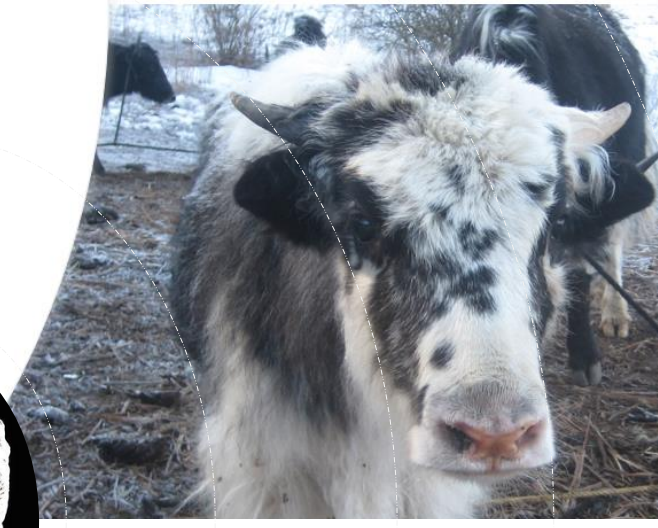
THE ANNUAL STATUS OF GID IN YAKS IN BHUTAN



2021

The Annual Status of Gid in Yaks in Bhutan – 2021

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FOREWORD

Coenurosis, commonly known in Bhutan as GID, is one of the most important diseases of yaks in terms of the socio-economic impact on the livelihood of the highlanders in the country. Amongst livestock diseases affecting yaks, gid has been considered the main cause of yak mortality in the country for decades. Therefore, gid has been considered a priority highland disease, against which intensive prevention and control measures have been implemented with the support from the National Highland Development Program under the Department of Livestock, Ministry of Agriculture and Forests.

To document and assess the progress of gid prevention and control activities in the highland areas, this report, The Annual Status of Gid in Yaks in Bhutan – 2021, has been compiled by the National Centre for Animal Health (NCAH) and the National Highland Research and Development Centre (NHRDC) under the Department of Livestock (DoL). It provides an overview of the disease's epidemiology and past prevalence recorded and presents a descriptive analysis of the current situation of the disease for the calendar year 2021.

The main purpose of this annual report is to provide an update and information sharing, regarding the status of gid in yaks in Bhutan and the prevention and control measures implemented, with all stakeholders including veterinarians, veterinary paraprofessionals, relevant stakeholders, and policymakers.

Firstly, we would like to thank the Director of the Department and the Chiefs, Livestock Research and Extension Division (LRED) and Animal Health Division (AHD), Department of Livestock (DoL) for their relentless support and guidance. We would also like to thank all the Regional Directors, Dzongkhag Livestock Officers, Veterinary Officers and Veterinary paraprofessionals of all the highland Dzongkhags for their kind support and coordination for the implementation of various technical measures prescribed in the National Gid Prevention, Control and Elimination Plan 2021. We extend our sincere appreciation to the Livestock Extension Supervisors at the gewog level for conducting various gid prevention and control activities, documenting and sharing information for the compilation of this annual report.

This report could provide baseline information for developing preparedness and response plans by the concerned government agencies responsible for the prevention and control of gid in yaks in the country.

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1. INTRODUCTION

Coenurosis, commonly known in Bhutan as **GID**, is caused by the larval stage, *Coenurus cerebralis*, of *Taenia multiceps*, a dog tapeworm. The adult form of the parasite is found in the intestines of carnivores (definitive host), especially dogs, while the larval stage, which causes coenurosis, is found in herbivores (intermediate host) that have ingested eggs or gravid proglottids of *T. multiceps*. *Coenurus cerebralis* forms bladder-like cysts in the central nervous system and they are mostly seen in the midportion of the cerebral cortex. Around the world, this disease is a common cause of neurological disease in young sheep. In Bhutan, among livestock diseases, gid is one of the primary causes of mortality in young yaks, and it's considered a priority livestock disease with a potential threat to the livelihood of highlanders in the country.

This report presents a descriptive analysis of the situation of gid in yaks in the country reported during the calendar year 2021. In addition, the report describes the distribution of yak-rearing households, gid susceptible yak population and yak watchdogs in the country, and the prevention and control measures implemented as prescribed in the National Gid Prevention, Control and Elimination Plan for Bhutan, 2021. To assess the progress made in the prevention and control of the disease in the highland areas of the country, gid prevalence data are presented in comparison with the baseline gid prevalence established in 2020.

The following table presents a summary of the status of gid in yaks in Bhutan, associated risk factors and the prevention and control measures implemented in the field.

Table 1: Report's summary table

Parameters	Unit	Value
Total no. of households rearing yaks	Numbers	818
Total no. of yak watchdogs	Numbers	875
Total no. of adult yaks (>3yrs)	Numbers	25405
Total no. of gid susceptible yaks (≤yrs)	Numbers	14528
Total yak population (young and adult)	Numbers	39933
Total no. of live gid cases	Numbers	391
Total no. of yaks died of gid	Numbers	465
Total no. of yaks affected by gid (live and dead)	Numbers	856
Total no. of yaks dewormed	Numbers	12680
Total no. of watchdogs dewormed	Numbers	769
Average prevalence of gid in yaks	Percentage	5.89%
Average Case Fatality Rate (apparent)	Percentage	54.32%
Deworming coverage in young yaks	Percentage	87.28%
Deworming coverage in yak watchdogs	Percentage	87.89%

2. SITUATIONAL ANALYSIS

2.1. Gid disease in Bhutan

In Bhutan, gid is commonly reported in young yaks, mostly below 3 years; however, few cases in adult yaks have been reported as well. The disease is widely known as GID in several government documents and reports; however, in local dialects, there are different names for this disease, Guyoom being the most common name.

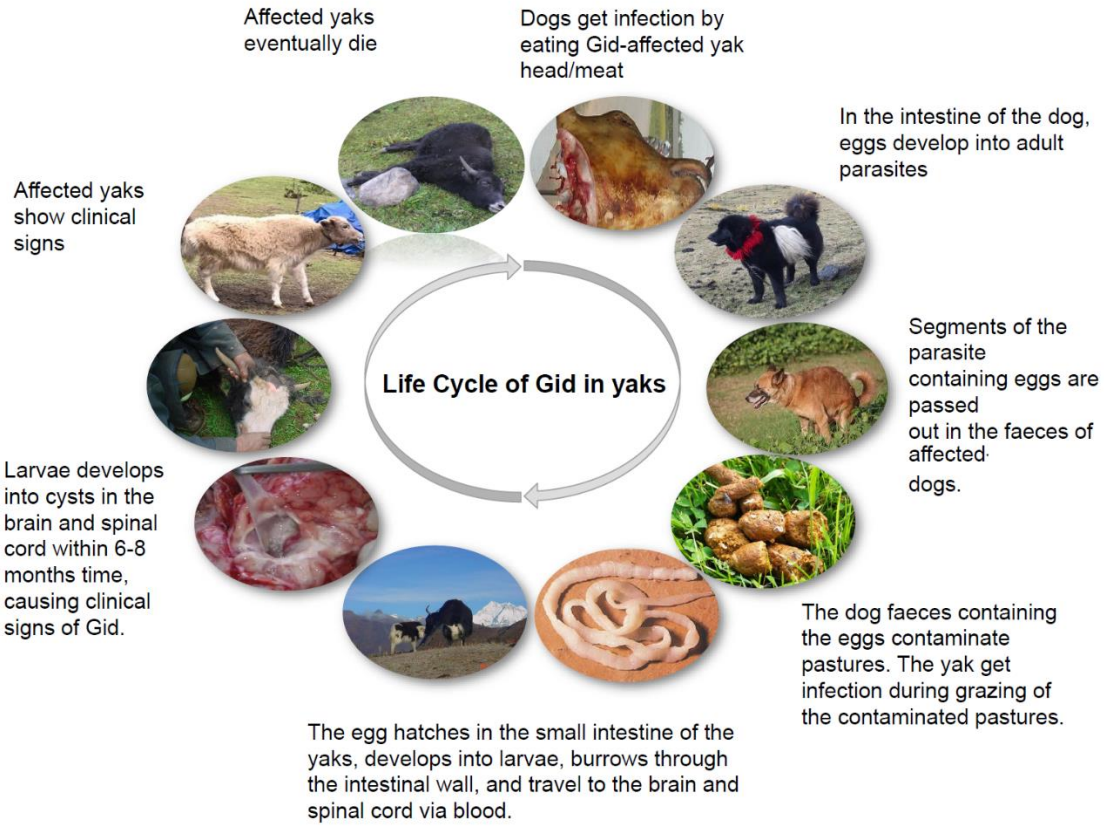


Figure 1: Life cycle of *T. multiceps* causing gid in yaks.

