, and managers. Three interview schedules were done for the following key informants: a parent to deceased participant; a rescue officer; and a medical doctor in a hospital close to the mountain together with a long serving outdoor facilitator.

The quality and trustworthiness of the findings was established through credibility, generalizability, dependability and confirmability. To ensure truthfulness of the findings, triangulation was used. The data had coherent accounts across all the cases. Triangulation also took the form of sources (various stakeholders in the outdoor adventure industry) and sites. It also involved various methods (in-depth interviews, focus group discussions and key informant interviews), which also ensured confirmability. There were also prolonged engagements that required that a researcher spends a good deal of time with the participants within the research context. The study ensured generalizability by purposively selecting the sample of those who were directly affected in fatal

Table 2. Focus group discussion guide

S/n.	Question item
1.	Have you handled any issues or incidents of fatalities during your their climbs?
2.	In case you have not handled any case, have you heard of such cases?
3.	What would you consider to be the causes of the fatalities on Mt. Kenya?
4.	How did you handle the fatality incident?
5.	What can be done to prevent such future occurrences?

incidents representing a range of stakeholders in the outdoor adventure industry. To assure dependability, the study records and source documents (research proposal, ethical review documentations, audio recordings, field notes, and transcripts) are available and well kept.

For data analysis, focus group discussions and interviews of key informants were recorded. The audio record files were compiled and deposited into the researchers' laptops. The data entry staff transcribed the qualitative data by listening to the conversations and handwriting the recordings word by word (text verbatim). The typed raw qualitative data was thereafter transferred to Qualitative Data Analysis (QDA) software and organized according to various themes. The data was then analysed and results transferred to a word document. A descriptive analysis was conducted on the data collected in the desk review of fatality occurrences in the outdoor adventure practice in Kenya.

3. Results

3.1. Causes of fatalities on Mt. Kenya

Many of the facilitators who participated in the focus group discussions indicated that they have not handled any issues or incidents of fatalities during their climbs. But they have heard of such cases. For fatalities near the mountain peak, respondents explained various reasons on why fatalities have occurred: The facilitators focus group discussion respondents explained that a major danger that results to fatalities is the "I must Summit mentality", which poses a psychological effect on the person. "Some opt to mask or hide *the* symptoms so that they will not be asked to turn back. Clients feel they must summit and do not want to be asked to turn back when they are only 100 m or 50 m from the peak. Many clients are defiant of instructions and orders."FGD. A case example was given in the FGD of a client at Shiptons in November, 2017 who was waiting to summit at 2am. He was having serious asthmatic attack with complete signs of acute altitude sickness and was using his inhalers. When the guide was asked why he did not let him abort and start descending, he said the client had completely refused to descend yet he was in bad shape. They later asked him to write on a paper that he knew the danger he was in and that he might die due to his decision to proceed with climbing to the summit. With further explanation he thereafter understood the seriousness of the matter and decided to start the descent on the same night.

It was also observed that "some guides may not take full charge or authority of the team and fail to give important instructions such as asking an ill climber to turn back. We need to thoroughly educate the climbers before starting the journey." On visitor education, according to FGD with outdoor facilitators; "Visitors should be allowed to ask questions and also agree that the *guides* word is final should one get ill and is asked to go back. The visitors should also sign a document *to indicate* their consent and understanding of what they are about to get involved in. *A* key informant (KI) noted, "In Denali Mountain National Park in Alaska USA, all visitors are required to watch a documentary movie on safety and risk management at the park gate and thereafter sign a waiver or release before being allowed to enter the park. Unfortunately, here, visitors come to the park gate, pay the entry fees and follow the guide up the mountain. In cases of eventualities, they don't know what to do or how to respond or behave and come to understand the problems later after they happen."

