DISSERTATION

AT

PUBLIC HEALTH FOUNDATION OF INDIA

Supported by

INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

POTENTIAL RISK FACTORS ATTRIBUTED TO OCCURRENCE OF BRUCELLOSIS IN DAIRY FARMERS OF PERI-URBAN AREA OF SOUTH-WEST DELHI

BY

Dr. NAVITA YADAV

PG/15/047

UNDER THE GUIDANCE OF

Dr. Sanjiv Kumar

Dr. Dhananjay srivastava

Dr. Divya Aggarwal

POST GRADUATE DIPLOMA IN HOSPITAL AND HEALTH MANAGEMENT

2015-17

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI

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PUBLIC
HEALTH
FOUNDATION
OF INDIA

The certificate is awarded to

Dr. Navita Yadav

in recognition of having successfully completed her dissertation on project

Potential risk factors attributed to occurrence of brucellosis in dairy farmers of peri-urban area of south-west Delhi

12th May 2017

Public Health Foundation of India

She comes across as a committed, sincere & diligent person who has a strong drive & zeal for learning

We wish him/her all the best for future endeavors.

Dr. Manish Kakkar
Senior Public Health Specialist,
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TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Dr. Navita Yadav** student of Post Graduate Diploma in Hospital and Health Management (PGDHM) from **International Institute of Health Management Research, New Delhi** has undergone dissertation at **Public health Foundation of India**, from 1st February 2017 to 30th April 2017.

The Candidate has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific and analytical. The Internship is in fulfillment of the course requirements. I wish her all success in all his future endeavors.

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Certificate from Dissertation Advisory Committee

This is to certify that Dr. Navita Yadav, a graduate student of the **Post- Graduate Diploma in Health and Hospital Management** has worked under our guidance and supervision. She is submitting this dissertation titled "POTENTIAL RISK FACTORS ATTRIBUTED TO OCCURRENCE OF BRUCELLOSIS IN DAIRY FARMERS OF PERI-URBAN AREA OF SOUTH-WEST DELHI" at "PUBLIC HEALTH FOUNDATION OF INDIA" in partial fulfillment of the requirements for the award of the **Post- Graduate Diploma in Health and Hospital Management**.

This dissertation has the requisite standard and to the best of our knowledge no part of it has been reproduced from any other dissertation, monograph, report or book.

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Certificate of Approval

The following dissertation titled "POTENTIAL RISK FACTORS ATTRIBUTED TO OCCURRENCE OF BRUCELLOSIS IN DAIRY FARMERS OF PERI-URBAN AREA OF SOUTH-WEST DELHI" at PUBLIC HEALTH FOUNDATION OF INDIA is hereby approved as a certified study in management carried out and presented in a manner satisfactorily to warrant its acceptance as a prerequisite for the award of Post Graduate Diploma in Health and Hospital Management for which it has been submitted. It is understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein but approve the dissertation only for the purpose it is submitted.

Dissertation Examination Committee for evaluation of dissertation.

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Name of the Student: Dr. Navita Yadav

Dissertation Organization: PUBLIC HEALTH FOUNDATION OF INDIA

Area of Dissertation: RCBP Program under Roadmap to Combat Zoonoses in India (RCZI)

Attendance: 100%

Objectives achieved: To identify the animal husbandry practices that contribute to risk of infection of brucellosis in small dairy farmers of southwest Delhi.

To identify the behavioural practices that contribute to infection of brucellosis in humans in human in small dairy framers of south west Delhi.

Deliverables: Identification of risk factors attribute to human brucellosis among the small dairy farmers in south west, Delhi.

Strengths: Willingness to learn, Receptive and Proactive attitude

Suggestions for Improvement: None

Suggestions for Institute (course curriculum, industry interaction, placement, alumni)

Signature of the Officer-in-Charge

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Project Coordinator

Roadmap to Combat Zoonosis in India Initiative

Public Health Foundation of India

INTERNATIONAL INSTITUTE OF HEALTH MANAGEMENT RESEARCH, NEW DELHI CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled POTENTIAL RISK FACTORS ATTRIBUTED TO OCCURRENCE OF BRUCELLOSIS IN DAIRY FARMERS OF PERI-URBAN AREA OF SOUTH-WEST DELHI and Dr. Navita Yadav Enrollment No. PG/15/047 under the supervision of Dr. Dhananjay Srivastava for award of Postgraduate Diploma in Hospital and Health Management of the Institute carried out during the period from 1st February 2017 to 30th April 2017. Embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other Institute or other similar institution of higher learning.

Dr. Navita Yadav

PG/15/047

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Abstract

Background: Brucellosis is one of the most common zoonotic disease globally. Hence a study was designed to identify the exposure to potential risk factors of brucellosis among the dairy farmers of south west Delhi.

Method: A cross sectional study was carried out in village Jhuljhuli of Najafgarh division of south-west Delhi, in the month Jan-April 2017. The study was done on 100 individuals through snowball sampling method. The participants were those who gave consent for the study and those who do maximum work of livestock. More focus was on adults as they are more involved in various activities of cattle. A semi structured questionnaire was used for data collection through interview. The quantitative data was analyzed using SPSS, additionally risk score was measured through 0-14 scale, where 0 means no risk and 14 meant at higher side of risk.

Result: On analysis it was found that out of 100 individuals only 36% responded that they get their animals vaccinated regularly, for treatment of their animals 70% of individuals treat the animal on their own, 72% individuals said that their animal had cases of abortion in the last one year, 57% of study population consume raw milk at their home on different occasions for different or no reason, 100% respondents said that they assist their animals during reproduction without using protective gloves. Risk scoring came out with maximum score of 12 out of 14 and minimum 3. Whereas mean score was 8.08 with standard deviation 1.835.

