

Findings Abstracts

Beliefs about Chronic Wasting Disease Risks across Multiple States, Years, and Interest Groups

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Chronic wasting disease (CWD) is found in deer (*Odocoileus* spp.), elk (*Cervus elaphus*), and moose (*Alces alces*) in several states and provinces. The disease causes abnormal behavior, emaciation, and death in all infected animals (Williams, Miller, Kreeger, Kahn, & Thorne, 2002). There is no evidence that CWD is transmissible to humans or causes human health problems (Belay et al., 2004). Researchers and agency officials are quick to point out, however, that they are not absolutely certain that it is safe to eat meat from infected animals (Salman, 2003).

Extensive research has examined the pathology, epidemiology, transmission, and clinical signs of CWD (see Williams et al., 2002 for a review). Research on the human dimensions of CWD, however, is limited and has primarily addressed economic impacts of CWD and hunters' behavior and acceptance of management actions in response to the disease (e.g., Bishop, 2004; Needham, Vaske, & Manfredo, 2004; Vaske, Needham, Newman, Manfredo, & Petchenik, 2006). Little empirical attention has focused on describing hunters' and non-hunters' current beliefs about CWD and the extent to which these beliefs are consistent across multiple states, years, and interest groups. This findings abstract helps to address these knowledge gaps.

Data were obtained from mail surveys of: (a) residents and non-residents who hunted deer with a gun in 2003 in Arizona, Colorado, Nebraska, North Dakota, South Dakota, Utah, Wisconsin, or Wyoming; (b) residents and nonresidents who hunted elk with a gun in 2003 in Colorado, Utah, or Wyoming; (c) residents and nonresidents who hunted deer or elk with a gun in 2004 in Colorado; and (d) hunters and non-hunters residing in Wisconsin's southwest CWD eradication zone (i.e., 1,351 mi² area where infected deer have been found) in 2004. Across studies, the total sample size was 12,905 and average response rate was 47% (see Table 1 for sample size, year, state, and interest group for each study). Telephone non-response bias checks were conducted in all studies except those involving Colorado hunters in 2004 where limited funds prohibited non-response checks. In each study, data were not weighted to correct for non-response bias because effect sizes

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Table 1
 Respondents' beliefs about possible CWD risks for each study

State	Interest group	Year	Sample size (<i>n</i>)	Belief statements about CWD ¹						
				Threat has been exaggerated	Eliminate from wild deer/elk	Risk to deer/elk, not humans	Risk to humans	Causes disease in humans	Concerned about eating deer/elk	Family concerned about eating deer/elk
Arizona	Nonresident deer hunters	2003	446	25	84	30	61	41	49	41
Arizona	Resident deer hunters	2003	394	15	84	24	56	48	55	49
Colorado	Nonresident deer hunters	2003	509	28	86	31	63	48	53	54
Colorado	Nonresident deer hunters	2004	679	35	82	36	62	41	43	42
Colorado	Nonresident elk hunters	2003	565	34	88	35	65	45	49	48
Colorado	Nonresident elk hunters	2004	731	39	84	37	66	47	41	42
Colorado	Resident deer hunters	2003	459	32	82	26	70	48	58	61
Colorado	Resident deer hunters	2004	672	33	78	36	68	43	47	52
Colorado	Resident elk hunters	2003	472	31	85	32	69	48	56	58
Colorado	Resident elk hunters	2004	643	36	82	36	71	42	45	53
North Dakota	Nonresident deer hunters	2003	509	38	87	31	65	45	43	42
North Dakota	Resident deer hunters	2003	346	18	88	21	56	51	48	46
Nebraska	Nonresident deer hunters	2003	524	35	85	36	68	43	48	51
Nebraska	Resident deer hunters	2003	423	29	86	28	63	54	54	54
South Dakota	Nonresident deer hunters	2003	558	42	85	33	63	37	47	47
South Dakota	Resident deer hunters	2003	422	28	82	27	57	42	48	47
Utah	Nonresident deer hunters	2003	438	21	84	24	52	44	60	52