It was also noted that AMS signs and symptoms usually show when the body is at rest, "Most incidences of HAPE, HACE and fatalities have happened at night. While people will struggle and walk up to the camp, they may arrive and you realize they are already showing signs and symptoms of AMS. So having had a long day, and one gets to a rest point, like at Shiptons, if one had not acclimatized well before then, then it shows up at night. At night, AMS cases worsen quickly." KI

Facilitators' focus group discussion noted that Mt. Kenya has steep incline and widely spaced accommodation facilities which compel climbers to gain dangerous daily altitude exposing them to AMS. Most people who go up the mountain may show signs of AMS, but the lack of early diagnosis and confusing AMS with fatigue has resulted to fatalities. They noted the need to identify signs and symptoms of AMS early enough: "Facilitators should be able to identify the signs and symptoms of AMS early enough. Note that almost everybody who goes up the mountain shows mild signs and symptoms of altitude illness, even us as instructors and guides. But the issue is, can you identify, can you diagnose early, so that having diagnosed, what do you do? That is usually the biggest challenge. And the worst problem is; do you have a turnaround programme for someone who is sick? A porter, or a guide, a client, a ranger; anybody who is going up high altitude, as a leader, what is your programme for turn-around? But you can only turn around if you are able to identify the progressing signs and symptoms of altitude illness. The problem is that we say the person is tired or fatigued. We have to separate exhaustion from AMS. The labelling of people as either tired or fatigued can have them walk into a death trap-it has happened" FGD. Also, a key informant noted that "The longer a victim stays at high altitude with signs and symptoms, the greater the probability of fatality due to organs failure caused by hypoxia, even if they get to hospital alive. He indicated, "This is why for me, it is standard practice that if anyone shows signs and symptoms of the altitude illnesses, I evacuate them to lower elevation immediately to avoid an immediate fatality or a later fatality whereby a patient may succumb days or even weeks after being admitted or in some cases discharged from hospital"

Another cause of fatalities at Mt. Kenya has been people with various motives, some out of curiosity. A key informant noted that around the year 1983, there was a case of a group of high-school boys who, after closing school, decided to have a walk up the mountain. "The boys went up the mountain in their school uniform. It started raining heavily. Their bodies were found frozen. They all died of hypothermia." KI

Other reasons that were given by study respondents as to why fatalities have occurred included: clients who are defiant of instructions and orders; guides not taking full charge or authority of the team and failing to give important instructions; porters without proper clothes and equipment; curiosity; lack of proper management for someone who contracts HAPE or HACE; lack of specific training in wilderness first aid or first responder; lack of proper risk management and lack of awareness on the hidden safety challenges and dangers of outdoor adventure activities.

3.2. Fatality occurrence on Mt. Kenya

The study conducted desk review analysis of reported fatal incidences on Mt. Kenya. The Kenya Wildlife Service (KWS) documentations and other records provided this information. Findings, as shown in Table 3 indicate that quite a number of fatalities that happened at Mt. Kenya were due to either High Altitude Pulmonary Edema (HAPE) or High Altitude Cerebral Edema (HACE). It is also noted that out of the 17 reported fatality cases (Table 3), there were more male participants (15) compared to two (2) female participants. According to the Kenya Wildlife Service (2001, pg. 25) report, there were 25 fatalities at Mt. Kenya, between the years 1990 and 2000, reported as follows: 1990–6; 1991–6; 1992–4; 1993–0; 1994–2; 1995–1; 1996–0; 1997–4; 1998–1; 1999–1; 2000–0. On the same report, Kenya Wildlife Service (2001), it is noted that between the years 1990–2000, the number of fatalities had decreased from an average of 2.7 to 1.5. Lack of proper acclimatization at the mountain was indicated to be the main risk factor in mountaineering-related illnesses and fatalities. Elsewhere, earlier on, Smith (1985) had noted that by the year 1985, at least 30 people had died while climbing Mt. Kenya. It is noted that except for the Kenya Wildlife Service (2001), included in Table 3, the study found limited data on recorded reports on

