

## **Dog Demography And Level Of Knowledge Against Rabies In Positive And Negative Case Of Rabies Areas In Mendoyo-Jembrana, Bali, Indonesia**

*(DEMOGRAFI ANJING DAN TINGKAT PENGETAHUAN MASYARAKAT TERHADAP  
RABIES DI DAERAH DENGAN KASUS RABIES POSITIF DAN NEGATIF  
DI MENDOYO-JEMBRANA, BALI, INDONESIA)*

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### **ABSTRACT**

This research aims were to compare the demography of dogs and knowledge profile of dog owners against rabies in Mendoyo Sub-District, Jembarana Bali. This research used observational method, conducted from May to June 2016 in Mendoyo sub-district of Jembrana. Two Banjars were selected by the rabies case report in dogs (Yeh Embang Kangin village) and two other without case (Mendoyo Dangan Tukad village). The data collected by interviewing the community and direct assessment of free-roaming dogs in the areas. A total of 200 household samples were taken, 50 respondents of each sampling area. This research resulted that the ratio of man-dog in Mendoyo was 4.5:1 and the ratio of male and female dogs was 1.8:1. As many as 64.8% of dog's age were more than 12 month old, 28% were 4 to 12 month old and 8% were less than 4 month old. In the sampling areas, 19.4% of dogs were sterilized, which were 91.18% males and 8.82% females. Coverage of rabies vaccination in owned dogs was 82.3%. Dog's petting method by people in Mendoyo was 69.71% free-roaming while 30.29% tied or caged. On free-roaming dog assessment, this study found 52 free-roaming dogs on the streets, 65.38% males and 34.62% females, only 30.8% of those used vaccination collar marker. Based on the body condition score, 76.9% of free-roaming dogs have good conditions. Of the total 200 households surveyed, there was a high level of knowledge about the danger of rabies and the importance of vaccination, but only a few people (<35%) received consulting about rabies, understood how to prevent rabies infection and the regulations about dog petting management. In positive area, we found there are still many people who have the habit of disposing dog. We conclude that there is needed to improve knowledge and attitude of the community about the prevention and risk factor of rabies.

Keywords: demography; dog; knowledge level; rabies

### **ABSTRAK**

Penelitian ini bertujuan untuk membandingkan data demografi anjing dan profil pengetahuan masyarakat pemelihara anjing terhadap rabies di Kecamatan Mendoyo, Jembrana Bali. Penelitian ini menggunakan metode observasional, dilaksanakan pada bulan Mei sampai Juni 2016 di Kecamatan Mendoyo. Dua banjar di Desa Yeh Embang Kangin dipilih karena merupakan daerah dengan kasus positif rabies, dan dua banjar lainnya di Mendoyo Dangan Tukad yang merupakan daerah tanpa adanya kasus rabies. Data dikumpulkan melalui interview masyarakat dan melakukan penilaian langsung terhadap anjing yang berkeliaran yang ditemukan di desa. Sebanyak 200 sampel keluarga dikumpulkan, masing-masing 50 sampel disetiap banjar. Hasil penelitian ini menemukan bahwa rasio manusia-anjing di Mendoyo adalah 4,5:1 dan rasio anjing jantan:betina adalah 1,8:1. Sebanyak 64,8% anjing berumur di atas 12 bulan, 28% berumur di antara empat sampai 12 bulan

dan 8% berumur di bawah empat bulan. Di daerah sampling, 19,4% anjing telah disteril diantaranya 91,18% jantan dan 8,82% betina. Cakupan vaksinasi rabies pada anjing berpemilik adalah sebanyak 82,3%. Cara pemeliharaan anjing oleh masyarakat di Mendoyo adalah 69,71% diliarkan, sementara hanya 30,29% diikat dan/atau dikandangkan. Pada studi anjing yang berkeliaran di desa, penelitian ini menemukan sebanyak 52 ekor anjing yang berkeliaran di jalan, diantaranya 65,38% jantan dan 34,62% betina, hanya 30,8% yang menggunakan kalung penanda vaksinasi. Berdasarkan *body condition score*, 76,9% anjing yang berkeliaran memiliki nilai tubuh yang ideal. Dari total 200 keluarga yang didata, diketahui bahwa tingkat pengetahuan masyarakat terhadap bahaya rabies dan pentingnya vaksinasi sudah baik, namun hanya sedikit masyarakat (<35%) yang telah memperoleh sosialisasi terhadap rabies, mengerti bagaimana pencegahan infeksi rabies dan peraturan terkait tata cara pemeliharaan anjing. Di daerah dengan kasus positif rabies, kami menemukan masih banyak masyarakat yang memiliki kebiasaan membuang anjing. Dapat disimpulkan bahwa disana perlu dilakukan upaya peningkatan pengetahuan dan sikap masyarakat terkait pencegahan dan faktor risiko penyakit rabies.

