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## Awareness of Kashmiri livestock owners with respect to public health issues, zoonosis and environmental hygiene in flood affected areas of Kashmir division (J&K, India)

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**Abstract**

The state of Jammu and Kashmir was hit by severe floods in year 2014 which left a great impact on people as well as on the livestock. The present study was purposively carried out in Kashmir Division of Jammu and Kashmir state that was severely hit by devastating floods in September 2014. Among the various flood affected districts of Kashmir Division, the three districts namely Bandipora, Srinagar and Pulwama were purposively selected based on the highest inundation levels reported in these areas. The findings of the study revealed that, majority of the livestock owners (42.92%) reported that their animal carcasses were washed off with the gushing force of water during the floods. Interestingly, Government and municipal agencies provided very little help in carcass disposal during these floods. About (77.92%) of respondents from flood affected areas were unaware about the use of dead carcass for various industrial purposes. With respect to zoonotic diseases more than half of the respondents (53.33%) had awareness about disease transmission between vertebrate animals and human beings. Among the different zoonotic diseases, the majority (43.75%) had knowledge about foot and mouth disease followed by bird flu, rabies, brucellosis and bovine tb. However a low overall level of awareness was found with respect to various contaminated sources. Further the adoption of livestock rearing safety practices against zoonosis was found to be of medium level by majority of respondents (76.25%). Surprisingly, majority of the respondents (89.17%) believed that they had no knowledge about contamination of public health sanitation via dead animals while (41.67%) of the owners perceived the environmental hygienic practices followed by them of poor level. This overall gives a clear cut image of the lack of knowledge, ignorance and low awareness among the respondents with regard to public health, zoonosis and environmental hygiene issues in concern which inturn depicts that least number of awareness drives were held in this direction by concerned quarters.

**Keywords:** Awareness, carcass disposal, floods, hygiene, public health, sanitation, zoonosis

**Introduction**

In an agrarian country like India with vast geo-climatic diversity, the economic contribution of livestock is far more versatile than depicted by its contribution to national GDP. A large number of people especially the rural masses are directly or indirectly involved with this sector and it has been estimated to support the livelihood of about 70 percent of the rural poor in India, thereby making Animal Husbandry an important subsidiary occupation of the farmers (Ali, 2007) [2]. About 70 percent of the livestock is owned by 67 percent of the small, marginal and landless people thereby contributing 25.6 percent of agricultural output (40% if draught and dung is also accounted for) and 4.11 percent of total GDP (19<sup>th</sup> Livestock census, 2012) [3]. Despite its important contribution in national economy, this sector is facing many challenges like low productivity due to shortage of feed and fodder, ill-health, increased incidence of emerging and re-emerging animal diseases, inadequate infrastructure for marketing, processing and value addition and the most drastic being the natural calamities/disasters (National Livestock Policy, 2013) [12]. These Disasters aggravate and worsen the condition of an economy by leaving direct and indirect negative effects on people as well on the livestock itself (Thole *et al.*, 1993) [13]. There has been an increase in the frequency and intensity of disasters that has posed a threat not only to the people but to livestock as well. The animal and public health concerns that result from post natural disasters in developing countries include diseases and infections ranging from epizootics to parasitosis (internal and external), besides the outbreak of other bacterial and vector born diseases like Black leg, Leptospira, Clostridial infections, Anthrax, Foot rot, Mastitis, Oedema, Bovine ephemeral fever, Infectious anaemia in horses, Lumpy wool in sheep, Botulism and other vector borne diseases post floods

(Department of Agriculture and Fisheries, Queensland, 2011) [5]. These post disaster consequences can be attributed to the physical and mental stress, scarcity of healthy food and potable water, environmental damage resulting in unhygienic surroundings and various public health issues in concern. These disasters have always brought miseries to numerous people, especially in rural areas across the country and the state of Jammu and Kashmir being no exception to it. Owing to the unique geographical setting, the state of Jammu and Kashmir has witnessed a multitude of disasters (J&K State Disaster Management Policy, 2011) [8] the most recent one being the floods of 2014 which left the Kashmiri livestock owners in state of despair and shock. Since then, there was a lack of detailed empirical study on the exact impact of floods of 2014 on the livestock sector of the region as well on livestock owners in light of its mitigation and better disaster management, so in one of its subsection the study tried to explore the extent of awareness with regards to public health issues faced by respondents during floods and also to check their awareness with respect to different zoonotic diseases, sanitations measures adopted and their knowhow on various possible source of disease transmission as discussed under the following subheadings.