Conclusion: The study concludes that animal husbandry practices such as keeping animals in close proximity of humans during sleep, irregular vaccination of cattle, contact of animals with other animals during grazing or watering, treating animals on their own when they fall sick and assistance during reproduction without wearing protective gloves are contributing to risk of brucellosis among the community of village Jhuljhuli. Dietary practices such as consumption of

raw milk is contributing to risk of brucellosis among the community. The women were found responsible for milking whereas men responsible for reproduction assistance.

Recommendations: The study recommends that socio-cultural and behavioral risk factors for human brucellosis, be incorporated into IEC material of current programs on zoonotic diseases. Sensitization, awareness creation campaigns, that include potential risk factors for brucellosis, be carried out among the community of Najafgarh division.

Acknowledgements

Every project big or small is successful largely due to the effort of a number of wonderful people who have always given their valuable advice or lent a helping hand. I sincerely appreciate the inspiration; support and guidance of all those people who have been instrumental in making this project a success.

I Dr. Navita Yadav, the student of IIHMR, Delhi, am extremely grateful to "Public Health Foundation Of India & International Livestock Research Institute, Kenya" for the confidence bestowed in me and entrusting my project entitled "Potential risk factors attributed to occurrence of brucellosis in dairy farmers of peri-urban area of south-west Delhi".

At this juncture I feel deeply honored in expressing my sincere thanks to **Dr. Abhimanyu Singh Chauhan , Dr. Jessy & Dr. Anjana Tomar (Project Coordinator),** from PHFI & **Dr. Johanna** from ILRI for making the resources available at right time and providing valuable insights leading to the successful completion of my project.

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Last but not the least I place a deep sense of gratitude to my family members and my friends who have been constant source of inspiration during the preparation of this project work.

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List of Symbols and Abbreviations

SEID: Systemic exertion intolerance disease

WHO: World health organization

CDC: Centers for disease control

ELISA: Enzyme linked immune sorbent assay

NCT: Statistical package for social sciences

IEC: Information education communication

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CHAPTER ONE

BACKGROUND OF STUDY

1.1 Introduction

Brucellosis**,** also known as "undulant fever", "Mediterranean fever" or "Malta fever" is a zoonosis and the infection is almost invariably transmitted by direct or indirect contact with infected animals or their products. It affects people of all age groups and of both sexes. Although there has been great progress in controlling the disease in many countries, there still remain regions where the infection persists in domestic animals and, consequently, transmission to the human population frequently occurs. It is an important human disease in many parts of the world especially in the Mediterranean countries of Europe, north and east Africa, the Middle East, south and central Asia and Central and South America and yet it is often unrecognized and frequently goes unreported. There are only a few countries in the world that are officially free of the disease although cases still occur in people returning from endemic countries. (1)

Brucellosis is an infectious zoonotic disease that is associated with chronic debilitating infections in humans and reproductive failure in domestic animals. It is still an important public health problem throughout the world, but principally, and in particular, in the Mediterranean region, including Iran, Turkey, the Arabian Peninsula, the Indian subcontinent, Mexico, and parts of Central and South America. (2)

1.2 General Objective

To identify the exposure to potential risk of Brucellosis among dairy farmers of South-West Delhi.

1.3 Specific Objectives

a) To identify the animal husbandry practices that contribute to risk of infection of Brucellosis in small dairy farmers of southwest Delhi.
b) To identify the behavioural practices that contribute to infection of Brucellosis in humans in human in small dairy framers of south west Delhi.

1.4 Research Question

What are the potential risk factors attributed to occurrence of Brucellosis in dairy farmers of peri-urban area of south-west Delhi?

1.5 Scope and limitations of study

- This study provides information of risk practices among dairy farmers of south west Delhi, hence an indication of how their interaction with their livestock can present risk factors for Brucellosis.

- The sample size calculation was conveniently taken also the sampling method was also non probability sampling hence the results can't not be generalized.

- The study only included questionnaire there was no observational checklist for checking the practices really done or not, hence there may be chances of bias.

CHAPTER TWO

LITERATURE REVIEW AND THEORITICAL FRAMEWORK

2.1 Literature Review

World Health Organization defines zoonoses as diseases and infections that are naturally transmitted between vertebrate animals and humans. A zoonotic agent may be a bacterium, a virus, a fungus or other communicable diseases. Zoonotic diseases represent one of the leading causes of illness and death from infectious disease. The poor in every society and particularly in developing countries bear a disproportionately high share of the burden of disease. The poor are more at risk of contracting many zoonoses because of the strong association between poverty and living in close contact with animals, the reservoirs of disease. It is the poor who are least likely to get proper treatment once infected. Most have to do with the sheer difficulty of obtaining a correct diagnosis, reflecting not just the lack of diagnostic facilities or cheap and effective tests but also the fact that zoonosis are mostly contracted by remote rural populations for whom the cost of repeated trips to health centres in search for treatment or diagnosis eventually becomes prohibitive. (1)

2.1.1 Brucellosis in humans

Brucellosis, popularly called Malta fever, undulant fever or Bang's disease, to mention merely a few of many names, is listed by the World Health Organization as a neglected zoonosis.(3)

2.1.2 Risk factors for Brucellosis

Certain occupations are associated with a high risk of infection with brucellosis due to direct contact with infected animals or exposure to a heavily contaminated environment. These include, people who work with farm animals, farmers, farm labourers, animal attendants, shepherds, sheep shearers, pig keepers, veterinarians and inseminators.(4)

The families of farmers and animal breeders may also be at risk as domestic exposure may be inseparable from occupational exposure when animals are kept in close proximity to living quarters. In some areas, the animals are kept in the yards of houses and may even be brought inside, especially in severe weather. In the case of recently aborted animals, this has resulted in infection of entire households (4). The use of dried dung as a fuel may also import infection into households. Tourists or business travellers to endemic areas may acquire brucellosis, usually by consumption of unpasteurized milk or other dairy products(1). Frequent travelling across the world in exchange for knowledge and expertise may predispose travellers