Kata-kata kunci: Demografi; anjing; tingkatpengetahuan; rabies

## INTRODUCTION

Dogs are one of the animals that are known to have good relations with humans (Barker and Wolen, 2008). But the dogs are also play an important role as a factor of carry and transmit diseases to humans and other animals (Rijks *et al.*, 2016). Rabies is one of the most important diseases who transmitted by dogs (Chomel, 2014). In Bali, all cases of rabies in human reported transmitted by dogs and had been distributed to all part of Bali (Batan *et al.*, 2014). Rabies is very frightening for people because it has a case fatality rate reaches 100% (Kuzmina *et al.*, 2013).

Human rabies deaths are almost entirely preventable through prompt delivery of post-exposure prophylaxis (PEP) to victims of bites by rabid animals (Hemachudha *et al.*, 2002) and through successive annual mass dog vaccination campaigns that achieve 70% vaccination coverage to bring rabies under control in reservoir populations (Kaare *et al.*, 2009; Lembo 2011). Prevention of human rabies depends on control of rabies in dogs (Yousaf *et al.*, 2012). World Health Organization (WHO) recommends that 70% of dogs in a population should be immunized to eliminate or prevent outbreaks of rabies (Coleman and Dye, 1996; Jibat *et al.*, 2015). Dog ecology involves studies on dog population density, dog population structure, and pattern of dog ownership (Cleaveland *et al.*, 2006). Data of ecology and demography of dogs are necessary to be able to estimate the population of dogs in the area that become target of vaccination (Ratsitorahina *et al.*, 2009; Dalem *et al.*, 2012). However, the eradication of rabies

does not only depend on the dog issue, but also involves behavioral change on the raising of dogs. The chance of rabies in Bali is relatively high supported by low public awareness of the dangers of rabies. Lack of knowledge and awareness in the communities, especially in rural communities are also the obstacle in implementing a program to eradicate rabies in BaliSuarthaet *al.* (2014).

Community awareness regarding rabies and treatment seeking behaviour are critical point both for the prevention and control of the disease in human and animals (Ghosh *et al.*, 2016). Since 2008 to 2016 as many as 167 people died by rabies in Bali (Dinas Kesehatan Prov Bali 2016) that cases were due to the lack of knowledge of the community, so people in rural areas do not go to hospital or medical center for getting proper treatment. All human cases have occurred as a result of their not getting vaccinated. However, people in rural area may not receive these life-saving treatments because either the post-exposure prophylaxis treatment is expensive and not readily available or people may not visit the hospital (Kayali *et al.*, 2003; Knobelet *et al.*, 2005; Hampson *et al.*, 2008).

Jembrana is one of District in Bali where rabies were infected in dogs and human, first case reported in dog in 2010 with 22 cases and the highest occurred in 2015 with 74 cases. Until the end of 2015 rabies spread over five sub-districts in Jembrana, included Mendoyo sub-district. But, Rabies cases did not Reported in all villages in Mendoyo, YehEmbangKangin village is one of the rabies case was found and MendoyoDanginTukad village have not ever occurred rabies case (DPKP Bali 2016). An

assessment of community knowledge of rabies and interactions with animal reservoirs can help target educational messages during the disease control (McCollum *et al.*, 2012).

**METHODS**

This study used an observational study, by collecting data on the socio-ecological dogs include: population, gender, age and sterilization, vaccination status, knowledge profile dog owners against rabies, and free-roaming dogs survey. The determination of the sampling area was done by purposive sampling. The research conducted in four areas in Mendoyo sub-districts of Jembrana, two Banjars with the dog rabies cases in Yeh Embang Kangin village (Sembul and TegakGede) and two other without rabies case in Mendoyo Dangin Tukad village (Kebebeng and Tengah) The data collected by interviewing the community and direct assessment of dog's condition and free-roaming dogs in the areas. A total of 200 household samples were taken, 50 respondents of each sampling Banjar. Data were tabulated and analyzed descriptively.

**RESULTS AND DISCUSSION**

**Demography of dog**

Based on data obtained from 200 households

known that the only 52.2% (105/200) of households who keep dogs. Human and owned dog populations were 797 and 175 with the man-dog ratio was 4.55:1. As many as 64.6% dogs were male and 35.4% were female, the sterilization status of dogs were still low at 19.4% mostly in male dogs (91.18%), the ratio of male-female dogs in Mendoyo was 1.8:1. From that population, 64.8% of dog's ages were more than 12 month old, 28% were 4 to 12 month old and 8% were less than 4 month old. Coverage of vaccination of dogs was 82.29% (Table 1). Breed of dog was maintained by the community in Mendoyo were 65.71% local dogs and 34.29% breeds dogs. Source of dogs were coming from outside was 55.24% while 44.89% from the same village.