### Materials and Methods

The study was purposively carried out in Kashmir Division of Jammu and Kashmir state that was severely hit by a devastating flood in September 2014. Among the various flood affected districts of Kashmir Division, the three districts namely Bandipora, Srinagar and Pulwama were purposively selected based on the highest inundation levels reported in these areas. The Kashmir Division of Jammu and Kashmir State consists of 10 districts. The present study was purposively carried out in three severely flood affected districts viz Pulwama in south, Srinagar in central and Bandipora in north of Kashmir. From each selected district two (2) flood affected blocks were purposively selected based on their livestock population for data collection from affected farmers. Further from each selected block four (4) affected villages were randomly selected for questioning of respondents. Finally ten (10) affected farmers were randomly

selected from each of the selected village making a total of two hundred and forty respondents.

## Results and Discussion

### Awareness regarding public health issues

Public health services reduces a populations exposure to diseases through various measures like proper carcass disposal of animals, sanitation and vector control which are very important for countries health care. Majority of the respondents (42.92%) informed that the carcasses of animals died in floods of 2014 were washed off with the gushing force of water and only (39.17%) respondents disposed off the animal carcasses by themselves. It was reported that Government and municipal agencies were less involved in carcass disposal along with least presence of private agencies. The probable reason for this could be that Government focus was primarily on humans, livestock sector somehow got neglected. With regard to various ways of carcass disposal a sizeable population of respondents (29.58%) preferred vehicle as a means of transportation for disposal of their dead animals. with majority (52.08%) being the ones who didn't required the disposal. The reason could be that vehicle is an easier convenient source to carry animals that is why it was preferred as a means of transportation. With regard to carcass disposal method as shown in (table 1) a good proportion of people (29.17%) threw their dead animals into the river as they found it one of the easiest methods to get rid from the dead carcasses for majority being the ones whose animals were washed off. The results pertaining to the help provided by Government agencies are in line with the findings of Bara (2014) [4] and that of carcass disposal method are in contrary to the findings of Ganguli (2004) [6] who reported that carcasses were disposed off either by burning or were buried under the ground by NGO personals and by army personnel's. The findings of Kumar (2016) [9] indicated that majority of the respondents threw the carcasses as such or disposed improperly. Majority of the respondents (77.92%) were not aware about the use of dead carcass for various industrial purposes. (Table1). The most probable reason was the absence of private sector/industries in the valley that utilize these dead carcasses for various purposes.

**Table 1:** Distribution of respondents according to the nature and pattern of carcass disposal among the flood affected livestock farmers' post 2014 N=240

Carcass disposal aspects	Districts			Total
	Srinagar	Bandipora	Pulwama	
<b>i. Agency involved in carcass disposal</b>				
Govt./Municipal agencies	8 (10.00)	2 (2.50)	8 (10.00)	18 (7.50)
Private agencies	1 (1.25)	2 (2.50)	0 (0.00)	3 (1.25)
Self (you only)	30 (37.50)	40 (50.00)	24 (30.00)	94 (39.17)
Washed off/ No disposal	25 (31.25)	30 (37.50)	48 (60.00)	103 (42.92)
No loss of animals	16 (20.00)	6 (7.50)	0 (0.00)	22 (9.17)
<b>ii. Means of transport used for carrying carcass(es) for final disposal</b>				
By vehicle	21 (26.25)	31 (38.75)	19 (23.75)	71 (29.58)
By trolley	1 (1.25)	0 (0.00)	4 (5.00)	5 (2.08)
Dragged over the ground	17 (21.25)	13 (16.25)	9 (11.25)	39 (16.25)
Washed off in flood water	25 (31.25)	30 (37.50)	48 (60.00)	103 (42.92)
No loss of animals	16 (20.00)	6 (7.50)	0 (0.00)	22 (9.17)
<b>iii. Method of carcass disposal used</b>				
Buried under	9 (11.25)	13 (16.25)	19 (23.75)	41 (17.08)
Left open as such	1 (1.25)	3 (3.75)	0 (0.00)	4 (1.67)
Thrown in river	29 (36.25)	28 (35.00)	13 (16.25)	70 (29.17)
Washed off in flood water	25 (31.25)	30 (37.50)	48 (60.00)	103 (42.92)
No loss of animals	16 (20.00)	6 (7.50)	0 (0.00)	22 (9.17)
<b>iv. Awareness about industrial use of dead carcasses</b>				
Aware	10 (12.50)	12 (15.00)	31 (38.75)	53 (22.08)
Unaware	70 (87.50)	68 (85.00)	49 (61.25)	187 (77.92)

