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Overview Leptospirosis in Agricultural: Literature Review

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Abstract:
The spread of leptospirosis worldwide shows a high incidence rate. The disease is transmitted through the urine of animals infected with leptospira bacteria. Factors that can affect the incidence of leptospirosis are gender, age, uncovered food storage, the presence of rats, the presence of pets and contact with standing water. The writing method used is literature review. The literature search used Google Scholar, PubMed, and ScienceDirect databases with the period 2019-2023. The results of a review of 10 national and international journal articles show that leptospirosis has considerable potential for farmers because the spread occurs directly through blood or urine containing germs into the human body, and indirect transmission can occur through stagnant water, rivers, lakes, drains, and mud contaminated by animal urine. The harmful effects of spreading leptospirosis in an agricultural environment can lead to infection in humans and livestock. Early symptoms in humans include fever, headache, and nausea. If not treated promptly, the disease can progress to a more serious and potentially life-threatening condition. Therefore, the role of nurses in monitoring the health of farm animals and educating farmers on preventive measures is crucial in maintaining animal health and keeping the agricultural sector sustainable.

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INTRODUCTION

As globalization increases, climate change, and urban expansion, the increasing number of emerging infectious diseases is a major concern. Among emerging infectious diseases, more than 60% are multi-host zoonoses, many of which are classified as "neglected" due to their lack of knowledge of their epidemiology, especially in the tropics (Rupasinghe et al., 2022). Perhaps the most widespread neglected zoonotic disease in the world is leptospirosis, which has an estimated annual global incidence of 1.03 million human cases with a projected number of 60,000 as fatal. The incidence due to leptospirosis becomes neglected because the symptoms do not show a significant inflammatory reaction, farmers tend to consider the reaction caused to be a natural or normal reaction (Benavidez et al., 2019).

Agriculture is an activity to cultivate food plants that can be used for human benefit (Kurniyawan et al., 2023a). Agriculture is generally known as farming, simplification of nature's food webs and rechanneling of energy for human planting and animal consumption. Indonesia is an agricultural country with a tropical climate and the work of most of the population is in the agricultural, plantation, marine, and industrial sectors (Porusia et al., 2021). Most of the rural workforce in Indonesia works in the agricultural sector, which poses a risk of health problems due

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to farmers' interaction with the environment (Afandi et al., 2023). Diseases that can attack farmers come from various fields such as the environment, psychology, work safety, infectious diseases and dangerous animals (Kurniyawan et al., 2023b). Agronursing is a holistic and comprehensive client-oriented service and service management in the agricultural sector (Kurniyawan et al., 2023c).

Leptospirosis is a zoonotic and waterborne disease worldwide. Leptospira is in included in infectious agents because leptospira are bacteria where infectious agents consist of 5 types, there are bacteria, fungi, parasites, worms, and fungi. infectious agents are organisms that are capable of producing infection or infectious diseases. Leptospira is neglected, reemerging disease of global public health importance with respect to morbidity and mortality both in humans and animals. Due to negligence, rapid, unplanned urbanization, and poor sanitation, leptospirosis emerges as a leading cause of acute febrile illness in many of the developing countries (Rejeki et al., 2013).

Leptospirosis is a bacterium that multiplies and lives in soil and also water, these bacteria can survive for months in dry soil. Leptospira bacteria infect through open skin wounds, humans can become infected with leptospira after exposure to soil or water contaminated with animal urine containing leptospira bacteria, rodents often become reservoirs (Pintea et al., 2022). However, not only in mice, but some farm animals also have the possibility to be exposed to leptospira bacteria, some of which are pigs and cows. Thus, it is necessary to vaccinate some animals to prevent and reduce the incidence of leptospirosis. Independent prevention through public awareness is also needed in preventing the spread of this disease, farmer compliance in wearing personal protective equipment plays a major role in contributing to reducing disease rates (Rejeki et al., 2013).