Table 3. Reported fatality cases

Date	Gender Age Nationality	Events leading to fatality	Evacuation	Information source
February 1965	Male (3) British	They were killed by a fall of rock at over 16,000 feet on the mountain. Their fourth companion descended alone to look for help.	Bodies were recovered under extremely arduous conditions, buried at 15,000 feet at the foot of the Darwin Glacier. On February 11, a short burial service was conducted at this altitude	www.1420h.org.uk/Forum/viewtopic.php?t=3545
1971	Male Pilot	An Austrian climber broke a leg and was stranded on the peaks for nine days. The climber survived. The fatality was the pilot; helicopter aiding in the rescue crashed into the mountain.		https://www.si.com/vault/1985/05/27/622474/a-day-in-the-life-of-mount-kenya
January 1997	Male 24 years Irish	Contracted HACE at Shiptons	Died during evacuation	Kenya Wildlife Service (2001)
February 1997	Male Kenyan	Contracted HAPE	Died while undergoing treatment at Nanyuki hospital	Kenya Wildlife Service (2001)/ Interview with KI
April, 1997	Male Kenyan	Porter—drowned in Ontulili river	Found dead after two days of search	Kenya Wildlife Service (2001)
August, 1997	Male 24 years Kenyan	Fell off while descending to Shiptons from Tereki and Sendeyo.	Died immediately from injuries	Kenya Wildlife Service (2001)
February 1998	Male 20 years Kenyan	Fell on Lewis glacier and slipped into curling pond. Died through drowning	Body retrieved after six days of search	Kenya Wildlife Service (2001)
1999	Male Kenyan	Instructor taking a group to Lenana peak with signs & symptoms of AMS	Died during evacuation by porters and guides near Liki North River. Body taken to Nanyuki Cottage hospital	Interview with Facilitator
August 1999	Female 34 years British	Died between Oblong Tarn and Hansberg Col. of AMS	Her climbing partner contacted and informed her family in Britain of her death. A British army hospital in Nanyuki sent a helicopter to bring her body down.	Kenya Wildlife Service (2001) https://www.theguardian.com/uk/1999/sep/01/linusgregoriadis

(*Continued*)

Table 3. (*Continued*)

Date	Gender Age Nationality	Events leading to fatality	Evacuation	Information source
April 2012	Male 29 years Kenyan	Complained of headache, chest pains and difficulty in breathing	Died while being evacuated down the Naromoru route just a few moments before reaching a waiting ambulance. Body was taken to Outspan mortuary in Nyeri Town	KI https://www.capitalfm.co.ke/news/2012/04/climber-dies-in-mount-kenya-expedition/
September 2013	Male Kenyan	Reported dead at Shiptons camp.	The body was taken to Nanyuki general hospital mortuary and the incident booked at Timau police station.	KWS—Mt. Kenya Records/Interview with KI
December 2013	Male	Passed away on his way to Shiptons camp, the cause of death was (HACE).	The body was recovered by the KWS rescue team. The incidence was booked at Timau police station	KWS—Mt. Kenya Records/Interview with KI
December 2016	Male 14 years Kenyan	Passed away on his way to hospital—airlifted from Shiptons camp after, the cause of death was (HAPE and HACE).	Airlifted from Shiptons camp to Cottage hospital in Nanyuki	The Warren Foundation—Kenya/Interview with KII
2017	Female University student on Presidential Award Expedition	Passed away near Shiptons Camp with signs and symptoms of AMS		Interview with Facilitators
September, 2017	Male 33 years Chinese	Slipped and fell down a 60 metre cliff to his death, near Shiptons Notch	Body retrieved later by KWS	Interview with Facilitator

fatality occurrences. Therefore, the results from the review of records are not necessarily a true reflection of the prevalence of fatalities since many of the incidences though known were not recorded. This may include victims who were evacuated and die on their way to hospital or in hospital later on and hence their details are not captured in the KWS records at the mountain.

3.3. Case of fatality of an outdoor adventure instructor

One of a long-serving facilitator who was a key informant gave an account of how in his early days, he encountered a fatality of his co-facilitator, his best friend. This changed his life and has hence been very careful in the practice of outdoor adventure at the mountain: "I was always with my friend. We used to dream together, how to climb mountains. One day we organized for a trip to the mountain with a group of friends and we were the facilitators. We used the Sirimoni route. We drove to Old Moses. The next day, we spent at Liki North. Then we proceeded to Shiptons, only one more night at Shiptons then to the Lenana. He was charismatic the whole evening. At 5.30 am, he woke up. When I saw him, I knew something was terribly wrong. He was looking exhausted. He had suffered the whole night in his tent and now he was in the last stages of HAPE. I had not yet seen such symptoms. As my friend was in his tent at night, he was reading a book, "Medicine for

Mountaineering" on mountain illness. He just came and told me "I have HAPE, can you read this?" Then, he said "I want to go down, you guys go up and I will wait for you" For the first time in our lives we had a bitter argument. I told him he can't go down alone, but he wanted to go alone.

