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## Research Article

# The determinants of bushmeat consumption in urban areas in Laos

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## Abstract

This study aims to examine the determinants of bushmeat consumption in urban areas in Laos. Men consume more bushmeat than women. Job, the government official was the major bushmeat consumer, but there was no proven by statistical approaches from this study we have done. The education of people who consume bushmeat has finished high school level. Ethnic, Lao Loum people have a negative impact on bushmeat consumption, but for Hmong or Lao Theung people, bushmeat is a long tradition of eating and being a major food source. In addition, believing in eating bushmeat can make people healthy is also valid.

## Introduction

The man jumped to the top of the food chain in the last 100,000 years [1] at least 17% of taxonomic families were lost in the fifth extinction and the sixth extinction will happen in the twenty-second century [2], between 25 and 50% of all current species are expected to be lost [3], the number of the extinction could as much as forty-five thousand times higher than the background rate [4], this sixth extinction will be caused by human activities [2]. In addition, the global human population will double over the next century and human activity can have adverse effects on biological resources loss and food requirement [5-7] and it will cause to the loss of habitat which is probably the single greatest threat facing endangered species [8,9], then it finally will automatically lead to biological conservation [10].

Biodiversity contributes directly and indirectly to many constituents of human well-being and at the same time, the loss in biodiversity will also cause a decline in people's well-being [11]. Humans benefit from wild nature such as nutrient cycling and the direct harvest of wild species for food, fuel, fibers and pharmaceuticals [12].

Bushmeat is a food item and part of a complex commodity chain, linking rural bushmeat hunters to urban bushmeat consumers [13]. To the condition of life and of one distinct organic being to another being [14] so that if one species disappears another would be too. Much biological research has been involved around the costs of species loss or protection, but there are few fundamental causes studied on the human economic behavior that leads to extinction like the determinants of bushmeat consumption topic [2,15].

Awareness raising on wildlife conservation issues is important for those who purchase bushmeat products in cities and also they have a moral obligation to conserve biodiversity [16]. Understanding the pattern of bushmeat consumption is an important issue for designing approaches to address the major threat to wildlife [17-20]. Urban people's perception that bushmeat is a luxury good [21], tastier, cleaner and healthier those have caused and pushed many species to the brink of extinction [22], also cultural factors are indeed the stronger predictors for bushmeat consumption [23]. Increasing urban bushmeat consumption poses a major threat to fauna biodiversity [24]. The raising of wealth in urban markets has also led to higher demand for bushmeat products [17-

19,21,25,26]. Bushmeat consumers tend to be high-income men of all ages working in high-status positions as businessmen, finance professionals and government officials [27].

Market price incentives may be effective at reducing demand for bushmeat products [28]. Bushmeat hunting is an important driver of wildlife depletion [29–32]. The issue of illegal wildlife trafficking, when considered as a problem resulting from economic, demographic, and market expansion, has led to increased consumer demand for wildlife [33], which clearly illustrates that buyer demand is a factor in increasing the commercialization of wildlife [30], government staff was the most observed customers in restaurants [24]. As the wildlife trade is a highly rewarding activity, the law cannot be restricted [32].

Most of the world's species and biodiversity are found in developing countries [34]. Southeast Asia, is a region supporting more threatened species than any other comparable continental area, but currently facing an extinction crisis driven by unsustainable levels of commercial hunting, cultural attitudes and behaviors related to bushmeat consumption [35]. The continued decrease in this wildlife is due to forest hunting [33].

Laos, which is in Southeast Asia has been recognized as one of the world's most important areas of biodiversity such as wildlife [36], also has been experiencing a decline in natural resources, with its continued decline in wildlife [37]. In November 2011, approximately 5,000 species of animals were protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Laos contains almost 5% of all world species [38].

In Laos, the practice of eating bushmeat is being constructed [15], some people eat bushmeat because it is familiar and traditional practice [39] and some ethnic group was statistically significant bushmeat consumer [40]. In some parts of Laos, bushmeat made up over 75% of the meal of households [41] and was eaten almost 2 times a week [41,42], while domestic meat, for instance, pork consumption was estimated at 9.31 kg/capita, followed by bovine meat at 7.29 kg/capita and poultry meat 4.21 kg/capita [43]. People from urban areas such as government officials, consultants, construction workers, and business people often travel to rural areas as an opportunity and sometimes they get some bushmeat [15]. Bushmeat hunting is essential for Lao livelihoods for instance the food source for the poor [22]. Overall, a big demand for bushmeat come from urban areas, so changing urban bushmeat consumption is needed to change bushmeat hunting among rural villagers [44].

