



Socio-Economic Impacts of COVID-19 Pandemic on Equine Rearing in Haryana, India

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Authors' contributions

All authors provided intellectual input and critically revised the manuscript. Final manuscript was read and approved by all authors and there is no conflict of interest among authors.

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ABSTRACT

The current study was aimed to analyze socio-economic impact of COVID-19 pandemic on equine rearing in Haryana, India. The study was descriptive and exploratory in nature, including field survey. Structured interview schedule was adopted to conduct personal interviews of respondents. COVID-19 pandemic impact were observed on equine community and 73.9% respondents reported that there was decrease in demand of work for their equines and as a result there was reduction in their income and sale of their by-products or utilizing their draught powers. 74.2% reported about reduction in income from equine rearing. As expenses on equine rearing are concern, it was found that expenses on equine rearing either increased or remained same, 59% reported no change in expenses, and 35.3% reported that equine rearing expenses increased. Regarding health of their equines, 82.5% respondents reported that there was no change in the health of their equines. Household total monthly income either decreased or remained same, 73.5% reported reduction in income and 23.4% reported no change in their household income. As per household expenses are concern, 39.2% reported increase and 52.1% reported that there was no change in household expenses. Regarding availability of veterinary services for equines, 80.8% respondents reported that veterinary services remained available for their equines. Regarding supply of feed/fodder for equines, 73.4% reported that there was no change in supply of feed/fodder and 22.1% reported

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reduction in supply of feed/fodder for their equines. Equine sector was adversely affected due to pandemic and socio-economic matters of respondents were totally disturbed. It revealed out that 33.7% respondents were not willing to continue with their current occupation of equine rearing and they are willing to migrate from equine rearing and exploring new sources of income. Statistical Package for Social Sciences (SPSS) version was adopted for data analysis. The current study is very significant to address the problem of equine farmer in changed scenario of pandemic.

Keywords: COVID-19; pandemic; equines; farmers; household.

1. INTRODUCTION

India has been blessed with various species of livestock. This sector is source of wealth and power and approximately two-third families of farming communities are associated with any one species of livestock to earn their livelihood through sale of livestock and In India, livestock sector is one of the largest sectors in the world and its equines population is 1.4% of world's equines population and livestock are considered as a walking bank and an insurance against any unseen /natural calamities [1]. Livestock sector faces a number of challenges in form of natural disaster; earthquake, flood, volcanoes, shortage of feed/fodder and incidence of emerging of pandemic and as a result they become susceptible to diseases [2]. These disasters occur almost every year in one or other form and left long lasting effects on every sector and natural calamities and pandemics affect health of livestock [3]. Adequate treatment is yet to be explored for COVID-19 [4]. COVID-19 pandemic impacts were on approximately 0.1 billion; no adequate up dated knowledge is available on kids and focuses were given on mostly on adults and children [5].

Equines are the reliable source of production chain of several industries and are used for transportation of household material and transportation in construction, agriculture and public sector [6]. Equines are major components of livestock and they are herbivores, monogastric, non-ruminant and sure footed animals. There are further four sub groups of equines i.e. horse and pony (*Equus caballus*), donkey (*Equus asinus*) and mule (*Equus mulus*) [7]. Equines are essential part of agrarian economy and known as ATM for poor and marginalized people in rural area in Haryana. [8]. In India ponies and mules are reared by landless and marginalized farmers and these farmers are dependent for livelihood on earning from these animals [9].

Equines contribution has been acknowledged globally also and they are known for speed,

power, energy and their role had been important in history of China [10]. Equines are essential part in agriculture and transportation in urban and peri-urban area in developing countries and are power source for these countries [11]. Equines are used worldwide for transportation of agricultural products, water, fuel and dairy products [12]. Globally, equine sector affects livelihood of more than 600 million people in one or another way [13].

COVID-19 pandemic was a health emergency throughout the world and it was declared as a global pandemic on 11 March 2020 by World Health Organization (WHO) [14]. As per UN data more than 65% parents were reluctant to continue education of their children, especially girl education and trafficking of women and girls were increased within the first few months of the pandemic and millions of people lost their jobs in India and globally as well [15]. In India, livestock sector provides livelihood and employment to approximately 8.8% and a huge population of landless and marginal farmers was under stress for saving their livestock [16].

