

WILDAID

**UNDERSTANDING
URBAN CONSUMPTION
OF PANGOLIN MEAT IN
CAMEROON**

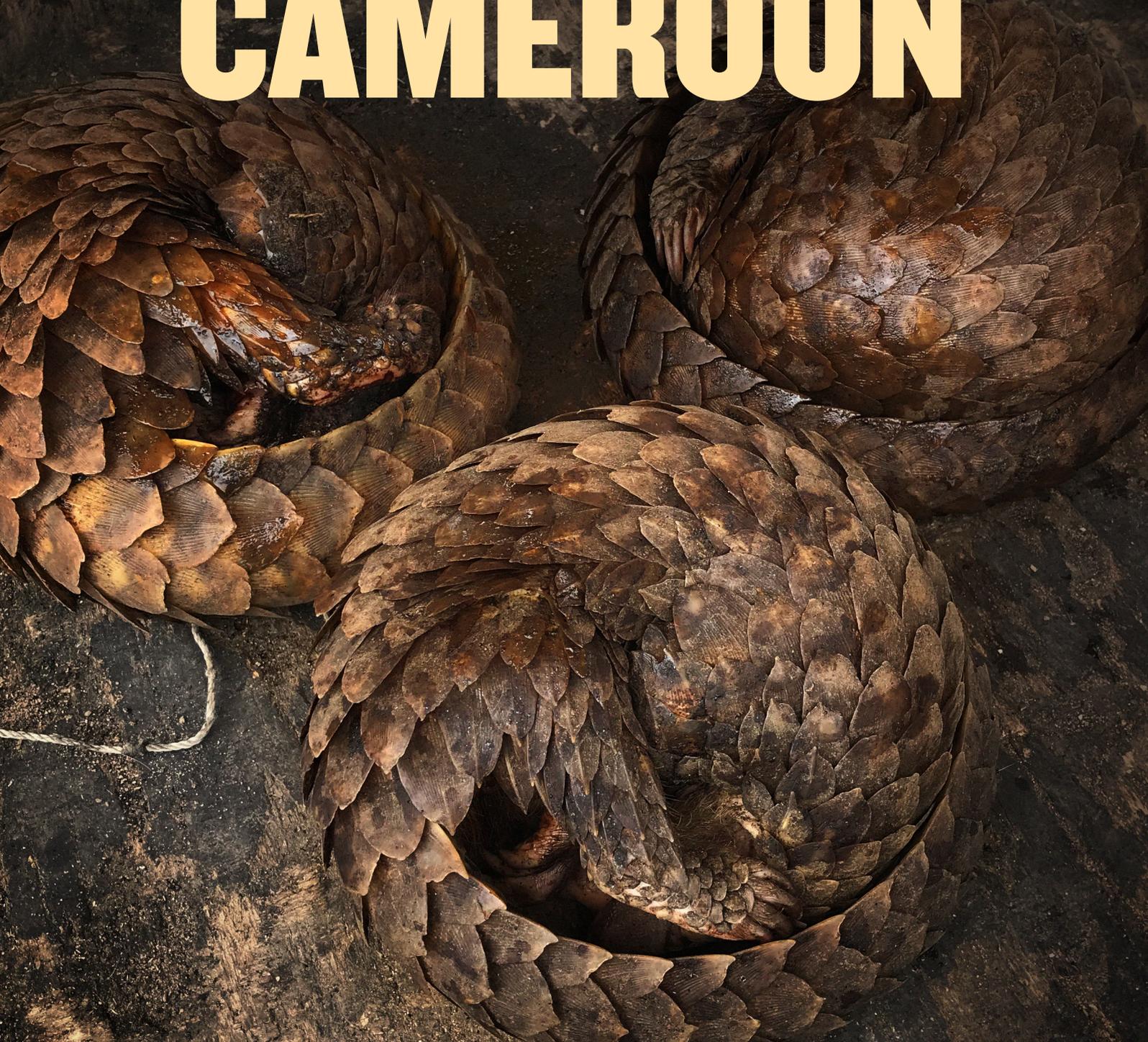


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Summary

Unsustainable bushmeat hunting has emerged as a major threat to wildlife populations in Africa, with demand for bushmeat from the continent's fast-growing cities putting serious strains on many species, especially in West and Central Africa. The bushmeat trade is also associated with an increased risk of propagating zoonotic diseases.

Pangolins in particular are facing growing threats of extinction in both Africa and Asia. In Africa, they are hunted for local consumption of their meat, while their scales are increasingly exported to Asia for use in traditional Chinese medicine.

The global threats to pangolins were recognized by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 2017, which placed all eight pangolin species on its Appendix I of most endangered species, banning all international trade. The government of Cameroon followed suit by banning the hunting, capture, killing and trade of all three indigenous pangolin species.

This study was designed to assess bushmeat and pangolin consumption patterns in Cameroon, concentrating on the cities of Douala and Mbalmayo. The objective was to provide information to help plan a campaign to raise awareness among city dwellers of the threats facing pangolins, and to promote their conservation. We surveyed a total of 424 bushmeat consumers in the two cities.

Our results showed that porcupine was most frequently eaten form of bushmeat, with 75% of respondents having consumed it in the past 12 months. The second most frequently eaten species was pangolin, with 49% of respondents having consumed it in the past year. This finding was considerably higher for pangolins than found in similar studies commissioned by WildAid in Nigeria and Gabon.

Other popular and frequently consumed forms of bushmeat in Cameroon included crocodile, snake, rat, duiker and monkey. Consumption of other endangered species, including gorilla, chimpanzee, manatee, elephant and leopard was reported, although less frequently. When respondents were asked which forms of bushmeat they would eat if cost was not an issue, pangolin topped the list as the most popular choice, followed by porcupine and crocodile. These findings dramatically underline the threats to Cameroon's pangolin population from urban consumption.

Looking more closely at consumption patterns, 83% of respondents said they ate bushmeat at least once a month. This is not surprising since the survey was conducted at bushmeat markets and restaurants so was naturally biased towards frequent bushmeat consumers. Pangolin meat was eaten less frequently, with 58% eating it at least once a month, and 42% percent only eating it once a year.

Around half of respondents usually buy and eat pangolin meat in a restaurant, while nearly 20% tend to buy and eat it in their hometown or village. Asked about the last time they ate pangolin meat, 76% said there was no particular occasion, although some reported buying it for use at traditional ceremonies, such as weddings or funerals. These findings reflect a sense that bushmeat is not an extraordinary item to find on the menu in Cameroon, while its consumption is not reserved for special occasions.

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Asked why they chose pangolin meat, 55% said it was tastier than other forms of bushmeat. A further 22% either said it was fresher, healthier or contained fewer chemicals than regular meat or fish, while a total of 11% either said it was a luxury or said it conferred a higher status than other forms of bushmeat. Conversely, when respondents were asked why they had last chosen regular meat or fish, 57% said it was more accessible, and 52% said it was cheaper. Just 5% said it was healthier, 3% said it was tastier, and only 2% cited laws about bushmeat. Again, the survey was conducted solely among bushmeat consumers, so there is a natural bias towards people who have positive views of bushmeat. Nevertheless, there is clear preference for the taste of pangolin meat, and a sense that bushmeat is fresher and healthier than regular meat. These factors represent significant challenges to any conservation awareness campaign.

Around 75% of respondents said they bought pangolin for its meat, and only 3% for its meat and scales. While there is trade in scales in Cameroon, this survey suggested low levels of awareness of this trade among city dwellers.

When bushmeat consumers were asked for acceptable substitutes for pangolin meat, 42% said there was no suitable replacement. Around 24% said fish could be a suitable replacement, while slightly smaller numbers cited pork, beef, goat and chicken. These findings are significant since any effort to significantly reduce pangolin meat consumption should be accompanied by the development of suitable alternatives.

