

# Asian Resonance

## Cold Weather and Livelihood Resilience of Bakarwal Pastoral Nomads

### Abstract

The present paper study the livelihood resilience of Bakarwal pastoralists against cold weather and focuses on cold weather stress faced by the community, capacity to deal with this stressful condition, strategies employed by the pastoralists, organizational support received by the pastoralists and community sensitivity to cold weather on the basis of mortality and affected rate. Research explores the community resilience during a stressful period. This study is based on DFID's framework; a cross-sectional survey was conducted. Findings of research demonstrate that an average family employed a combination of 3.60, 1.46 and 2.66 kinds of capacities in the winter, transit and summer camps. To deal with SCW, MCW and NCW an average family employed a combination of 2.46, 1.67 and 1.42 kinds of strategies.

**Keywords:** Capacities, Cold Weather, Livelihood, Pastoralists, Resilience, Strategies

### Introduction

Morality is known to be associated with the seasonal pattern, the excess cold in winter caused high mortality (Analitis et al., 2008). Cold weather environment effect on livelihood refers to the stress brought by a cold wave, the low temperature in terms of hypothermia condition and mortality of human being and livestock. The cold weather stress on the Bakarwal habitat is common phenomena, untimely snowfall makes the stressor acuter, for instance in the month of August 1996, an incident of heavy rainfall and snowfall happened in Amar Nath shrine area which led to the deaths of 241 pilgrims, whereas 9000 pilgrims were stranded along the way (Dube and Rao 2005), the same mountain range is the summer habitat of Bakarwal pastoralists.

Bakarwal is the pastoral nomadic community of Jammu and Kashmir State of India (Casmier and Rao 1985; Dewan 1999), and in Swat and Kunhar valleys of Northern Pakistan (Ehlers and Kreutzmann 2000). Pastoral nomadic Bakarwals spend their winter in the Jammu Shiwaliks and summer in the alpine pastures up to Drass (Casmier and Rao 1985). The winter camps of the nomadic Bakarwals are situated between 400-1200 meters above mean sea level in Rajouri, Poonch, Udhampur, Reasi, Samba, Kathua and Jammu districts. The area experiences hot summer in May and June and cold winter season in January and February; it receives monsoon rainfall during July and August and western disturbances bring rainfall during the months of December and January. The summer pastures are located at 3500-4500 meters above mean sea level (Khatana 1984). The summer camps of Bakarwals are located in Matayan in Kargil, Pahalgam, Maru, Gurez, Wardwan valley, Kishtwar, and Drass. During autumn and spring season Bakarwal migrates and cross seven different altitude zones; Pir Panjal pass route and Banihal pass route are two main routes used for seasonal migration (Khatana 1985). Most of the pastoralists utilized Kargil and Drass summer pastures. Drass which is the second coldest place in the world, covered with snow, the snow melt during mid-June. Most of the pastoralists do not have an idea about the weather condition at Zozila pass and they enter here very sooner especially, poor pastoralist who start their seasonal migration early towards summer habitat, thus they have to pay the cost of this stressor in terms of hypothermia caused injuries and deaths. Resilience is defined as the capacity of a system to deal with change (Stockholm Resilience Centre 2015). Resilience Alliance (2018) defines it as "the ability of a system to absorb disturbance, to be changed and then to re-organise and still have the same identity". IPCC considers resilience as the ability of a system to withstand with climatic stresses without changing its structure and function (IPCC 2007). Adger (2000, 347) defined social resilience "as the ability of



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groups or communities to cope with external stress and disturbances as a result of social, political and environmental change”. The present study defines livelihood resilience as the capacities, strategies and organizational supports to deal with cold weather, and continue to develop while maintaining essential properties and functions.