Equine sector was adversely affected worldwide due to this pandemic. In UK impacts of COVID-19 and prolonged lockdown were observed on equine industry [17]. Equine industry was adversely affected in India due to COVID-19 protocol and restriction on movement of equines and affected their fitness due to lack of exercise [18]. It was observed that equine population is declining rapidly in India and Haryana as well [Figs. 1 & 2]. COVID-19 pandemic has played a role of catalyst in this process in Haryana.

In India, equine population was 1930000 in 1997, 985000 in 2003, 1049739 in 2007, 1139897 in 2012, and 550074 in 2019. In this way, there is a declining trend in equine population [Fig. 1].

In Haryana, equine population was 147000 in 1997, 47000 in 2003, 36529 in 2007, 48567 in 2012 and 13002 in 2019. In this way, there is a great decline in equine population [Fig. 2].

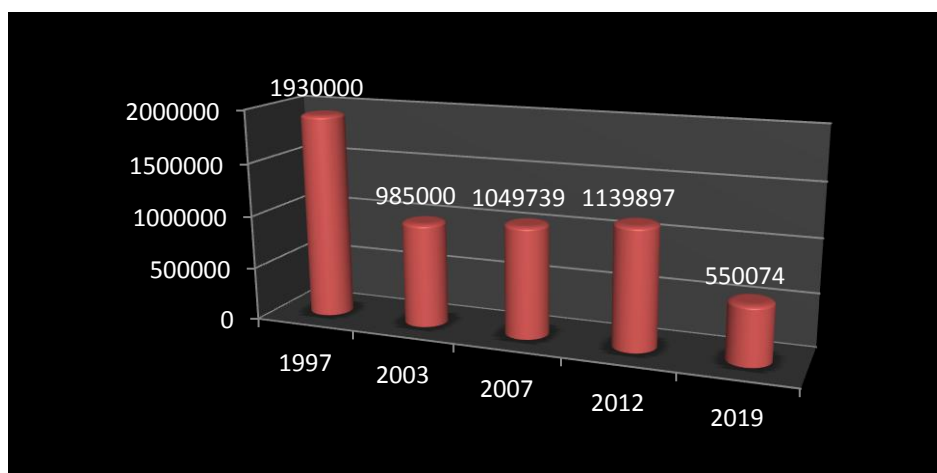


Fig. 1. Graphic presentation of trend of equine population in India
 Source: <https://dahd.nic>

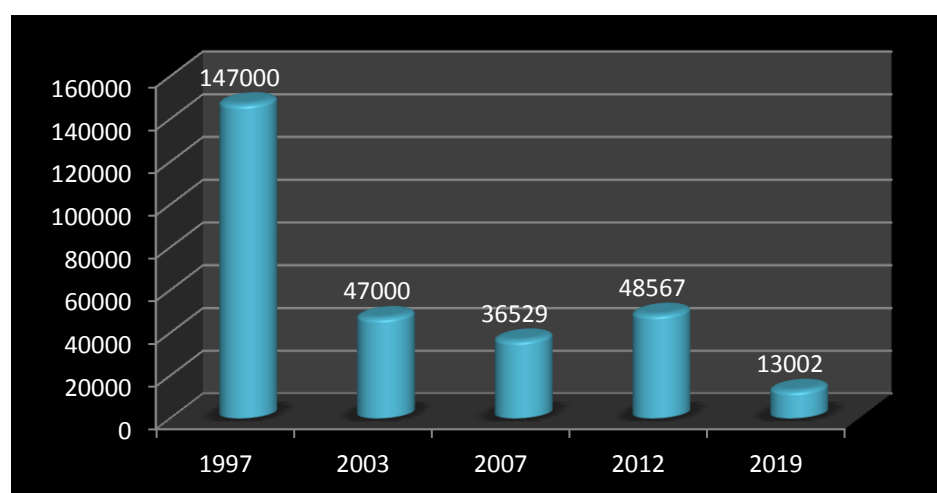


Fig. 2. Graphic presentation of trend of equine population in Haryana (India)
 Source: <https://dahd.nic>

2. METHODOLOGY

2.1 Objective of the Study

Objective of the current study was to analyze socio-economic impact of COVID-19 pandemic on equine rearing in Haryana.