I organized a few more people, and we went down. All this time, we did not imagine it can be something bad. We knew we had acclimatized enough and now we are doing the right thing to have him descend. This is also an instructor we had gone with to Lenana peak, many times before. He had also climbed Mount Kilimanjaro to Uhuru peak, so I wondered, how can he get HAPE? We started walking down very slowly. About 100 m from Shiptons, he collapsed. The mountain is a very strange place. Many things happen that I do not understand. This was a bad day. There was hostile weather. And it was happening during the day, snow, hail and rain. From 5.30 am to 6 pm we did not go far. I told the rest that I would go down to look for reinforcement. After getting another instructor and more rescue support, we came back to the mountain, reaching my friend at 3am. The night was also chilly and windy. Meanwhile, we carried my friend down. We went down and now there was hope near Liki North. We organized to make tea near the river. My friend asked to be shown where he was. By now, he was talking and making jokes. So while on the stretcher, he was made to sit down and noticed the Barrow. When he laid back at the stretcher, he got a heart attack. We did CPR, it was messy. The lungs were filled with water. Then, we did not know, but now we know what happened. He died there. We were many of us who had come for reinforcement. We went to report to the police. His body was taken to the mortuary. Up to date, I have repeated the story to so many people, until I almost got crazy. For the next few days up to around 20 years, I lived with it. The mountain killed my friend!"

Asked what he now knows better, the respondent indicated that, "When lying down, in the lungs, when suffering from HAPE, the water is collected in one place. When he was lifted to sit upright, and taken back down, there was a compromise on all the surface areas in the lungs. That is why it is very painful for one to stand from a sitting position when they have HAPE. The areas that were still intact were affected. So we should maintain the same position throughout. But the most ideal position to transport any patient under your care should be 'Position of Comfort'. For HAPE patients, this is usually the fowler or sitting position or semi fowler or half sitting position. With fluid on the lower lobes of the lungs, more surface area experience no logging hence more optimal breathing. When a patient is made to lie supine, more lung surface area is compromised by fluid logging or drowning. Again, I learnt from this case, that, the very fit people are in danger on the mountain, because of bad attitude. They rush and end up over exerting themselves, which is dangerous on the mountain. When they get to a camp, they should not just sleep, hiking around the camp helps. People who climb fast get tired and when they go to sleep, they get affected. Another concern is the possibility of stress predisposing climbers to lack of acclimatization. Stress could be a contributing factor to mountaineering fatalities." KI

3.4. Case of fatality of a close relative

One of the reported fatality cases was with a key informant, who was a guardian of a fatality victim. The following is an account of key highlights of the case:

> "We had medical attendants up the mountain with them. His death, I think explains many things, like there is so much that needs to be done in terms of preparation for going to the Mountains. He was not well as they went up from Old Moses camp. He was nauseated and had a headache. He kept vomiting. His pace, of course became slower. There was one paramedic in his group. What happened is that he explained that his chest was aching. He asked another boy, "so how are you feeling?" the other boy said he was fine, so he decided to push up so that he can't be the one who was lazy. On Thursday, at Shiptons, he came out of the cabin while partially dressed and without shoes, which means by now he was not himself. He was disoriented. His breathing was also not normal. He was told to dress up properly. When we asked other participants, "How was he?" They said, "Most of the time he was just lying as if he was unwell".

Eventually, on Friday morning, he woke his other colleagues. His breathing was rough and very loud. The pictures taken by the other boys of him, at this moment, shows that he was very weak by now, his face was swollen. They woke up, had breakfast, and when they were taking the group photo, he collapsed. When he collapsed, fluid started coming out of his nose and ears. They made a stretcher and the porters started carrying him down.