METHOD

The literature search process in this literature review uses three databases, namely Google Scholar, PubMed, and Science Direct, with a publication year range of 2019-2023. The literature search was carried out using several keywords, such as emergency, agriculture, farmer, and nursing, using the Boolean operator (AND and OR) method. Searching for articles begins with identifying keywords that have been found. At the identification stage, 5,400 articles match the keywords. The next step is to do a screening by selecting the title of the article and the year of publication that fits the research criteria. At the screening stage, 1,840 articles met the assessment criteria. Afterward, articles were filtered according to the inclusion and exclusion research criteria. Three hundred sixty-five articles are suitable with inclusion and exclusion research criteria. The next stage is filtering articles against abstracts to focus articles on research criteria. At this stage, 25 articles met the research criteria. Then, from the 25 articles that have been selected, re-selection of language, research design, outcome, and several other criteria have been determined. Finally, ten articles were determined that matched the research criteria and could proceed to the analysis stage.

The writing method used is literature review. The literature search uses the Google Scholar, PubMed, and ScienceDirect database with a period of 2019-2023. The keywords used were leptospirosis in farmes and mice. Journals used in English. From the search results are then analyzed and selected according to the topic of discussion. There were 10 journals that were analyzed and used as literature. The steps for selecting literature using the PRISMA Protocol are as follows.

1. Identification: keywords leptospirosis in farmers and mice. Using boolean logic AND (n=12.600), OR (n=1.360), and NOT (n=2.290).

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2. Screening: as many as 12.600 articles that have been found previously, were screened based on the year of publication, namely 2019-2023 and the results obtained were 2.420 articles.
3. Eligibility: the top journals that were assessed for eligibility were taken and obtained (n = 15) journals with full text.
4. Included: the number of journals that meet the criteria and are used as literature is 10 journal articles.