2.2 Study Area

The study was conducted in four districts (Provinces) of Haryana; Hisar, Bhiwani, Jind and Rohtak and it was conducted in rural and urban area as well. Haryana is surrounded by National Capital New Delhi from three sides. Contribution of Haryana is significant in national GDP. There are 22 districts and as per national census-2011, human population of the state is approximately 25.3 million [19].

2.3 Methods of Data Collection

Structured interview schedule was adopted for data collection containing questions designed especially as per the requirement of the study. Multistage random sampling method was applied for data collection and personal interview method was adopted.

2.4 Sample Size

Selection of respondents was done by simple random sampling method at sampling site. Overall 303 respondents took part in study and out of these 88 were from Hisar district, 77 from Bhiwani district, 73 from Jind district and 65 from Rohtak district.

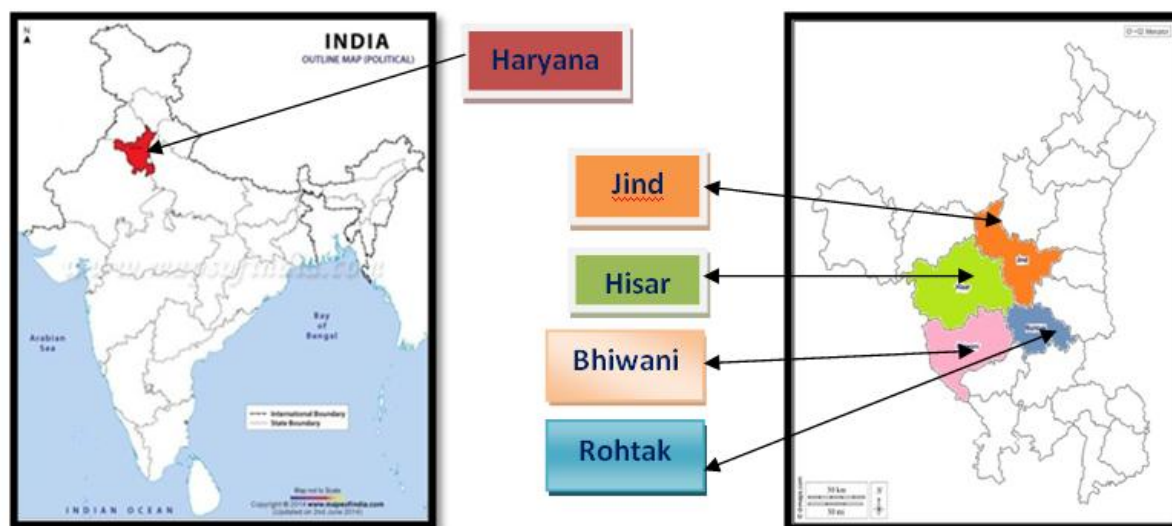


Fig. 3. Geographic location of study area in Haryana in India

2.5 Data Management and Analysis

Interview schedules were arranged district and category wise. List was prepared and all filled interview schedules were examined thoroughly; missing digits were updated by contacted respondents through telephonic conversation. Editing and post coding was done and classification was done to convert raw data into a meaning full. Data entered in Microsoft office excel worksheet. Statistical analysis was done by using IBM Special Package for Social Sciences (SPSS) version.

2.6 Importance of the Study

The current study is very significant to address the problem of equine farmers in changed scenario of pandemic when equine population is declining rapidly in the state and equine farmers

are migrating from their current occupation of equine rearing and this can affect vital source of income of respondents in Haryana [20].

3. UTILITIES OF EQUINES IN HARYANA

Utilities of equines means, what type of work is being taken from equines in Haryana and it was found that multiple tasks are taken from equines in the state.