2.1.3 Sources of Brucellosis infection

The key sources of infection for humans are the major food-producing animals cattle, sheep, goats, pigs. The possible means of acquisition of brucellosis include: person-to-person transmission, transmission to attendants of brucellosis patients and laboratory workers processing samples from patients. Infection from a contaminated environment; Infected animals passing through populated areas or kept in close proximity to housing may produce heavy contamination especially if abortions occur. Inhalation of the bacteria may result from exposure to contaminated dust or dried dung. Contact infection may also result from contamination of skin or conjunctivae from soiled surfaces. Water sources, such as wells, may also be contaminated by recently aborted animals or by run-off of rain water from contaminated areas.(1)

2.1.4 Sign and symptoms of Brucellosis in humans

General symptoms of brucellosis are often vague and similar to the flu. They may include:

- Fever (the most common symptom, with high "spikes" that usually occur in the afternoon)
- Back pain
- Body-wide aches and pains

- Poor appetite and weight loss
- Headache
- Night sweats
- Weakness
- Abdominal pain
- Cough

Symptoms usually appear within five to 30 days after you come in contact with the bacteria.

Severe brucellosis may cause:

- Infection of the central nervous system
- Endocarditis (infection of the lining of the heart or valves)
- Liver abscess

Brucellosis can cause long-lasting symptoms that are similar to systemic exertion intolerance disease. SEID is formerly known as Myalgia Encephalomyelitis/Chronic Fatigue Syndrome. The symptoms can lead to disability. They may include:

- Fatigue
- Fevers that come and go
- Joint pain

Brucellosis in a pregnant woman may lead to:

- Miscarriage

- Birth defects in the baby

Death from brucellosis is uncommon. Most brucellosis-related deaths are due to endocarditis.(5)

2.1.5 Diagnosis of Brucellosis in humans

Brucellosis is diagnosed preliminarily by the patient's history of exposure to likely sources of *Brucella* bacteria and the patient's clinical symptoms. Confirmation of the diagnosis is made by culturing *Brucella* bacteria from the patient. In addition, there are serological tests for the organisms done on the patient's blood specimens. These tests look for IgM or IgG antibodies directed against the bacteria. However, the CDC recommends that these tests be confirmed by a *Brucella*-specific agglutination test, a specific test that is usually run by a specialty laboratory. Diagnosis of brucellosis relies on demonstration of the agent: blood cultures in tryptose broth, bone marrow cultures. It is important to note that the culture poses a risk to laboratory personnel due to high concentrations of brucellae. Indirect tests include demonstration of antibodies against the agent either with the classic Huddleson, Wright and/or Bengal Rose reactions, either with ELISA or the 2-mercaptoethanol assay for lgM antibodies associated with chronic disease.(1) Diagnosis can also rely on histologic evidence of granulomatous hepatitis.(5)

2.1.6 Treatment of human Brucellosis

The essential element in the treatment of all forms of human brucellosis is the administration of effective antibiotics for an adequate length of time. Patients and their families should be reassured that full clinical and bacteriological recovery is usual in human brucellosis.(1) According to the CDC, doxycycline (Vibramycin, Oracea, Adoxa, Atridox) and rifampin (Rifadin) are the recommended antibiotics, taken in combination, for a minimum of six to eight weeks to treat infected patients. This long treatment time is due to the organism's ability to survive inside human cells; consequently, the CDC recommends that a firm diagnosis be established before long-term antibiotic treatment is begun. Individuals who are immunosuppressed and pregnant patients, in most cases, should be treated in consultation with an infectious-disease specialist.(5)

2.1.7 Prevention of human Brucellosis

To reduce the risk of infection, personal hygiene must be observed, adoption of safe working practices, protection of the environment and food hygiene. Farm workers and animal attendants in particular, should wear adequate protective clothing when in contact with infected animals that are aborting or giving birth, when the shedding of Brucella organisms will reach maximum levels.(1) Aborted foetuses, placenta and contaminated litter should be collected in leak-proof containers and disposed of preferably by incineration. Children should be prevented from having contact

with newborn animals or those that have recently aborted or given birth. Consumption of raw milk, blood or uncooked meat should be discouraged. For the general population which does not have direct contact with animals, the greatest potential source of brucellosis is through consumption of unpasteurized milk and dairy products. Meat may also be a significant source of infection, especially in cultures where the consumption of raw or undercooked meat products is favoured. Boiling or high temperature pasteurization will kill Brucella in milk.(1) Ideally all milk produced in areas in which brucellosis is present should be pasteurized. This should apply to all milk for human consumption, whether to be drunk without further processing or to be used for making other food products. However, in some cultures, raw or undercooked meat may be eaten through choice. This practice and the consumption of fresh blood, either alone or mixed with milk, should be discouraged.(1)

An overview on Brucellosis presented at the 1st International Conference on Emerging Zoonosis held in Jerusalem, Israel in June 1997, recommended that prevention of brucellosis in humans depends on the eradication or control of the disease in animal hosts, the exercise of hygienic precautions to limit exposure to infection through occupational activities, and the effective heating of dairy products and other potentially contaminated food.(4)

A review on control and prevention of Brucellosis in Africa, discusses the effective control of brucellosis through a combination of improvement in diagnosis, vaccination and treatment, together with measures to increase awareness, and improved farm sanitation and food hygiene. Collectively these will increase the

effect of control measures and lessen the burden of the disease. Epidemiological evidence emphasizes the need for detailed knowledge about the disease and community support for its effective control.(4)

A recent study in rural northern Tanzania,(4) reveals that while contact with products of conception has been shown to be a risk factor for brucellosis transmission in other places, closeness of households in livestock keeping communities and the social background have not been documented as important risk factors for brucellosis transmission. This study indicates that health education on ways to prevent brucellosis transmission through preventative measures such as protective clothing like gloves especially when assisting animal deliveries, should be given priority. Importance of increasing awareness even to those who did not keep livestock on the potential of acquiring brucellosis from their neighbour's livestock through contact with infected products was emphasized.