Infected yak dogs and other wild carnivores (definitive hosts) excrete eggs of *T. multiceps* in their faeces, contaminating the pastures. When yaks (intermediate host) graze on the contaminated pastures, the eggs are ingested and developed into larvae (*Coenurus cerebralis*), which are then released into small intestines. The larvae migrate through the bloodstream to the brain and spinal cord and develop into cysts which take about 6 to 8 months. At maturity, the size of the cyst can grow up to 5 cm or more in diameter. The cysts can also be found lodged in the spinal cord of the affected yaks. The dog gets an infection from eating the infected brain or spinal cord or contaminated meat. In the small intestine of the definitive hosts (dog), the cystic larval stage develops into adult tapeworm causing taeniasis which in turn releases the eggs with the faeces,

thus contaminating the pastures and environment. The lifecycle of *T. multiceps* causing gid in yaks in Bhutan is illustrated in the diagram above (Figure 1).

During the early stages of migration through brain tissues, the migrating larvae may cause signs of irritation including nausea and convulsions. However, clinical signs are caused by the Coenurus exerting pressure on the brain tissue resulting in irritation and damage to the brain. It may exert sufficient pressure to soften cranial bones if the location of the cysts is on the surface of the brain. The cyst may take up to 6 to 8 months to develop to its full size of about 5 cm in diameter. Coenurosis can occur in both acute and chronic forms.

Acute coenurosis occurs during the migratory phase of the larvae, usually about 10 days after the ingestion of large numbers of tapeworm eggs. The signs are associated with an inflammatory and allergic reaction. There is transient pyrexia and relatively mild neurological signs such as listlessness and a slight head aversion (turning of the head to one side). Occasionally the signs are more severe, and the animal may develop encephalitis, convulse, and die within 4 to 5 days.

In chronic coenurosis, the time taken for the eggs to hatch, migrate and grow large enough to present nervous dysfunction varies from 2 to 6 months. The earliest signs are often behavioural, with the affected animal tending to stand apart from the herd and react slowly to external stimuli. As the cyst grows, the clinical signs progress to depression, unilateral blindness, circling, altered head position, incoordination, paralysis, recumbency and death. Head tilting behaviour of the affected yak depends on the location of the cysts.

2.2. History of Gid Disease in Yaks in Bhutan – till 2015

Gid disease in yaks in Bhutan has been reported since the 1950s. Since then, various measures have been implemented to prevent and control the disease. An eradication programme for gid was introduced consisting of deworming yak calves with Albendazole and Fenbendazole and yak watchdogs with Niclosamide, and it was recorded that the programme was successful in reducing yak mortality due to gid in yak herds in one of the worst-affected areas of Bhutan from 40.3 per cent in 1992 to 1.5 per cent in 1994. However, due to various reasons, the programme could not be implemented sustainably. Therefore, the disease gradually spread to different yak-rearing highland areas of Bhutan.

As per the national gid surveillance data published in the National Gid Prevention and Control Plan 2016, the first edition, between 2000 and 2015, a total of 9,464 yak calves have died due to gid (Figure 2) – an annual average of 592 deaths. Between 2010 and 2015, 10 gewogs (sub-district) in 5 dzongkhags (district) reported incidences of gid disease in young yaks in Bhutan. The places are Laya and Lunana under Gasa dzongkhag; Lingzhi, Soe and Naro under Thimphu dzongkhag; Tsento under Paro; and Bji and Kar-tshog under Haa dzongkhag (Figure 3).

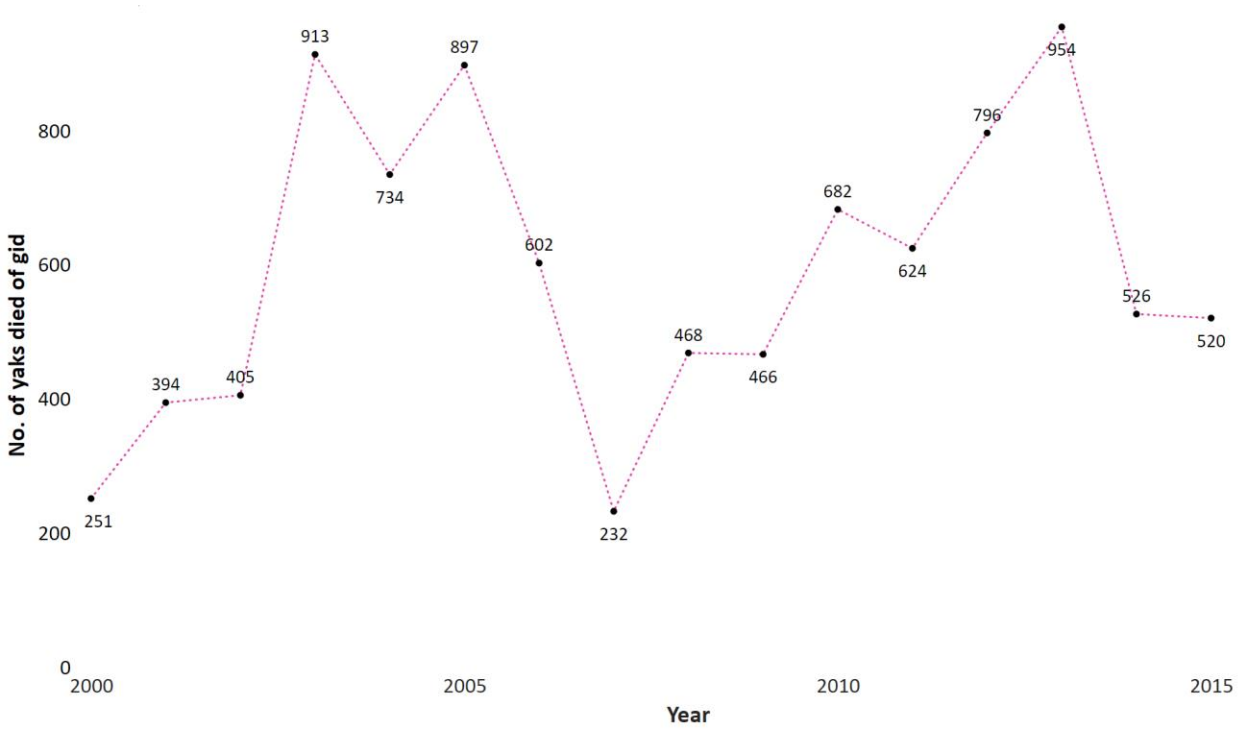


Figure 2: Yak mortality due to gid in Bhutan, 2000 - 2015

Between 2010 and 2015, Tsento gewog of Paro dzongkhag reported the highest prevalence of the disease (19.6 %), followed by Chhoekhor (15.1%), Laya (11.9), Lunana (11.8), etc. (Figure 3).