The survey found that pangolins are becoming significantly scarcer in bushmeat restaurants in Cameroon, but knowledge about Cameroon's laws banning their consumption was low. Asked about the availability of pangolin meat, 42% said there was much less than five years ago, 16% said there was a little less, with 28% saying they didn't know.

Despite the change in the law in 2017, only 36% of bushmeat consumers were aware it is illegal to buy pangolin meat, while 46% said they were not aware of the law. Reinforcing this finding, 82% said the recent change in the law had made no difference to their consumption of pangolin meat.

There was limited recognition of the link between bushmeat and zoonotic diseases. Around 45% blamed laboratory or research experiments for diseases such as Ebola, HIV and COVID-19, while only 26% cited contact with wild animals or eating bushmeat as the likely cause. Reinforcing this finding, 87% of respondents said COVID-19 had had no impact on their intentions to buy or consume pangolin meat. However, since the survey only asked opinions from bushmeat consumers, it could have missed people who had stopped eating bushmeat altogether due to health concerns.

Finally, bushmeat consumers were asked opinions about four species found in Cameroon: elephant, lion, gorilla, and pangolin. Pangolins scored less highly as "important for our identity and our national heritage" than the other three species, with fewer people expressing pride in them. Still, the number expressing positive views about pangolin conservation was not insignificant, even among a sample made up entirely of bushmeat consumers. This suggests that campaigns that raise pride in pangolins as part of Cameroon's natural heritage could have some impact. Some respondents said they saw pangolins as a source of food, but a greater number said pangolins should be protected, a potentially encouraging finding for conservationists.

I. Introduction

Unsustainable bushmeat hunting is a major threat to wildlife, and its consumption is associated with an increased risk of contracting zoonotic diseases such as Ebola (Ordaz-Nemeth et al. 2017). Bushmeat consumption in large cities in sub-Saharan Africa is perceived as a major threat to the conservation of many species because their large population sizes can generate significant demand for bushmeat (Luiselli et al. 2018). In Central Africa alone, even two decades ago, the wild meat trade was estimated to be worth between \$1 billion and \$3 billion (Wilkie and Carpenter 1999). Such a level of extraction of terrestrial wildlife for food significantly exceeds sustainable harvest rates; the economic value representing a short-term gain that will rapidly decline as wildlife populations are depleted (Coad et al. 2019). In particular, the desire of urban families to eat bushmeat is a key driver of wildlife overexploitation in this region (Wilkie et al. 2005, Cronin et al. 2015).

The pangolin is a group of eight mammalian species distributed throughout tropical and subtropical Asia and sub-Saharan Africa (Heath 2013). Located in central Africa, Cameroon is home to three species of pangolin: the giant pangolin (*Smutsia gigantea*), the white-bellied pangolin (*Phataginus tricuspis*) and the black-bellied pangolin (*Phataginus tetradactyla*). Their range extends from the Congo basin to the southern region of Cameroon (Kingdon et al. 2013). Pangolins are hunted for local consumption of their meat and scales, which are used for cultural and ethno-medicinal purposes in West Africa, and primarily for traditional Chinese medicine (Bräutigam et al. 1994). Asian pangolin populations have declined sharply due to local demand in pangolin range states and increasing international demand for pangolin scales (e.g. Loucks et al. 2009; Wu et al. 2004) and, simultaneously, intercontinental trade and trafficking in African pangolin scales has emerged over the past decade (Heinrich et al. 2016; Ingram et al. 2019a), potentially amplified by the growing economic linkages between the African and Asian continents (Mambeya et al. 2018).

Threats to Central African pangolins include poaching and uncontrolled hunting, national and regional bushmeat trade, and international trafficking in scales and meat (Ichu et al. 2017). Located in Central Africa, Cameroon has been identified as a major player in pangolin scale trafficking (Ingram et al. 2019a). Since the transfer of pangolins to CITES Appendix I (CITES 2017abc), all three species of pangolins are now classified as a Class A species in Cameroon, giving them the highest level of protection (MINFOF 2017). In a recent review of the conservation status of pangolins, the giant and white-bellied pangolins were classified as "Endangered" primarily due to the increasing risks posed by overexploitation and habitat loss throughout their range (Nixon et al. 2019; Pietersen et al. 2019). Conservation efforts have been carried out in Cameroon through numerous initiatives to better coordinate and carry out conservation actions, for example the Progress on Pangolins (MENTOR-POP) and MENTOR-Bushmeat programs led by the Central Africa Bushmeat Action Group (CABAG); the Pangolin Rescue and Rehabilitation Center in Mefou, and the ongoing contribution of university pangolin researchers through the collaborative platform known as the Cameroon Pangolin Working Group (CPWG). However, poaching and trafficking of pangolins in Cameroon persists despite the protection afforded them by Cameroonian law (Ingram et al. 2019) and by conservation programs.

After the recent Ebola outbreak in West Africa and the global coronavirus pandemic, it is possible that human dietary behavior and local attitudes toward bushmeat

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consumption could change, while the rate of change could depend on prevailing socio-economic conditions, including wealth and education (Ordaz-Nemeth et al. 2017). In large metropolitan areas, consumers typically have a choice of domestic animal protein sources, but many opt for bushmeat for reasons other than its nutritional importance (Chausson et al. 2019). Given the pressures facing pangolins in Cameroon and in Africa more broadly, it is important to continue raising awareness in urban areas. WildAid has been attempting to raise public awareness in Cameroon of the threats to wildlife in general and pangolins in particular and the importance of their preservation. However, data on the consumption of bushmeat and pangolins in particular are scarce in some cities and a baseline survey is needed.

Overall objective: To assess the consumption patterns of bushmeat and pangolins, in particular in two Cameroonian cities, in order to help plan an awareness campaign among urban residents.

II. Materials and methodology

II.1 Study area

The survey was conducted in the Central and Littoral regions of Cameroon, specifically in the cities of Mbalmayo and Douala.

Douala is the economic capital of Cameroon, and also the capital of the Littoral region, in the department of Wouri on the country's southwest coast. With an area of 210 km² and a population of about 3 million people, this cosmopolitan city accounts for nearly 20% of the country's urban population and is the most heavily populated city in Central Africa, with rich socio-cultural diversity.

Mbalmayo is a city of around 70,000 people in Cameroon's Centre region and the capital of the Nyong-et-So'o department. It is located on the banks of the Nyong River, about 50 km south of the capital city of Yaoundé (Ville et commune du Cameroun 2020).

Site selection criteria

Very few studies on bushmeat have been conducted in these cities, yet they could be considered important cities in the transit, trade and consumption of bushmeat. Indeed, Mbalmayo is very close to the national capital Yaoundé, forming a direct link to rural areas from which bushmeat is transported to Yaoundé from the south. Douala is a destination for the bushmeat trade, and the economic capital of Cameroon (Edderai & Dame 2006).

II.2. Methodology

The study took place from September 1 to 14, 2021. Three interviewers were trained to understand the questions in order to harmonize the collection of information, evaluate the sample size and estimate the time needed to complete a questionnaire. The identification of markets and restaurants where bushmeat is sold and consumed was done using a guide (see Nash et al. 2016). Guides were selected from individuals with knowledge of the bushmeat supply and sales chain in the target cities. After identification of the sampling sites, the survey was conducted between approximately 8:00 am

and 5:00 pm using a questionnaire (Turvey et al. 2014; Nash et al. 2016) encoded in the KoBoCollect smartphone application. This software was chosen because it allows for speed in data collection in the field, avoiding errors occurring during data entry. However, some survey frames were printed and the data collected on them was entered into KoBoCollect. The printing of some survey sheets was for those respondents who, for fear of reprisals, suspected a possible recording of the conversation by a smartphone. The interviews were conducted in French and sometimes in English.

