

ORIGINAL ARTICLE

Changes in attitudes toward wildlife and wildlife meats in Hunan Province, central China, before and after the severe acute respiratory syndrome outbreak

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Abstract

Two surveys of opinions about wildlife conservation were carried out in Hunan Province, China, before and after the severe acute respiratory syndrome (SARS) epidemic. Hunan is the northern neighbor of Guangdong Province, where the first SARS case was reported. The custom of consuming wild meat was not common in Hunan 30 years ago. However, in recent years, consumption of wildlife such as snakes has spread to northern China. We handed out 1300 questionnaires between 22 February and 10 May 2002, before the SARS epidemic. Survey sites included the provincial capital, major cities, towns, and villages in Hunan. Another 1300 questionnaires were distributed between 10 March and 10 May 2004, after the SARS epidemic. The 2004 survey covered the same sites as the 2002 survey. Questionnaire recovery rates for the 2002 and 2004 surveys were 81.2% and 84.6%, respectively. The valid return rate was 73.0%. Frog, snake, hare, and pheasant were the wild meats most frequently eaten by local people. At the time of the first survey, more than 80% of interviewees claimed to have eaten frogs. That number had reduced to 60% by the time of the second survey. Monkey, Chinese pangolin, and bear paw were the wild meats least frequently eaten. Although palm civet was suspected to be the carrier of SARS, it was interesting to note that, after the SARS epidemic, the proportion of people surveyed who ate palm civets had declined only slightly. The results of the surveys indicate a low level of conservation consciousness; however, after the SARS and bird flu epidemics, there were obvious changes in the conservation consciousness of people in Hunan Province. We recommend some measures that could be taken to change the habits of people who consume wildlife.

Key words: bushmeat, conservation consciousness, severe acute respiratory syndrome, wild meat, wildlife.

INTRODUCTION

The outbreak of severe acute respiratory syndrome (SARS) in China in 2003 shocked the world (Heymann 2004).

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The impact of SARS was far-reaching and long-lasting (Zhong 2004). National and global health organizations were determined to find the cause of the outbreak, and a hunt for the origin of SARS was launched. Ultimately, a coronavirus that was completely identical to the SARS coronavirus aside from a 29-nucleotide insert was isolated from six masked palm civets (Guan *et al.* 2003). Although some speculation remained, the SARS coronavirus was believed to have moved from an animal host to human hosts (Anderson *et al.* 2004; Bell *et al.*, 2004; Chinese SARS

Molecular Epidemiology Consortium 2004; Lingappa 2004; Webster 2004; Zhong 2004). Many reports pointed to wild animals, such as palm civets, as potential hosts of the SARS coronavirus because the source of the coronavirus infections was traced to restaurants and markets where wild animals such as palm civets were sold. People had long been told that they should avoid eating wild animals for the sake of animal conservation, but now they were being told not to eat wild meats in order to avoid this life-threatening illness.

We initially conducted this survey in order to investigate local attitudes towards consuming wild meats in the context of wildlife conservation. We distributed more than 1000 questionnaires in Hunan Province, south-central China, between December 2001 and May 2002. The unforeseen event of SARS was an opportunity to determine whether a change in attitudes toward consuming wildlife took place after the consumption of wild meats was connected with the spread of a life-threatening virus. We conducted another survey in Hunan Province between March and May 2004. The results of these surveys are summarized in the present paper, and their significance with regard to conservation is discussed.