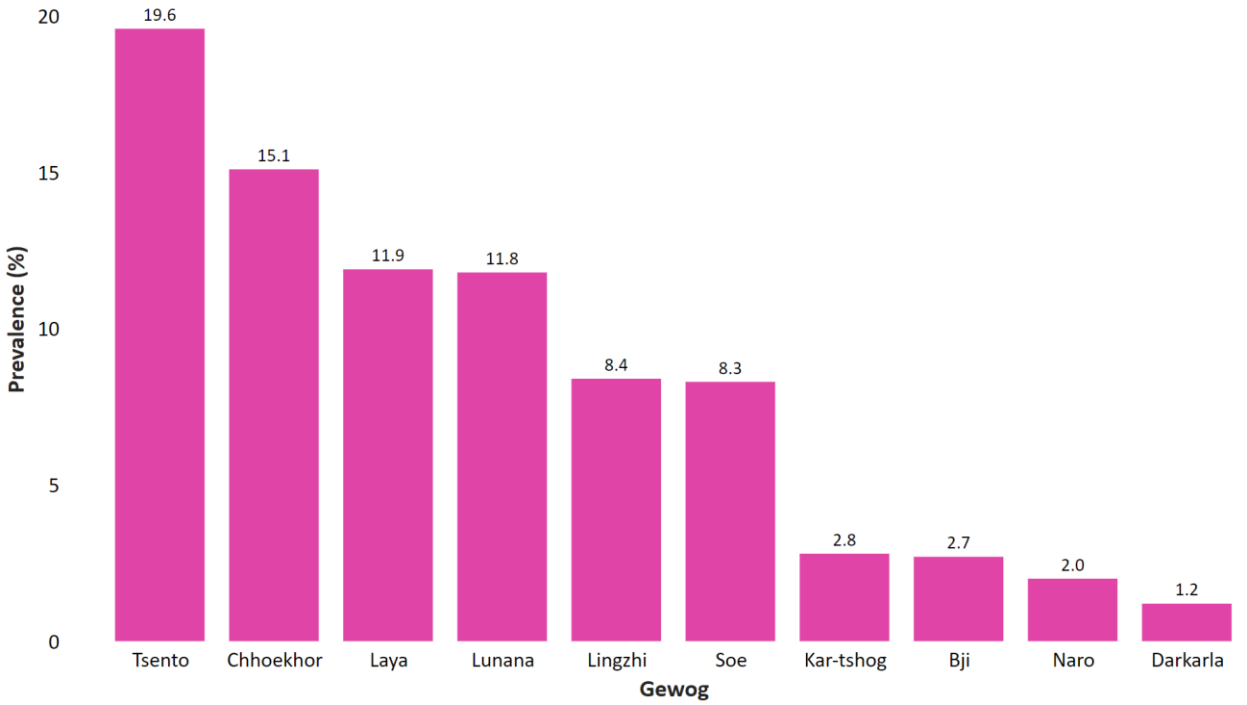


Figure 3: Gewog-specific prevalence of gid in yaks,2010 - 2015

2.3. Gid Disease Prevalence in Bhutan, 2020

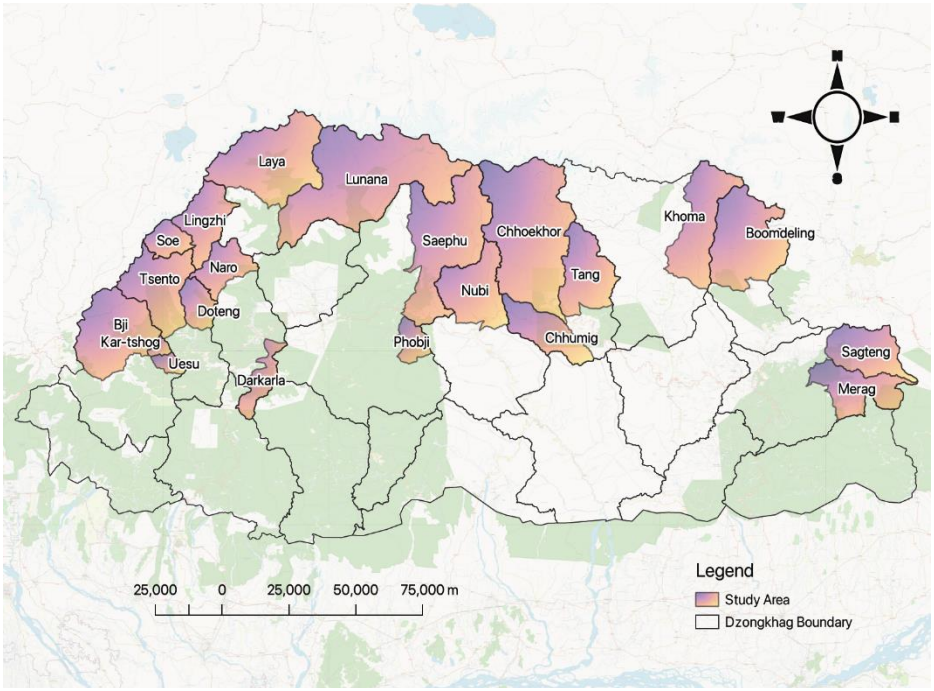


Figure 4: Study sites (Gewogs), 2020

Due to inconsistent reporting regarding the disease's prevalence in yak-rearing highland areas, the actual status of the disease in the whole country couldn't be defined. A few studies were published about the presence of the disease in yak calves in the country, however, they focused on small places of their interest. Therefore, to establish the baseline prevalence of the disease in the country, a survey was conducted between February and June 2020 in all the yak-rearing highland areas of Bhutan, comprising 10 districts and 23 sub-districts (Figure 4).

During the survey, it was found that a total of 1,222 yaks were affected by gid disease over the past year from the total susceptible population of 8,541, thus attributing the prevalence of gid disease in yaks in Bhutan to 14.31 per cent (Figure 8).

At the regional level, the prevalence of gid in yaks was found to be the highest in the West-Central Region (34.40 %) followed by the West Region (13.05 %), the East Central Region (12.33 %) and the East Region (0.78 %) (Figure 9).

At the district level, the highest prevalence of gid disease in yaks was reported from Gasa dzongkhag (50.75%) followed by Paro (22.41%), Haa (19.21%), Bumthang (13.49%), Thimphu (6.88%), Wangdue Phodrang (2.58%) and Trashigang (0.99%) (Figure 10).

At the gewog level, the prevalence of gid disease in yaks was found to be the highest in Lunana gewog of Gasa dzongkhag with 71.31 per cent followed by Laya (35,92 %), Bji (32.85 %), Tsento (22.86 %), Doteng (20 %), Lingzhi (15.37 %), Chhoekhor (14.67 %), etc. (Figure 11).

3. CURRENT STATUS OF THE DISEASE IN BHUTAN, 2021

This section presents a descriptive analysis of the current situation of gid (coenurosis) in yaks in Bhutan and the associated risk factors, and the measures recommended and implemented for prevention and control of the disease during the calendar year 2021. The data analysis, visualization and description were conducted in reference to the annual reports submitted by field livestock extension offices, spread across all the gewogs in the highland areas of the country, for the reporting period between January and December 2021. The reporting format for gid disease in yaks and deworming of young yaks and yak watchdogs are prescribed in the National Gid Prevention, Control and Elimination Plan, 2021 (Annexures 1 and 2).

The data compiled and analysed in this report was collected from the yak-rearing highland areas of the country, as shown in the following table (Table 2). A total of 21 Gewogs from 10 Dzongkhags reported the disease's status in their respective jurisdictions.

Table 2: Gid and deworming data submitting highland areas for the calendar year 2021

Region	Dzongkhag	Gewog
East	Lhuentse	Khoma
	Trashigang	Merag
		Sagteng
	Trashiyangtse	Boomdeling
East-Central	Bumthang	Chhoekhor
	Trongsa	Nubi
West	Haa	Bji
		Kar-tshog
		Uesu
	Paro	Doteng
		Tsento
	Thimphu	Dakarla
		Lingzhi
		Naro
		Soe
West-Central	Gasa	Laya
		Lunana
	Wangdue Phodrang	Gangteng
		Kazhi
		Phobji
		Saephu

3.1. Yak-rearing Households in Bhutan

As per the field reports submitted, there are 818 yak-rearing households (Table 3) in these 21 reporting highland gewogs in the country. The West-Central region has the highest number of yak-rearing households (n=271), closely followed by the West (n=258) and East (n=246) regions. There are only 43 households in the East-Central region rearing yaks, distributed across Bumthang and Trongsa dzongkhags.

Trashigang, comprising Merag and Sakteng gewogs, dzongkhag has the highest number of households rearing yaks (n=236), forming about 29 per cent of the total yak herding families in Bhutan followed by Gasa (n=175) and Thimphu (158) (Table 3).

Table 3: Region and Dzongkhag-specific distribution of yak-rearing households in Bhutan, 2021

Region - Dzongkhag	No. of Households
East	**246**
Lhuentse	5
Trashigang	236
Trashiyangtse	5
East-Central	**43**
Bumthang	40
Trongsa	3
West	**258**
Haa	48
Paro	52
Thimphu	158
West-Central	**271**
Gasa	175
Wangdue Phodrang	96
Total	**818**

In Bhutan, Sakteng gewog of Trashigang dzongkhag has the highest number of yak-rearing families (n=183), followed by Lunana (n=124) in Gasa. Other major yak-rearing gewogs in the country are Lingzhi, Merag, Saephu, Laya, Tsento, Chhoekhor, Darkarla, Naro and Kazhi – where more than 30 households in each gewog rear yaks for livelihood (Figure 5).