**Review of Literature**

Adams, Cekan, and Sauerborn (1998) studied household resilience: coping strategies related to the problems of famine and food insecurity in West Africa, the study revealed that coping strategies to exogenous stressors are similar but for endogenous it varies from family to family. Mortimore and Adams (2001) studied the farmer’s adaptation to climate change and crises in Sahel. Boureima (2009) studied the importance of *Billital moroabe network*, a type of a regional network, among the pastoralist in West Africa. Bingeman, Gardner, and Sinclair (2000) studied the institutional responses to development pressures and resilience of social-ecological systems in the Kullu district of Himachal Pradesh. Sinclair and Ham (2000) studied the livelihood of rural people in the northwest Himalaya; the research focused on strategies used by household to secured livelihood. Shaoliang, Ismail, and Zhaoli (2012) studied the pastoralists’ perception on climate change and their adaptive strategies in the Hindu Kush-Karakoram Himalayas. Ning et al. (2014) studied pastoral communities in six countries within Hindu Kush region and advocated livelihood diversification as an adaptation approach to changes in pastoral region.

**Objectives of the Study**

This study tires to investigate the livelihood resilience of Bakarwal pastoralists to cold weather and focuses on (1) cold weather stress faced by the community (2) capacity possessed by the community (3) strategies employed by the pastoralists (4)

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organizational support received by the pastoralists and community sensitivity to cold weather on the basis of mortality and affected rate.

**Methodology**

A cross-sectional survey was conducted in the pastoralists habitat using purposive sampling, 239 families were selected, 160 families from Banihal pass route and 79 from Pir Panjal pass route. All the economic classes also included in the survey according to their proportion in the population. The help of veterinary experts from sheep husbandry department and the help of experienced pastoralists were taken to develop the Bakarwali translated version of scientific literature on the effect of cold weather on assets. For the identification and classification of various capacities, strategies and organizations possessed by the Bakarwal pastoral nomads a “CSO list” (capacity, strategies and organizations) was developed through personal interviews with pastoral nomad families, specialists on Bakarwal pastoral nomads and NGO’s that works for the nomadic population. Various government policies and schemes regarding nomadic population were also reviewed. For data collection, the audio recorder and video camera were used. After getting the information of all these capacities, strategies and organizations, a household survey was conducted.

**Cold weather Environment as a stressor on Livelihood**

Cold weather in the pastoralists’ habitat can classify into three categories (Table 1). The severe cold weather (SCW) is called *Mauch Sardi*, many pastoralists used *Chillai Kalan* for this condition which is a Kashmiri word, which means the harshest cold. The Moderate Cold weather (MCW) is called *Chillai-Kurd* and the Normal cold weather (NCW) is called *Chillai-Bacha*, *baby cold* or *small cold weather*.

**Table-1**  
**Cold Weather Events Faced by the Pastoralists**

| Stressor Magnitude          | Habitat | Duration of Events (in Days) | Exposed family (in % age) |
|-----------------------------|---------|------------------------------|---------------------------|
| Severe Cold weather (SCW)   | Winter  | 14 (SD ± 0)                  | 100 (239)                 |
|                             | Transit | 0.52 (SD ± 1.44)             | 15.06 (36)                |
|                             | Summer  | 0.13 (SD ± 0.55)             | 5.86 (14)                 |
| Moderate cold weather (MCW) | Winter  | 35 (SD ± 0)                  | 100 (239)                 |
|                             | Transit | 1.86 (SD ± 1.80)             | 61.09 (146)               |
|                             | Summer  | 0.38 (SD ± 1.12)             | 12.13 (29)                |
| Normal cold weather (NCW)   | Winter  | 26.07 (SD ± 4.36)            | 100 (239)                 |
|                             | Transit | 1.95 (SD ± 2.28)             | 51.46 (123)               |
|                             | Summer  | 0.66 (SD ± 1.41)             | 20.98 (48)                |

**Source:** Field Survey, 2017-18.

The overall duration of Severe Cold weather (SCW) faced by average pastoralist was 14.65 days; in winter camps community faced 14 days of SCW, followed by transit camps for 0.52 days and in the summer camps for 0.13 (SD ± 0.55) days. The duration of MCW faced by the community was 37.24 days, maximum no of MCW events were faced in the winter habitat (35 days) followed by transit habitat (1.86, SD ±1.80) and in summer habitat (0.38, SD ± 1.12). Normal cold weather (NCW) was not deadly among the pastoralists, the community faced 26.07

(SD ± 4.36) days of NCW in the winter habitat, followed by 1.95 (SD ± 2.28) days in the transit habitat and 0.66 (SD ± 1.41) days in the summer habitat.