**Free-roaming dog assessment**

A total of 52 free-roaming dogs in Mendoyo have been assessed, 65.4% (34/52) of them were male while 34.65% (18/52) were female. From the total of free-roaming dogs were found, unfortunately, the only 30.8% (16/52) of them were wearing vaccination sign collar. Most of them (76.9%) showed a good body condition, only a few of free-roaming dogs that look unhealthy were suffering from skin diseases and malnutrition. The gender of free-roaming dog was 65.38% male and 34.62% female (Table 2).

**Profile of dog owner**

Dog's petting method by people in Mendoyo

Table 1. Dog demography in Mendoyo

Village	N	Σ people	Σ owned dogs	Sex		Vaccination		Sterilized		Petting	
				M (%)	F (%)	Yes (%)	No (%)	M (%)	F (%)	Tied / caged (%)	Free-roaming (%)
Negative	100	394	96	63.5	36.5	80.2	19.8	21	2.1	32.3	67.7
Positive	100	403	79	65.8	34.2	84.8	15.2	14	1.3	27.9	72.1
Total	200	797	175	64.60	35.4	82.3	17.7	18	1.7	30.3	69.7

N: number of sample, M: Male, F: Female

Table 2. Free-roaming dog assessment in Mendoyo

Village	N	Vaccination sign (collar)		Body condition		Sex	
		Yes (%)	No (%)	Good (%)	Bad (%)	M (%)	F (%)
Negative	15	20	80	80	20	86.7	13.3
Positive	37	35.1	64.9	75.7	24.3	56.8	43.2
Total (%)	52	30.8	69.2	76.9	23.1	65.4	34.6

N: number of sample, M: Male, F: Female

Table 3. Profile of dog owner in Mendoyo

Village	Knowledge against rabies											
	A		B		C		D		E		F	
	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
Negative	94	6	25	75	89	11	41	59	23	77	4	96
Positive	96	4	45	55	94	6	27	73	41	59	24	76
Total	95	5	35	65	91.5	8.5	34	66	32	68	14	86

- A. Know that rabies is danger for human
- B. Know how to prevent people from rabies
- C. Know the importance of rabies vaccination in dogs
- D. Know the regulation of upkeep dogs
- E. Have had counseling about rabies
- F. Have experience of dispose dog

was mostly free-roaming (69.71%) while the only 30.29% were tied or caged (Table 1). The majority of the respondents (95%) have heard about the danger of rabies disease, 91.5% known about the vaccination, but only few people in the community (less than 35%) have received counseling, understood about the way to prevent rabies infection in human and dog and the regulation of petting dog. Still found many people (mostly in positive area) who have habit to dispose dog (Table 3).

**Discussion**

Dog demographic and ecology are essential in understanding the distribution, structure, and population density of dogs and pattern of dog ownership in any given area (Otolorin *et al.*, 2014). This survey resulted that the dog-human ratio in Mendoyo was 1:4.4, this finding was higher than the previous research that reported 1:5.8 in Tabanan (Dewi, 2012), 1:6.5 before rabies occurred in Bali (LSM Yudistira in Suartha *et al.*, 2014) and 1:8.7 in Kesiman Denpasar (Dalem *et al.*, 2012). This indicates the variation of dog populations in the respective regions. The ratio of owned dogs to people is usually higher in rural areas of a country, but there is also considerable variation within cities (Lembo *et al.*, 2010). In other countries, the dog-human ratio was reported between 1:10 to 1:6 (Wandeler *et al.*, 1993; Otolorin *et al.*, 2014). The research found the population of breed dogs (34.29%) was lower than bali local dogs (65.71%), it was in contrary with other research where conducted in Denpasar city that found the population of bali local dogs only 24.61% in Sanur Villages (Swacita, 2017). Source of dogs who upkeep in Mendoyo were came from outside village was 55.24%, these data indicates the dog

transportation and movement was still high.

The success of rabies control is determined by adequate vaccination coverage above 70% (WHO, 2004; Sugiyama and Ito, 2007) and dog population control and management (Suartha *et al.*, 2014). Rabies epidemiology in the dog reservoir is directly associated with dog ecology; thus, better understanding of dog ecology would be useful for designing appropriate rabies control measures in the dog population (Matter and Daniel, 2000). Low coverage of sterilization of dog (19.18%) in Mendoyo will affect the population and heard immunity. The dog population has a high turn-over rate, meaning high birth rates due to a high proportion unsterilized dogs (Wandeler *et al.*, 1993; Toukhsati *et al.*, 2012).