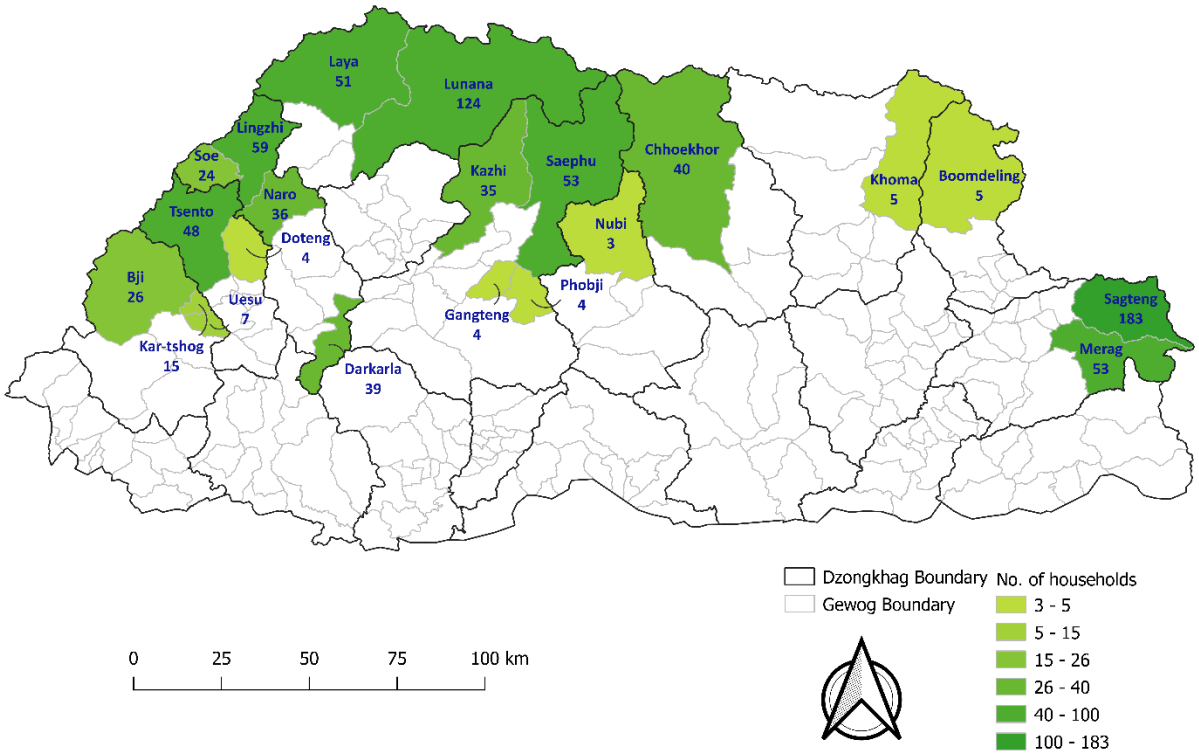


Figure 5: Gewog-specific distribution of yak-rearing households in Bhutan, 2021

3.2. Distribution of susceptible yak population

There are about 39,933 yaks (Table 4), including their hybrids, in Bhutan in 2021, distributed across 21 highland gewogs of 10 dzongkhags. The total yak population comprise 25,405 adult yaks (>3 years of age) and 14,528 young yaks (≤3 years of age), translating to 64 and 36 per cent of the total respectively.

Amongst the regions, about 45 per cent of the yaks in Bhutan are found in the West (n=18,082) spread across Thimphu, Paro and Haa. Thimphu dzongkhag has the highest number of yaks in the country (n=10,601), contributing to 27 per cent of the country's yak population and 59 per cent of the total yak population in the West region (Table 4).

In Bhutan, young yaks of less or equal to 3 years of age are the most susceptible age group for gid disease; they act as the intermediate host in the lifecycle of *Taenia multiceps* causing gid in yaks. West (n=6,765), of all the regions, and Thimphu (n=4,056), of all the dzongkhags, have the highest count of gid susceptible yak population in the country (Table 4). Looking at the gewogs (sub-districts), Darkarla gewog has the highest number of young yaks in the country (n=1,845), followed by Tsento (n=1,464), Merag (n=1,438), Lunana (n=1,264), etc. (Figure 6).

Table 4: Region and Dzongkhag-specific distribution of yak population in Bhutan, 2021

Region - Dzongkhag	Adult yaks (>3yrs)	Young yaks (≤3yrs)	Total
East	**4924**	**2854**	**7778**
Lhuentse	73	134	207
Trashigang	4552	2572	7124
Trashiyangtse	299	148	447
East-Central	**2779**	**1135**	**3914**
Bumthang	2677	992	3669
Trongsa	102	143	245
West	**11317**	**6765**	**18082**
Haa	2422	1128	3550
Paro	2350	1581	3931
Thimphu	6545	4056	10601
West-Central	**6385**	**3774**	**10159**
Gasa	4564	2167	6731
Wangdue Phodrang	1821	1607	3428
Total	**25405**	**14528**	**39933**

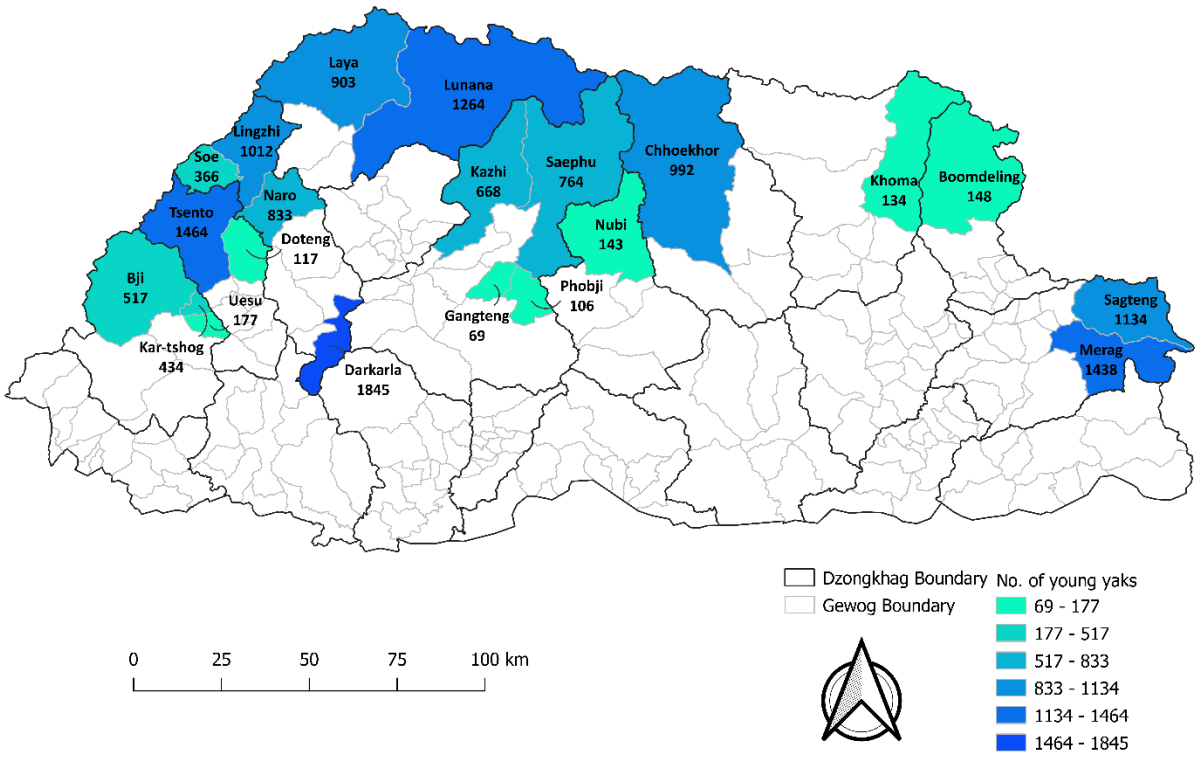


Figure 6: Gewog-specific distribution of gid susceptible yak population in Bhutan, 2021

3.3. Distribution of yak watchdogs

It's been a traditional practice of keeping dogs with yak herding families in the country. Some of the obvious reasons for keeping dogs along with the yaks are companionship provision for the family, protection of the family's temporary hut and property from theft, and guarding the family and the yaks from wild predators. In the lifecycle of *T. multiceps* causing gid in yaks in Bhutan, yak watchdogs play a critical role, as a definitive host, in infecting the young yaks (Figure 1).

A total of 875 yak watchdogs were counted in 21 yak-rearing gewogs in the country in 2021, translating to more than a dog per yak-herding family in Bhutan. Amongst the regions, the West region has the highest number of yak watchdogs (n=374). Trashigang, among the yak-rearing dzongkhags, has the highest number of dogs (n=257) – mainly because of the highest number of yak-herding families residing in the dzongkhag (n=236).

Table 5: Region and Dzongkhag-specific distribution of yak watchdogs in Bhutan, 2021

Region - Dzongkhag	No. of dogs
East	**274**
Lhuentse	7
Trashigang	257
Trashiyangtse	10
East-Central	**63**
Bumthang	59
Trongsa	4
West	**374**
Haa	92
Paro	34
Thimphu	248
West-Central	**164**
Gasa	145
Wangdue Phodrang	19
Total	**875**

Figure 7 shows the spatial (gewog-wise) distribution of yak watchdogs in the country reported for the calendar year 2021. Gewogs with a significant number of yak watchdogs are Sakteng (n=199), Lingzhi (n=117) and Laya (114). Out of 4 yak-rearing highland gewogs of Wangdue Phodrang dzongkhag, there is not even a single yak watchdog in Kazhi, Gangteng and Phobji.