**Table- 2**  
**Socio-Economic Characteristics of the Sample Population**

| Age Group (years)        | Population  |
|--------------------------|-------------|
| 0-14                     | 467 (29.48) |
| 14-59                    | 998 (63.01) |
| 60+                      | 119 (7.51)  |
| Total                    | 1584        |
| <b>Gender</b>            |             |
| Male                     | 762 (48.11) |
| Female                   | 822 (51.89) |
| <b>Sex Ratio</b>         |             |
| 0-14                     | 937.76      |
| 15-59                    | 1024.34     |
| 60 & above               | 1087.72     |
| Total Sex Ratio          | 1078.74     |
| <b>Size</b>              |             |
| Kafila size              | 2.45        |
| Family size              | 6.63        |
| <b>Educational Level</b> |             |
| Up to Primary education  | 139 (66.19) |
| Up to Middle education   | 47 (22.38)  |
| Up to High school        | 16 (7.62)   |
| Up to Higher Secondary   | 8 (3.81)    |

|                                       |              |
|---------------------------------------|--------------|
| Total Literate                        | 210          |
| <b>Residence</b>                      |              |
| Eastern Habitat using Pir panjal pass | 1056 (66.67) |
| Western Habitat using Banihal pass    | 528 (33.33)  |
| <b>Livestock Asset by species</b>     |              |
| Total livestock                       | 20198        |
| Average household stock               | 84.51        |
| Goat                                  | 8740         |
| Sheep                                 | 10878        |
| Horse                                 | 580          |
| <b>Source:</b> Field Survey, 2017-18. |              |

### Resilience Capacities

Capacity is considered as the combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals” (UNISDR 2018). To deal with cold weather effect an average family employed a combination of 3.60 (SD ± 1.28) kinds of capacities in the winter camps followed by a combination of 1.46 (SD ± 0.79) kinds of capacities in the transit camps and a combination of 2.66 (SD ± 1.09) kinds of capacities in the summer camps.

**Table-3**  
**Bakarwal Pastoral Nomads**  
**Availability and Utilization of Capacities to deal with Cold Weather Stress**

| Capacities                            | Winter Camps |             | Transit Camps |             | Summer Camps |             |
|---------------------------------------|--------------|-------------|---------------|-------------|--------------|-------------|
|                                       | Ownership    | Utilization | Ownership     | Utilization | Ownership    | Utilization |
| C1                                    | 35.6 (85)    | 46.9 (112)  | 0             | 0           | 15.1 (36)    | 28.5 (68)   |
| C2                                    | 25.5 (61)    | 36.0 (86)   | 0             | 5 (12)      | 7.9 (19)     | 27.6 (66)   |
| C3                                    | 7.9 (19)     | 7.9 (19)    | 0             | 0           | 0            | 0           |
| C4                                    | 97.5 (233)   | 97.5 (233)  | 97.5 (233)    | 40.46 (97)  | 97.5 (233)   | 97.5 (233)  |
| C5                                    | 39.7(95)     | 39.7(95)    | 39.7(95)      | 1.7(4)      | 39.7(95)     | 23.8 (57)   |
| C6                                    | 78.7 (188)   | 78.7 (188)  | 78.7 (188)    | 71.1 (170)  | 78.7 (188)   | 65.7 (157)  |
| C7                                    | 13.0 (31)    | 14.2 (34)   | 0             | 0           | 15.5 (37)    | 17.2 (41)   |
| C8                                    | 6.7 (16)     | 8.4 (20)    | 0             | 0           | 1.3 (3)      | 0.4 (1)     |
| C9                                    | 10.9 (26)    | 10.5 (25)   | 0             | 0           | 4.6 (11)     | 4.6 (10)    |
| C10                                   | 0            | 0           | 0             | 0           | 0            | 0           |
| C11                                   | 21.3(51)     | 20.5(49)    | 29.7 (71)     | 27.2 (65)   | 1.3(3)       | 1.3(3)      |
| <b>Source:</b> Field Survey, 2017-18. |              |             |               |             |              |             |