We found that only 30.3% of dogs in Mendoyo were in cage or tether, people mostly upkeep their dogs as free-roaming, in rabies cases area 72.1% and in non-case area 67.7% of dogs were free-roaming. Knowledge of the population dynamics of free-roaming dog populations, particularly the core demographic rates of birth, death and migration, may therefore help to inform effective planning and implementation of mass dog vaccination campaigns to control rabies and to design strategies for the eventual elimination of dog rabies and associated human deaths. Knowledge of these rates, and their interplay with population vaccination coverage levels, may also improve understanding of the possible contribution of humane dog population management to rabies control efforts (Cleaveland *et al.*, 2014; Rowan *et al.*, 2014). Maintaining herd immunity to rabies in free-roaming dog populations can be challenging, particularly in communities that lack regular access to veterinary services. In these communities, mass vaccination is usually implemented in annual

campaigns, of relatively short duration. Between campaigns, the proportion of immune individuals in the population declines, often dropping below the critical threshold as vaccinated dogs die and susceptible dogs enter the population through birth or migration (Conan *et al.*, 2015)

The anti rabies vaccination coverage of owned dogs in Mendoyo were high (82.3%), unfortunately there are many free-roaming dogs without sign of vaccinations (collar), particularly in the area of cases. The population of free-roaming dog is known as a risk factor of rabies infection in human and animal (Karshima *et al.*, 2013; Morters *et al.*, 2013). High population of stray or free roaming dogs will complicate the rabies control program, difficult to catch and give vaccination (Muller *et al.*, 1998; Estrada *et al.*, 2001). Similar case occurred in Philippines that there many dogs were inaccessible for vaccination by the injection route (Estrada *et al.*, 2001). Control of stray dogs with regard to other human health risks (e.g. stray dogs on roads; dog attacks within communities) may fall within the responsibility of the public health agency but is more likely to be the responsibility of the local government authorities or other agencies for public safety/security operating at the state/provincial or municipal level (OIE, 2009).

We found 76.9% of free-roaming dogs were in good body conditions, this indicates that there are available of foods for the dogs. Dogs can get feed from the household rubbish and the rest of Hinduism offerings, especially in traditional markets, temples and cemetery. Stray and feral dogs, which pose serious human health, animal health and welfare problems and have a socio-economic, political and religious problems in many countries. Whilst acknowledging human health is a priority including the prevention of zoonotic diseases notably rabies, the OIE recognizes the importance of controlling dog populations without causing unnecessary or avoidable animal sufferings. Veterinary Services should play a lead role in preventing zoonotic diseases and ensuring animal welfare and should be involved in dog population control, coordinating their activities with other competent public institutions and/or agencies (OIE, 2009).

Level of knowledge against rabies of the community in Mendoyo was already good. A total of 95% people in cases and non case area believe that rabies is danger for human. But knowing about how to prevent people from rabies was still

low, only 35% of overall people know; 45% in cases area and 25% in non case area. Knowledge about preventing rabies is necessary for people in rabies endemic area. Knowledge, attitudes and practices (KAP) studies have been widely used around the world for different applications in public health based on the principle that increasing knowledge will result in changing attitudes and practices to minimize disease burden (Mascie-Taylor *et al.*, 2003). But we found that there were lack people who received consulting about rabies (32%).

In Mendoyo, still found people (24% in rabies cases area and 4% in non case area) who have behavior to dispose dogs when their dog was not accepted in their family anymore. When a person takes on the ownership of a dog there should be an immediate acceptance of responsibility for that dog, and for any offspring it may produce, for the duration of its life or until a subsequent owner is found. The owner must ensure that the welfare of the dog, including behavioral needs, are respected and the dog is protected, as far as possible, from infectious diseases (e.g. through vaccination and parasite control) and from unwanted reproduction (e.g. through contraception or sterilization). Owners should ensure that the dog's ownership is clearly identified (preferably with permanent identification such as a tattoo or microchip) and, where required by legislation, registered on a centralized database. All reasonable steps should be taken to ensure that the dog does not roam out of control in a manner that would pose a problem to the community and/or the environment (OIE, 2009).

## CONCLUSION

To be concluded that: The ratio of man-dog in Mendoyo was 4.5:1 and the ratio of male-female dogs was 1.8:1. As many as 64.8% of dog's age were more than 12 month old, 28% were 4 to 12 month old and 8% were less than 4 month old. A total of 19.4% dogs were sterilized; 91.18% males and 8.82% females. Dog petting system in Mendoyo was 69.71% free-roaming. Coverage of rabies vaccination in owned dogs was 82.3%, while 30.8% of free roaming dogs used sign for rabies vaccination and 76.9% of free-roaming dogs have good body conditions. Overall knowledge of the community in Mendoyo against rabies is already good, but only few people (<35%) received consulting about rabies and understood

how to prevent rabies infection and the regulations about upkeep dog.

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