Nobody had briefed us what high altitude illnesses were – I had no clue. I thought he had just fainted and there is nothing wrong or he had just fallen. Eventually, he was picked by a helicopter, it took 15 minutes for them. He was transferred to the chopper. He was pronounced dead on arrival to hospital. This is a child who left home well, no history of sickness. He was healthy. It is so dear to our hearts, as a family, that we have outdoor safety; lack of it cost us our son. Just going out for the outdoors for the sake of going out is just unacceptable. There is no one who should go through what we went through. It was painful. We have been grieved and filled with pain, we would never have chosen this path. At the cost of our son, practitioners need to re-think about mountaineering safety. Such demise is not necessary on any mountain trip."

The key informant also noted that, "Outdoor adventure is good for our youth, since there is an inherent need for all of us to go outdoors. The risk in the outdoors cannot scare us away from adventure pursuits. Our challenge is the risk preparedness and management. This is actually what as a foundation, our interest is." Note that in this case, a foundation was formed, which has been on the forefront in creating awareness on the hidden safety challenges and dangers of outdoor adventure activities (The Warren Foundation, 2017).

4. Discussion

In Kenya, most of the fatality cases, especially in the outdoor adventure practice, were not documented, as was noted in the focus group discussions and the desk reviews that found limited data on organized records. There is need to compile a detailed database such as those in New Zealand, National Incident Database (NID) which is managed by the Mountain Safety Council (MSC) on behalf of the mountaineering sector. This is vital for collecting and sharing information between organizations about incidents or near-miss events that occur in mountaineering. The information should be documented so that the mountaineering stakeholders can refer to and learn from and take steps to manage their operations more safely and prevent similar incidents from happening (Mountain Safety Council, 2018).

The study found that the majority of the reported cases of mountaineering fatalities were as a result of either HAPE or HACE. This is in agreement with other literature, for example, in Australia, high altitude illnesses were categorized as serious, severe and fatal; with "(8) 14%, severe cases; (1) 2% serious cases and a whole (46) 84% fatalities" (Sedgman, 2004, p. 14). Brookes (2016) noted that fatal incidents in outdoor adventure practice tend to occur in specific circumstances. In this case, this study found altitude mountain sickness to be specific to most reported fatal incidents on Mt. Kenya. This has been a common occurrence in most mountaineering fatalities as also noted in other studies (Firth et al., 2008; Luks et al., 2017; R. B. Huey et al., 2020; Windsor et al., 2009).

The reported cases were more among male participants compared to female participants. Literature supports this, with higher numbers of incidents on males than females, since men outnumber women in mountaineering (B. Huey et al., 2007; Bastien et al., 2014). Findings by Niedermeier et al. (2020) also indicated that majority (96%) of fatalities during high altitude activities were males. Warren (2016) indicates that there is evidence that outdoor adventure is a male-dominated venture. Therefore, with more male participants, incidents would be high in males than females.

Another key concern noted by the study is over exerting for those who seem to be "fit". Brookes (2007) notes that in the outdoor adventure, teenage boys have been involved in fatal incidences because of their willingness, at this stage, when unmonitored, to try out new things that would otherwise be done by adults. It should be realized that studies (Fulco et al., 1998; Milledge et al., 1991; Richalet et al., 2012; Welch & Symmons, 2013) have shown no association between physical

fitness and susceptibility to altitude mountain sickness. In other words, regardless of a climbers fitness levels, anyone can be a victim of altitude sickness. However, more fit participants are likely to reach the summit than the less fit participants, and regular endurance training is encouraged so that the mountaineering experience can be less strenuous (Welch & Symmons, 2013).

Most of the study findings that were given as reasons for fatal incidents (I must Summit mentality; lack of proper acclimatization; guides not taking full charge or authority of the team; porters without proper clothes and equipment; lack of early diagnosis of altitude mountain sicknesses; lack of a turn-around programme; lack of specific training in wilderness first aid) all point to the much needed effort by all the involved stakeholders in the preparation and planning of the outdoor adventure programmes. This is supported by literature that cites various causes of injuries and fatalities in mountaineering, including under-prepared climbers (Sward & Bennett, 2014); Decision-making on descent (Luks et al., 2014); Turn-around program based on visitor education (Kordi et al., 2012); and welfare of porters and guides and medical facilities (Mixon, 2018; Bärtsch and Swenson (2013)).