### Capacities code

C1- Traditional type Shelter for human being, C2- Traditional Shelter for livestock, C3- Electric heater, C4- Bedding material such as blanket, quilt etc., C5- Fire pot (*Kangri*), C6- Tent either plastic or clothes one, C7-Pucca shelter for human being, C8-Pucca shelter for livestock, C9- Semi Pucca shelter for human being, C10- Semi Pucca shelter for livestock, and C11-Uninhabited houses of others.

Based on pastoralists’ priority, traditional type shelter is considered as the best protective infrastructure for cold weather environment, nearly one-half (46.9 per cent) of the pastoralist families utilized traditional type shelter to protect from the winter cold weather. About 36 per cent pastoralists utilized the traditional type shelter to protect the livestock, especially weak and newborn livestock in the winter camps. To escape from the effect of seasonal weather change they keep a large number of warming garments and bedding material which includes woollen blankets, carpet, pillows and tent.

Most of the pastoralists utilized woollen blanket and bedding material to protect themselves from cold weather environment in the winter camps and summer camps. In the transit camps, about 40.46 per cent pastoralist families utilized this capacity against cold weather environment. Firepot (*Kangri*) which keeps Bakarwal pastoralists warm during cold weather, nearly 40 per cent pastoralists used this capacity to deal with cold weather. A modern electric gadget like room heater is extensively used during cold weather among the sedentary population, but among Bakarwals community only a few families (7.9 per cent) utilized room heater.

**Table- 4**  
**Combination of Capacities utilized by the Pastoralists to deal with Cold Weather**

| Number of Capacities' | Winter camps | Transit camps | Summer camps |
|-----------------------|--------------|---------------|--------------|
| 0                     | 0.8 (2)      | 8.8 (21)      | 0.8 (2)      |
| I                     | 2.9 (7)      | 46.4 (111)    | 12.6 (30)    |
| II                    | 14.6 (35)    | 35.1 (84)     | 32.6 (78)    |
| III                   | 30.1 (72)    | 9.6 (23)      | 33.5 (80)    |
| IV                    | 27.6 (66)    | 0             | 15.1 (36)    |
| V                     | 17.2 (41)    | 0             | 5.0 (12)     |
| VI                    | 5.4 (13)     | 0             | 0.4 (1)      |
| VII                   | 1.3 (3)      | 0             | 0            |