In the current study it reveled out that overall 56.9% respondents utilize their equines for carting activities, 10.9% for ceremonial activities, 12.2% for breeding and trading activities, 6.6% for pleasure and riding activities, 7.9% for personal use, 5% for multiple activities, 0.3% for any other activities and 2 (0.7%) utilize their equines for loading activities [Table 1].

Table 1. Classification of respondents on the basis of their responses on utilities of equines

Responses	Frequency (Percentage)				
	Hisar (n-88)	Bhiwani (n-77)	Jind (n-73)	Rohtak (n-65)	Overall (n-303)
Carting activities	48 (15.8%)	31 (40.3%)	55 (75.3%)	37 (56.9%)	171 (56.4%)
Ceremonial activities	13 (4.3%)	10 (13%)	2 (2.7%)	8 (12.3%)	33 (10.9%)
Breeding and trading	4 (1.3%)	15 (19.5%)	9 (12.3%)	8 (12.3%)	37 (12.2%)
Pleasure and riding	13 (4.3%)	6 (7.8%)	00 (0.0%)	1 (1.5%)	20 (6.6%)
Personal use	8 (2.6%)	8 (10.4%)	4 (5.5%)	5 (7.7%)	24 (7.9%)
Multiple activities	2 (0.7%)	6 (7.8%)	00 (0.0%)	6 (9.2%)	15 (5%)
Any other activities	00 (0.0%)	00 (0.0%)	2 (2.7%)	00 (0.0%)	1 (0.3%)
Loading	00 (0.0%)	1 (1.3%)	1 (1.4%)	00 (0.0%)	2 (0.7%)

Table 2. Classification of respondents on the basis of their responses on impacts of COVID-19 pandemic on equine rearing in Haryana

Variables	Responses	Frequency (percentage)				
		Hisar (n-88)	Bhiwani (n-77)	Jind (n-73)	Rohtak (n-65)	Overall (n-303)
Demand of work for equines	Decreased	55 (62.5%)	53 (68.8%)	61 (86.6%)	55 (84.6%)	224 (73.9%)
	Increased	01 (1.1%)	01 (1.3%)	01 (1.4%)	01 (1.5%)	004 (1.3%)
	No Change	31 (35.2%)	22 (28.6%)	10 (13.7%)	08 (12.3%)	071(24.4%)
	Cannot say	01 (1.1%)	01 (1.3%)	01 (1.4%)	01 (1.5%)	004 (1.3%)
Income from equines rearing	Decreased	62 (70.5%)	51 (66.2%)	58 (79.5%)	54 (83.1%)	225 (74.2%)
	Increased	01 (1.1%)	01 (1.3%)	01 (1.4%)	01 (1.5%)	004 (1.3%)
	No Change	24 (27.3%)	24 (31.2%)	13 (17.8%)	09 (13.8%)	070 (23.1%)
	Cannot say	01 (1.1%)	01 (1.3%)	01 (1.4%)	01 (1.5%)	09 (13.8%)
Equine rearing expenses	Decreased	07 (8%)	01 (1.3%)	03 (4.1%)	01 (1.5%)	012 (3.9%)
	Increased	27 (30.7%)	21 (27.3%)	22 (30.1%)	37 (56.9%)	107 (35.3%)
	No Change	52 (59.1%)	54 (70.3%)	47 (64.4%)	26 (40%)	179 (59%)
	Cannot say	2 (2.3%)	01 (1.3%)	01 (1.4)	01 (1.5%)	005 (1.6%)
Impact on Equine health	Deteriorated	11 (12.5%)	05 (6.5%)	10 (13.7%)	13 (20%)	039 (12.8%)
	Improved	03 (3.4%)	03 (3.9%)	02 (2.7%)	01 (1.5%)	009 (2.9%)
	No Change	72 (81.8%)	68 (88.3%)	60 (82.2%)	50 (76.9%)	250 (82.5%)
	Cannot say	2 (2.3%)	01 (1.3%)	01 (1.4%)	01 (1.5%)	005 (1.6%)
Household income	Decreased	62 (70.5%)	51 (66.2%)	60 (82.2%)	50 (76.9%)	223 (73.5%)
	Increased	01 (1.1%)	01 (1.3%)	01 (1.4%)	02 (3.1%)	005 (1.6%)
	No Change	24 (27.3%)	24 (31.2%)	11 (15.1%)	12 (18.5%)	071 (23.4%)
	Cannot say	01 (1.1%)	01 (1.3%)	01 (1.4%)	01 (1.5%)	004 (1.3%)
Household expenses	Decreased	08 (9.1%)	05 (6.5%)	06 (8.2%)	02 (3.1%)	021 (6.9%)
	Increased	28 (31.8%)	21 (27.3%)	29 (39.7%)	41 (63.1%)	119 (39.2%)
	No Change	50 (56.8%)	50 (64.9%)	37 (50.7%)	21 (32.3%)	158(52.1%)
	Cannot say	02 (2.3%)	01 (1.3%)	01 (1.4%)	01 (1.5%)	005 (1.6%)
Availability of feed and fodder for equines	Decreased	20 (22.7%)	12 (15.6%)	16 (21.9%)	19 (29.2%)	067 (22.1%)
	Increased	02 (2.3%)	02 (2.6%)	01 (1.4%)	01 (1.5%)	006 (1.7%)
	No Change	64 (72.5%)	62 (80.5%)	55 (75.3%)	44 (67.7%)	225 (73.4%)
	Cannot say	02 (2.3%)	01 (1.3%)	01 (1.4%)	01 (1.5%)	05 (1.6%)
Availability of Veterinary services for equines	Decreased	14 (15.9%)	06 (7.8%)	10 (13.7%)	15 (23.1%)	45 (14.8%)
	Increased	01 (1.1%)	01 (1.3%)	01 (1.4%)	03 (4.6%)	06 (1.7%)
	No Change	72 (80.7%)	69 (89.6%)	61 (83.6%)	43 (66.2%)	245 (80.8%)
	Cannot say	01 (1.1%)	01 (1.3%)	01 (1.4%)	04 (6.2%)	07 (2.3%)