MATERIALS AND METHODS

Study location

Hunan Province is located in a subtropical region of central China, south of the Yangtze River. The total area of the province is 211 829 km², and the population is 66.97 million. The annual temperature averages from 16 to 18°C. The average annual precipitation ranges from 1200 to 1700 mm. A warm, humid climate and an abundance of wetlands (representing approximately 20% of the total area) provide vast suitable habitats for amphibians and reptiles. Fifty-nine amphibian species and 87 reptile species are found in Hunan Province, 19 and 17 of which, respectively, are endemic to China (Forestry Department of Hunan and Metsähallitus Forest and Park Service 2000; Yang *et al.* 2000). Half a century ago, eating wild animals such as snakes was limited mainly to people living in Guangdong Province. Only a fraction of the population of neighboring Hunan shared this habit. Previously, many amphibians and reptiles were exported from Hunan to Guangdong and Hong Kong. However, in the last two decades of the 20th century, the habit of eating snakes spread to Hunan from Guangdong.

Survey

Our questionnaire was composed of four questions.

Most people are unfamiliar with the names of specific animal species; therefore, we grouped wild animals by common names, which normally represent a taxonomic group, such as frogs, snakes, hares, pheasants, and monkeys. Questions were as follows:

Question 1

Have you ever eaten one of the following wild animals: a palm civet, snake, wild boar, frog, culver (dove), muntjac, pheasant, hare, monkey, or pangolin?

If yes, why?

- (1) I eat wild animals for nutrients.
- (2) I eat wild animals to test something novel.
- (3) I eat wild animals because they taste good.
- (4) I eat wild animals because they are expensive, and they signify my social status.

If no, why?

- (1) I do not eat wild animals because I dislike eating wild animals.
- (2) I do not eat wild animals because they are protected by law.
- (3) I do not eat wild animals because they are too expensive to eat.
- (4) I do not eat wild animals because it is hard to buy wild animals in the local markets.

Question 2

If you saw somebody hunting illegally, what would you do?

- (1) I would be determined to stop him.
- (2) I would try to stop him.
- (3) I would let him go.

Question 3

Have you changed your opinion about eating wild animals since SARS?

- (1) I eat wild animals whenever I get the chance.
- (2) I have stopped eating wildlife meats because wild animals are legally protected.
- (3) I will only eat wild animal meats after they are inspected by food inspectors.

Question 4

Do you think palm civets were the carriers of SARS coronavirus?

- (1) Yes
- (2) No
- (3) Don't know

Table 1 Survey sites and numbers of questionnaires distributed and collected during the 2002 and 2004 surveys

Survey site		Provincial capital		Medium-sized cities			Towns		Village
		Changsha	Zhuzhou	Xiangtan	Huaihua	Liuyang	Dao Xian	Bailuqian	
Time	2002	April–May	Feb.–April	April	Feb.	March	March	Feb.	
	2004	April	May	April	March	April	March	April	
No. questionnaires distributed	2002	372	165	153	151	147	123	245	
	2004	366	142	154	124	153	132	267	
No. questionnaires returned	2002	312	141	122	117	132	109	227	
	2004	347	123	146	115	146	108	221	
No. questionnaires discounted	2002	12	41	22	17	32	9	27	
	2004	47	23	46	15	46	8	21	
No. valid questionnaires	2002	300	100	100	100	100	100	200	
	2004	300	100	100	100	100	100	200	

The poll was conducted randomly in the large city of Changsha (population >2 million); the medium-sized cities of Zhuzhou, Xiangtan, and Huaihua (1–2 million); the towns of Liuyang and Daoxian (<100 000), and the village of Beiluoqiao (<10 000). The sample sizes at each site are given in Table 1.

RESULTS

During the 2002 survey, 54% of those surveyed were male and 46% were female, with each sex being approximately equally sampled ($\chi^2 = 0.640$, d.f. = 1, $P = 0.424$). During the 2004 survey, 55% were male and 45% were female, with each sex being approximately equally sampled ($\chi^2 = 1.000$, d.f. = 1, $P = 0.317$). The age groups of those surveyed are shown in Fig. 1.