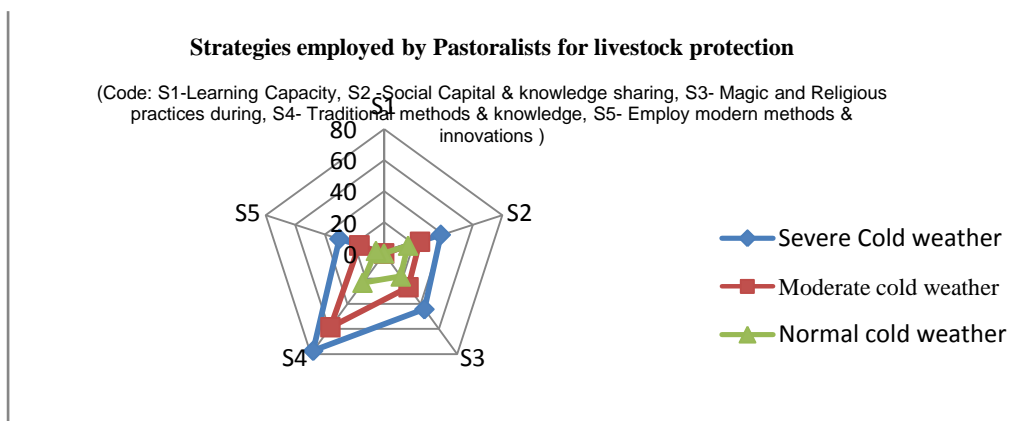
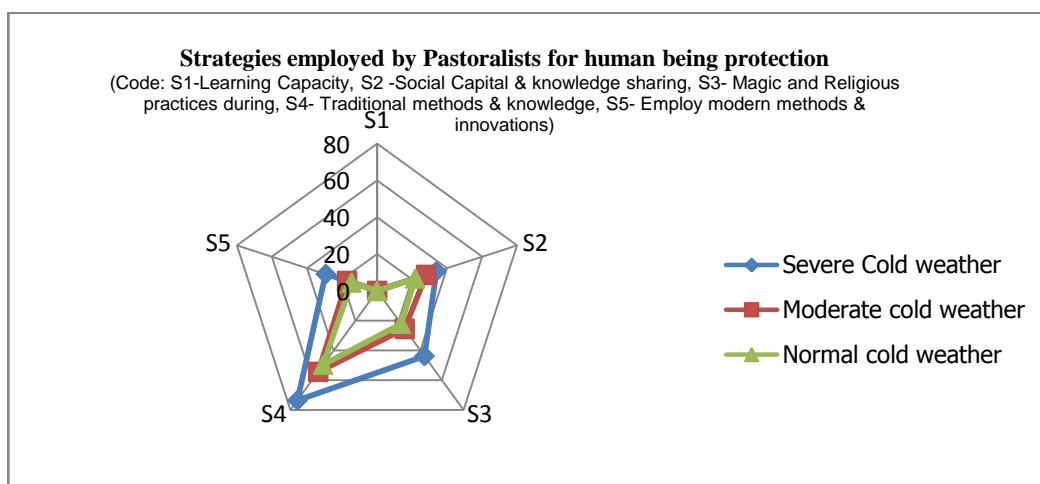
**Source:** Field Survey, 2017-18.

As shown in Table, about 0.8 per cent of pastoralist families utilized not even a single capacity against cold weather environment in the winter camps. In the transit camps, 8.8 per cent pastoralist families utilized no capacity. The majority (30.1 per cent) of the pastoralist families utilized a combination of three capacities in the winter camps, a combination of two capacities (46.4 per cent families) in the transit camps and a combination of three capacities (33.5 per cent families) in the summer camps were utilized by the pastoralists. Very few (approximately 5 per

cent) pastoralist families were there who utilized more than a combination of six capacities.

### Strategies

Strategies are the 'mechanisms that people choose as a way to live through difficult times' (International Federation of Red Cross and Red Crescent Societies-IFRC. 2015). It is mainly of five kinds that are learning capacity, social capital, religious practices, traditional methods and modern methods. The radar diagram shows the different kind of strategies employed by the pastoralist families.



Learning strategies against cold weather stress are; leave the summer camps on time, cross the Pir Panjal Range on time before heavy snowfall. About 65 per cent pastoralists employed learning capacity for a human being protection and 66 per cent pastoralist families employed this strategy for

livestock protection. It was seen that the learning against deadly stressful condition was higher. Many pastoralists do not use their previous experience and start early migration which caused a heavy loss due to the prevalence of hypothermia condition at the high altitude areas (approximately 44 per cent pastoralist

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families do not employ learning strategy against cold weather events).

Participation in the social network to increase assets, labour support form group member, use of group equipment, tools and infrastructure (Speranza., et al., 2014) is helpful in adaptation to a stressful condition and leads towards resiliency (Adger 2010). The observed usage of social capital among the pastoralists was the use of abandoned shelter of others, sharing of protected structure with other pastoralists. In the present study nearly 34 per cent pastoralists employed social capital for human being welfare and 38.5 per cent employed this strategy to save its livestock against SCW environment followed by 28 per cent and 24 per cent implementation of social capital by the pastoralist families against MCW and very few pastoralists employed it against NCW that was 21.8 per cent for human being and 16.3 per cent for livestock. Religious performance and practices of magic is common among Bakarwal community, approximately 44 per cent pastoralists in this survey employed this strategy against SCW and 44.4 per cent employed a similar strategy for their livestock as well.