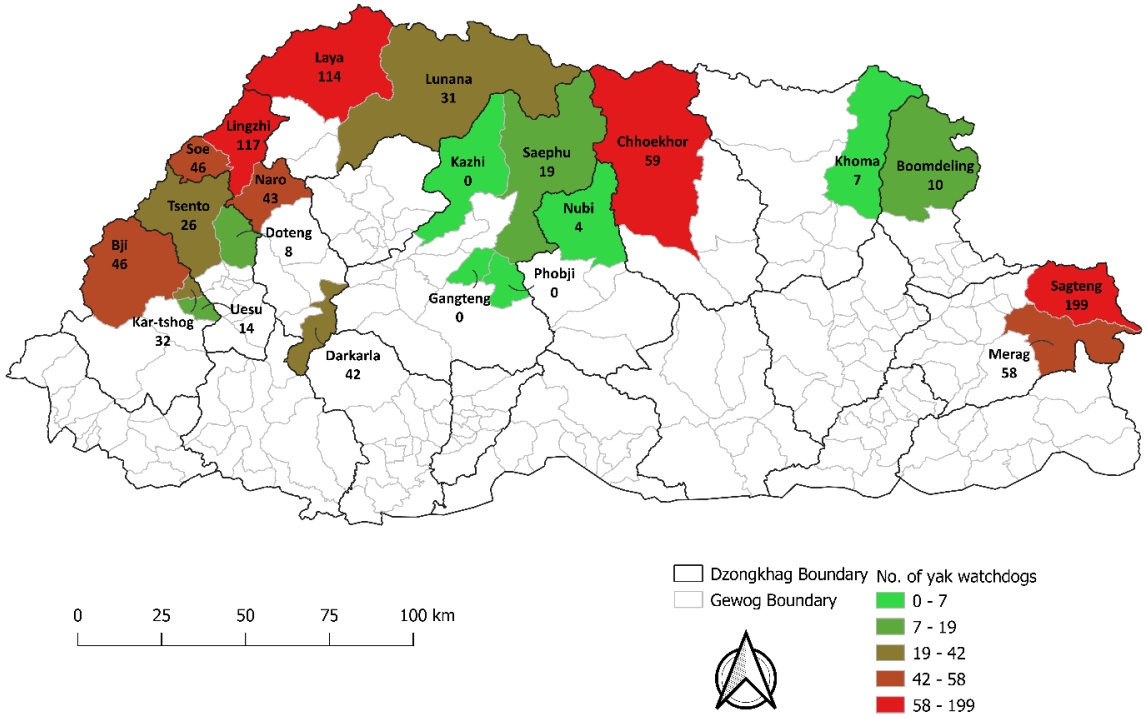


Figure 7: Gewog-specific distribution of yak watchdogs in Bhutan, 2021

3.4. Disease Prevalence in 2021

Through the implementation of various gid prevention and control measures in the highland areas of the country, a significant reduction in the prevalence of gid in yaks could be achieved. From the recorded baseline national gid prevalence of 14.31 per cent in 2020, over the calendar year 2021, the prevalence of the disease decreased to 5.89 per cent (Figure 8).

In terms of the number of yaks affected, 1,222 yaks were affected by gid in 2020 and 856 in 2021. Therefore, the decline in the number of yaks affected over the past year is not as significant as the reduction in prevalence rate achieved.

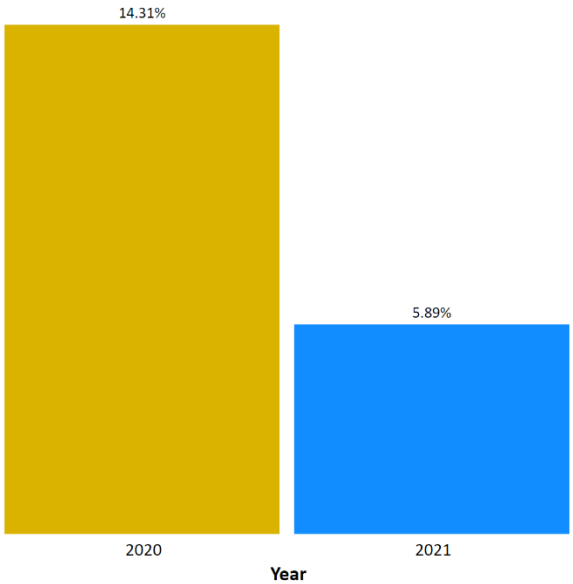


Figure 8: National prevalence of gid in yaks in Bhutan, 2020 and 2021

Moreover, the number of susceptible populations counted in 2021 (n=14,528) was about 1.7 times the population counted in 2020 (n=8,541).

At the regional level, a reduction in the prevalence rate was observed across all the regions. A huge decline in the prevalence of gid in yaks could be achieved in the West-Central region: from 34.4 per cent in 2020 to 6.68 per cent in 2021 (Figure 10).

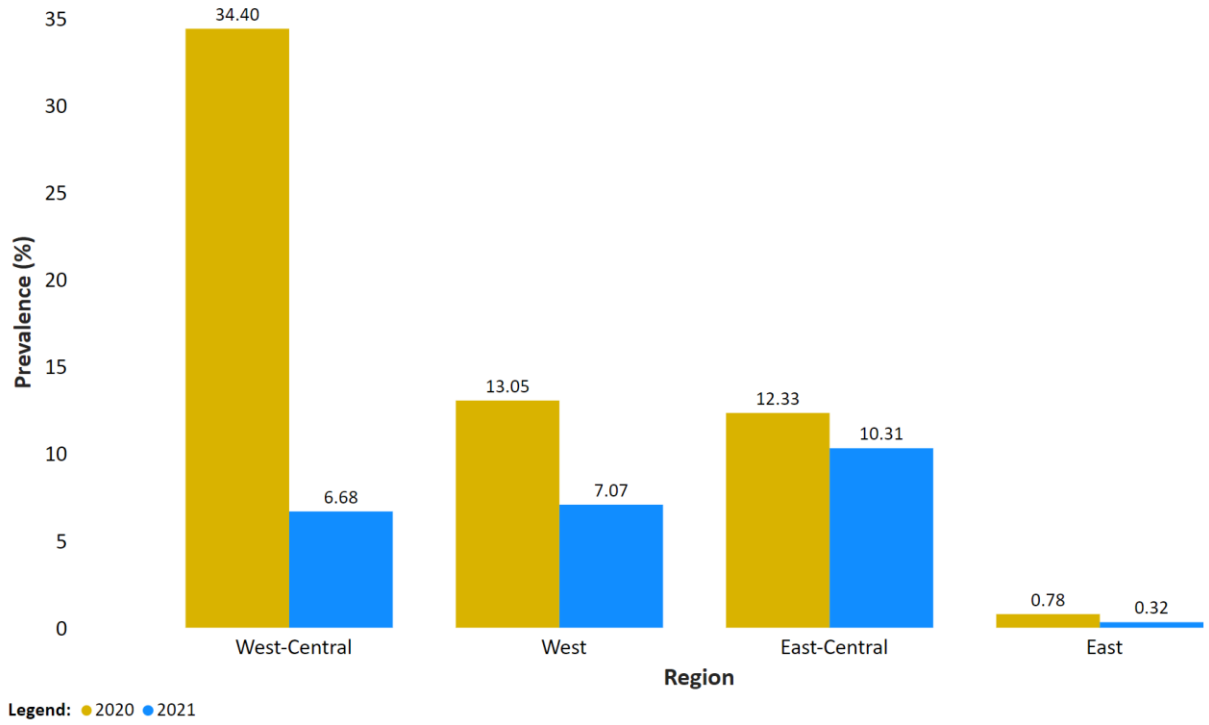


Figure 9: Regional prevalence of gid in yaks in Bhutan, 2020 and 2021

In 2021, all the highland dzongkhags have observed a decline in the prevalence of the disease at different rates in comparison to the baseline prevalence established in 2020. A significant reduction in gid prevalence was observed in Gasa dzongkhag: from 50.75 per cent in 2020 to 10.24 per cent in 2021. Paro dzongkhag has also recorded a significant decline in the gid prevalence rate, from 22.41 per cent in 2020 to 11.70 per cent in 2021 (Figure 11).

Lhuentse, Trashiyangtse and Trongsa were the districts with no gid cases reported in 2020 during the nationwide survey. These districts could successfully maintain the status quo regarding the prevalence of gid in yaks in their respective jurisdictions over the past 12 months of the calendar year 2021 (Figure 10) through the implementation of preventive measures in line with the National Gid Prevention, Control and Elimination Plan 2021.