Question 1

The results of both surveys were similar (independent-samples t-test: $t = 0.822$, d.f. = 20, $P = 0.421$), although the percentage of people who claimed to have consumed wild meats had decreased by 8.67%. The composition and percentage of wild animal taxa that interviewees claimed to by snakes, hares, pheasants, wild pigs, culverts, palm civets, pangolins, monkeys, and bear paws. While the percentage of older people who had eaten wildlife decreased ($t = 4.965$, d.f. = 99, $P = 0.000$), the percentage of people who had eaten wildlife increased after SARS for people younger than 15 years ($t = 2.443$, d.f. = 99, $P = 0.016$), between 15 and 25 years ($t = -2.914$, d.f. = 99, $P = 0.004$), and between 25 and 55 years ($t = -3.908$, d.f. = 99, $P = 0.000$).

The percentage of people who had eaten snakes ($t = -3.788$, d.f. = 99, $P = 0.000$) and frogs significantly decreased by about 20% ($t = -4.671$, d.f. = 99, $P = 0.000$), and the number of people who had eaten hares, pheasants, wild pigs, culvers, muntjacs, and pangolins decreased by 15.70% ($t = -3.185$, d.f. = 99, $P = 0.002$), 15.50% ($t = -3.047$, d.f. = 99, $P = 0.003$), 13.20% ($t = -2.949$, d.f. = 99, $P = 0.004$), 8.20% ($t = -1.990$, d.f. = 99, $P = 0.049$), 4.80% ($t = -1.531$, d.f. = 99, $P = 0.129$), and 2.30% ($t = -1.370$, d.f. = 99, $P = 0.174$), respectively. Consumption of palm civets decreased only by 0.90%. Consumption of monkeys ($t = 1.990$, d.f. = 99, $P = 0.049$) and bear paws ($t = 0.587$, d.f. = 99, $P = 0.559$) increased, but monkeys and bear paws made up only a small proportion of the wild animal meat eaten (Fig. 2).

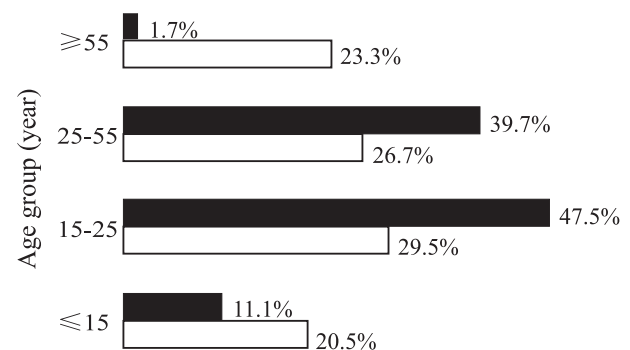


Figure 1 Percentage of respondents who had ever included wild animals in their diets. (■), 2004; (□), 2002.

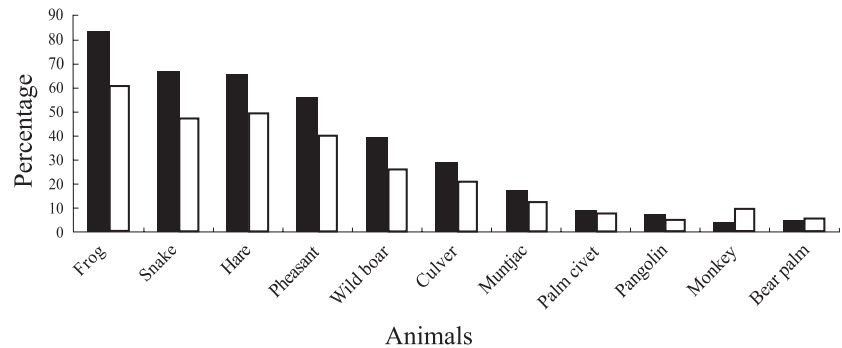


Figure 2 Percentage of respondents who stated that they included wild animals in their diets and the types of wild animals they had eaten. (□), 2004; (■), 2002.