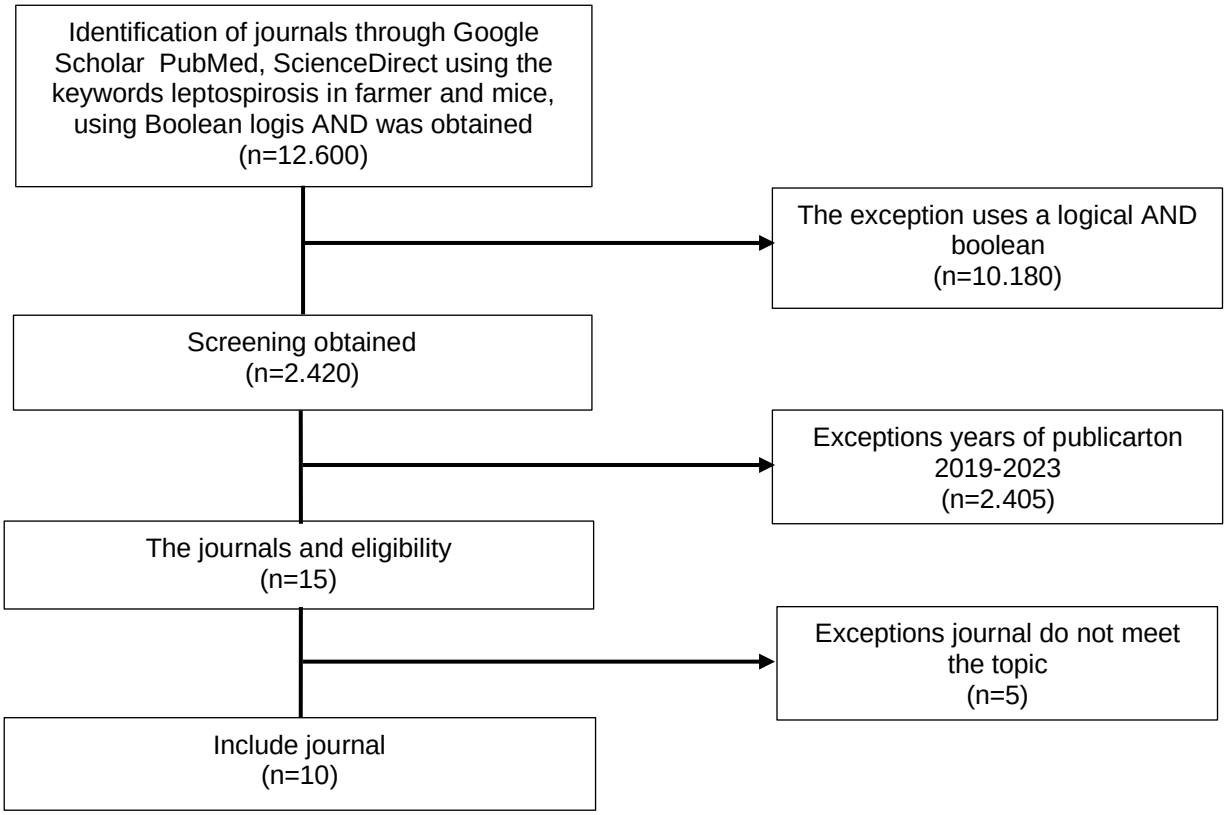

Figure 1. Flow Diagram of Analysis Literature Based on PRISMA (2009)

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RESULT

Table 1. Result of Literature Review

ID Number	Author and Journal Identity	Journal Title	Objective	Population and Sample	Method	Summary of Result
A1	Author: Mathanamohan J., et al Journal Identity: Sri Lankan Journal of Infectious Diseases/2020/Vol.10 (1): 21-29	Farmer's occupational health, perception and practices towards leptospirosis : A cause for concern	To assess knowledge, attitudes and practices about leptospirosis risk and awareness about disease prevention among farmers which is the main group	The population in the study were 120 farmers who were randomly selected. After being assessed using a questionnaire and analyzed using SPSS, there were 30 sample respondents obtained	Descriptive cross sectional study	There is a gap in farmer knowledge regarding attitudes, practices, and prevention of leptospirosis. However, this gap can still be filled by further increasing the knowledge and awareness of farmers so that successful prevention and control of leptospirosis can occur effectively.
A2	Author: Luu Phuong Dung, et al Journal Identity: BMC Infectious Disease/2022/22:583	A case-control study of agricultural and behavioral factors associated with leptospirosis in Vietnam	Identifying the main agricultural factors related to the transmission of acute leptospirosis in Vietnam, so that it is expected to encourage public health policies to improve disease prevention	11 hospitals	Case-control study	After conducting research using the case-control study method, it was found that the farmer's protective factors related to leptospirosis were still lacking, so it was necessary to carry out health promotion targeting farmers to use personal protective equipment such as gowns, gloves and boots during agricultural activities.
A3	Author: 1. Jutharat Jittimanee 2. Jaruwan Wongbutdee Journal Identity: Journal of Infection and Public Health 12/2019/ 705-711	Prevention and control of leptospirosis in people and surveillance of the pathogenic leptospira in rats and in surface water found at villages	Providing education to farmers so that the expected outcome is that farmers can prevent leptospirosis exposure and can detect leptospirosis that can infect humans	There were 2 samples used, namely the perception and prevention of farmers in leptospirosis as many as 108 sample subjects. Then, rat samples were as many as 270 samples	Cross-sectional study	The level of knowledge or perception of respondents towards leptospirosis disease received high results, but the preventive measures taken were still moderate. Although leptospira has not been detected in the mouse samples studied, relevant agencies must still promote activities that lead to correct perceptions that then pave the way for a healthy lifestyle that minimizes the risk of leptospirosis