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Use of traditional methods against SCW was very high about 73.6 per cent of families employed this strategy for a human being and 77.4 per cent families employed it for their livestock welfare. The MCW is also considered as beyond comfort zone, thus 54.4 per cent of families employed this strategy for a human being and 58.6 per cent families employed this strategy for livestock welfare. The NCW is not deadly for the pastoralists; about one-half of the families employed this strategy whereas 23.4 per cent families employed this strategy for their livestock welfare. Usage of modern method and new innovations against cold weather environment among Bakarwal is not fashionable. It was seen that 29.3 per cent of the sampled families employed modern methods and innovations to save their livestock against SCW and approximately 30 per cent of pastoralist families employed a similar strategy for their livestock welfare. The utilization of this strategy among the Bakarwal against MCW was 17.2 per cent of families for a human being and 16.7 per cent for livestock.

**Table- 5**  
**Combination of Strategies Employed by the Pastoralists to deal with Cold Weather**

| Combination of Strategies | Severe Cold weather |           | Moderate cold weather |           | Normal cold weather |           |
|---------------------------|---------------------|-----------|-----------------------|-----------|---------------------|-----------|
|                           | Human being         | Livestock | Human being           | Livestock | Human being         | Livestock |
| 0                         | 6.3 (15)            | 5.9 (14)  | 15.1 (36)             | 15.1 (36) | 16.3 (39)           | 38.1 (91) |
| I                         | 17.2 (41)           | 15.5 (37) | 27.6 (66)             | 27.6 (66) | 29.7 (71)           | 36.4 (87) |
| II                        | 25.9 (62)           | 25.9 (62) | 26.4 (63)             | 26.4 (63) | 28.0 (67)           | 15.9 (38) |
| III                       | 29.7 (71)           | 29.3 (70) | 24.7 (59)             | 24.7 (59) | 21.3 (51)           | 8.8 (21)  |
| IV                        | 17.2 (41)           | 15.9 (38) | 5.0 (12)              | 5.0 (12)  | 4.2 (10)            | 0.4 (1)   |
| V                         | 3.8 (9)             | 7.5 (18)  | 1.3 (3)               | 1.3 (3)   | 0.4 (1)             | 0.4 (1)   |

**Source:** Field Survey, 2017-18.

In case of human being protection, to deal with SCW an average family employed a combination of 2.46 (SD  $\pm$  1.24) kinds of strategies. To deal with MCW average pastoralist family used a combination of 1.67 (SD  $\pm$  1.15) kinds of strategies and for NCW average pastoralist family used a combination 1.42 (SD  $\pm$  1.13) kinds of strategies. Most of the pastoralists employed a combination of 1 to 3 capacities. Very few pastoralist (3.8 per cent) families were there who employed a combination of five strategies together to fight with SCW environment effect followed by 1.3 per cent families against MCW and 0.4 per cent families employed against NCW.

In case of livestock the strategies employed against cold weather for the livestock protection was

different from the strategies employed for human being protection. To deal with SCW an average family employed a combination of 2.56 (SD  $\pm$  1.30) kinds of strategies. To deal with MCW average pastoralist family used a combination of 1.81 (SD  $\pm$  1.19) kinds of strategies and for NCW average pastoralist family used a combination 0.98 (SD  $\pm$  1) kinds of strategies. Most of the pastoralist families employed a combination of 2 to 4 strategies against SCW.

### Organizational Supports

Government supports and other supports varies from habitat to habitat; it depends on the office of district collector to provide compensation, provision of support also depends upon the donor agencies, NGO's and government.