About half of the people who claimed that they do not eat wild meats said that this was because they could not find wild meats in local markets. The percentage of people who said that they could not find wild meats in local markets decreased by about 10% in 2004 ($t = -1.877$, d.f. = 99, $P = 0.063$). The proportion of people who said that they dislike eating wild animals increased about 10% between the two surveys ($t = 2.714$, d.f. = 99, $P = 0.008$).

Most people who had eaten wild animals said that they had done so to try something novel, and the number of people who gave this response decreased slightly during the second survey after the SARS outbreak, but the difference was not significant ($t = -1.608$, d.f. = 99, $P = 0.111$). The second most common impetus for eating wild animals was that wild animal meats were delicacies, and the difference between the two surveys was not significant ($t = -0.249$, d.f. = 99, $P = 0.804$). Approximately one-tenth of respondents ate wild animals as a source of nutrients, which increased in the second survey, but not statistically significantly ($t = 0.574$, d.f. = 99, $P = 0.568$). The proportion of people who ate wild animals for ostentation increased, but not statistically significantly ($t = 2.434$, d.f. = 99, $P = 0.017$; Fig. 3).

For people who did not eat wild animals, the proportions that stated that they disliked wild animals ($t = 2.714$, d.f. = 99, $P = 0.008$), wished to protect wild animals ($t = 0.427$, d.f. = 99, $P = 0.671$), thought that wild animals were expensive ($t = -0.795$, d.f. = 99, $P = 0.429$), and could not find wild animals ($t = -1.877$, d.f. = 99, $P = 0.063$) did not differ significantly before and after SARS (Fig. 4).

Question 2

When asked whether they would stop someone who was hunting illegally (most wild animals are protected by state law or bylaws in China), in 2002 16% of the interviewees responded that they would stop the hunter,

and 57% responded that they would let him go, whereas in 2004 these percentages were 51.0% ($t = 6.966$, d.f. = 99, $P = 0.000$) and 9% ($t = -16.688$, d.f. = 99, $P = 0.000$), respectively.

Question 3

In the 2004 survey, 55% of respondents said that they had stopped eating wildlife meats because these animals are legally protected, and 38% of respondents said that they would only eat wild animal meats when the meats had been inspected by vets. Only 7% of people said that they would eat wild animals whenever they had the chance.

Question 4

When asked whether or not they thought that palm civets were the carriers of the SARS coronavirus, 38% of re-

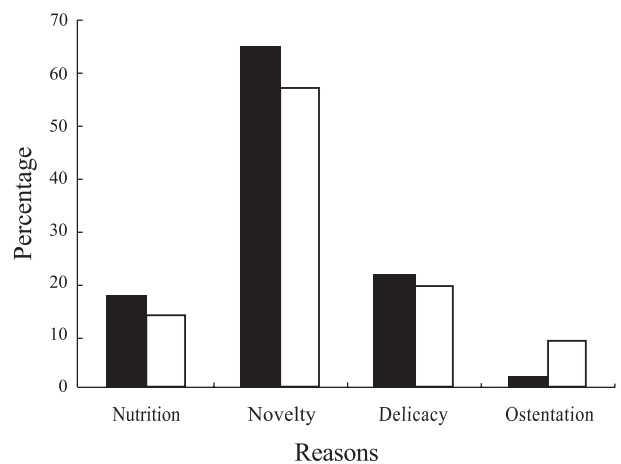


Figure 3 Reasons given for eating wild animals. (□), 2004; (■), 2002.