The cost of protecting wildlife is huge for the government, most of the economic research has involved the costs of species protection [2]. Recently, in Laos, the cost for paying a ranger is about USD 6.5 per person per day<sup>1</sup>, so it needs about 5 rangers to complete 2 km<sup>2</sup> area per day, while there is over 300 km<sup>2</sup> (or 14% of the land area of Lao PDR) has been defined as protected areas, so it requires lots of money to implement the conservation of flora and fauna. Therefore, an analysis

of understanding the determinants of demand for bushmeat would be an alternative solution that should be considered since many factors can determine bushmeat consumption. Thus far, the central objective of this research is to estimate what are the factors that determine urban bushmeat consumption in Laos. In this study, we want to test that the big bushmeat consumers are government officials [15,24].

## Methods

This study assesses the factors associated with bushmeat consumption or otherwise. 2,464 urban individuals who have eaten bushmeat (or otherwise) in the last week and have been living in eight major provinces<sup>2</sup>, were randomly interviewed<sup>3</sup>. The data was collected in two phases, the first collection was conducted in early 2018 and the second one was in middle 2018 by the Faculty of Economics and Business Management (FEBM), National University of Laos (NUoL).

Figure 1 shows the map of Laos and the sampling areas. Laos is situated in the middle of South East Asia. The country is landlocked, so it has no direct access to the sea and has common borders with China, Vietnam, Cambodia, Thailand and Myanmar. The country is located in the center of the Indochinese peninsula. In tropical Southeast Asia, the biodiversity hotspot, which includes Lao PDR, is one of the most biologically important regions of the planet [45]. Currently, it is suggested that this biodiversity richness will soon reach human-induced extinction rates at least five times higher than in the recent past [46]. Regarding the sampling areas 1,2,3,4,5,6,7 and 8, representing Luangphrabang, Xiengkhuang, Vientiane, Vientiane Capital, Bolikhamxay, Khammuan, Sannakhet and Champasack provinces, respectively, these are the majority cities of Laos so the potential of bushmeat consumption is usually from these areas.

Table 1 defines all variables and their measurement units in the logistic regression analysis method. The bushmeat consumer is the dependent variable (cons) and independent variables are gender (gen), age (age), job (job), education (educ), ethnic (ethn), households size (hhs), belief (belief) and average monthly expenditure of the households (mexp).

Table 2 describes the relationship between the dependent variable (bushmeat consumer) and independent variables (gender, age, job, education, ethnicity, household size, belief and monthly expenditure) as well as the explanation of their assumption of them.

<sup>1</sup>A Six Months Report on Patrol in Phouchomvoy Provincial Protected Area (PCV-PPA), January - June 2018, the project managed by the Faculty of Economic and Business Management, National University of Laos

<sup>2</sup>Luangphrabang, Xiengkhuang, Vientiane, Vientiane Capital, Bolikhamxay, Khammuan, Sannakhet and Champasack provinces.

<sup>3</sup>The individual respondents who are as a representative of the households and live in the third household along the right side of the road.