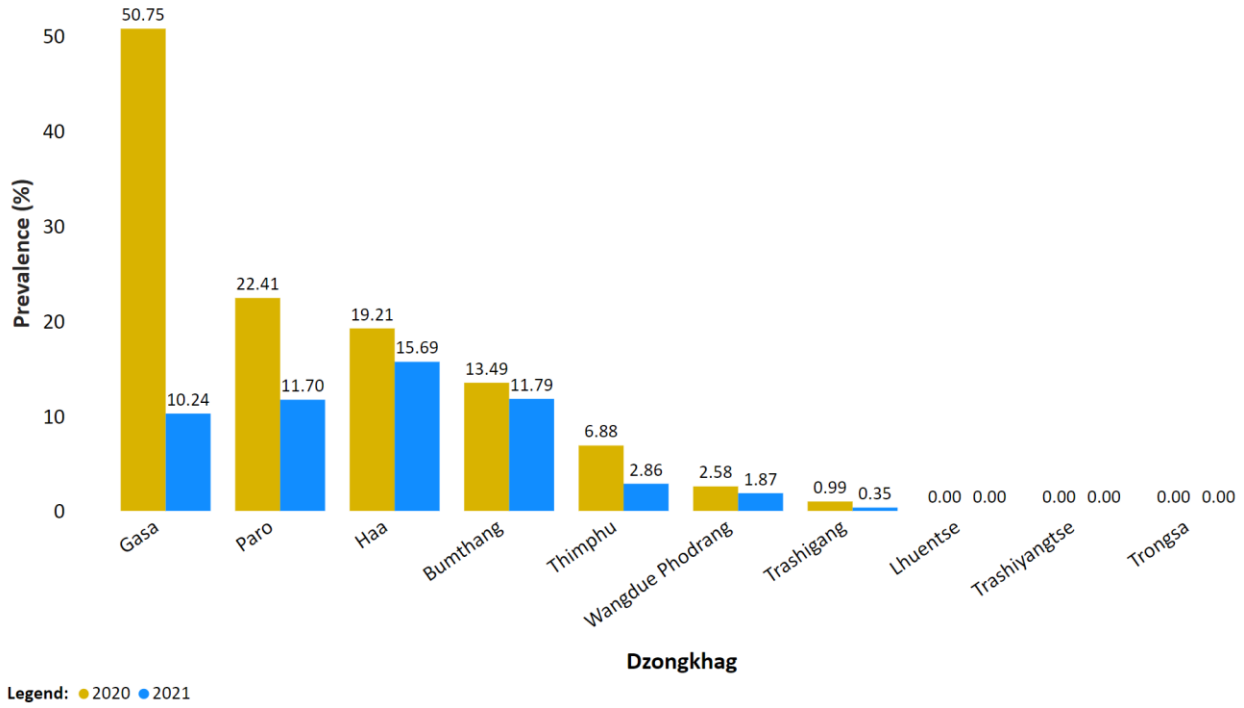


Figure 10: Dzongkhag-specific prevalence of gid in yaks in Bhutan, 2020 and 2021

At the gewog level, most of the gewogs achieved a reduction in gid prevalence in 2021, as compared to the prevalence recorded in 2020. Lunana and Laya observed a drastic reduction in the prevalence rate; from 71.31 % in 2020 to 10.24 % in 2021 for Lunana and from 22.41 % to 11.70 % for Laya gewog (Figure 11).

Doteng, Kar-tshog, Saephu and Merag are the gewogs where an increase in gid prevalence was reported (Figure 11). Doteng gewog of Paro dzongkhag observed a record-high increment in the gid prevalence, from 20 % prevalence in 2020 to 52.14 % in 2021. Kar-tshog gewog of Haa also observed a significant increase in gid prevalence, from 11.49 % in 2020 to 18.66 % in 2021.

In 2021, Boomdeling, Gangteng, Khoma, Nubi and Phobji could maintain the status of zero per cent gid prevalence as reported in 2020 (Figure 11). In addition, from the gid prevalent gewogs – as reported in 2020 – Kazhi, Uesu and Darkarla reported no gid cases during the calendar year 2021 (Figure 11). Therefore, these 3 gewogs enter the group of gid non-prevalent highland gewogs of the country.

Figure 12 shows the spatial (gewog-wise) distribution of gid prevalence in the country reported in 2021. As per the field reports submitted for the calendar year 2021, Doteng (52.14%), Kar-tshog (18.66%), Bji (18.57%), Lunana (13.84%), Chhoekhor (14.67%) and Naro (10.68%) are the top five gid prevalent gewogs in the country. However, considering the epidemiology of the disease, even a single gid case in the area could pose a high risk of transmission to other young yaks if the recommended gid prevention and control measures are not implemented.

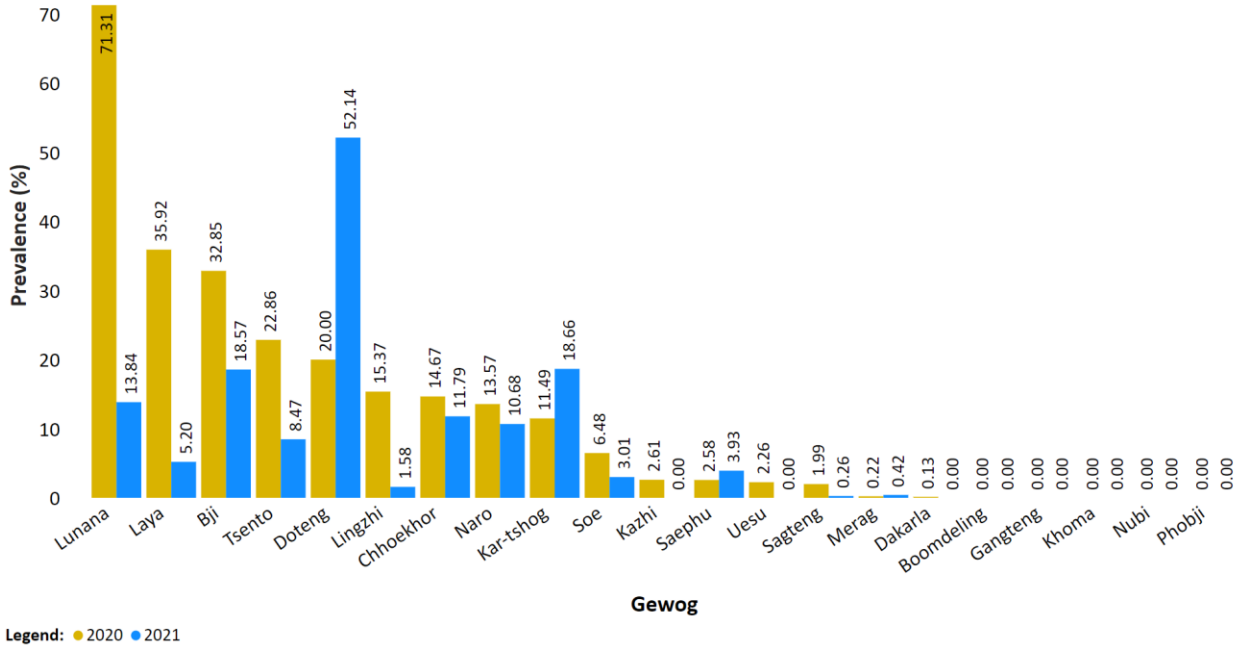


Figure 11: Gewog-specific prevalence of gid in yaks in Bhutan, 2020 and 2021

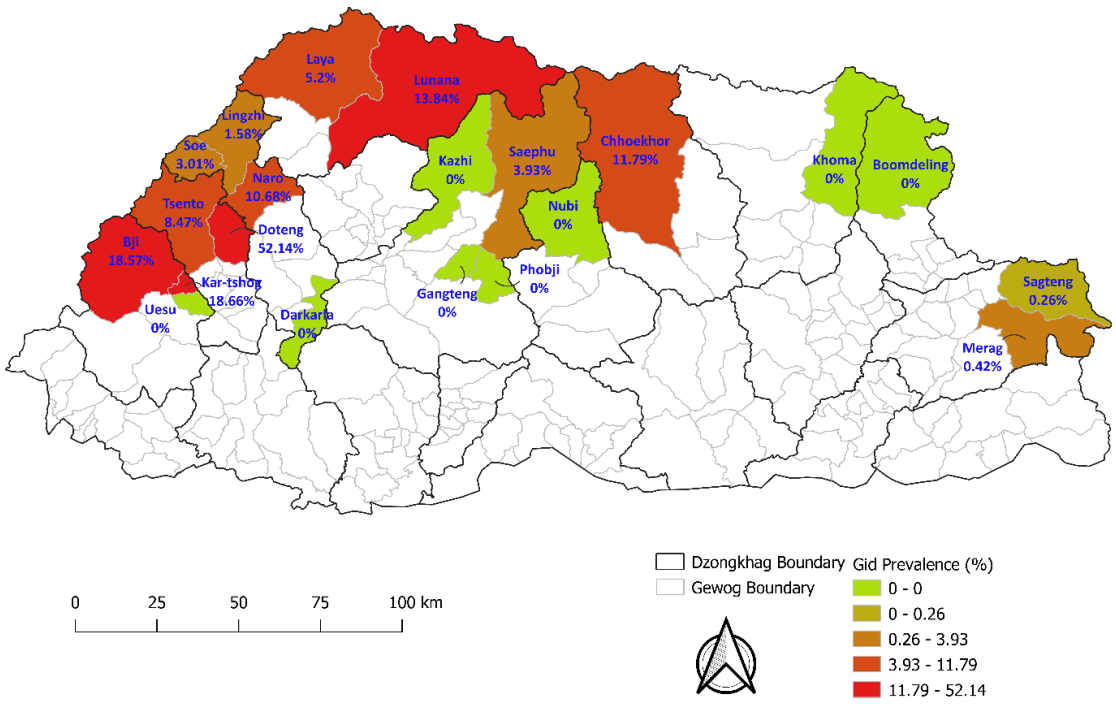


Figure 12: Map showing gewog-specific distribution of gid prevalence in Bhutan, 2020