A study carried out in Kenya (4) Narok district, shows that Brucellosis has not been diagnosed much in humans in Kenya. However there is increasing awareness on the zoonosis situation. Brucellosis patients who are not tested are mostly treated for other diseases, mainly malaria. The study showed that accurate clinical diagnosis of flu-like diseases was difficult. However there was need for more studies to be done to identify prevalent species of *brucella* in order for effective control of brucellosis in Narok.

The true incidence of human Brucellosis however, is unknown for most countries and no data are available for India. It is expected that the control measures that are

now being instigated have become effective. It has been estimated that the true incidence may be 25 times higher than the reported incidence due to misdiagnosis and underreporting. Several publications indicate that human brucellosis can be a fairly common disease in India.(6) Hence there is a need of study for identifying the potential behavioural risk factors for developing Brucellosis in those who handles cattle.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This section is divided into different sections covering, the research site; research design; study population; methods of data collection; analysis and ethical consideration.

3.2 Site selection and description

3.2.1 Administrative and physical description

This study was carried out in Jhuljhuli village of Najafgarh division of south-west Delhi. South West Delhi is one of the eleven administrative districts of the National Capital Territory of Delhi in India. The Sub-city of Dwarka serves as the administrative headquarters of South West Delhi. The District is composed of three Sub-Divisions; Vasant Vihar, Najafgarh and Delhi Cantonment. The south west Delhi is comprised of urban and peri urban areas with a population of 2292363(census2011), literacy rate 88.81%, population density 5445, area 421 sq km. The Najafgarh division comprises of 39 villages, out of which Jhuljhuli village

was selected for the study. Jhuljhuli is a village situated in Najafgarh tehsil of South West district in Delhi. As per the Population Census 2011, there are total 300 families residing in the village Jhuljhuli. The total population of Jhuljhuli is 1,662 out of which 884 are males and 778 are females thus the Average Sex Ratio of Jhuljhuli is 880.

FIG 3.1 Map of study area

Source: www.google.co.in

3.2.2 Situation analysis

Amongst the three subdivisions of south west Delhi, Najafgarh is highly comprised of peri-urban population which is having 39 villages. This is the area which houses maximum livestock; hence this area has been selected for the study. Najafgarh is located at 28.60°N 76.98°E in South West Delhi district in the NCT of Delhi.

Najafgarh is situated 29 km south-west of the New Delhi City Centre and 10 km north-west to the district headquarters at Dwarka.

3.2.3 Research design

This was a descriptive cross sectional study.

3.2.4 Study population

The study population was livestock keeping households, the person who spend maximum time with cattle were approached to participate in providing answer for the research instrument. The focus was on adults because of their experiences with the daily activities in the community in relation to animal husbandry, behavioural practices would come out clearly.

3.2.5 Sample size and sampling procedure

Sample size of 100 households taken conveniently. Snowball sampling method was used for data collection. The interviewer visited the area along with the questionnaire and those who were willing to participate and fulfilled inclusion criteria of the study were interviewed (Within the household, person who is involved in various activities of handling cattle, milking, cleaning and other works

would be a major participant).

A pilot and re pilot study was done before data collection. After which necessary changes were made in study seeing the community religious belief and practices.

3.2.6 Method of data collection

The method of sampling was through an interview with the help of a questionnaire.(4) This questionnaire (appendix II) was composed of both open ended and close ended questions. Questionnaire included socio demographic factors, various animal husbandry practices such as vaccination of cattle, proximity of animals with humans at night, handling of aborted material and retained placenta, assistance in reproductive procedures, contact of cattle with other animals during grazing, person involved in milking, gender roles and responsibility.

Additionally the way in which milk is consumed was also assessed, specifically the frequency of consumption of these products.

3.2.7 Data management and analysis

The study used quantitative method of data collection the quantitative data from field was edited and screened for errors and omission, accuracy, uniformity and completeness and then arranged to enable coding and tabulation before statistical analysis was carried out. The analysis was performed using the SPSS computer

software to generate frequencies and percentages displayed using tables and graphs.

Additionally risk scoring was also done form 0-14 where 0 means no risk and 14 means on higher side of risk. Each risky practise was assigned 1 mark if they are doing that practice and 0 if they are not doing the same.

3.2.8 Encountered problems and solution

The study was conducted in the village which is near to Haryana, where the local language in Haryanvi, for this reason, one local assistant was used for translation during the discussion wherever needed.

3.2.9 Ethical consideration

Explanation was given to the respondents concerning confidentiality before the interview commenced.

CHAPTER FOUR

RESULTS

4.1 Introduction

This section include the various results came out of the analysis done through SPSS using frequencies and risk scores.

4.2 Master table after analysis:

Response rate : 100/107*100= 93.74%

S No	Question	Category	N=100	%
	A. Personal information			
1.	Age	20-30	18	18
		31-40	36	36
		41-50	29	29
		51-60	15	15
		61-70	2	2
2	Sex	Male	6	6
		Female	94	94
3	Religion	Hindu	100	100
4	Marital status	Married	97	97
		Widow	3	3
5	Occupation	Farmer	5	5

		Homemaker	80	80
		Laborer	1	1
		Milk vendor	10	10
		Tailor	4	4
6	Education	None	24	24
		Primary incomplete	14	14
		Primary incomplete	28	28
		Secondary incomplete	11	11
		Secondary complete	21	21
		Tertiary	2	2
7	Socio-economic status	Lower	10	10
		Lower middle	17	17
		Middle	25	25
		Upper middle	47	47
		Upper	1	1
8	Diet	Veg	86	86
		Non veg	14	14
	B. Animal husbandry practices			