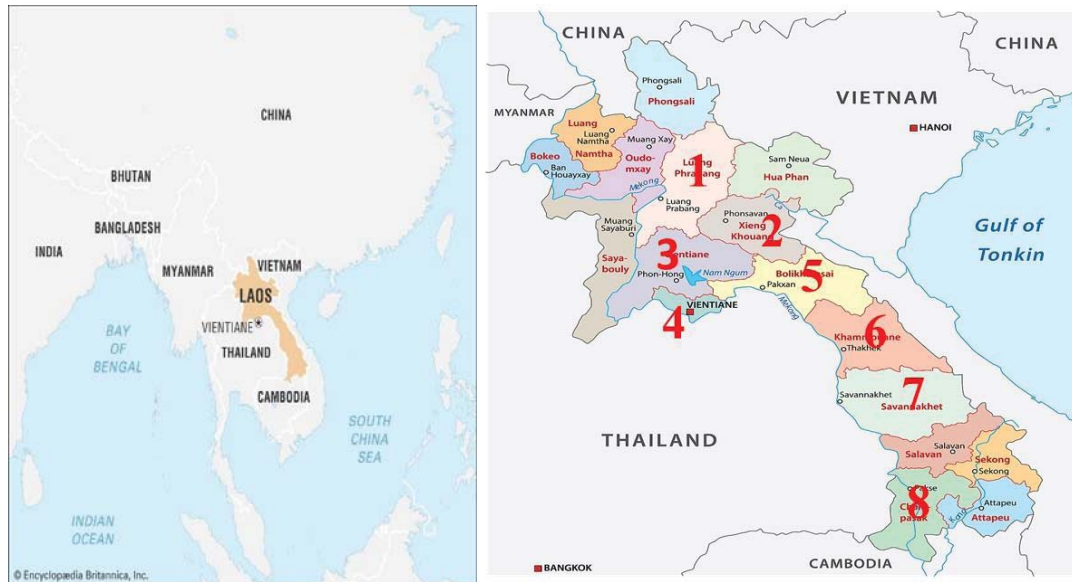


Figure 1: The map of Laos and sampling areas (1,2,3,4,5,6,7 and 8).

The specification of the logistic equation is as below:

$$Cons = \beta_0 + \beta_1 gen + \beta_2 age + \beta_3 job + \beta_4 educ + \beta_5 ethn + \beta_6 hhs + \beta_7 belief + \beta_8 logmexp + \varepsilon$$

## Results

Table 3 shows that individual respondents or bushmeat consumers covered more than 53%, of those are male which is covered almost 60%, are on average over 34 years old and are Lao Loum people who believe in Buddhism. The bushmeat consumers tend to be people who are married and have completed high school level, they are retired government employees and merchants who have a position (government employee) as a head of the division office. The household size is about 6 people and has an average monthly expenditure of more than 3,4 million kips (equivalent to 450 US dollars). More than 60% of bushmeat consumers used to go to the province in the last year on average more than 2–3 times. In addition, there are more than 67% of bushmeat consumer believe that eating bushmeat lead to making them healthy. Furthermore, more than 93% of bushmeat consumers are aware of law enforcement on wildlife.

Table 4 shows the result of logistic regression estimation shows that the repressors other than age, household size and average monthly expenditure are not statistically significant. The Gender, by 0.538 units of bushmeat consumption increase if the bushmeat consumer is men, for a reason because eating bushmeat for fun or to make good relation with friends and colleagues. The job of respondents is statistically significant by 0.412 unit increase in bushmeat consumption if they are the government official, it is true that when government officials go to work in other provinces, on the way back home they like to have (buy by themselves or a gift from local people) some bushmeat for eating with their friends, families, and colleagues [15]. The education is statistically significant by 0.027 increase

Table 1: Definition of variables.

Variable	Definition	Unit
Dependent variable		
cons	Bushmeat consumption	1 = Consumer, 0 = Otherwise
Independent variables		
gender	Gender of respondents	1 = male, 0 = otherwise
age	Age of respondents	Year (s)
job	Occupation of respondents	1 = government officials
educ	Education of respondents	Year
ethn	Ethnic of respondents	1 = Lao, 0 = otherwise
hhs	Household size	people
belief	Belief in bushmeat consumption	1 = healthy, 0 = otherwise
mexp	Monthly expenditure	Lao Kip

Note: USD 1 = 8,000 LAK.

Table 2: Assumption of the relationship between a dependent variable and independent variables.

Independent Variables	Relationship	Assumption
gender	+	Men (gender) are more likely to bushmeat consumption than women
age	+	As age increases, it is possible to make more decisions about bushmeat consumption
job	+	If the state employee (job) can decide to consume wildlife, it is more likely than other occupational groups.
educ	-	The higher the education level, the lower the decision to wildlife consume
ethn	+	If it is Lao (ethnic), possible to decide to consume wildlife rather than other ethnic groups
hhs	-	If the household size (hhs) increased the likelihood of making a decision the wildlife consumption will be less
belief	+	Anyone who believes that eating wildlife is made healthier and better (Belief). The possibility of using wildlife is more than anyone who has other beliefs
mexp	-	If the expenditure increases the likelihood of a decrease in the consumption of wildlife

The mark (+) refers to the relationship in the same direction as the dependent variable and (-) is otherwise.



in bushmeat consumption if people who have higher education, the reason is that they know bushmeat is a rare food to find then they will buy when they have found it [47]. Ethnic is the opposite of the assumption, but has statistically significant by negative 0.265, meaning that Lao Loum people are likely to consume less bushmeat, in another word, bushmeat is the major food source for Hmong people and Lao Theung people [26,47-51]. Belief is in the same direction as the assumption and has a statistically significant by 1.127 increase if people believe that eating bushmeat can make them healthy [22,39]. In addition to the result of the logistic regression model, the LR  $\chi^2(9) = 338.6$ ; Prob >  $\chi^2 = 0.000$ ; and the Pseudo  $R^2 = 0.1128$ .