Utah	Nonresident elk hunters	2003	336	22	88	26	58	44	51	49
Utah	Resident deer hunters	2003	329	19	87	20	50	42	60	55
Utah	Resident elk hunters	2003	332	21	89	21	56	43	50	50
Wisconsin	Nonresident deer hunters	2003	463	49	85	34	74	46	50	57
Wisconsin	Resident deer hunters	2003	381	48	80	41	69	40	45	56
Wisconsin	Hunters in eradication zone	2004	360	62	65	59	66	44	59	69
Wisconsin	Non-hunters in eradication zone	2004	253	47	70	49	72	63	73	68
Wyoming	Nonresident deer hunters	2003	473	35	81	37	66	40	48	51
Wyoming	Nonresident elk hunters	2003	507	33	83	31	61	36	43	44
Wyoming	Resident deer hunters	2003	307	22	82	22	57	36	50	47
Wyoming	Resident elk hunters	2003	374	19	85	23	62	36	46	44
Total			12,905	33	83	32	64	44	49	50

¹Responses were measured on a 7-point scale of 1 = strongly disagree to 7 = strongly agree. For analysis purposes, responses were recoded into disagree, neither agree nor disagree, and agree. Cell entries are percentages (%) that agreed with each belief statement about CWD.

showed weak or minimal differences ($V, \eta \leq .15$) between those who did and did not respond to surveys (Cohen, 1988; Vaske, Gliner, & Morgan, 2002).

To measure current beliefs about CWD, respondents reported whether they disagreed or agreed with seven statements: (a) the threat of CWD has been exaggerated; (b) effort should be taken to eliminate CWD from the wild deer/elk population; (c) CWD poses a risk to deer/elk, but not to humans; (d) CWD may pose a risk to humans, but not enough is currently known to be sure; (e) CWD may cause disease in humans if they eat meat from animals infected with CWD; (f) because of CWD, I have concerns about eating deer/elk meat; and (g) because of CWD, members of my family have concerns about eating deer/elk meat.

In total, 33% of respondents believed that the threat of CWD has been exaggerated (Table 1). Wisconsin respondents were most likely to agree with this statement (47% to 62%); Arizona (15%) and North Dakota (18%) resident hunters were least likely to agree. In Arizona and North Dakota, CWD has not been discovered and has received less attention. Conversely, actions taken by the media and government in Wisconsin since CWD was found in the state have been referred to as rapid, aggressive, and extreme (Heberlein, 2004). In most studies, however, fewer than 40% of respondents agreed that CWD has been exaggerated and although responses were statistically different among studies and states, differences were relatively weak or minimal, $\chi^2(14 \text{ to } 54, n = 12,599) \leq 691.76, p < .001, V \leq .17$.

Most respondents (83%) agreed that effort should be taken to eliminate CWD from wild deer/elk populations. Although slightly fewer respondents residing in Wisconsin's eradication zone agreed with this statement (65% to 70%), differences among studies and states were weak or minimal, $\chi^2(14 \text{ to } 54, n = 12,574) \leq 253.30, p < .001, V \leq .11$.

Only 32% of respondents believed that CWD is a risk to deer and elk, but not to humans. Conversely, the majority of respondents in each study (50% to 74%; 64% overall) believed that CWD may pose a risk to humans. Approximately half of the respondents in most studies also agreed that CWD may cause disease in humans (36% to 63%; 44% overall) and that they (41% to 73%; 49% overall) and their families (41% to 69%; 50% overall) were concerned about eating deer or elk because of CWD. Although Wisconsin respondents were among the most likely to agree with each of these statements, differences among studies and states were weak or minimal, $\chi^2(14 \text{ to } 54, n \leq 12,579) \leq 484.74, p < .001, V \leq .14$.