1	If you buy new cattle, do you take any action to assure it is healthy?	Yes	45	45
		No	55	55
2	If yes for above question, what action do you take for assuring that cattle is healthy?	Use more experienced people in village	44	44
		Use veterinary inspection	1	1
3	Do you get your cattle vaccinated regularly?	Yes	34	34
		No	66	66
4	Who mainly does the milking of animals in your household?	Men	21	21
		Women	79	79
5	What action do you take if your cattle are sick/shows signs of disease?	Sell the animal in market	11	11
		Sell the animal directly to the Butcher	0	0
		Always call veterinarian	19	19
		Treat on own	70	70
6	Have you had cases of abortions in your cattle in the last 1 year?	Yes	72	72
		No	28	28
7	How do you handle aborted material?	Buried	84	84

		Throw out	1	1
		Don't know	15	15
8	What do you do with dead cattle foetuses?	Bury	72	72
		Call veterinarian	11	11
		Throw out	3	3
		Don't know	14	14
9	In the last 1 year, have you had any cases of retained placenta after abortions?	Yes	9	9
		No	91	91
10	Do your livestock have contact with other peoples' livestock during grazing and/or watering?	Yes	47	47
		No	53	53
	C. Risk factors of brucellosis			
1	Do we have occasions when raw milk is taken?	Yes	57	57
		No	43	43
2	If yes, on what occasion raw milk is taken	Daily	16	16
		When gastric problems	8	8
		Dot know	33	33
3	For what reason do you consume raw milk?	For good taste	23	23
		For gastric complaints	8	8
		Don't know	26	26

4	Do you keep your animals close to your sleeping area overnight?	Yes	44	44
		No	56	56
5	Do you assist your animal during reproduction?	Yes	100	100
		No	0	0
6	Who assist your animal during reproduction?	Men	47	47
		Women	7	7
		Any available person	46	46
		Always call doctor	0	0
7	During assistance of reproduction in your animals do you put on protective gloves?	Yes	0	0
			100	100
8	Do you share water source with animal's water source?	Yes	9	9
		No	91	91
9	Do you consume animal urine?	Yes	20	20
		No	80	80

4.1 Master table after analysis

4.3 Key Findings:

4.3.1 Animal husbandry practices:

a) Action taken before buying new animal: Out of 100 participants only 45 participants answered that they take any action before buying new cattle. Out of

which 97.77% individuals take advice from elderly and experienced persons of the village. Only 2.33% get the animal inspected by veterinary doctor.

b) Vaccination of cattle:

66% percent of the total population doesn't get their cattle vaccinated regularly.

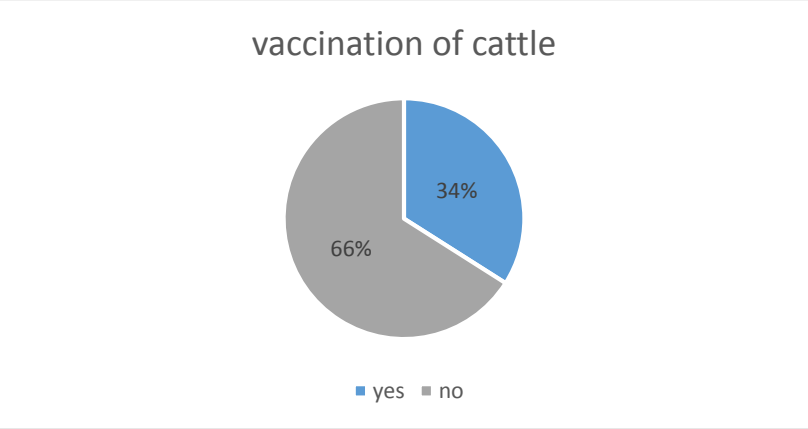

Fig 4.1 Vaccination of cattle

c) Action taken when animal is sick:

The following figure shows the various actions taken by the community when their animals fall sick along with the percentage for each action.

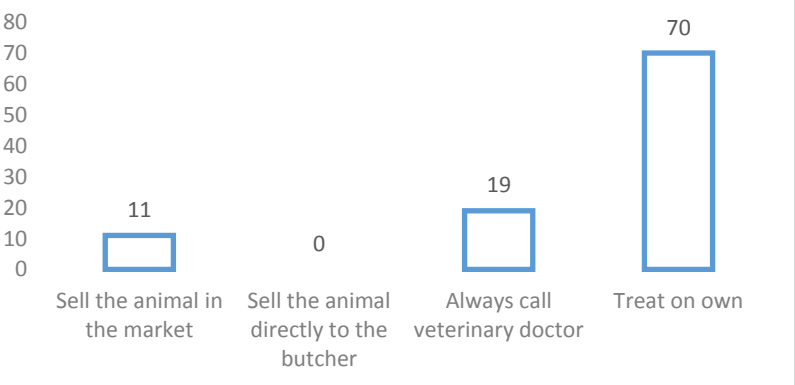

Fig 4.2 Action taken when animal fall sick

Majority of population treat the animal through their own home remedies and only 19% of study population consult veterinary doctor.

4.3.2 Behavioral practices and dietary practices:

a) Consumption of raw milk:

57% of study population consume raw milk for various reasons on various occasions, listed below with percentage.