Respondents were selected from restaurants and other places where bushmeat is sold and consumed following a protocol adapted from Nguyen et al. (2021). Interviewers approached everyone who was there to consume bushmeat (after their meal or before it was served). After collecting demographic information (age, gender, education level, etc.) while maintaining the anonymity of the respondent, questions were asked about past and future bushmeat and pangolin meat consumption habits in particular. Those who had eaten bushmeat in the past 12 months were asked additional questions to gather more information about their habits and preferences (see questionnaire in Appendix). The 40-question questionnaire took 15 to 45 minutes to complete.

III. Results

III.1. Demographic profile of study population

We interviewed 424 people in Douala (58%, n=246) and Mbalmayo (42%, n=178), split between different age groups, sex, marital status, occupation, salary range and occupation, as well as a variety of travel habits. The largest sub-group came from the 25-34 age group (31%), while 39% were single, 49% had children, and 67% said they were Christians.

III.2. Bushmeat consumption: Frequency and species

Among respondents who said they had ever eaten bushmeat, a large majority (80%) said they had consumed porcupine. Also among the most consumed species were hedgehog (62%) and pangolin (59%). But there was also notable if less frequent consumption of protected species such as gorilla, chimpanzee, manatee, elephant and leopard. Percentages were calculated based on number of people who responded to this question (n=348). Multiple answers were allowed.

Over the course of the past 12 months, porcupine was again the most frequently eaten species, with 75% of respondents saying they had consumed it over that period. That was followed by pangolin (49%) and hedgehog (46%). Consumption of other protected species such as gorilla, chimpanzee, elephant, manatee and leopard was recorded, albeit much less frequently. Percentages were calculated based on number of people who responded to this question (n=339). Multiple answers were allowed.

Table 1. Species of bushmeat ever consumed

Q: Have you ever eaten this animal or parts of it?

Species	Number	%
Porcupine	280	80.5
Hedgehog	217	62.4
Pangolin	207	59.5
Rat	175	50.3
Monkey	157	45.1
Duiker	156	44.8
Antelope	147	42.2
Hare	134	38.5
Snake (viper)	131	37.6
Snake (boa)	112	32.2
Wild Pig/Boar	102	29.3
Monitor Lizard	102	29.3
Crocodile	92	26.4
Buffalo	62	17.8
Tortoise	51	14.7
Gorilla	42	12.1
Chimpanzee	40	11.5
Manatee	25	7.2
Elephant	20	5.7
Water Chevrotain	17	4.9
Leopard	12	3.4
Mongoose	12	3.4
Bat	5	1.4
Total	348	100

Figure 1. Species of bushmeat ever consumed

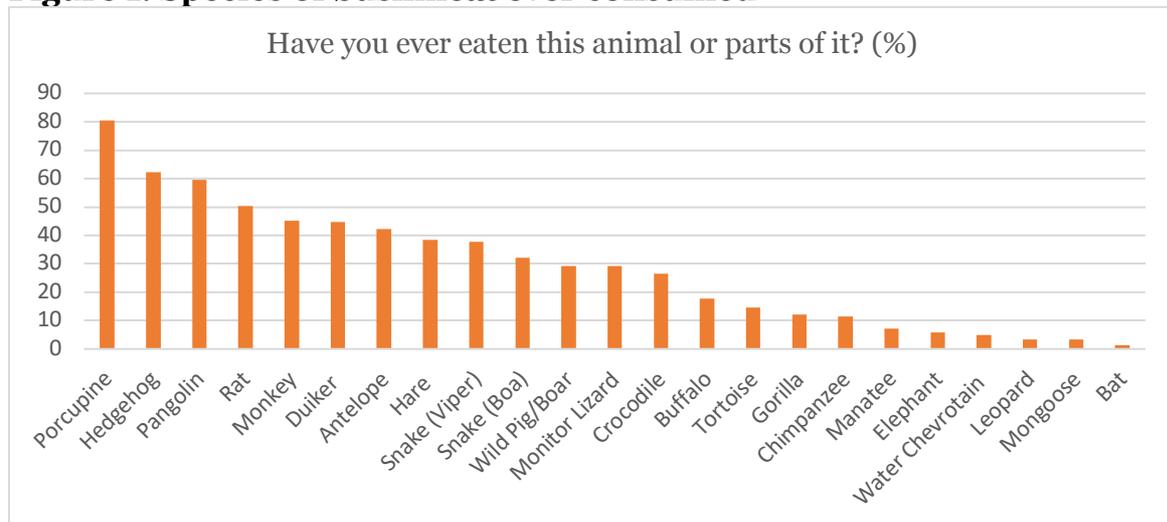
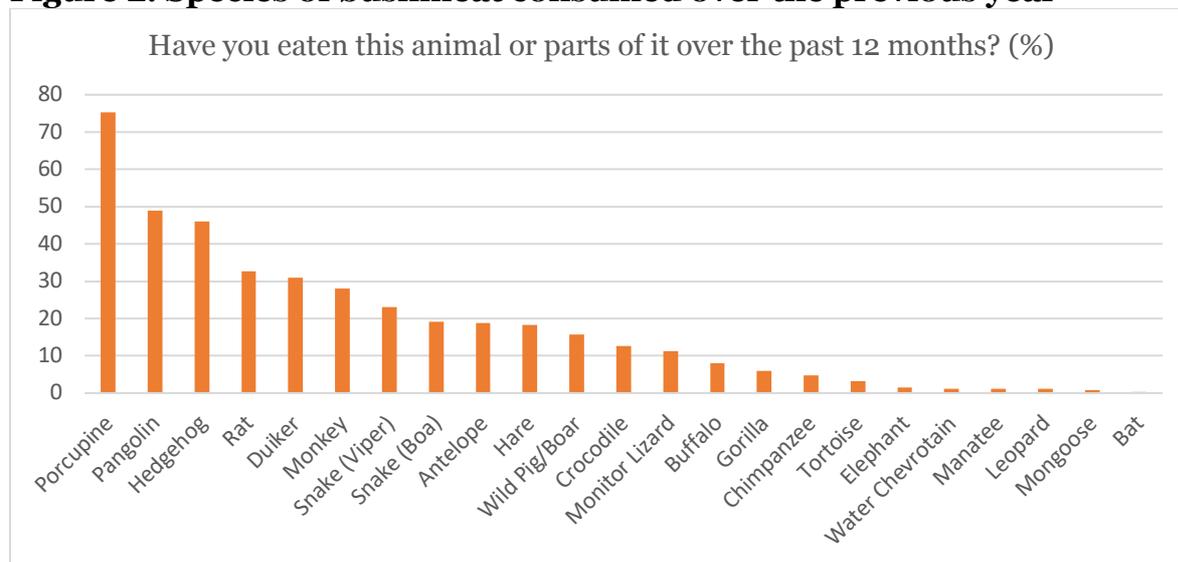


Table 2. Species of bushmeat consumed over the previous year

Q: Have you eaten this animal or parts of it in the last 12 months?