4. SOCIO-ECONOMIC IMPACT OF COVID-19 PANDEMIC ON EQUINE REARING IN HARYANA

COVID-19 had been declared as a pandemic on 11 March 2020 by World Health Organization (WHO) [14]. It was a health emergency throughout the world and critical for a developing country like India, having human population more than 130 million. Two-phase continuous lockdown enforced for a long duration had been a new experience for everyone [15]. This pandemic brought unexpected losses for equine sector in Haryana.

5. RESULTS AND DISCUSSION

Impact of COVID-19 pandemic on different variables in equine rearing in Haryana is furnished below.

5.1 Demand of Work for Equines

COVID-19 pandemic was a trigger shooting for equine sector. Overall 73.9%; in Hisar 62.5%; in Bhiwani 68.8%; in Jind 86.6% and in Rohtak 84.6% respondents reported reduction in work for equines during COVID-19 pandemic [Table 2]. The current study agrees with study which was conducted in 14 low-medium income countries and up to 73% reduction in demand of work for equines was found in Asian countries [21].

5.2 Income from Equines Rearing

As monthly income from equine rearing is concern, overall 74.2%; in Hisar 70.5%; in Bhiwani 66.2%; in Jind 79.5% and in Rohtak 83.1% respondents responded about reduction in income from equine rearing [Table 2]. This study also agrees with study which was conducted in 14 low-medium income countries and up to 83% reduction in monthly income from equines was reported in Asian countries during COVID-19 pandemic [21]. This study also agrees with study which was conducted in nine developing countries and found that equine farmers were not getting adequate work for their equines during COVID-19 resulting decrease in income from equine rearing [22].

5.3 Equine Rearing Expenses

Overall 35.3% responded increase in expenses and 59% responded no change; in Hisar 30.7%

responded increase and 59.1% responded no change; in Bhiwani , 27.3% responded increase and majority of respondents 70.3% responded no change; in Jind, 30.1% responded increase and 64.4% responded no change and in Rohtak, 56.9% responded increase 40% responded no change in expenses on equine rearing [Table 2]. It was reported that in Himachal Pradesh, India working equids owners were getting less income from their animals, but their routine expenses were either remained same or increased [18].