There was also a lack of attention through available data and documentation on injuries and fatal incidences on Mt. Kenya. This involves the safety measures that should be employed within a broader risk management approach that represents best practice to health and safety (Peden et al., 2009). Since mountaineering carries inherent risks and dangers that lead to fatalities, then the providers also need to be keen on their risk assessment, prepare for anything that could go wrong and be ready to develop response strategies for various eventualities.

5. Conclusion

This study discussed the occurrences of fatalities on Mt. Kenya. The fatal incidences on Mt. Kenya, hopefully should lead the practitioners and stakeholders to think about legislation. This is as seen in other countries such as the UK, where fatality cases were an eye-opener and led to the government forming the Adventure Activities Licensing Authority (AALA) and later on, the 2007 BS8848 standard (Moonie, 2014). It is noteworthy that even a single fatality that is preventable is worth learning from. It is also noted that when fatalities occur, there is deep grieving and regrets. It is hoped that the Kenyan mountaineering stakeholders can learn from the cases reported in this study and do everything possible to minimize future fatality occurrences through ensuring more concerted effort in risk and safety planning and management. There was no structured database on most of the fatality cases. There is a need to come up with a database within the national level. This can be used as a guide in improvement of practice and prevention of future fatal incidents.

Acknowledgments
The authors acknowledge and thank Kenyatta University for funding this study through the Vice Chancellor's Research Grant. The funders had no role in the study design, data collection or reporting processes.

Funding
The work was supported by the Kenyatta University [KENYATTA UNIVERSITY 2016 VC RESEARCH GRANT].

Author details
Nkatha Muthomi[1]
E-mail: muthomi.hellen@ku.ac.ke
ORCID ID: http://orcid.org/0000-0001-9248-8485
Lucy-Joy Wachira[2]
Shikuku Willy Ooko[3]
[1] Department of Recreation and Sports Management; School of Hospitality, Tourism and Leisure Studies; Kenyatta University, Nairobi, Kenya.
[2] Department of Physical Education, Exercise and Sport Science; School of Public Health and Applied Human Sciences, Kenyatta University, Nairobi, Kenya.
[3] Janam Peace Building Foundation, Naro-Moru, Kenya.

Disclosure statement
No potential conflict of interest was reported by the author(s).

Citation information
Cite this article as: Occurrence of fatalities in mountaineering: The case of Mt. Kenya, Nkatha Muthomi, Lucy-Joy Wachira & Shikuku Willy Ooko, *Cogent Social Sciences* (2023), 9: 2220534.

References

Bärtsch, P., & Swenson, R. (2013). Acute high-altitude illnesses. *The New England Journal of Medicine*, *368* (24), 2294–2302. https://doi.org/10.1056/NEJMcp1214870

Bastien, S., Brice, L., Eric, B., Véronique, R., Frédérique, R., & Jean, C. (2014). Accidentology of mountain sports: Situation review & diagnosis. https://www.researchgate.net/publication/271134898_Accidentology_of_mountain_sports_Situation_review_diagnosis

Brookes, A. (2002). Outdoor education fatalities in Australia 1960–2002. Part 1: Summary of incidents and introduction to fatality analysis. *Journal of*

Outdoor & Environmental Education, *7*(1), 20–35. https://doi.org/10.1007/BF03400766

Brookes, A. (2007). Research update: Outdoor education fatalities in Australia. *Journal of Outdoor & Environmental Education*, *11*(1), 3–9. https://doi.org/10.1007/BF03400842

Brookes, A. (2016). Outdoor education, safety and risk in the light of serious accidents. In B. Humberstone, H. Prince, & K. A. Henderson (Eds.), *Routledge International Handbook of Outdoor Studies* (pp. 444–454). Routledge. Taylor and Francis.

Chang, R. (2018, August 22). Mountain death rate, the dark side of mountaineering. Retrieved June 5, 2021, from https://marvelmountain.com/blogs/blog/mountain-death-rate

Christen, E. D., & Lacsina, E. Q. (1999). Mountaineering fatalities on mount rainier, Washington, 1977-1997: Autopsy and investigative findings. *The American Journal of Forensic Medicine and Pathology*, *20*(2), 173–179. https://doi.org/10.1097/00000433-199906000-00014

Ewart, A. (1989). *Outdoor adventure pursuits: Foundations, models, and theories*. Publishing Horizons.