Species	Number	%
Porcupine	255	75.2
Pangolin	166	49
Hedgehog	156	46
Rat	111	32.7
Duiker	105	31
Monkey	95	28
Snake (viper)	78	23
Snake (boa)	65	19.2
Antelope	64	18.9
Hare	62	18.3
Wild Pig/Boar	53	15.6
Crocodile	43	12.7
Monitor Lizard	38	11.2
Buffalo	27	8
Gorilla	20	5.9
Chimpanzee	16	4.7
Tortoise	11	3.2
Elephant	5	1.5
Water Chevrotain	4	1.2
Manatee	4	1.2
Leopard	4	1.2
Mongoose	3	0.9
Bat	1	0.3
Total	339	100

Figure 2. Species of bushmeat consumed over the previous year

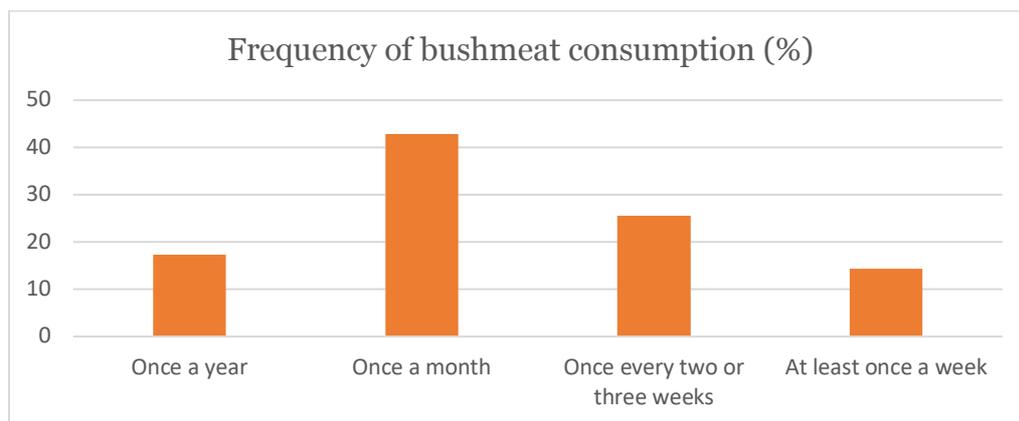


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In terms of frequency of consumption of bushmeat, around 43% of respondents said they ate it once a month, with 26% saying they ate it once every two or three weeks, 14% saying they ate it at least once a week, and 17% saying they ate bushmeat once a year.

Percentages were based on number of respondents (341), with only one answer allowed. It is important to recognise that data was collected from bushmeat restaurants and places where bushmeat is sold, among bushmeat consumers, so these figures do not reflect consumption patterns among the broader population.

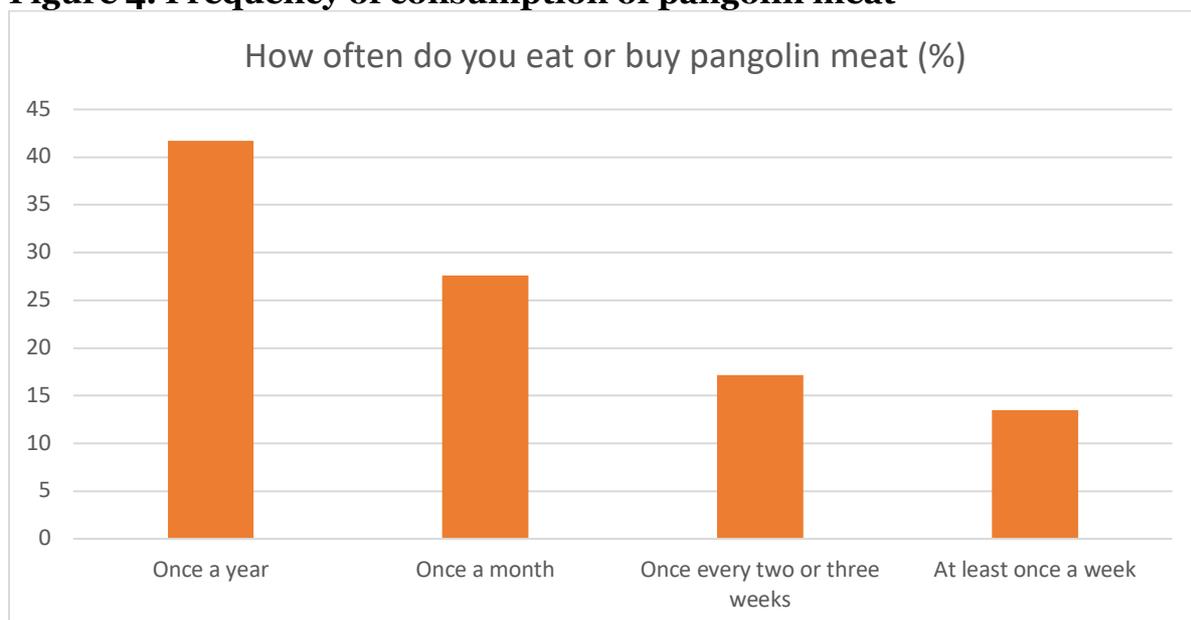
Figure 3. Frequency of bushmeat consumption



III.3. Pangolin meat consumption: Frequency

Asked how often they consume pangolin meat, 42% said once a year. Roughly 28% said once a month, while 17% said once every two or three weeks, and 13% said at least once a week. Percentages were calculated based on respondents who have eaten pangolin meat in the past 12 months (n=163).

Figure 4. Frequency of consumption of pangolin meat



III.4. Pangolin meat consumption: Locations

Among people who said they consume pangolin, nearly half (47%) said they most often bought it in a restaurant. Similarly, when asked where they most often ate pangolin meat, 51% said in a restaurant.

Table 3. Locations for purchase and consumption of pangolin

<i>Q: Where did you most often buy pangolin?</i>	Number	%
In a restaurant	172	46.9
In my home village or town	69	18.8
In the market	57	15.5
Directly from a dealer	30	8.2
From a hunter's home	19	5.2
Through my family	12	3.3
Other location	8	2.2
Total	367	100

<i>Q: Where did you most often eat pangolin meat?</i>	Number	%
In a restaurant	191	51.5
At home	78	21.0
In my home village or town	63	17.0
In the market	25	6.7
In the home of a friend or parent	14	3.8
Total	371	100



Images 1 and 2. Cooked pangolin meat (left) and bushpig (right) for sale at a market in Mbalmayo

III.5. Pangolin meat consumption: Reasons

A large majority of respondents (74%) said they buy pangolin meat exclusively for its meat. Very few people in the two cities surveyed (3%,) said they bought it for meat and scales.

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Asked why they chose pangolin meat over other forms of bushmeat or ordinary meat, more than half (55%) said it is tastier. Smaller numbers said it is fresher (10%), healthier (7%), or contains fewer chemicals (6%). Other responses included that pangolin meat is a luxury (9%) or it conveys higher status than other forms of bushmeat (3%).

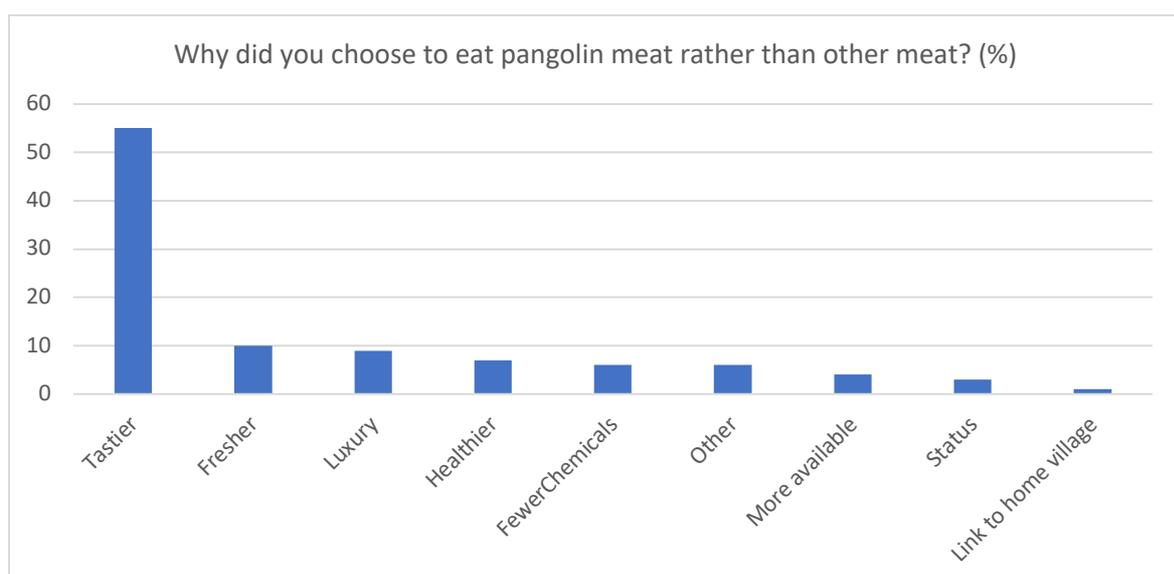
Table 4. Reasons to buy/choose pangolin

<i>Reason to buy pangolin</i>	Number	%
I buy pangolin exclusively for its meat	205	74.5
I buy pangolin because it is rarely found in the market	28	10.2
Other reason	21	7.6
I buy pangolin because it is available in the market	14	5.1
I buy pangolin for its meat and its scales	7	2.5
Total	275	100

Q: Last time you ate pangolin, why did you choose it over other types of bushmeat or ordinary meat?