(Figures in parenthesis indicate percentage)

### Zoonosis

The link among humans, animal populations and the surrounding environment is very close as the animals are used in transportation, draught purpose and a source of protein in the form of meat, milk and eggs. In the absence of proper care of these animals, the linkage can result to zoonotic hazards (WHO, 2010). Findings in (table2) indicated that about half (53.33%) of the respondents had awareness with respect to disease transmission between vertebrate animals and human beings. When compared with the study of Hundal *et al.*, (2016) [7] they found that awareness level was more or less similar to that of zoonotic diseases in this study.

Regarding the knowledge about existence of specific zoonotic diseases, respondents were asked about the nature of various zoonotic diseases that they know. Maximum percentage of respondents i.e. (43.75%) had awareness about foot and mouth disease followed by bird flu, rabies, brucellosis and bovine Tb. (Table 2). The results were contrary to the findings of Babu *et al.*, (2015) [3] who reported that majority of respondents were aware about the rabies and were unaware about other zoonotic diseases and on contrary the findings were similar to Munisamy *et al.*, (2017) [11] who reported that Rabies and FMD were the major known zoonotic diseases. As the livestock in Kashmir is more frequently affected by Foot and mouth disease the livestock owners have developed more awareness about this disease. The least awareness with respect to bovine tuberculosis is reported by Amenu *et al.*, (2010) [1] in his findings.

### Perception about possible sources of contamination for disease outbreak

Table 2 indicated the major sources of contamination responsible for disease transmission to humans. The results showed that majority of the respondents (26.25%) perceived milk being a possible source of contamination for transmission of diseases between humans and animals.

However direct contact with animals was perceived as possible source of contamination by least number of respondents. This could be explained by the fact that the milk is more perishable and spoils more frequently and visibly affecting the farmer's awareness level compared to other sources which are more intangible to visibility. The results were similar in findings of Hundal *et al.*, (2016) [7] who reported that majority of respondents were aware of the transmission of zoonotic diseases to human being through contaminated milk, meat, air and feed respectively. The results with respect to knowledge about the existence of contaminated sources of disease transmission, majority of the respondents (62.92%) had low knowledge about the same (table2). These results were in agreement with the findings of Babu *et al.*, (2015) [3] who reported that respondents were having low knowledge about contaminated sources. Among the different districts the respondents of Bandipora had maximum knowledge about the contamination sources as revealed by their mean value. The results can be explained by the fact that high awareness areas had a comparatively higher general awareness about zoonotic diseases.

### Livestock rearing safety practices against zoonosis

As a preventive measure livestock farmers should have knowledge regarding safety rearing practices like use of protective clothing, proper boiling of raw milk, proper cooking of raw meat etc. The findings of (Table 2) indicated that majority of respondents (93.33%) avoided living with animals under same roof. The results pertaining to adoption of these livestock rearing safety practises depicted that majority of the respondents (76.25%) had a moderate level of adoption of these safety practices. This may be attributed to reasons like limited knowledge about the same, inadequate communication between Veterinarians and livestock owners as is depicted in their extension contact.