Firth, P. G., Zheng, H., Windsor, J. S., Sutherland, A., Imray, C. H., Moore, G. W., Semple, J. L., Roach, R. C., & Salisbury, R. A. (2008). Mortality on Mount Everest, 1921-2006: Descriptive study. *BMJ Journal*, *337* (dec11 1), a2654. https://doi.org/10.1136/bmj.a2654

Fulco, C. S., Rock, P. B., & Cymerman, A. (1998). Maximal and submaximal exercise performance at altitude. *Aviation, Space, and Environmental Medicine Journal*, *69*(8), 793–801. https://pubmed.ncbi.nlm.nih.gov/9715971/

Hann, R. (2009). *An accident waiting to happen: Criminal liability when death occurs during participation in adventure sports in New Zealand*. University of Otago. eThesis Repository. https://www.otago.ac.nz/law/research/journals/otago036307.pdf

Hogan, R. (2002). The crux of risk management in outdoor programs — minimising the possibility of death and disabling injury. *Journal of Outdoor & Environmental Education*, *6*(2), 71–76. https://doi.org/10.1007/BF03400758

Huey, R. B., Carroll, C., Salisbury, R., Wang, J., & Mousseau, T. A. (2020). Mountaineers on Mount Everest: Effects of age, sex, experience, and crowding on rates of success and death. *PLos One*, *15*(8), 8. https://doi.org/10.1371/journal.pone.0236919

Huey, B., & Eguskitza, X. (2001). Limits to human performance: Elevated risks on high mountains. *The Journal of Experimental Biology*, *204*(18), 3115–3119. https://doi.org/10.1242/jeb.204.18.3115

Huey, B., Salisbury, R., Wang, J.-L., & Mao, M. (2007). Effects of age and gender on success and death of mountaineers on Mount Everest. *Biology Letters*, *3*(5), 498–500. https://doi.org/10.1098/rsbl.2007.0317

Iserson, K. V. (2013). Medical planning for extended remote expeditions. *Wilderness & Environmental Medicine*, *24*(4), 366–377. https://doi.org/10.1016/j.wem.2013.05.005

Kenya Wildlife Service. (2001) . *Management plan for Mount Kenya ecosystem, 2002 – 2007*. KWS H/Qs Library.

Kordi, R., Rostami, M., Heidari, P., Ameli, S., Foroughifard, L., & Kordi, M. (2012). Fatalities among Iranian high-altitude outdoor enthusiasts: Causes and mechanisms. *Asian Journal of Sports Medicine*, *3* (4), 285–290. https://doi.org/10.5812/asjsm.34553

Lawrence, J. S., & Reid, S. A. (2016). Risk determinants of acute mountain sickness and summit success on a 6-day ascent of Mount Kilimanjaro (5895 m). *Wilderness & Environmental Medicine*, *27*, 78–84. https://doi.org/10.1016/j.wem.2015.11.011

Luks, A. M., McIntosh, S. E., Grissom, C. K., Auerbach, P. S., Rodway, G. W., Schoene, R. B., Zafren, K., & Hackett, P. H. (2014). Wilderness medical society practice guidelines for the prevention and treatment of acute altitude illness: 2014 update. *Wilderness & Environmental Medicine*, *25*(4), S4–S14. https://doi.org/10.1016/j.wem.2014.06.017

Luks, A. M., Swenson, E. R., & Bartsch, P. (2017). Acute high-altitude Sickness. *European Respiratory Review*, *26*(143), 160096. https://doi.org/10.1183/16000617.0096-2016

McIntosh, S., Campbell, A., Dow, J., & Grissom, C. (2008). Mountaineering fatalities on Denali. *High Altitude Medicine & Biology*, *9*(1), 89–95. https://doi.org/10.1089/ham.2008.1047

Milledge, J. S., Beeley, J. M., Broome, J., Luff, N., Pelling, M., & Smith, D. (1991). Acute mountain sickness susceptibility, fitness and hypoxic ventilatory response. *The European Respiratory Journal*, *4*(8), 1000–1003. https://doi.org/10.1183/09031936.93.04081000