	Number	%
Pangolin meat is tastier than ordinary fish/meat	169	55.4
Pangolin meat is fresher than ordinary fish/meat	29	9.5
Pangolin meat is a luxury	26	8.5
Pangolin meat is healthier than other bushmeat	20	6.6
Pangolin meat contains fewer chemicals than ordinary fish/meat	18	5.9
Other	17	5.6
Pangolin meat is more available than other bushmeat	13	4.3
Eating pangolin gives me a higher status compared to other bushmeat	9	3.0
Eating pangolin meat is a link to my home village	4	1.3
Total	305	100

Figure 5. Reasons to choose pangolin meat



III.6. Pangolin meat consumption: Occasions, influences

Asked about the last time they ate pangolin meat, a large majority of respondents (76%) said there was no particular occasion. Small numbers cited other reasons such as a burial, business meal or wedding. But asked about reasons for the last time they bought pangolin meat, 38% cited a traditional ceremony such as a wedding or a funeral.

Table 5. Occasion to eat or buy pangolin meat

<i>Q: Last time you ate pangolin, what was the occasion?</i>	<i>Number</i>	<i>%</i>
No particular occasion	200	76.3
Burial	10	3.8
Other	10	3.8
Business meal	8	3.1
Wedding	8	3.1
Birthday	7	2.7
Religious holidays like Christmas, Easter and Eid	7	2.7
Festival	6	2.3
New Year's Eve	4	1.5
When the hunt is on	2	0.8
Total	262	100

<i>Q: Last time you bought pangolin meat, what was the occasion?</i>		
Other	121	51.5
For a traditional ceremony (wedding, funeral etc)	89	37.9
To re-sell it	23	9.8
For traditional medicine	1	0.4
For a traditional rite	1	0.4
Total	235	100

Asked who influenced their decision to buy pangolin meat, the majority of respondents (60%) said they took the decision themselves. A further 18% said friends had influenced them and 6% cited acquaintances. Some 6% cited parents and a similar number cited work colleagues.

Asked to choose a species of bushmeat if money was not a problem, pangolin was the most popular, with 51% of respondents choosing it. The next most popular were porcupine (47%) and crocodile (47%). Percentages were calculated based on number of respondents (n=319). People were allowed to give multiple responses.

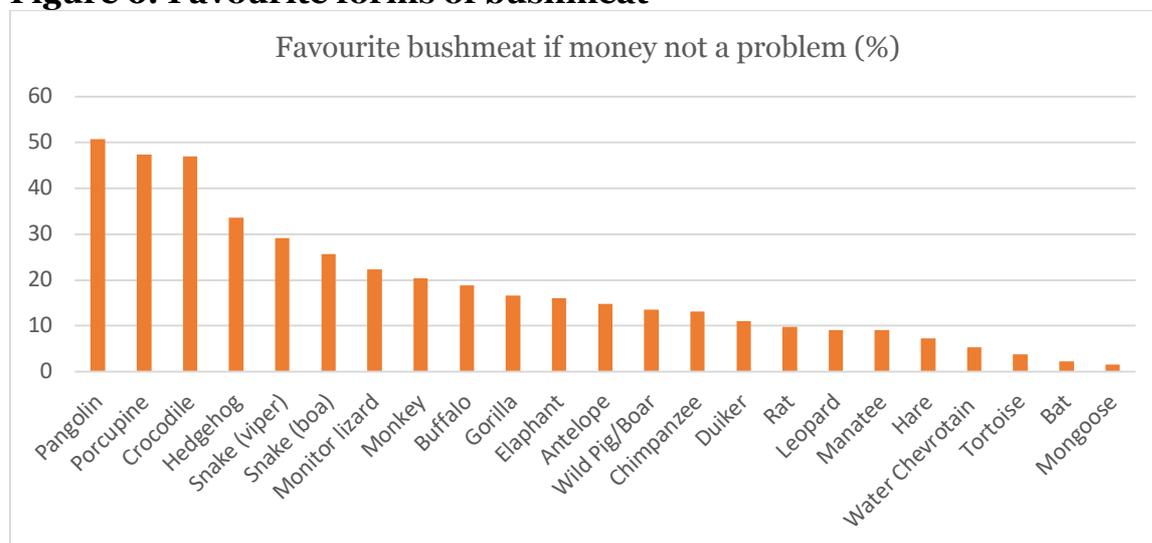
III.7. Favourite forms of bushmeat

Table 6. Favourite forms of bushmeat

Q: Which types of bushmeat would you eat if money was not a problem?

Species	Number	%
Pangolin	162	50.8
Porcupine	151	47.3
Crocodile	150	47.0
Hedgehog	107	33.5
Snake (viper)	93	29.2
Snake (boa)	82	25.7
Monitor lizard	71	22.3
Monkey	65	20.4
Buffalo	60	18.8
Gorilla	53	16.6
Elephant	51	16.0
Antelope	47	14.7
Wild Pig/Boar	43	13.5
Chimpanzee	42	13.2
Duiker	35	11.0
Rat	31	9.7
Leopard	29	9.1
Manatee	29	9.1
Hare	23	7.2
Water Chevrotain	17	5.3
Tortoise	12	3.8
Bat	7	2.2
Mongoose	5	1.6
Total	319	100

Figure 6: Favourite forms of bushmeat





Images 3 and 4: Bushmeat for sale in restaurants at study sites

III.8. Substitutes for pangolin meat

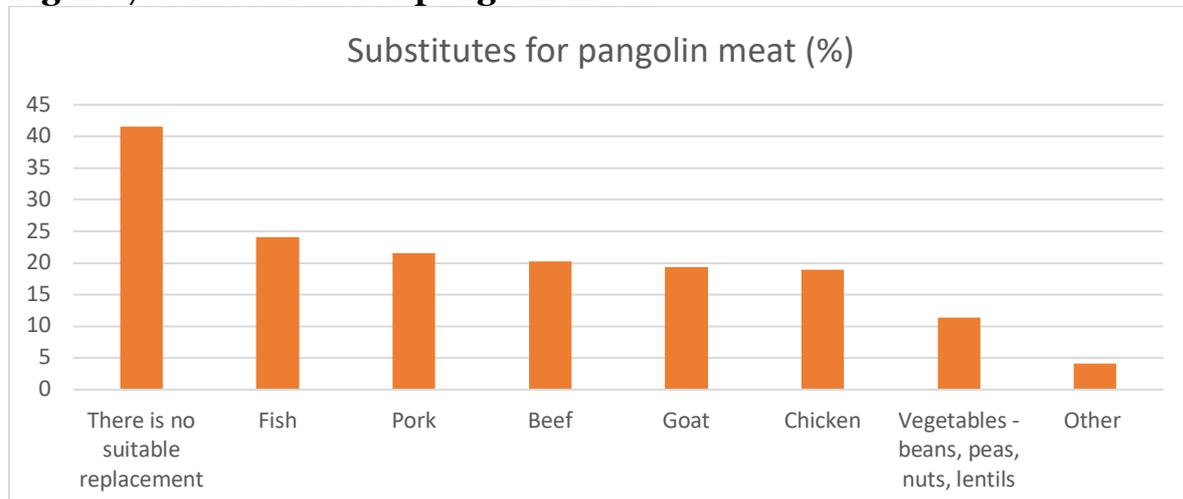
Asked to name sources of protein that could substitute for pangolin meat, the largest proportion (42%) said there was no suitable replacement. The next most popular choices were fish, pork and beef. Percentages are given based on number of respondents (n=315). Multiple responses were allowed.