**Table 6**  
**Organizational Supports Received By The Pastoralists Against Cold Weather**

| Organizational Supports | Winter camps |           | Transit camps |           | Summer camps |           |
|-------------------------|--------------|-----------|---------------|-----------|--------------|-----------|
|                         | Availability | Received  | Availability  | Received  | Availability | Received  |
| OS1                     | 5 (12)       | 5 (12)    | 5.4 (13)      | 2.5 (6)   | 11.7 (28)    | 9.2(22)   |
| OS2                     | 0            | 0         | 0             | 0         | 4.2 (10)     | 4.2 (10)  |
| OS3                     | 0            | 11.3 (27) | 0             | 11.3 (27) | 0            | 11.3 (27) |
| OS4                     | 2.1 (5)      | 2.1 (5)   | 1.7 (4)       | 1.7 (4)   | 3.8          | 2.5(6)    |
| OS5                     | 4.6 (11)     | 4.6 (11)  | 0             | 0         | 1.3(3)       | 1.3(3)    |

**Source:** Field Survey, 2017-18.

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**Code**

OS1- Government supports and subsidies (blanket), OS2- Early warning provided to the pastoralists especially in vulnerable areas such as in Drass, OS3- Health insurance of human being and livestock, OS4- NGO's supports or other donor agencies working for the Bakarwal community, OS5- Compensation if any received by the pastoralists to recover from shock.

The pastoralists get government supports in term of material as well as non-material supports such as blanket from the government at the time of the extreme climatic event. In the present study, about 5 per cent of pastoralist families got the government support in the winter camps. It was also reported that NGO's support and local support was received by some pastoralist families. The early warning delivered

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by the agency is broadcasted through a local radio channel. The warning is also delivered by the officials in the Kargil district.

## Sensitivity to Cold Weather Environment

It is the degree to which a system will be affected by or will respond to a given shock or stress (Department for International Development 2010). In the present study pastoralists' livelihood sensitivity was learnt through affected rate per 1000 persons, mortality rate per thousand persons and CFR per 100 persons similarly, affected rate and mortality rate for livestock assets was calculated on per thousand livestock. This study used verbal autopsy; verbal autopsy is kind of research method which helps to determine the probable cause of injuries, affectedness and deaths in those cases where there is no formal attention or medical record kept (CGHR 2018).

**Table- 7**  
**Bakarwal Pastoral Nomads**  
**Human Beings Sensitivity to Cold Weather Environment**

| Kind of Stressful condition | Habitat | Affected Rate (per 1000 Persons) | Mortality Rate (per 1000 Persons) | Case Fatality Rate (CFR) |
|-----------------------------|---------|----------------------------------|-----------------------------------|--------------------------|
| Severe Cold Weather (SCW)   | Winter  | 80.18                            | 2.53                              | 1.85                     |
|                             | Transit | 37.25                            | 1.26                              | 3.39                     |
|                             | Summer  | 17                               | 0.63                              | 3.70                     |
| Moderate Cold Weather (MCW) | Winter  | 49.09                            | 0                                 | 0                        |
|                             | Transit | 34.72                            | 0                                 | 0                        |
|                             | Summer  | 13.89                            | 0                                 | 0                        |
| Normal Cold Weather (NCW)   | Winter  | 1.89                             | 0                                 | 0                        |
|                             | Transit | 3.16                             | 0                                 | 0                        |
|                             | Summer  | 2.53                             | 0                                 | 0                        |

**Source:** Field Survey, 2017-18

The table reveals the sensitivity of human being to cold weather environment; the affected rate against severe cold weather in the winter habitat recorded high (136.36 persons per thousand persons) followed by 37.25 persons per thousand persons in the transit camps and 17 persons per thousand in the summer camps. The SCW is considered as deadly among the pastoralists; in the present study mortality rate of 2.53 persons per thousand persons was found in the winter camps, whereas mortality rate of 1.26 persons per thousand persons in the transit camps and 0.63 persons per thousand persons in the

summer camps was reported. The moderate cold weather is not deadly for the human being among the pastoralists community, it only affects the health of the human being about 97.7 persons per thousand persons were affected due to moderate cold weather. The normal cold weather does not provide much discomfort to the pastoralists; in the present study only 7.58 persons per thousand persons were affected due to the normal cold weather effect. The overall mortality rate of 4.42 persons per thousand was reported for the year 2016-17 against cold weather stress.