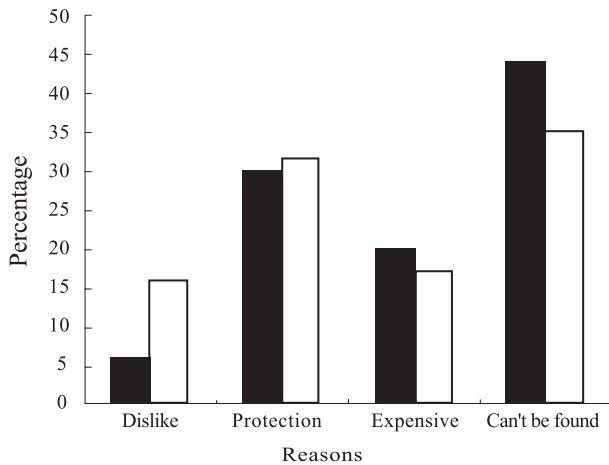


Figure 4 Reasons given for not eating wild animals. (□), 2004; (■), 2002.

spondents thought palm civets were the carriers of the SARS coronavirus, 16% thought they were not, and 43% did not know.

DISCUSSION

Many wild animal species are on the brink of extinction in China (Chen & Le 1998; Wang 1998; Zhao 1998; Zhen & Wang 1998). There are many reasons why these species are endangered, but there are four main factors: over-exploitation, loss of habitat, invasive species, and disease spread by invasive species (Wilson *et al.* 1992). Consumption of wildlife for food is one of the main components of the over-exploitation of wildlife resources. Wildlife was the major source of protein for early human beings (Roosevelt 1996). However, with the establishment of modern animal husbandry, human beings no longer need wildlife meat as a source of protein. In most inhabited areas of the Earth, people still consume considerable amounts of wild meat. Today, except for forested and savanna areas, relatively few large mammals remain for humans to hunt (Redford & Robinson 1991; Redford 1992; Bennett 2002), so people turn to amphibians and reptiles. Over-exploitation is the main cause of the decline of amphibians in southern China (Stuart *et al.* 2004). During the last decade of the 20th century, China shifted from the country that exported the most snakes to the country that imported the most snakes. The main reasons were the depletion of domestic snake populations due to increased consumption (Zhou & Jiang

2004, 2005). The depletion of amphibian and reptile populations also stimulated illegal international smuggling of amphibians, snakes, and turtles (Li & Li 1998; Ades *et al.* 2000).

With outbreaks of infectious diseases emerging, we have learned to expect the unexpected (Gill 1991, 2001; Normile & Enserink 2003; Pearson *et al.* 2003). Weiss and McLean (2004) stated that "Due to the rapid response of the scientific world, the cause of SARS was quickly identified, but there is no complacency over the global or local management of the epidemic in terms of public health logistics." In the present study we found that after the SARS and bird flu epidemics, the number of people who consumed wild meats decreased. When they were asked why they did not eat wild meats, many people stated that they were concerned about uninspected wild meat being contaminated with pathogens and feared that they might contract infectious diseases. People began to be more cautious about consuming wild animals. However, we were surprised to find that a large proportion of those who didn't eat wild animals said it was because they could not find wild animals in their local markets. This implies that there is either a decreasing abundance of wild animals or a stronger enforcement of wildlife protection laws.

Species consumed in the survey are, for the most part, common wild animals. The list of animals commonly consumed includes bushmeat, that is, that caught in the field without having undergone inspection or quarantine. We chose wild animals that can be found in local markets for the survey. Snakes and frogs are commonly consumed, although our investigation shows that consumption of reptiles and amphibians is declining. A considerable proportion of reptiles and amphibians are now imported. Large mammals like monkeys and bears are rare, so few people have eaten them. International trade of wildlife may be a way of spreading disease (Bell *et al.* 2004); therefore, quarantine of imported wildlife and wildlife products is very important. Many wildlife species in China are protected; therefore, enforcing wildlife protection laws will solve part of the problem. However, changing dietary habits is also important, so last year the Chinese Wildlife Protection Society launched a movement they dubbed "A million cooks sign for not cooking wildlife meat." The impacts of such activities are far-reaching. Many non-governmental and media organizations are also campaigning for the protection of wild animals. Such efforts will ultimately reduce the demand for wildlife in the market and will change the culinary interests of those who eat wild animals.

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