Table 7. Substitutes for pangolin meat

Q: Which of the following protein sources is the most appropriate substitute for pangolin?

	Number	%
There is no suitable replacement	131	41.6
Fish	76	24.1
Pork	68	21.6
Beef	64	20.3
Goat	61	19.4
Chicken	60	19.0
Vegetables - beans, peas, nuts, lentils	36	11.4
Other	13	4.1
Total	315	100

Figure 7. Substitutes for pangolin meat



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Asked why respondents chose to eat regular meat/fish, most either said it was more accessible or cheaper than bushmeat. Very few said regular meat or fish was healthier or tastier than bushmeat. Percentages are given out of total respondents (n=333), with multiple answers allowed.

Table 8. Reasons for choosing regular meat/fish

Q: The last time you chose to eat regular meat (for example, beef, poultry or goat) or fish rather than bushmeat, why did you do that?

	Number	%
Regular meat/fish is more accessible than bushmeat	191	57.4
Regular meat/fish is cheaper than bushmeat	174	52.3
Other	25	7.5
Regular meat/fish is healthier than bushmeat	18	5.4
Regular meat/fish is tastier than bushmeat	11	3.3
I am concerned about laws about bushmeat consumption	6	1.8
Regular meat/fish is a luxury	5	1.5
Ordinary meat carries less disease than bushmeat	5	1.5
I am concerned about the extinction of animals in the wild	4	1.2
Eating bushmeat is not part of my culture	2	0.6
Eating regular meat/fish gives higher status than eating bushmeat	2	0.6

III.9. Availability of pangolin meat

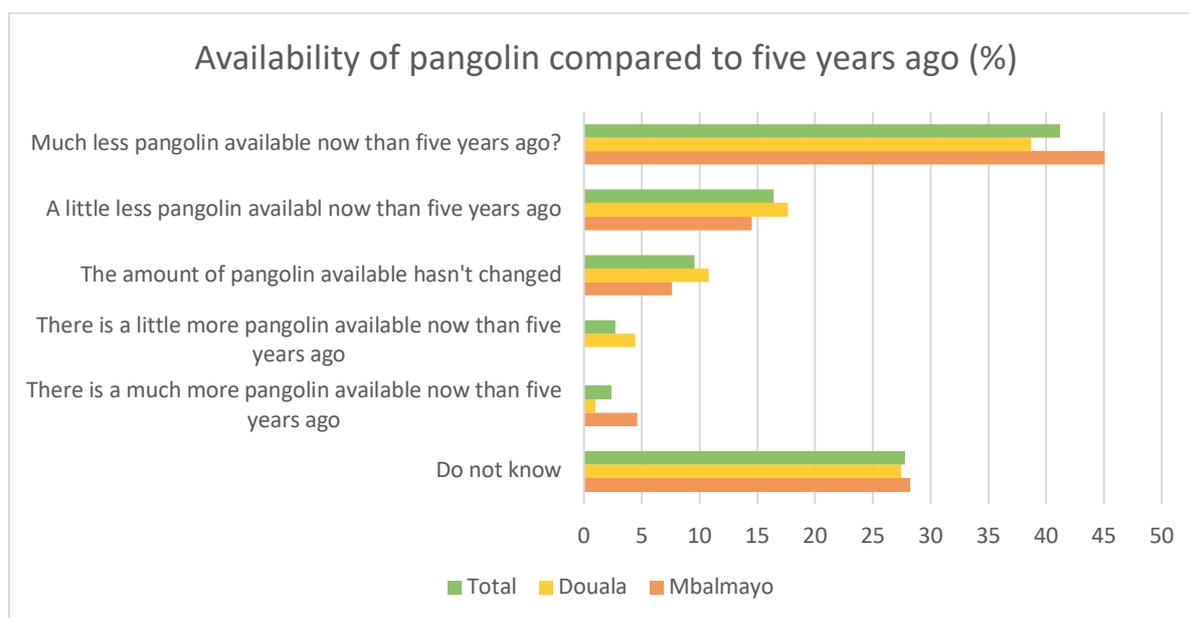
Respondents generally reported there was less pangolin available than five years ago. Across both cities, 41% reported much less pangolin was available, while a further 16% reported there was a little less. Only 5% (n=17) reported more pangolin was available than five years ago. The pattern was similar across both cities surveyed.

Table 9. Availability of pangolin meat

Q: In comparison with five years ago, has the availability of pangolin changed?

	Total	%	Douala	%	Mbalmayo	%
Much less pangolin available now	138	41.2	79	38.7	59	45.0
Little less pangolin available now	55	16.4	36	17.6	19	14.5
The availability hasn't changed	32	9.6	22	10.8	10	7.6
Little more pangolin available now	9	2.7	9	4.4	0	0.0
Much more pangolin available now	8	2.4	2	1.0	6	4.6
Do not know	93	27.8	56	27.5	37	28.2
Total	335	72.2	204	100.0	131	100.0

Figure 8. Availability of pangolin meat



III.10. Pangolin meat and the law

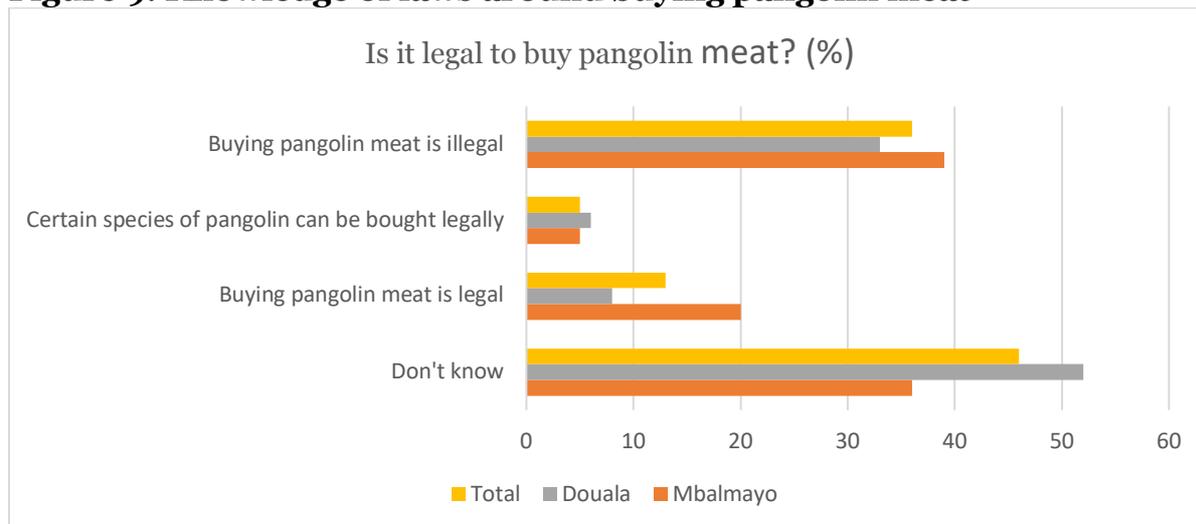
When asked if buying pangolin meat is legal, the largest number of respondents (46%) of respondents said they did not know. However, a total of 36% correctly said buying pangolin meat is illegal. A total of 13% incorrectly believed that buying pangolin meat is legal.

Knowledge of the law differed slightly in Douala and Mbalmayo, but responses reflected similar trends, with most people unaware of the regulations.