**Table- 8**  
**Bakarwal Pastoral Nomads**  
**Livestock Sensitivity to Cold Weather Environment**

| Stressor Magnitude          | Habitat | Affected Rate (per 1000 Livestock) | Mortality Rate (per 1000 Livestock) | Case Fatality Rate (CFR) |
|-----------------------------|---------|------------------------------------|-------------------------------------|--------------------------|
| Severe Cold Weather (SCW)   | Winter  | 10.74                              | 3.81                                | 35.48                    |
|                             | Transit | 4.11                               | 2.13                                | 51.81                    |
|                             | Summer  | 3.56                               | 0.69                                | 19.44                    |
| Moderate Cold Weather (MCW) | Winter  | 1.93                               | 0                                   | 0                        |
|                             | Transit | 1.68                               | 0                                   | 0                        |
|                             | Summer  | 1.29                               | 0                                   | 0                        |
| Normal Cold Weather (NCW)   | Winter  | 0.79                               | 0                                   | 0                        |
|                             | Transit | 0.64                               | 0                                   | 0                        |
|                             | Summer  | 0.25                               | 0                                   | 0                        |

**Source:** Field Survey, 2017-18

The table reveals the sensitivity of Bakarwals livestock to cold weather environment; the livestock

affected rate due to cold weather effects was approximately 25 per thousand livestock per year and

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the crude mortality rate of 6.63 livestock per thousand livestock per annum was found. The affected rate against severe cold weather was 18.41 per thousand livestock; the maximum affected rate was recorded in the winter habitat that were 10.74 per thousand livestock followed by 4.11 livestock per thousand livestock in the transit habitat and 3.56 livestock per thousand livestock in the summer habitat. The SCW is considered as deadly among the Bakarwals livestock, in the present study mortality rate of 6.63 livestock per thousand livestock was reported against SCW, the maximum number of livestock deaths due to SCW were reported in the winter camps (3.81 livestock), whereas, mortality rate of 2.13 livestock per thousand livestock was reported in the transit camps and 0.69 livestock per thousand livestock in the summer camps was reported for the year 2016-17 against SCW. The livestock affected rate against MCW was approximately 5 livestock per thousand livestock; no livestock death was reported in this study due to MCW condition. The livestock affected rate against NCW was 1.65 per thousand livestock and no livestock death reported due to it.

### Conclusions

Findings of research demonstrate that the community faced 80.57 days duration of cold weather in their habitat; overall duration of SCW faced by pastoralists were 14.65 days; in winter camps (14 days) in transit camps (0.52 days) and in the summer camps (0.13 days). The duration of MCW faced by the community were 37.24 days, maximum no of MCW events were faced in the winter habitat followed by transit habitat and summer habitat. Normal cold weather was not deadly among the pastoralists. To protect from cold weather an average family employed a combination of 3.60 kinds of capacities in the winter camps, a combination of 1.46 kinds of capacities in the transit camps and a combination of 2.66 kinds of capacities in the summer camps. To deal with severe cold weather an average family employed a combination of 2.46 kinds of strategies. To deal with moderate cold weather average pastoralist family employed a combination of 1.67 kinds of strategies and for normal cold weather average pastoralist family used a combination of 1.42 kinds of strategies, similarly for livestock average family employed 2.56 for severe cold weather, 1.81 strategies for moderate cold weather and 0.98 strategies for normal cold weather. The livestock affected rate due to cold weather effect was 25 livestock per thousand livestock per annum and the mortality rate was 6.63 per thousand livestock per annum and for a human being, a mortality rate of 4.42 persons per thousand persons was reported for the year 2016-17 among the nomadic pastoralist livelihood.

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