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ID Number	Author and Journal Identity	Journal Title	Objective	Population and Sample	Method	Summary of Result
A4	Author: Nicoleta Ancuța Pintea, Simina Baciu, Gabriela Marc Journal Identity: Journal of School and University Medicine, Vol. IX, Issue 4, October-December 2022.	Monitoring the outbreak of leptospirosis at the academic medical office of the university of agricultural sciences and veterinary medicine (usamv) in cluj-napoca	The present study checks the evolution of a few cases of leptospirosis in students from the Faculty of Veterinary Medicine	12 patients with leptospirosis.	For the current study we have used the data recorded in the medical files of students after anamnesis, the objective clinical exam, the epidemiological investigation, establishing the diagnosis of leptospirosis, treatment and monitoring of the case until recovery. Establishing the diagnosis of leptospirosis, analysing the initial symptoms, showcasing the complications , studying the epidemiological enquiry, showcasing the role of primary prevention and of keeping with the hygienic norms labour safety	The first case of leptospirosis first appeared with general symptomatology three days after coming into contact with the infected animal. The epidemiological enquiry after diagnosing the first case of human leptospirosis led to the identification of 80 cases of direct contacts. They were monitored for 21 days at the students' medical office of the Faculty of Veterinary Medicine. The first four cases appeared three days after contact with the infected animal and had general symptomatology (fever, acute asthenia, cephalalgia, myalgia, abdominal discomfort). Of the 12 cases confirmed through specific serology testing (IgM specific), one was infected indirectly from another confirmed human case. The first diagnosed case presented renal and haematological complications 5 days after infection and 2 days after the beginning of the specific treatment; it needed hospitalisation and the evolution under treatment was favourable. All confirmed, probable and possible cases received treatment with antibiotics including 200 mg doxycycline per day for at least 10 days. The evolution under treatment was favourable. There were no violent cases or fatalities. The confirmed cases did not wear the appropriate safety equipment upon contact with the infected anima

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ID Number	Author and Journal Identity	Journal Title	Objective	Population and Sample	Method	Summary of Result
A5	Author: Elizabeth Bahar, Netti Suharti, Roslaili Rasyid, Andani Eka Putra, Linosefa, Muhammad Reza, dan Arni Amir Journal Identity: WARTA PENGABDIAN ANDALAS - VOL. 26 NO. 2 (2019), 88-96	Leptospirosis Counseling and Examination of Farmers in Nagari Alahan Panjang Solok Regency	For anticipating the threat to the health of farmers by leptospirosis because farmers are among the people who are at the risk of being infected with leptospira	48 farmers	The counseling method uses a power point slide and poster about leptospira followed by blood tests using the Standard Q rapid test for Leptospira IGM / IgG.	Positive results appear in the red line in the IgM / IgG area according to the control indicated on the rapid test tool.
A6	Author: Aryani Pujiyanti, Wening Widjajanti, Arief Mulyono, dan Wiwik Trapsilowati Journal Identity: Journal of Disease Vectors, Vol. 14 No. 2, 2020 : 73 - 82	An Assessment of Community Knowledge and Behavior in Increasing Cases of Leptospirosis in Gantiwarno District, Klaten Regency	Describe the knowledge and behavior of the community regarding leptospirosis incidence in Gantiwarno District was carried out as input in efforts to control leptospirosis	32 residents	Survey among 32 residents around the case house and in depth interviews with five staff of district health office and Gantiwarno public health center.	Most respondents have correct knowledge about first symptoms, health assistance facilities for leptospirosis treatment, mode of transmission, leptospirosis prevention, and carcasses handling. The community already knew about early symptoms, but didn't see the necessity of the second visit in health facilities nor given information to medical staff about exposure history or risk factors. Qualitatively, farmers' groups are susceptible to leptospirosis because some communities still throwing rat carcasses into paddy fields, minimum use of PPE, and handwashing behavior