5.4 Impact on Equine Health

Majority of respondents reported that there was no change in health of equines during COVID-19 pandemic. In overall 82.5%; in Hisar 81.8%; in Bhiwani 88.3%; Jind 82.2% and Rohtak 76.9% responded no change in health of equines during this pandemic [Table 2]. The current study agrees with study which was conducted in 14 low-medium income countries and 71% respondents reported from Asian countries that there was no change in health of their equines during COVID-19 pandemic [21].

5.5 Household Income

Overall 73.5%; in Hisar 70.5%; in Bhiwani 66.2%; in Jind 82.2% and in Rohtak 76.9% respondents reported that their household income decreased during COVID-19 pandemic [Table 2]. It was reported that in Himachal Pradesh, India that working equids owners were getting less income from their animals due to decreased work demands [18]. Up to 83% reduction in household income was reported in Asian countries during study in 14 low-medium income during COVID-19 pandemic [21].

5.6 Household Expenses

During COVID-19 pandemic household expenses either increased or remained unchanged in Haryana. In overall 39.2% reported increase and 52.1% responded no change; in Hisar 31.8% responded increase and 56.8% responded no change; in Bhiwani 27.3% responded increase and 64.9% responded no change; in Jind 39.7% responded increase and 50.7% responded no change and in Rohtak 63.1% responded increase and 50.7% responded no change in their household expenses during COVID-19 pandemic [Table 2]. During study of impact of COVID-19 pandemic in 14 low-medium income countries, 32% respondents reported increase in household

expenses and 46% reported no change in household expenses during COVID-19 pandemic in Asian countries [21].

5.7 Availability of Feed and Fodder for Equines

Movements were restricted and supply of feed/fodder for equines was not possible in urban area, but there was no change in rural area. In overall 22.1% responded decrease in supply and 55.1% reported no change; in Hisar 22.7% responded decrease and 72.5% responded no change; in Bhiwani 15.6% responded decrease and 80.5% responded no change; in Jind 21.9% responded decrease and 75.3% responded no change and in Rohtak 29.2% responded decrease and 67.7% responded no change in supply of feed and fodder for equines during COVID-19 pandemic [Table 2]. However no data are available for comparison for supply of feed/fodder for equines during COVID-19 pandemic.

5.8 Availability of Veterinary Services for Equines

Majority of respondents reported that there was no change in government veterinary services for their equines during COVID-19 pandemic in Haryana. In overall 80.8%; in Hisar 80.7%; in Bhiwani 89.6%; in Jind 83.6% and in Rohtak 66.2% responded that there was no change in availability of veterinary services for equines during COVID-19 pandemic [Table 2]. However no data are available for comparison for availability of veterinary services for equines during COVID-19.

6. WILLINGNESS TO FURTHER EXPAND EQUINE REARING BUSINESS IN CHANGED SCENARIO AFTER COVID-19 PANDEMIC

Equine population is declining rapidly in Haryana and equine farmers are migrating from their current profession of equine rearing to other profession. Hence this variable is very important.

In current study, it revealed out that in overall 66.3% responded in yes and 33.7% responded in no; in Hisar 68.4% in yes and 35.2% in no; in Bhiwani 80.5% in yes and 19.5% in no; in Jind 47.9% in yes and 52.1% in no and in Rohtak 52.3% in yes and 47.7% responded in no to further expand equine rearing business [Table 3]. Equine population is declining rapidly in Haryana and equine farmers are exploring new sources of

income due to constraints being faced by them in equine rearing [20].

7. SUGGESTIONS AND CONCLUSION:

7.1 Suggestions

Globally, livestock and allied sectors contribute 40% of agricultural production and in India its contribution is 24% [23]. This sector is facing a number of challenges in the form of natural disaster [24]. COVID-19 pandemic was a type of disaster and though there were no reported evidence indicating direct effects on health of equines; but it was observed that its indirect effects will be long lasting on livestock sector, especially on equine sector.