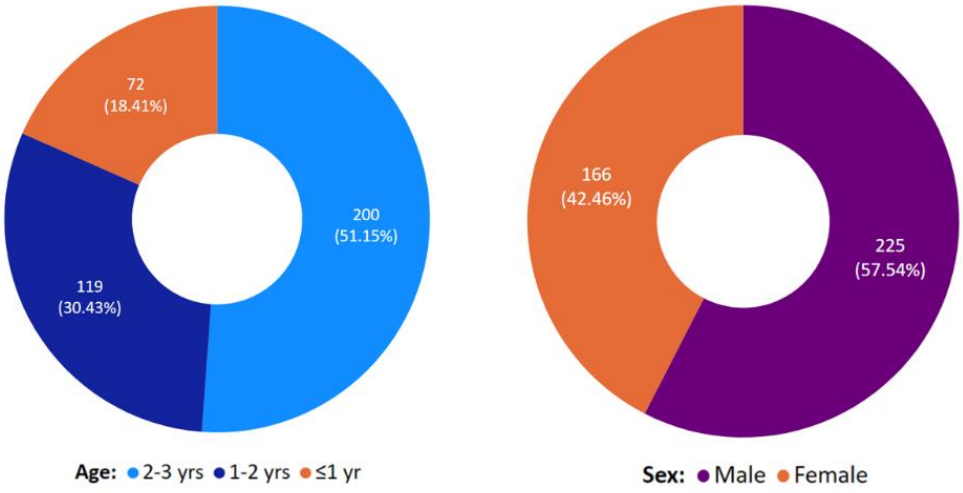


Figure 13: Age and sex-specific distribution of gid-affected yaks in Bhutan, 2021

Amongst the young yaks affected by gid, yaks between the age range of 2 to 3 years are the primarily affected age group (51.15 %) followed by 1 to 2 years (30.43 %) and less or equal to 1 year of age (18.41 %) (Figure 13). This indicates that the susceptibility of young yaks to gid increases with the increase in age, corresponding to the decrease in maternal antibodies level in yak calves following weaning, the period for which ranges from 6 to 12 months (Gyamtsho, 2000). There is not much difference in the sex ratio of the gid-affected young yaks observed in 2021. 57.54 per cent (n=225) of the total affected were male yaks and the remaining 42.46 per cent (n=116) were female.

During the calendar year, a total of 856 young yaks were affected by gid, of which 465 died, thus translating to an apparent case fatality rate (CFR) of 54 per cent (Table 6). The regional apparent CFR ranged from 42 % in the West-Central to 62 % in the West. For the dzongkhags, the highest apparent CFR was recorded in Paro dzongkhag (84 %) and the lowest in Wandgue Phodrang (0 %). Similarly, at the gewog level, Tsento and Doteng recorded the highest CFR of 85 % and 84 % respectively.

Table 6: Region, Dzongkhag and Gewog-specific distribution of gid affected yaks reported in Bhutan, 2021

Region-Dzongkhag-Gewog	CFR (Apparent)
East	**56%**
Trashigang	**56%**
Merag	50%
Sagteng	67%
East-Central	**51%**
Bumthang	**51%**
Chhoekhor	51%
West	**62%**
Haa	**55%**
Bji	50%
Kar-tshog	62%
Paro	**84%**
Doteng	84%
Tsento	85%
Thimphu	**37%**
Lingzhi	0%
Naro	48%
Soe	0%
West-Central	**41%**
Gasa	**46%**
Laya	83%
Lunana	37%
Wangdue Phodrang	**0%**
Saephu	0%
Total/Average	**54%**

3.5. Prevention and Control

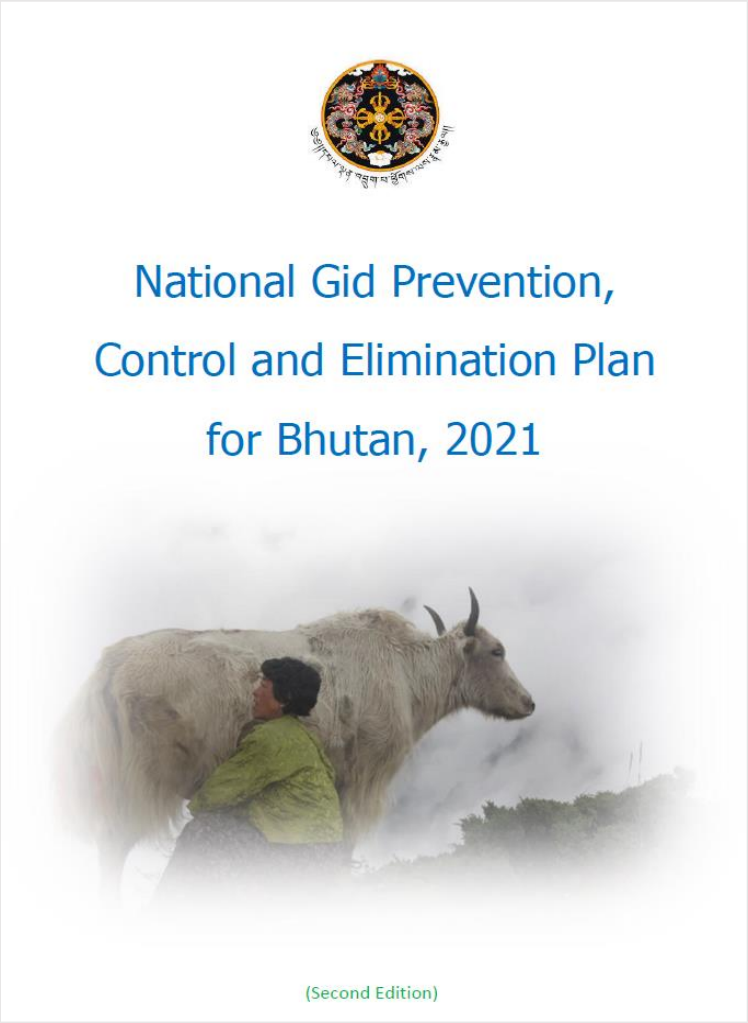


Figure 14: National Gid Prevention, Control and Elimination Plan for Bhutan, 2021

The National Gid Prevention, Control and Elimination Plan for Bhutan 2021 (Figure 14), developed by the Department of Livestock, Ministry of Agriculture and Forests guides the implementation of various technical measures to prevent and control the disease in the susceptible highland livestock population of the country, thus protecting the livelihood of the vulnerable highland communities in the country who depends on yak farming as one of the primary sources of family income.

Host-specific preventive measures are as follows:

A. Definitive Host
   - Deworming of yak watchdogs – Quarterly with Praziquantel @ 5mg/kg body weight
   - Dog population management
   - Movement control of free-roaming dogs in the highland areas

B. Intermediate Host
   - Deworming of young yaks – Biannually with Albendazole @ 7.5mg/kg body weight

Control measures:

- Isolation and observation of affected yaks
- Proper disposal of the carcass
- Treatment – surgery/ anthelmintics
- Movement control of affected or suspected yaks to gid-free areas

In line with the guiding document for the prevention and control of gid in yaks in Bhutan, with the support of the National Highland Development Program, all the recommended measures have been implemented. Deworming of yak watchdogs with Praziquantel (anti-cestode) and young yaks with Albendazole (broad-spectrum anthelmintic) are the main strategies advised and implemented intensively in the yak-rearing highland areas of the country.

Table 7: Region and Dzongkhag-specific distribution of young yaks and yak watchdogs dewormed against the parasite, 2021

Region - Dzongkhag	No. of yaks dewormed	No. of dogs dewormed
East	**1370**	**157**
Lhuentse	134	6
Trashigang	1118	141
Trashiyangtse	118	10
East-Central	**1135**	**60**
Bumthang	992	56
Trongsa	143	4
West	**5965**	**374**
Haa	1128	92
Paro	1567	34
Thimphu	3270	248
West-Central	**4210**	**178**
Gasa	2167	145
Wangdue Phodrang	2043	33
Total	**12680**	**769**

In 2021, a total of 769 yak watchdogs and 12,680 young yaks (less or equal to 3 years of age) were dewormed in 21 highland gewogs under 10 dzongkhags, translating to national deworming coverage of 87.89 per cent in yak watchdogs and 87.28 per cent in young yaks in the country (Table 7). In addition, other measures such as advocacy to yak herders about the disease, demonstration on deworming of yak watchdogs and active laboratory surveillance were conducted in the targeted highland gid prevalent areas of the country.

Figure 15 and 16 shows the number of yak watchdogs and young yaks dewormed against *Taenia multiceps* respectively. Since Kazhi and Phobji under Wangdue Phodrang dzongkhag have no yak watchdogs, the dogs dewormed, as shown in figure 15, belonged to nearby villages with no yaks but with a risk of introducing the parasite into the yak herds in the gewog.