Table 10. Knowledge of laws around buying pangolin meat

<i>Q: Is it legal to buy pangolin meat?</i>	Total	%	Douala	%	Mbal-mayo	%
Buying pangolin meat is illegal	121	35.8	69	33.5	52	39.4
Certain pangolin species can be bought legally	18	5.3	12	5.8	6	4.5
Buying pangolin meat is legal	44	13.0	17	8.3	27	20.5
Don't know	155	45.9	108	52.4	47	35.6
Total	338	100	206	100	132	100

Figure 9. Knowledge of laws around buying pangolin meat



Asked what they know about penalties for buying pangolin meat, a large majority (71%) said they did not know.

Table 11. Knowledge of penalties for buying pangolin meat

Q: How strong are penalties for buying pangolin?	Number	%
Very strong	46	13.7
Moderately strong	6	1.8
Slightly weak	7	2.1
Very weak	39	11.6
Don't know	238	70.8
Total	336	100.0

Public awareness and respect for the law

The next question informed respondents that “since January 2017, following the registration of pangolins on Appendix I of CITES, all pangolin species are listed in Class A in Cameroon, prohibiting the hunting, capture and killing, as well as domestic and international trade.”

Respondents were asked if this ban made them stop eating or buying pangolin meat.

The vast majority (82%) said it made no difference.

Table 12. Effects of Cameroon’s ban on pangolin consumption.

	Number	%
It made no difference	202	82.4
I consume less	36	14.7
I consume more	7	2.9
Total	245	100

III.11. Sources of information

Asked where they had obtained information about laws on consumption of pangolin, a majority of respondents (58%) cited television, with the internet and radio also significant sources of information. Percentages were calculated based on numbers who responded to this question (n=239), while multiple answers were allowed.

Table 13. Sources of information

Q: Where did you obtain information about the laws regulating consumption of pangolin?

	Number	%
Television	139	58.2
Internet	88	36.8
Radio	73	30.5
Other	72	30.1
Family	31	13.0
Press (paper and online)	29	12.1
School	12	5.0

III.12. The influence of COVID-19 and attitudes about zoonotic diseases

Asked for their opinion about the source of diseases such as Ebola, HIV and COVID-19, nearly half of respondents (45%) cited laboratory or research experiments. Smaller numbers cited contact with wild animals (20%) or eating bushmeat (6%).

Table 14. Sources of disease

Q: What do you think is the main source of diseases like Ebola, HIV and COVID-19

	Number	%
Laboratory/research experiments	151	44.7
Contact with wild animals	67	19.8
Lack of hygiene	42	12.4
Not sure	39	11.5
Eating bushmeat	20	5.9
Other	8	2.4
Lack of appropriate drugs	5	1.5
Deterioration of the environment	4	1.2
Contact with pets	2	0.6
Total	338	100

Asked to identify species involved in transmitting COVID-19 to humans, only 84 people responded. Of them, 48% said bats, while 37% said pangolins.

Impact of COVID-19 on consumption habits

Asked about the impact of COVID-19 on future purchases of pangolin or consumption of pangolin meat, the vast majority of respondents (87%) said it had no impact. Only small numbers said they would consume or buy less pangolin as a result, or cease entirely (a total of 11%). Percentages are based on number of respondents (n=294). Note that only one answer was allowed.

Table 15. Impact of COVID-19 on purchase intentions

Q: Has COVID-19 influenced your intention to consume/purchase pangolin in the future?

	Num-ber	%
COVID-19 hasn't affected my intention to purchase pangolin	153	52.0
COVID-19 hasn't affected my intention to consume pangolin	104	35.4
I will probably eat less pangolin in future due to COVID-19	12	4.1
I will probably buy less pangolin in future due to COVID-19	11	3.7
I will probably eat more pangolin in future due to COVID-19	6	2.0
I stopped buying pangolin because of COVID-19	5	1.7
I will probably not buy any more pangolin	2	0.7
I stopped eating pangolin meat due to COVID-19	1	0.3
Total	294	100

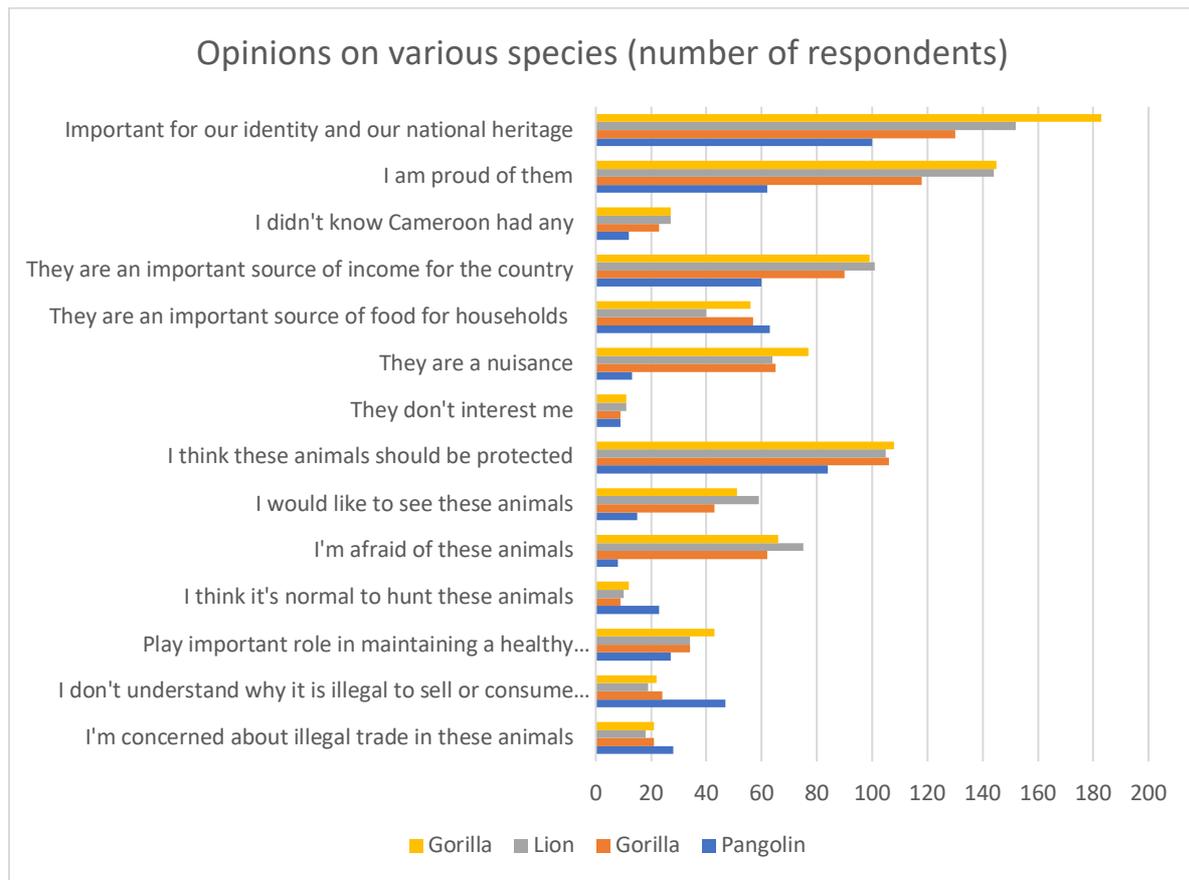
III.13. Conservation: Opinions about various species

Table 16. Opinions on various species

Q: What is your opinion on the following species in Cameroon?