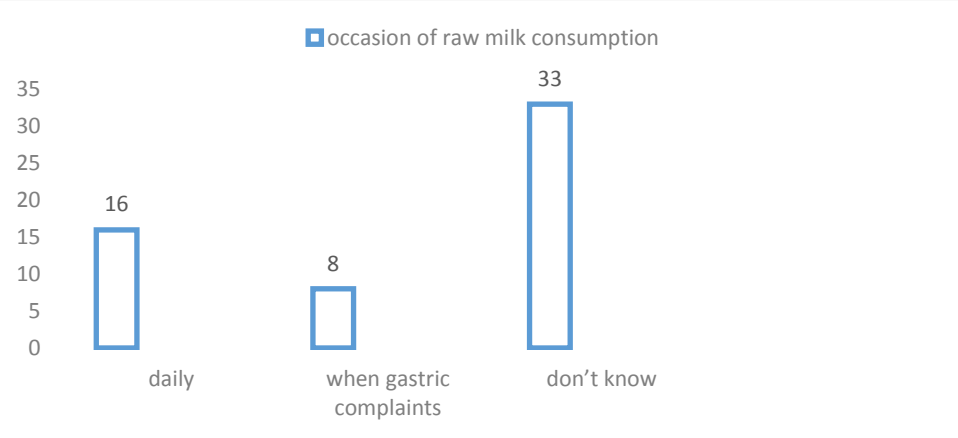

Fig 4.3- Occasions of raw milk consumption

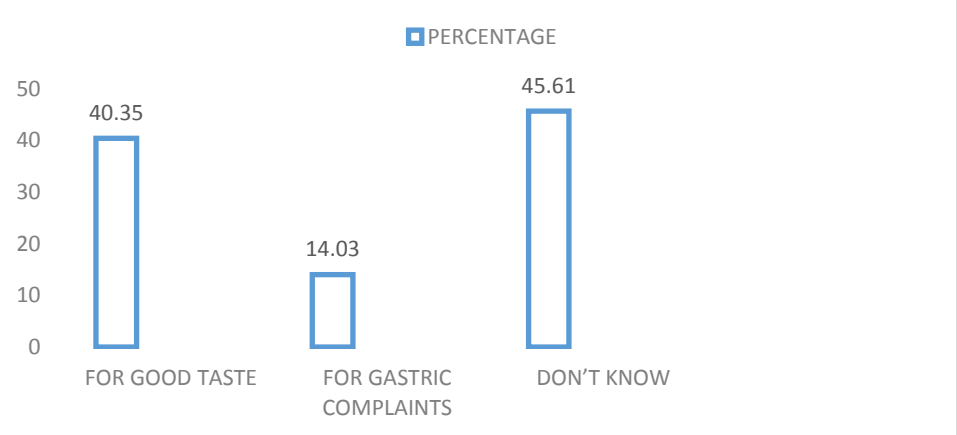

FIG 4.4- Reasons of raw milk consumption

b) Proximity of cattle with human's sleeping area over night:

44% of participants responded that they keep their animals close to their sleeping area during night.

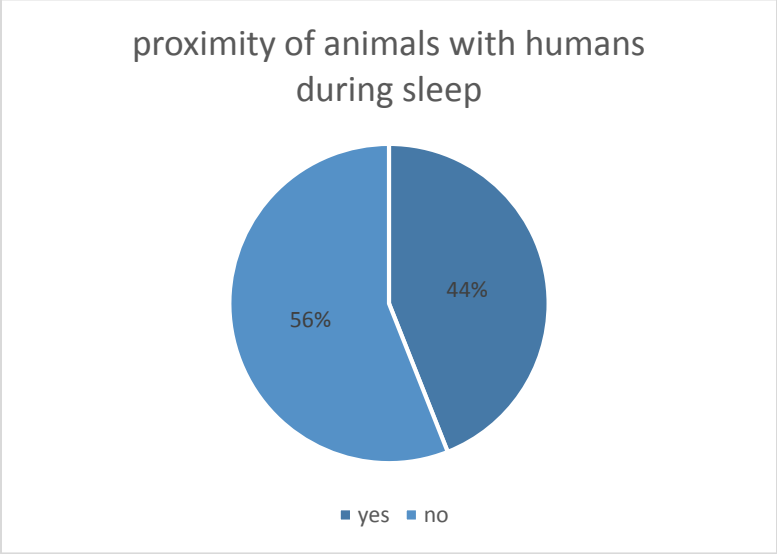

Fig 4.5 Proximity of animals with humans

c) Assistance during reproduction:

All respondents answered yes when they asked that, do they assist their animals during reproduction. And all of them said they don't put on protective gloves during assistance of reproduction in their animals.

4.3.3 Gender roles and responsibilities:

a) Milking of animals:

It was clear after analysis that milking of animals is majorly done by females.

Responses of respondents for milking of cattle has been shown below in table.

S No.	Milking of animal by:	Number(100)	Percentage
1	Men	21	21
2	Women	79	79
3	Girls	0	0
4	Boys	0	0

Table 4.2- Milking responsibility

b) Assistance in reproduction:

When the individuals were asked about who does the assistance of animals during reproduction major responses were that male do the assistance during reproduction. The various responses for the same question are shown below.