Mixon, J. (2018, June, 7). *The Kilele Life: A Film about the Mountaineers of East Africa*. Retrieved June 04, 202, from https://www.youtube.com/watch?v=rqZmYEffUJg&feature=share

Moonie, J. (2014, July 12). Adventure Medic. British Standard 8848 (BS 8848): 2014. Retrieved July 3, 2020, from https://www.theadventuremedic.com/features/british-standard-8848-bs8848/

Mountain Safety Council. (2018). *New Zealand National Incident Database (NID)* retrieved from https://www.incidentreport.org.nz/

Niedermeier, M., Gatterer, H., Pocecco, E., Frühauf, A., Faulhaber, M., Menz, V., Burtscher, J., Posch, M., Ruedl, G., & Burtscher, M. (2020). Mortality in Different Mountain Sports Activities Primarily Practiced in the Winter Season—A Narrative Review. *International Journal of Environmental Research and Public Health*, *17*(1), 259. https://doi.org/10.3390/ijerph17010259

Peden, A. E., Franklin, R., & Larsen, P. (2009). Survey of Primary Schools across Australia: An Examination of Key Water Safety Issues. *International Journal of Aquatic Research & Education*, *3*(2), 197–208. https://doi.org/10.25035/ijare.03.02.10

Richalet, J. P., Larmignat, P., Poitrine, E., Letournel, M., & Canoui-Poitrine, F. (2012). Physiological Risk Factors for Severe High-Altitude Illness. *American Journal of Respiratory and Critical Care Medicine*, *185*(2), 192–198. https://doi.org/10.1164/rccm.201108-1396OC

Schön, C. A., Gordon, L., Hölzl, N., Milani, M., Peter Paal, P., & Zafren, K. (2020). Determination of Death in Mountain Rescue: Recommendations of the International Commission for Mountain Emergency Medicine (ICAR MedCom). *Wilderness & Environmental Medicine*, *31*(4), 506–520. https://doi.org/10.1016/j.wem.2020.06.013

Sedgman, I. (2004). Climbing *accidents in Australia (1955 – 2004)*. Retrieved from http://www.vicclimb.org.au/file/id/61

Smith, G. (1985, May 22). *A day in the life of Mount Kenya*. Retrieved July 10, 2020, from https://vault.si.com/vault/1985/05/27/a-day-in-the-life-of-mount-kenya

Sward, D. G., & Bennett, B. L. (2014). Wilderness medicine. *World Journal of Emergency Medicine*, *5*(1), 5–15. https://doi.org/10.5847/wjem.j.issn.1920-8642.2014.01.001

Warren, K. (2016). Gender in outdoor studies. In B. Humberstone, H. Prince, & K. A. Henderson (Eds.),

Routledge International Handbook of Outdoor Studies (pp. 360–368). Routledge, Taylor and Francis.

The Warren Foundation. (2017, June 30). *The Warren Foundation outdoor safety initiative launched.* Retrieved July 10, 2020, from https://trending.co.ke/warren-foundation-outdoor-safety-initiative-launched/

Welch, P., & Symmons, D. A. D. (2013). The Dangers of Trekking on Mount Kilimanjaro. *Journal of Travel Medicine*, *20*(2), 137. https://doi.org/10.1111/jtm.12006_1

Westensee, J., Rogé, I., Van Roo, J., Pesce, C., Batzli, S., Courtney, D., & Lazio, M. (2013). Mountaineering fatalities on Aconcagua: 2001-2012. *High Altitude Medicine & Biology*, *14*(3), 298–303. https://doi.org/10.1089/ham.2013.1018

Wickens, C. D., Keller, J. W., & Shaw, C. (2015). Human Factors in High-Altitude Mountaineering. *Journal of Human Performance in Extreme Environments*, *12*(1). https://doi.org/10.7771/2327-2937.1065

Windsor, J. S., Firth, P. G., Grocott, M. P., Rodway, G. W., & Montgomery, H. E. (2009). Mountain mortality: A review of deaths that occur during recreational activities in the mountains. *Postgraduate Medical Journal*, *85*(1004), 316–321. https://doi.org/10.1136/pgmj.2009.078824