	Elephant	Lion	Gorilla	Pango- lin
Important for our identity and national heritage	183	152	130	100
I am proud of them	145	144	118	62
I didn't know Cameroon had any	27	27	23	12
They are an important source of income for country	99	101	90	60
They are important source of food for households	56	40	57	63
They are a nuisance	77	64	65	13
They don't interest me	11	11	9	9
I think these animals should be protected	108	105	106	84
I would like to see these animals	51	59	43	15
I'm afraid of these animals	66	75	62	8
I think it's normal to hunt these animals	12	10	9	23
Play important role in maintaining healthy environment	43	34	34	27
Don't understand why illegal to sell/consume	22	19	24	47
Concerned about illegal trade in these animals	21	18	21	28

Figure 10. Opinions on various species in Cameroon



IV. Discussion

This study contributes to the understanding of bushmeat consumption patterns in urban areas of Cameroon after a resurgence of zoonotic disease. Our study looks in detail for the first time at pangolin consumption in Douala and Mbalmayo; similar studies were done in Bertoua and Ebolowa by Nguyen et al. (2021) and TRAFFIC (2019).

IV.1. Bushmeat consumption: Preferences and habits

Porcupine was the most frequently eaten bushmeat species over the past 12 months, followed by pangolin and hedgehog. Our results agree with the observations of Nguyen et al. (2021), TRAFFIC (2019) and previous studies.

We found that bushmeat consumers most often cite pangolin as their favourite species, a finding similar to that of Nguyen et al. (2021). The reported preference for pangolin meat is significantly higher than found in similar studies of bushmeat consumers in neighboring Nigeria and Gabon (WildAid 2021). Other popular and frequently consumed forms of bushmeat in Cameroon include crocodile, snake, rat, duiker and monkey. Other notable endangered species such as gorilla and chimpanzee, and to a lesser extent elephant, manatee and leopard, continue to be eaten in Cameroon.

Asked about frequency of consumption of bushmeat, the vast majority of respondents ate bushmeat at least once a month. However, this is not entirely surprising as the survey was conducted around bushmeat restaurants so would naturally be biased

towards frequent bushmeat consumers. Consumption of pangolin meat was less frequent, with 42 percent only consuming one a year. This diverges from surveys conducted in rural areas where pangolin meat consumption appears to be more frequent (Simo et al. in prep), and where respondents sometimes present you with the remains of pangolin meat they consumed the day before (Difouo et al. 2020).

Choices of which meat to consume appears partly based on availability and accessibility. Asked about the last time they chose regular meat or fish, most people said it was more accessible or cheaper, which is similar to the observations of Fa et al. (2019) and Nguyen et al. (2021). Only small numbers said it was healthier or tastier, while just 2% cited laws about bushmeat.

When asked why they chose pangolin meat, a majority said it was tastier than other forms of bushmeat. Others either said it was fresher, healthier or had fewer chemicals than regular meat or fish, while a smaller group either said it was a luxury or said it conferred a higher status than other forms of bushmeat. Other studies have found pangolin meat is considered a luxury for many consumers (Nguyen et al. 2021.) because of its white flesh, or, in Nigeria, found that it conferred status in society for those who consume it (Sodeinde & Soewu 2014).

IV.2. Pangolin meat consumption: Preferences and habits

We found that the majority of consumers buy and consume pangolin meat in a restaurant, although with the obvious caveat that we surveyed people in restaurants. Other studies have found that most of the pangolin meat consumed in urban areas is eaten outside the home due to the fact that some family members do not consume it (Nguyen et al. 2021), and because the high cost of meat only allows wealthier families to purchase for the whole family to consume in their homes. Nguyen et al. (2021) had noticed that people with low incomes were less likely to consume bushmeat in the city.

This study showed that most consumers of pangolin meat did not reserve consumption of this for a special occasion, nor do they only consume during the hunting season. The main reason for buying pangolin is consumption of meat; this is in line with previous work in Cameroon in both urban areas (Nguyen et al. 2021) and rural areas (Mouafo et al. 2021). There was some use of pangolin meat in traditional ceremonies, similar to findings of Nguyen et al. (2021) in urban areas, but other studies in rural areas such as Difouo et al. (2020) found only 1% of respondents had knowledge of the use of pangolins in traditional medicine, and people hunted mainly for consumption (Simo et al. in prep.).

We have shown that the decision to eat pangolin meat is mostly made individually. While a minority were influenced by friends, and a few by work colleagues or parents, people were not influenced by the media or the recommendation of a doctor.

The desire to eat bushmeat in general and pangolin meat in particular is related to eating habits acquired over years (Fa et al. 2019, Nguyen et al. 2021). These habits may be difficult to change regardless of the situation (Difouo FG pers. obs.). This is reflected in respondents' attitudes towards buying and consuming pangolins in the midst of the COVID-19 pandemic (see section below).

IV.3. Pangolin availability

Our study showed that in both cities, the most people say there is less pangolin available than in the past. Our results are consistent with those of Difouo et al. (2020) and Mouafo et al. (2021).



Images 5,6,7. Delivery of bushmeat in a bag transported by motorcycle to a large bushmeat catering site in Mbalmayo

IV.4. Knowledge of the law and attitudes

Knowledge about Cameroon's laws banning the trade and consumption of pangolin meat is low (see Difouo et al. 2020). Consumption of pangolin meat is taking place even though Cameroon has moved to protect pangolins, with the Ministry of Forest and Wildlife (MINFOF) designating the giant pangolin a Class A protected species in December 2006, with the maximum protection under the law. When all species of pangolin were up listed to Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in January 2017, Cameroon's government placed all three native pangolin species under Class A protection, banning all hunting, capture, killing, and trade within the country (MINFOF 2017; CITES 2017; Difouo et al. 2020).

However, only 36% of bushmeat consumers were aware it was illegal to buy pangolin meat, while 46% said they were not aware of the law. Reinforcing these findings, 82% of respondents said the recent change in the law had made no difference to their consumption of pangolin meat. Again, it should be noted that the survey was concentrated on active consumers of bushmeat, so could be missing people who have turned away from bushmeat consumption.

IV.5. The impact of zoonotic diseases on meat consumption

There was limited recognition of the link between bushmeat and zoonotic diseases. Around 45% blamed laboratory or research experiments for diseases such as Ebola, HIV and COVID-19, while only 26% cited contact with wild animals or eating bushmeat. This may be partly because of a lack of direct evidence such an obviously diseased or dead animal linked to human illness (Difouo FG pers. obs.). People may also be reluctant to blame wildlife they rely on as a protein source (Wilkie et al. 2016).

Reinforcing this finding, 87% of respondents said COVID-19 had had no impact on their intentions to buy or consume pangolin meat. However, since the survey only asked opinions from bushmeat consumers, it could have missed people who had stopped eating bushmeat altogether.

V. Conclusion

The most frequently consumed forms of bushmeat in Cameroon are porcupine, pangolin, hedgehog, rat, monkey, duiker and antelope. Pangolin came top as the preferred species among bushmeat consumers if money was not an object, while people also expressed strong preferences for porcupine and crocodile.

The list of species consumed as bushmeat in Cameroon includes many that are endangered or threatened with extinction. The fact that bushmeat is widely hunted in Congo Basin countries? to supply demand from Cameroon's expanding cities raises serious concerns about sustainability, especially for threatened species.

The fact that bushmeat consumption is embedded in Cameroon's culture and tastes is also evidenced in this survey. Many people said they preferred the taste of pangolin meat, while others felt that its meat was fresher or healthier than other forms of meat.

At the same time, though, significant numbers of bushmeat consumers felt pangolins were important for Cameroon's national identity and natural heritage, and felt proud of them. While many said pangolins were an important source of food, an even higher number felt they should be protected. A lower number felt pangolins played an important role in maintaining a healthy environment.

Meanwhile awareness of the law protecting pangolins was low.

These findings suggest a public awareness campaign that raises awareness of the law, teaches people about the threats facing them and their value to the environment, and stresses the value of pangolin as part of Cameroon's national identity could start to change habits.

Acknowledgments and thanks

We thank the populations of Douala and Mbalmayo who kindly agreed to participate in this study.

WildAid thanks the Central African Bushmeat Action Group (CABAG) for planning, selection of interviewers and support during this survey.

Report authors: Simon Denyer, WildAid and CABAG.

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