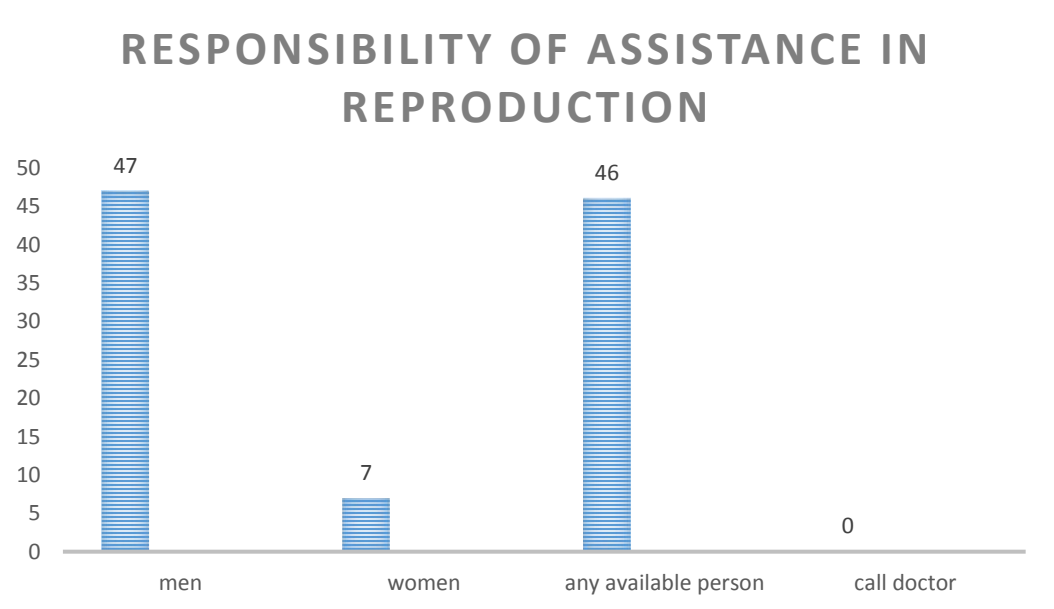

FIG 4.6- Responsibility of assistance during reproduction

4.5 Risk score

Risk scoring was done according to 0 and 1 score. 0 for no risk and 1 for practicing risky practices. From the questionnaire 14 such questions were chosen for risk scoring like, consumption of raw milk, animal urine, proximity of animals during sleep, assistance during reproduction, use of protective gloves during assistance in reproduction of animals, sharing of water sources of animals with humans, contact of animals with other animals outside during grazing or watering, vaccination of cattle, assurance of healthy cattle before buying, action taken when animal fall sick, handling of aborted material and handling of dead fetuses.

a) Mean score:

Shown in table:

Descriptive analysis	
Maximum score	12
Minimum score	3
Mean score	8.08
Standard deviation	1.835

Table 4.3- Descriptive analysis of risk score

b) Classification of risk score:

For comparative analysis of scores in different groups the percentage score has been divided into majorly three categories i.e.

Category	**Percentage range**
Category I	0%-50%
Category II	50.01%-75%
Category III	75.01%- 100%

Table 4.4- Categorization according to score

The frequencies of three different categories has been shown below in figure.

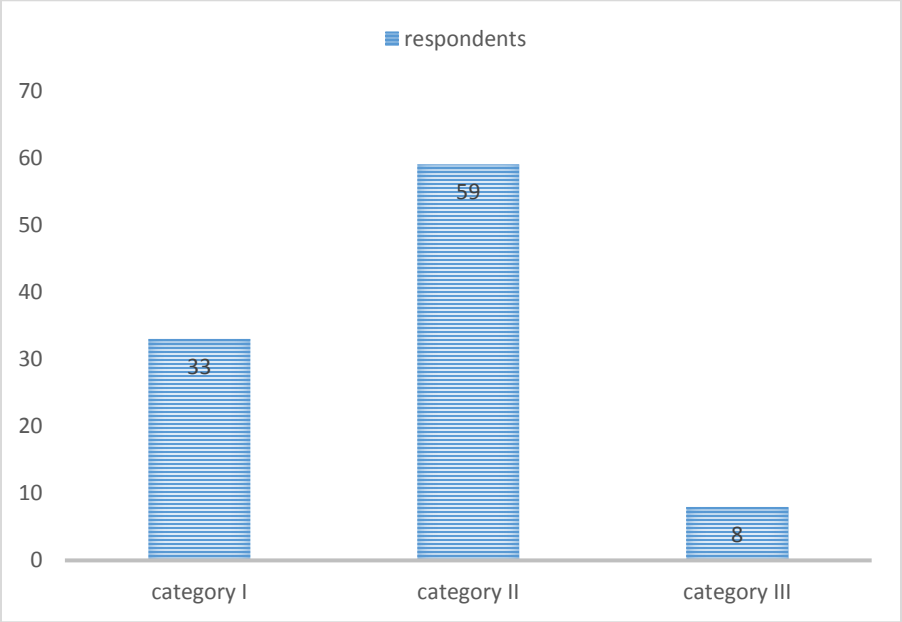

FIG 4.7- No. of respondents in each score category

c) Compare means:
Mean score were compared among the following variables such as, age, sex, occupation, education and socio-economic status.

The graphical representation of compare means is shown below:

i) Age compare mean risk score:

Age of respondent	Mean	Number
20-30	8.22	18
31-40	8.00	36
41-50	8.10	29
51-60	8.00	15
61-70	8.50	2
Total	8.08	100

Table 4.5- Mean score compare age

ii) Sex compare mean score:

Sex of respondent	Mean	Number
Male	8.64	14
Female	7.99	86
Total	8.08	100

Table 4.6- Mean score compare sex

iii) Occupation compare mean:

Occupation of the respondent	Mean	Number
Farmer	8.20	5
Homemaker	7.96	80
Laborer	9.00	1
milk vendor	8.70	10
Tailor	8.50	4
Total	8.08	100

Table 4.7- Mean score compare occupation

iv) Socio-economic status compare mean:

Socio-economic status	Mean	Number
lower status	8.40	10
lower middle	8.00	17
Middle	7.92	25
upper middle	8.04	47
Upper	12.00	1
Total	8.08	100

Table 4.8- Mean score compare occupation

v) Education level and mean score:

Education of respondent	Mean	Number
None	8.17	24
primary incomplete	8.36	14
primary complete	7.96	28
secondary incomplete	7.55	11
secondary complete	8.19	21
Tertiary	8.50	2
Total	8.08	100

Table 4.9- Mean score compare education level

Inference: comparing mean score with socio demographic profile didn't shown any marked difference in mean score of any category.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section presents the discussion of the findings on the socio-cultural, dietary, behavioral risk factors and gender roles and responsibilities attributed to human brucellosis in southwest Delhi. Conclusion and Recommendations are also included.

5.2 Discussion

The main theme of discussion in the subsections are animal husbandry practices, behavioral and dietary practices and gender roles and responsibilities.

It is a zoonosis and the infection is almost invariably transmitted to people by direct or indirect contact with infected animals or their products. (1)

5.2.1 Animal husbandry practices:

Selection of health animal before purchase:

In a study conducted in Punjab (India) in 2014, it was reported that, Careful selection of animals before purchase from *Brucella*-free herds, pre-purchase tests and quarantine needs to be followed to keep the herd free of brucellosis. (7)

Similarly in the current study it was found that people never get any pre-purchase test done before selection of animal before purchase.