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ID Number	Author and Journal Identity	Journal Title	Objective	Population and Sample	Method	Summary of Result
A7	Author: (Fonseka et al., 2019) Journal Identity: Journal of Tropical Medicine Volume 2019, https://doi.org/10.1155/2019/2917154	Doxycycline Usage for Prevention of Leptospirosis among Farmers and Reasons for Failure to Use Chemoprophylaxis: A Descriptive Study from Southern Sri Lanka	Application of health authorities to chemoprophylaxis programs for disease prevention for farmers at high risk of leptospirosis.	319 farmer's	Cross-sectional descriptive study	Out of the total of 319 farmers, 18 (5.6%) has already had leptospirosis diagnosed either clinically or by confirmatory testing. Majority of the farmers knew that fever is a main clinical feature of leptospirosis, but other symptoms were known only by a minority. Nearly 40% farmers knew that it gives rise to kidney injury, but surprisingly 48% were unaware of any organ involvement. the 10 percent of farmers were unaware of the reservoir of the illness
A8	Author: Fortune, D.S.S Nurlaela, S Octaviana, D Journal Identity: Journal of Public Health National Vol. 8, No. 4, November 2013	Leptospirosis Analysis and Risk Factor Mapping	Analyzed the The aim of this study was to map cases of leptospirosis and analyze environmental and behavioral risk factors that influence leptospirosis.	all new cases of leptospirosis The total number of samples is 65.	This study used a case-control observational study design. Data collection is done by interview, observation, and measurement . Data analysis used spatial analysis, univariate and bivariate analysis.	The results of this study indicate that environmental factors are very influential in the incidence of severe leptospirosis, namely the presence of garbage in the house, high rainfall, close proximity to houses and gutters. Environmental factors that are proven to be associated with the incidence of leptospirosis in Banyumas Regency are poor road conditions around the house, while behavioral risk factors that are proven to be associated with leptospirosis are the habit of bathing/washing in the river, history of participation in risky social activities, and use of PPE.

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ID Number	Author and Journal Identity	Journal Title	Objective	Population and Sample	Method	Summary of Result
A9	Author: Ariani, N Wahyono, T.Y.M Journal Identity: Indonesian Journal of Health Epidemiology vol 4, no. 2 (2020)	Factors Influencing the Incidence of Leptospirosis in 2 Districts Locations of Sentinel Leptospirosis Surveillance Banten Province in 2017 – 2019	to determine the factors that influence the incidence of leptospirosis in 2 districts where sentinel leptospirosis surveillance was conducted, Banten province during 2017 – 2019.	suspected leptospirosis at the Sentinel site. The variables studied were the incidence of leptospirosis, gender, age, occupation, presence of rats, food storage areas, presence of pets, presence of livestock, flooded houses, contact with stagnant water, activities in water/rivers, cleaning waterways and cleaning up trash using the Proportional Random Sampling technique.	The research design used cross sectional	Some factors that can affect the incidence of leptospirosis are gender, age, uncovered food storage, presence of rats, presence of pets and contact with stagnant water. However, the dominant influence is a rat, so it is necessary to do prevention by controlling rats, namely by keeping the house clean.
A10	Author: Nursitasari, H. A Journal Identity: Journal of Environmental Health, vol 11, no. 3 (2019).	Analysis of behavior and conditions of ratproofing homes on the incidence of leptospirosis in ponorogo district	Analyzing the behavior of respondents and the condition of ratproofing houses against the incidence of leptospirosis in Ponorogo Regency.	9 people and 27 control people with letospirosis cases in Ponorogo district.	This research is an observational study with a case control design (1: 3 ratio with 9 cases and 27 controls). Data were obtained through observation and interviews using observation sheets and questionnaires to obtain information about the behavior of respondents and the condition of the ratproofing houses.	Contact with standing water after work was statistically associated with the incidence of leptospirosis (p value 0.03 ; OR = 10.0) and contact with standing water had a risk 10 times more risky than those without contact with water. SPAL conditions in the ratproofing house were statistically associated with the incidence of leptospirosis (p value 0.02 ; OR = 0.10) and as a protective factor against the occurrence of leptospirosis. So that it can be concluded that the community must change their lifestyle while for ratproofing house conditions, namely by closing the possibility of rats entering the house, especially at the SPAL by closing the SPAL with a wire, or a filter so that rats cannot enter the house through the SPAL.

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DISCUSSION

The results of the review carried out for 10 articles journal national and international show that leptospirosis is diseases that have the potential to be encountered in the sector agriculture at risk alone for health the workers but in a number of condition and area, education and discipline health in an attempt prevent until treat disease This still very little understood, applied, and encountered.