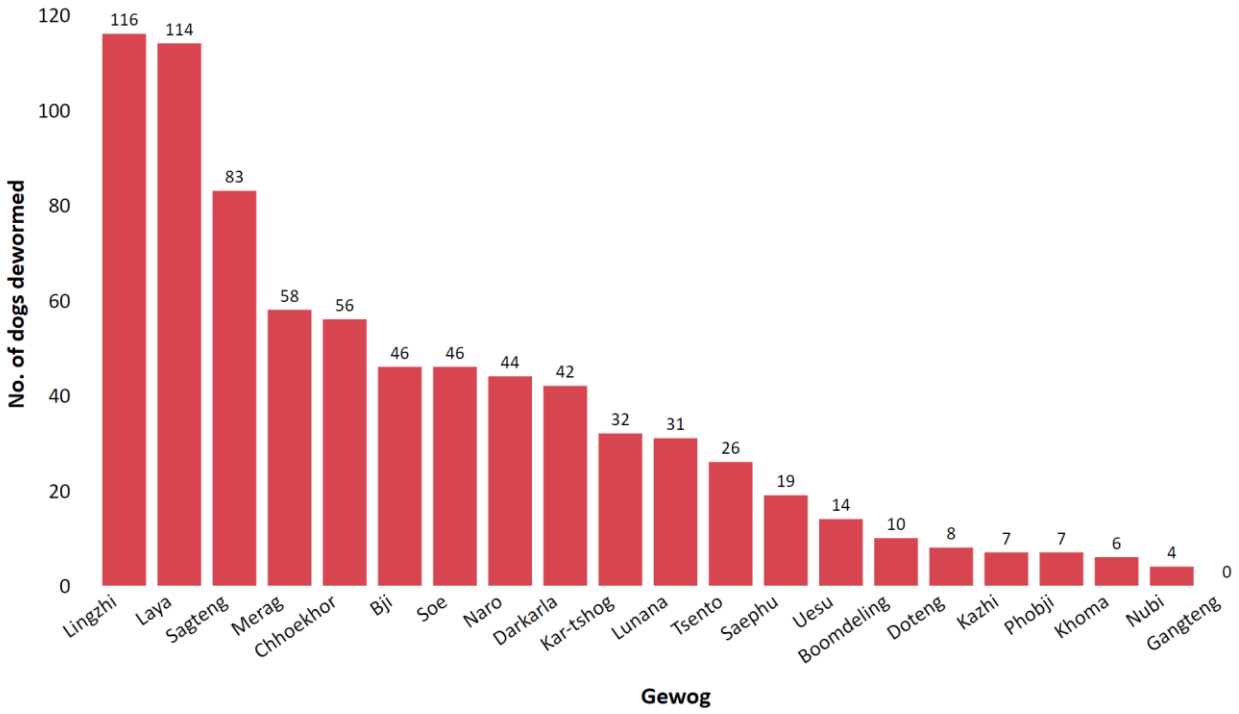


Figure 15: Yak watchdogs dewormed with Praziquantel in the Highland Gewogs, 2021

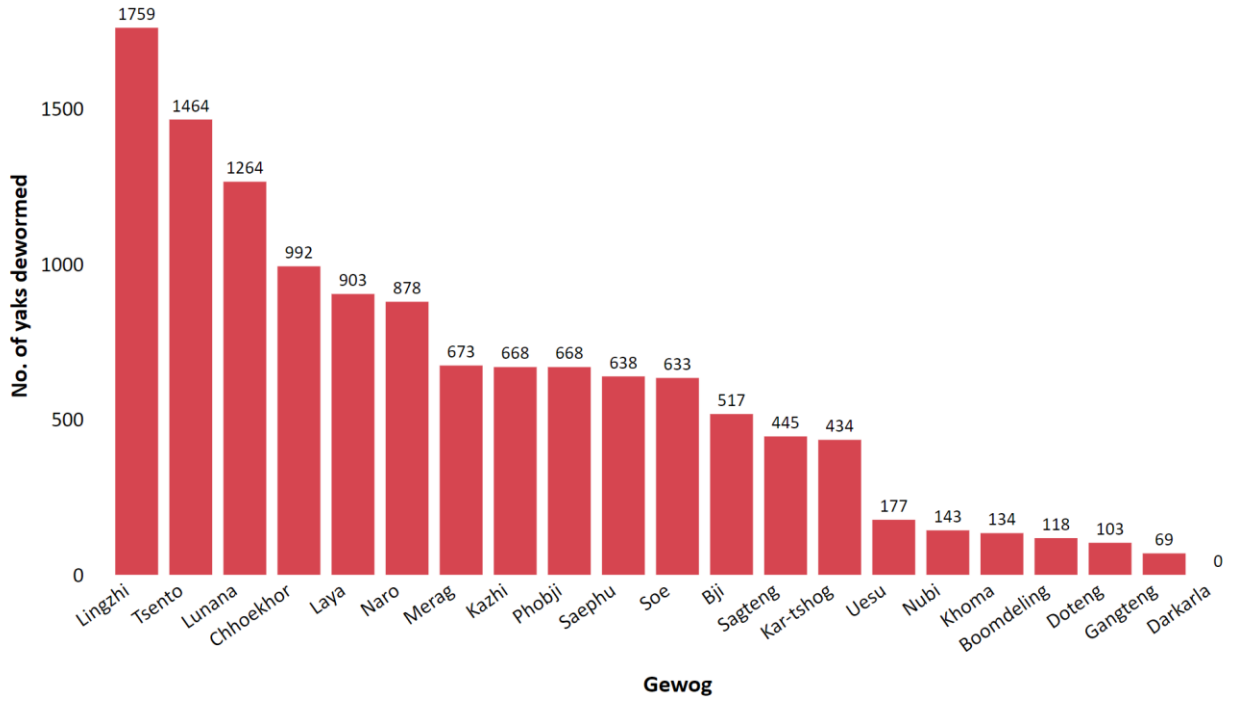
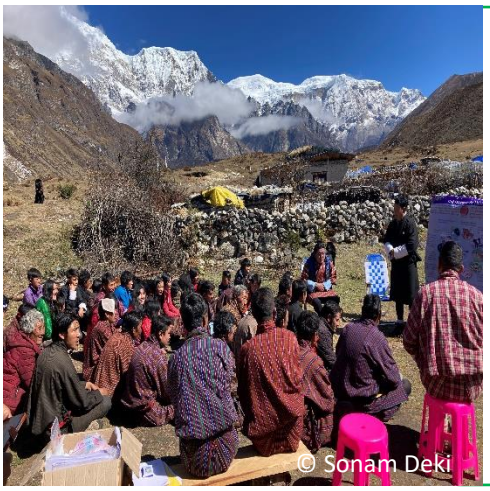


Figure 16: No. of young yaks dewormed with Albendazole in the Highland Gewogs, 2021

Following are some of the pictures concerning the implementation of various measures to prevent, control and eliminate gid in yaks from the yak-rearing highland areas of the country.



Awareness and education of yak-rearing highlanders about gid disease and its prevention and control.

Awareness and education of yak-rearing highlanders about diseases affecting highland livestock species and promotion of responsible pet ownership for the prevention and control of gid in yaks.

Advocacy on the importance and protocol of deworming of yak watchdogs and young yaks for the prevention of gid in yaks.

Registration of yak watchdog as their pet and dispensing of deworming medicine for the dog.

Livestock officials demonstrating on the yak watchdog deworming procedure.

Laboratory official collecting dog faecal sample for the Taeniid examination.

Livestock Extension Supervisors demonstrating on deworming of young yaks with anthelmintic medicine.

Yak herder deworming yak calf with the dispensed anthelmintic medicine.

Conducting survey to assess the level of yak herder's awareness about gid disease and its prevention and control.

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ANNEXURE

1. Gid Disease Reporting Form

Name of LEC/RNR-EC: ..... Name of Ext. Staff: .....

Gewog: ..... Dzongkhag: ..... Reporting period: .....

Name of owner/herder	Village	Adult Yak popn.		Dog popn.		No. of calves born		Existing calf popn.						No. of yak affected with gid		Calves died due to Gid						Place of death	Date/month of death	PM done(Y/N) & PM findings
								1 yr. old		2 yrs. old		3 yrs. old				1 yr. old		2 yrs. old		3 yrs. old				
		M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F			

Note: Under name of owner/herder, please write down the name of all yak-owning households irrespective of whether a gid case was reported or not in that household.

2. Deworming Form for Dogs and Yaks

Name of LEC/RNR-EC: ..... Name of Ext. Staff: .....

Gewog: ..... Dzongkhag: ..... Reporting period: .....

Sl. No.	Name of owner/herder	Village	Deworming of young yaks with Albendazole		Deworming of Dogs with Praziquantel		Date/Month of deworming	Place where dewormed	Remarks
			Male	Female	Male	Female