Vaccination of animals:

The current study reveals that people do not vaccinate their animals on regular basis which could lead to increased risk of brucellosis and other zoonotic diseases.

Assistance of animals during reproduction:

The current study concludes that assistance of animals during reproduction without wearing protective gloves by the community as a major factor which may lead to human brucellosis.

FIG 5.1- showing contact of animals with other animals

5.2.2 Behavioral and dietary practices:

Consumption of raw milk:

There many studies which supports that consumption of raw dairy products is one of the major risk factor of developing brucellosis in humans.

Also it was seen in current study that majority of study population consumes raw milk for any reason or no reason**.**

5.2.3 Gender roles and responsibilities:

A study conducted by Alusi (4) reveals that males are responsible for assistance of animals during reproduction whereas female have major role in performing daily work of animals including milking of animals.

Fig 5.2- Showing female milking cattle

Similar finding was seen in the current study that the majority of study population was females and were involved in daily activities of livestock. Males are more responsible for assistance in reproduction of cattle.

As the ultimate source of human brucellosis is direct or indirect exposure to infected animals or their products, prevention must be based on elimination of such contact. The obvious way to do this – elimination of the disease from animals – is often beyond the financial and human resources of many developing countries. (1)

5.3 Conclusion

The study concludes that animal husbandry practices such as keeping animals in close proximity of humans during sleep, irregular vaccination of cattle, contact of animals with other animals during grazing or watering, treating animals on their own when they fall sick and assistance during reproduction without wearing protective gloves are contributing to risk of brucellosis among the community of village Jhuljhuli. Dietary practices such as consumption of raw milk is contributing to risk of brucellosis among the community. The women were found responsible for milking whereas men responsible for reproduction assistance.

5.4 Recommendations

- A study should be carries out with appropriate sample size calculation and probability sampling method, so that generalization of results can be done.
- Another study can be conducted using a standardized tool to access the risk factors can be conducted.
- Socio cultural and behavioral facts of human brucellosis should be incorporated into IEC material of currently running programs of zoonotic diseases.
- The sensitization and awareness creation campaigns that includes potential risk factors of human brucellosis as well as other zoonotic diseases should be carried out in the community.

Appendix

Appendix I

CONSENT

My name is Dr. Navita Yadav, a student of International Institute of Health Management research, Dwarka, Delhi. I am doing research on Potential risk factors attributed to occurrence of brucellosis in dairy farmers in this area. This questionnaire seeks to get information from you about your knowledge on this disease. The purpose of this activity is to establish how you practice your animal husbandry & how you handle your animal products The information obtained will be used to understand how best to handle the animals and products to avoid contacting of the disease in future. This information you provide and photographs taken will be treated with confidentiality, and is purposely for this study.

If you accept to participate in this study,

Please sign here……....…… Date……..

Appendix II

Questionnaire

RID.....

A. Background Information

Name (head of the family)..... Mobile no.....

Name of Respondent (Optional)……

1. Sex..... Age…… religion……. Marital status…… occupation.....

Diet- veg/non-veg

2. What is the highest level of education attained by the respondent?

0. None

1 Primary Incomplete

2. Primary complete

3. Secondary incomplete

4. Secondary complete

5. Tertiary

3. Modified Kuppuswamy's score (2015) for socioeconomic status.(8)

	Score
c) Education	
Professional or Honors	7
Graduate or Post-Graduate	6
Intermediate or Post-High-School Diploma	5
High School Certificate	4
Middle School Certificate	3
Primary School or Literate	2
Illiterate	1

ii) Occupation

Profession	10
Semi-Profession	6
Clerical, Shop-owner, Farmer	5
Skilled worker	4
Semi-skilled worker	3
Unskilled worker	2
Unemployed	1

*iii) Family Income Per Month (in Rs)**

>39020	12
19510-39019	10
14633-19509	6

9755-14632	4
5853-9754	3
1971-5852	2
<1970	1

Total score	Socioeconomic class
26-29	Upper
16-25	Upper middle
11-15	Middle
5-10	Lower middle
<5	Lower

B. Animal husbandry practices

4. If you buy new cattle, do you take any action to assure it is healthy?

1. Yes

2. No

5. If yes for above question, what action do you take for assuring that cattle is healthy?

1. Use more experienced people in village

2. Use veterinary inspection

6. Do you get your cattle vaccinated regularly?

1. Yes

2. No

7. Who mainly does the milking of animals in your household?

1. Men

2. Women

3. Girls

4. Boys

8. What action do you take if your cattle are sick/shows signs of disease?

1. Sell the animal in market

2. Sell the animal directly to the Butcher

3. Always call veterinarian

4. Treat on own

9. Have you had cases of abortions in your cattle in the last 1 year?

1. Yes

2. No

10. How do you handle aborted material?

1. Buried

2. Burnt

3. Throw it out

4. Don’t know

11. What do you do with dead cattle fetuses?

1. Bury

2. Call veterinarian

3. Throw out

4. Burn

5. Don´t know

12. In the last 1 year, have you had any cases of retained placenta after abortions?

1. Yes

2. No

13. Do your livestock have contact with other peoples' livestock during grazing and/or watering?

1. Yes

2. No

C. Risk Factors for Brucellosis

14. Do we have occasions when raw milk is taken?

1. Yes

2. No

15. If YES in, during what occasions is raw milk taken?

…….....

16. Why is raw milk taken during the above occasions?

……

17. Do you keep your animals close to your sleeping area overnight?

1. Yes

2. No

18. Do you assist your animals during reproduction?

1. Yes

2. No

19. If yes, who does the assistance of animals during reproduction?

1. Men

2. Women

3. Any available person

4. Always call veterinarian

20. During assistance of reproduction in your animals do you put on protective gloves?

1. Yes

2. No

21. Do you share water source with animal's water source?

1. Yes

2. No

22. Do you consume animal urine?

1. Yes

2. No

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