7.2 Preventive Measures to Avoid Occurrence of Any Pandemic

Animals, especially equines, are susceptible to diseases and become more susceptible during any pandemic and other disaster due to stress [3]. Proper planning is necessary to prevent the occurrence of any pandemic in livestock in general and equines in particular. The following steps can be taken in advance.

- **Vaccination:** It is suggested that a proper vaccination schedule should be followed to avoid occurrence of any pandemic outbreak in livestock in general and equines in particular.
- **Deworming:** Parasitic load increase stress level on equines and they become weak. To control internal parasitic infestation, regular deworming schedule should be followed to keep equines free from parasitic load.
- **Hygiene:** Regular cleanliness, use of disinfectants and insecticides spray should be practiced in animal paddocks and surrounding area.
- **Planning:** An accurate strategy is needed to stop occurrence of any pandemic in future and this is to be done at government and private level. Many NGOs are working for welfare of equines and these should be involved. Awareness camps should be organized at every level. Special disaster management fund should be established for equine welfare by Haryana government. If possible, susceptible species of livestock can be shifted to suitable places.

Table 3. Classification of respondents on the basis of their willingness to further expand equine rearing business

Responses	Frequency (Percentage)				
	Hisar (n-88)	Bhiwani (n-770)	Jind (n-73)	Rohtak (n-65)	Overall (n-303)
Yes	57 (68.4%)	62 (80.5%)	35 (47.9%)	34 (52.3%)	188 (66.3%)
No	31 (35.2%)	15 (19.5%)	38 (52.1%)	31 (47.7%)	115 (33.7%)

7.3 Steps should be Taken to Minimize Impact of Any Pandemic

- Influencing factors and vulnerability of disaster should be studied which effect direct and indirect loses and follow-up guidelines should be prepared [25].
- **Therapy:** Medicinal plants abstract and combined therapies can be used in case of occurrence of COVID-19 in equines. Use of medicinal plants and other therapies were suggested in COVID-19 patients with mucormycosis that has high mortality rate [26].
- **Arrangement of feed/fodder:** Feed/fodder banks can be established at various points and loans from banks at cheaper rates for purchase of fodder should be made available to equine farmers to meet out requirements during pandemic and to prevent starvation of equines [2].
- **Segregation and carcass disposal:** During pandemic, animals get infected and these can spread disease to other animals. Hence segregation of infected animals should be done in proper way. Heavy mortality can occur during pandemic and disaster. Hence, disposal of carcass can be done properly by burning or burial method.
- **Livestock welfare activities:** It includes disposal of infected animals. If an animal is suffering from zoonotic disease, it needs to euthanize in a proper way to avoid spread of disease in human community. A veterinarian is well qualified and competent enough to take the decision of whether an animal should be euthanized or not. This action should be well justified by a veterinarian.

8. CONCLUSION

Equines play a significant role in generating livelihoods for their owners and equine farmer's community was adversely affected due to COVID-19 pandemic and subsequent lockdown. There was a great reduction in demand of work

for equines and there were remarkable impact of this pandemic on socio-economic aspects of respondents, resulting reduction in income from equines rearing. Equine welfare activities remained disturbed on large scale during pandemic and lockdown. Two government institutions are located in study area and roles of these institutes are very crucial. One is National Institution; ICAR-National Research Centre on Equines, Hisar (Haryana) India and another is State Veterinary University; Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar (Haryana). Department of Animal Husbandry, Fisheries and Dairying, Haryana can also play an important role in controlling such type of incidents if any disaster happens in future. Further, the Brooke India is an equine welfare organization, which works for welfare of equines and it can also play an important role. This situation further needs close monitoring including follow-up guidelines to explore long-term impact of the pandemic on equine sector in Haryana with help of above mentioned organizations. The current study is an attempt to visualize the situation in changed scenario and in raising awareness in assessing seriousness of the situation. There is a need for special financial packages to be made available for welfare of affected equines owners and addressing above mentioned issues by Haryana government.

CONSENT AND ETHICAL APPROVAL

Present study was a survey-based and did not require any ethics committee approval. However, prior to start interview, respondents were explained about the study and their consents were taken to conduct interviews.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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