Nonresident hunters (34%) were more likely than residents (28%) to believe that CWD has been exaggerated, $\chi^2(2, n = 12,011) = 60.55, p < .001, V = .07$. Elk hunters (85%) were more likely than deer hunters (82%) to believe that CWD should be eliminated, $\chi^2(2, n = 7,632) = 9.98, p = .007, V = .04$. Elk hunters (32%) and nonresident hunters (33%) were more likely than deer hunters and residents (both 29%) to believe that CWD poses a risk to deer and elk, but not to humans, $\chi^2(2, n \leq 11,996) \leq 25.68, p \leq .005, V \leq .05$. Deer hunters and resident hunters (both 51%) were more likely than elk hunters and nonresidents (both 47%) to agree that they and their families were concerned about eating big game due to CWD, $\chi^2(2, n \leq 11,947) \leq 30.69, p < .001, V \leq .05$. These differences between: (a) residents and nonresidents, and (b) deer and elk hunters were weak, but consistent across most studies and states where comparisons were possible.

Among Colorado hunters, agreement that CWD has been exaggerated increased from 31% in 2003 to 36% in 2004, $\chi^2(2, n = 4,621) = 14.48, p < .001, V = .06$. Compared to 2003 hunters (31%), more 2004 hunters (37%) agreed that CWD poses a risk to deer/elk, but not to humans, $\chi^2(2, n = 4,622) = 16.89, p < .001, V = .06$. Agreement that CWD may cause disease in humans (47% to 43%) and should be eliminated (85% to 81%) decreased from 2003 to 2004, $\chi^2(2, n \leq 4,618) \leq 24.13, p < .001, V \leq .07$. Between 2003 and 2004,

concerns among hunters (54% to 43%) and their families (55% to 47%) about eating deer or elk also declined, $\chi^2(2, n \leq 4,595) \leq 50.40, p < .001, V \leq .11$. These changes in Colorado hunters' beliefs over time were relatively consistent across strata (i.e., resident, non-resident, deer, elk hunters), suggesting that concerns about potential CWD risks may be declining in this state.

In Wisconsin's eradication zone, hunters were significantly more likely than non-hunters to believe that CWD has been exaggerated and that it is not a risk to humans, $\chi^2(2, n \leq 588) \leq 15.89, p \leq .037, V \leq .17$. Non-hunters were more likely to agree that they were concerned about eating deer and that CWD causes disease in humans, $\chi^2(2, n \leq 586) \leq 23.10, p < .001, V \leq .19$. These findings may be partially explained by research showing that these non-hunters were less knowledgeable about CWD than hunters (Vaske, Needham, Stafford, Green, & Petchenik, 2006).

Taken together, results showed that respondents generally agreed that CWD may pose a risk to humans and should be eliminated, and disagreed that CWD has been exaggerated and is not a risk to humans. Many respondents agreed that CWD may cause disease in humans and they and their families were concerned about eating deer or elk because of CWD. Findings contradict most agency information and education campaigns stressing that although precautionary measures should be taken (e.g., wear gloves when handling harvested animals), a relationship between CWD and human health problems has never been confirmed. The lack of evidence showing a connection between CWD and human health problems should be reiterated. For legal reasons, agencies are likely to continue to emphasize that precautions should be taken. Precautionary messages, however, may dominate over scientific facts in the minds of various interest groups. This should be taken into consideration when developing CWD information campaigns.

Findings were strikingly similar and begin to generalize, as most effect sizes ($V \leq .19$) showed weak or minimal differences among states, years, and interest groups (Cohen, 1988; Vaske et al., 2002). More research is required, however, to determine the extent to which beliefs about CWD: (a) differ between hunters and non-hunters in geographical locations other than Wisconsin, (b) differ among additional interest groups (e.g., hunting guides and outfitters, natives/First Nations), (c) are changing in states other than Colorado, and (d) change over a duration longer than one year.

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