**Table 2:** Distribution of respondents according to their awareness about zoonosis and related aspects N=240

Awareness aspect	Districts			Total
	Srinagar	Bandipora	Pulwama	
<b>i. Awareness of disease transmission between humans and animals (zoonosis)</b>				
Aware	44 (55.00)	43 (53.75)	41 (51.25)	128 (53.33)
Unaware	36 (45.00)	37 (46.25)	39 (48.75)	112 (46.67)
<b>ii. Knowledge about existence of specific zoonotic diseases</b>				
Rabies	11 (13.75)	18 (22.50)	12 (15.00)	41 (17.08)
Brucellosis	5 (6.25)	14 (17.50)	16 (20.00)	35 (14.58)
Bovine Tuberculosis	7 (8.75)	10 (12.50)	9 (11.25)	26 (10.83)
Foot & Mouth disease	40 (50.00)	32 (40.00)	33 (41.25)	105 (43.75)
Bird Flu	21 (26.25)	22 (27.50)	15 (18.75)	58 (24.17)
<b>iii. Perception about possible sources of contamination for disease outbreak</b>				
Milk	21 (26.25)	20 (25.00)	22 (27.50)	63 (26.25)
Meat	11(13.75)	9 (11.25)	11 (13.75)	31 (12.92)
Eggs	13 (16.25)	15 (18.75)	19 (23.75)	47 (19.58)
Aerosol	24 (30.00)	21 (26.25)	15 (18.75)	60 (25.00)
Feed and water	17 (21.25)	20 (25.00)	16 (20.00)	53(22.08)
Direct contact	0 (0.00)	15 (18.75)	11 (13.75)	26(10.83)
<b>iv. Awareness about livestock rearing safety practices</b>				
Use of protective clothing/gloves/mask etc	23(28.75)	18 (22.50)	24 (30.00)	65 (27.58)
Proper washing of hands after working in animal shed	50 (62.50)	25 (31.25)	34 (42.50)	109 (45.41)
Avoid working with animals when they are sick, weak and pregnant	27 (33.75)	38 (47.50)	34 (42.50)	99 (41.25)
Avoid living with animals under same roof	80 (100.00)	74 (92.50)	70 (87.50)	224 (93.33)
Keep healthy animals separated from infected animals	40 (50.00)	35 (43.75)	26 (32.50)	101 (42.08)
Proper disposal of dead and diseased	21 (26.25)	24 (30.00)	36 (45.00)	81 (33.75)
Cleaning and disinfection of animal sheds	48 (60.00)	36 (45.00)	39 (48.75)	123 (51.25)

(Figures in parenthesis)

### Environmental hygiene

Environmental hygiene was studied with respect to awareness about public health sanitation. Sanitation refers to public

health conditions/measures necessary for improving and protecting health and well being of humans. The variables study the proper disposal of dead carcasses, their excreta and sewage with a check on its contamination with public health

sanitation. Findings (Table 3) indicated that majority of the respondents (89.17%) reported that they had no knowledge about contamination of public health sanitation via dead animals since most of the carcasses were washed off by flood water which they believed had no access to public health sanitation.

From the results of (table 3) it was quite evident that majority

of respondents (41.67%) perceived the environmental hygienic practices followed by them as poor. Further a good majority of respondents (70.41%) used water for cleaning of their animal sheds. The probable reason being lack of knowledge and awareness among the respondents with regard to environmental hygiene further there was least number of awareness drives held in this direction by concerned quarter.

**Table 3:** Distribution of respondents as per their perception with regard to Knowledge about contamination of Public health sanitation via dead animals and environmental hygienic practices followed during the floods of 2014. N=240

Environmental hygiene issues	Districts			Total
	Srinagar	Bandipora	Pulwama	
<b>i. Knowledge about contamination of Public health sanitation via dead animals</b>				
Yes	7 (8.75)	11 (13.75)	8 (10.00)	26 (10.83)
No	73 (91.25)	69 (86.25)	72 (90.00)	214 (89.17)
<b>ii. Perception about environmental hygienic practices followed (score)</b>				
Good	22 (27.50)	11 (13.75)	13 (16.25)	46 (19.17)
Average	35 (43.75)	21 (26.25)	38 (47.50)	94 (39.17)
Poor	23 (28.75)	48 (60.00)	29 (36.25)	100 (41.67)
<b>iii. Cleaning and disinfection of animal sheds</b>				
Water	45 (56.25)	59 (73.75)	65 (81.25)	169 (70.41)
Disinfectants	35 (43.75)	21 (26.25)	15 (18.75)	71 (29.58)

(Figures in parenthesis indicate percentage)

### Conclusion

It was concluded from the study that Government and municipal agencies were less involved in carcass disposal along with least presence of private agencies or NGO's due to which livestock sector somehow got neglected. Livestock owners were not aware about the use of dead carcass for various industrial purposes because of the absence of private sector/industries in the valley that utilize these dead carcasses for various purposes. About half of the respondents (53.33%) had the awareness with respect to disease transmission between vertebrate animals and human beings. Since the livestock in Kashmir is more frequently affected by Foot and mouth disease the livestock owners have developed more awareness about this disease as depicted from the findings of the study. The results with respect to knowledge about the existence of contaminated sources of disease transmission showed that majority of the respondents near about (62.92%) had low knowledge about the same. With respect to the adoption of these livestock rearing safety practices, majority of the livestock owners (76.25%) had a moderate level of adoption of these safety practices. This gives a clear cut picture of limited knowledge, inadequate communication between Veterinarians and livestock owners depicting low extension contact. Also near about majority of respondents 41.67 percentage of respondents perceived the environmental hygienic practices followed by them as poor indicating least number of awareness drives held in this direction by concerned quarter which is a matter of great concern.

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