Table 5 shows the result of the average partial effects. If the respondent is a man, a government official, higher education level and belief (bushmeat consumption makes healthy), around 12%, 9.2%, 0.6% and 25.42% increase in bushmeat consumption, respectively. In addition, if the respondent is Lao, around a 5.98% decrease in bushmeat consumption.

### Conclusion

Bushmeat is a kind of luxury good [21], sometimes bushmeat consumers do not buy it by themselves (it was like a gift from their cousins, friends and colleagues) so the bushmeat price was not statistically significant in this study. From this study, men consume more bushmeat than women. Job, according to [15], the government official was the major bushmeat consumer, but there were no proven statistical approaches so this study, is statistically significant at 0.412 unit increase in bushmeat consumption if they are the government official. The education of people who consume bushmeat has finished high school level. Ethnic, Lao Loum people have a negative impact on bushmeat consumption, but for Hmong or Lao Theung people, bushmeat is a long tradition of eating and being a major food source. In addition, believing in eating bushmeat

Table 3: Summarized data.

Variable	Obs	Mean	Std. Dev.	Min	Max
Bushmeat consumption	2,464	0.53	0.49	0	1
Sex	2,464	0.59	0.49	0	1
Age	2,464	34.21	11.88	13	83
Ethnic	2,464	1.2	0.52	1	3
Religion	2,464	1.14	0.37	1	3
Status	2,464	1.8	0.47	1	3
Education	2,464	11.19	4.11	0	18
Job	2,464	4.11	2.1	1	7
Job's title	435	8.45	1.75	1	11
Household size	2,464	6.49	2.83	2	19
Montly expenditure (LAK)	2,464	34,33,735	27,43,741	1,80,000	4,00,00,000
Went to province (last year)	2,464	0.6	0.48	0	1
Number of time of TP (time)		2.58	4.19	0	50
Bushmeat price (LAK/Kg)	1,280	55,138.28	21749.7	1,000	3,00,000
Belief	2,464	0.69	0.46	0	1

Source: Authors' calculation, 2019.

Table 4: Results of logistic regression.

Variables	Bushmeat consumption
Gener (Male)	0.538*** (0.0885)
Age	0.00411 (0.00379)
Job	0.412*** (0.126)
Education	0.0277** (0.012)
Ethnic	-0.265** (0.124)
Household size	-0.0108 (0.0149)
Belief	1.127*** (0.0938)
logmexp	0.12 (0.26)
Monthly expenditure	-2.91E-08 (0.0000000306)
Constant	-1.861 (1.556)
Observations	2,464

Standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Source: Authors' calculation, 2019

Table 5: Average Partial Effects.

	dy/dx	std.err	z	p>z	95%conf.	interval
gen	0.1213212	0.019416	6.25	0	0.083	0.159
age	0.0009284	0.000855	1.09	0.278	0	0.003
Job	0.0929445	0.028235	3.29	0.001	0.0376	0.148
educ	0.00624	0.002706	2.31	0.021	0.0009	0.012
ethn	-0.059814	0.027882	-2.15	0.032	-0.1144	-0.005
hhs	-0.00243	0.00335	-0.73	0.468	-0.0089	0.004
belief	0.2542955	0.018666	13.62	0	0.2177	0.291
logmexp	0.026982	0.05872	0.46	0.646	-0.088	0.142

Source: Authors' calculation, 2019

can make people healthy is also valid. The specific objective of this research is to explore whether government official in Laos induces bushmeat hunting. Therefore, it needs to put more campaigns among government offices on stopping bushmeat consumption.

Based on this research, the potential practical applications that the government of Lao (GoL) should pay more attention for instance raising more awareness among government officials by stopping the bushmeat buyer. Furthermore, the GoL also has to work hard to make society change its mind that eating bushmeat makes them more healthy.



In this research, there is some limitation since the data was collected in the mid of 2018, which is a little old. In addition, it was before the pandemic of COVID-19. Therefore, bushmeat consumption patterns might have changed in Southeast Asian nation like Laos because of the potential influence of COVID-19 that make bushmeat consumer fear.

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