Several research that has performed on the journals we analyzed, stated that importance procurement counseling specifically for farmers discuss about leptospirosis. The spread of leptospirosis can do with easy Because bacteria can move with fast. Leptospirosis This can also be distributed through intermediary animal, like rats or rodents, pigs, cows, goats, sheep, horses, dogs, cats, insects, birds and insectivores. Animals That will spread bacteria through urine, feces, or fluid others in water, soil or mud, plants and other where if happen contact with human, then they will too be infected with leptospirosis. Infected leptospirosis bacteria to in body will determine place residence, generally eka will infect liver, spleen, or later kidney will raises a number of signs and symptoms continued (Bahar et al., 2019).

In some areas, such as in the Village Towangsan understand about leptospirosis disease, they can categorized as understand education provided by staff health, from signs and symptoms, process of spread bacteria, to guard cleanliness environment. However, no a little too from those who still are Not yet understand that guard cleanliness self is also effort from prevent infected with leptospirosis. Many of community in the District Klaten not yet understand about personal hygiene, such as wash hand or legs, meanwhile No A little from those who also have history wound on the leg, did contact with mouse or puddle. (Pujiyanti et al., 2020). Condition this also happens in other areas that do research, that is Banten province, where still there is negligent society with cleanliness himself with touch carcass animal without know history his death, contact with fluid infectious moment animal urinating, milking, helping animal giving birth, or handle specimen animal or suspected human infected (Ariani & Wahyono, 2021). Besides factor cleanliness, condition environment too influence enhancement individual infected with leptospirosis. No only in area rice fields, some areas have potency enhancement spread of leptospirosis, eg area vulnerable floods, plantations, and livestock. This proven in research that has carried out by (Widjajanti, 2020) and (Rejeki et al., 2013) where there are enhancement bulk rain can become opportunity for mouse For do reproduction so that happen enhancement population mouse. Besides that's the height bulk causing rain flood can cause the damage houses mouse so that mouse will hanging around the house society.

There are various mutual factors related so that can cause individual infected with leptospirosis. So from That needed awareness and improvement education for farmer related to leptospirosis (Mathanamohan et al., 2020). Besides education prevention is also important education in inspection until treatment. With exists the times, leptospirosis can diagnose good for animal nor human. For animal can done through inspection kidney and spleen, whereas for man via serum, blood plasma, urine, and fluids cerebrospinal. Possible screening given form Enzyme Linked Immunosorbent Assay (ELISA), agglutination test latex, lateral flow test, and IgM dipstick. There are two diagnostic tools: Microscopic Agglutination Test (MAT) and Polymerase Chain Reaction (PCR). Whereas for the treatment depending on the level the severity experienced farmer. Mild leptospirosis farmer can given doxycycline tablets with dose of 100 mg, moderate leptospirosis farmers, or heavy can given intravenous penicillin G at a dose of 1.5 MU. If it happens fail kidney so need done hemodialysis and pulmonary hemorrhage need done ventilation Respiratory mechanical. (Widjajanti, 2020). Besides that's important for public for always follow

norm hygienic-sanitary so that created clean and safe environment from leptospirosis. (Pintea et al., 2022).

CONCLUSION

There are lots possible factor become reason enhancement deployment or transmission of leptospirosis, eg exists intermediary through animal carrier leptospirosis bacteria, less awake cleanliness self and the environment, as well factor environment, like enhancement bulk rain, and others. So that can concluded For disconnect deployment This can done with enhancement education about leptospirosis, there is awareness public in guard cleanliness, do vaccinations, and discipline in using proper and adequate PPE, as well fixing the stigma that society still has think that disease Leptospira is mild illness. Possible actions done If infected is with do screening, like Enzyme Linked Immunosorbent Assay (ELISA), agglutination test latex, lateral flow test, and IgM dipstick. There are two diagnostic tools, namely Microscopic Agglutination Test (MAT) and Polymerase Chain Reaction (PCR). Whereas for the treatment depending on the level experienced severity. For realize matter This Of course needed help power health, for one is nurse community to be help implementation counseling and doing collaboration with power other internal health give service health. Besides it is, it is good collaboration between community and officers health too lower number infected with leptospirosis precise and fast.

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