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Church Affiliation and Meat Taboos in Indigenous Communities of Guyanese Amazonia

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Abstract Using data from a three-year study of socioeconomic factors influencing hunting in 23 indigenous communities, we assess the influence of indigenous and Christian beliefs and practices on dietary taboos among Makushi and Wapishana peoples in the Guyanese Amazon. We found that members of Evangelical and established (Anglican and Catholic) churches do not differ significantly in terms of their adherence to dietary restrictions and members of Sabbatarian churches show a stronger tendency to adhere to dietary taboos than Evangelicals or members of established churches. Counter to expectations, we found no significant difference in avoidance of meat between households belonging to established and Evangelical churches. Furthermore, members of all church groups deviated in terms of dietary restrictions from indigenous norms as exemplified in dietary advice given by shamans. We conclude that, despite doctrinal opposition to shamanistic practices associated with indigenous taboos, there is continuity in terms of dietary practice among Makushi and Wapishana households that have converted to Evangelical and, to some degree, Sabbatarian forms of Christianity.

Keywords Dietary taboos · Indigenous lands · Amazonia · Shamanism · Christianity

Introduction

Environmental management strategies in high priority areas for ecological conservation, such as the Amazon Basin, require an understanding of the diverse social, economic and cultural factors that influence natural resource use (Gray *et al.* 2008; Godoy *et al.* 2009; Ostrom 2009). Given that more than 25% of the Amazon Basin, an area equivalent to the total of all conservation units in the Basin, is under legal or de facto management by indigenous peoples (Hill *et al.* 1997; RAISG 2012),[1] the ways in which Amazonia's indigenous peoples manage resources on their extensive territories have implications for the biome as a whole.

In terms of potential ecological impacts one of the most important ways in which indigenous peoples interact with their environment is through the harvest of wild animal species. While Amazonia's indigenous lands often experience lower rates of deforestation than non-indigenous lands (Gray *et al.* 2008; Ricketts *et al.* 2010), indigenous peoples often tend to hunt more intensively than many of their non-indigenous neighbors (Redford and Robinson 1987). However, researchers have posited an important role for indigenous belief systems and practices, such as the dietary taboos practiced by many indigenous peoples of the neotropics (Hames and Vickers 1982; Redford and Robinson 1987; Koster *et al.* 2010; but see also Hill and Hawkes 1983) in the exploitation of natural resources, including wild game. Resource and habitat taboos (RHTs) are an often complex system of nature-related social norms and proscriptions, that guide human conduct toward the natural environment (Colding and Folke 2001). When applied to hunting, RHTs can affect both hunting pressure in specific areas of the landscape (Read *et al.* 2010) and the targeting or avoidance of specific classes and species of wildlife (McDonald 1977; Balée 1985; Pezzuti *et al.* 2010).

Dietary taboos have been widely documented among various indigenous peoples in Amazonia and elsewhere and often appear as cultural responses to specific health

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[1] In addition to protected and indigenous lands, Amazonia includes timber concessions, agricultural land and state and federal lands under varying degrees of human impact.

maladies (Moran 1974; Hames 1991; Dean 2009; Meyer-Rochow 2009; Pezzuti *et al.* 2010). Among many indigenous peoples in the neotropics shamans, as healers, play a central role in reinforcing taboo systems through dietary advice given to community members in the context of healing practices (Hugh-Jones 1994; Henfrey 2002; Meyer-Rochow 2009). In many cases, taboos do not apply across the society but to specific individuals, or demographic subsets such as women and children (Moran 1974; Smith 1981; Begossi *et al.* 2004; Pezzuti *et al.* 2010). Game meat taboos are often believed to be essential to preserving good health, especially those taboos applying to children, menstruating women, and parents of newborn infants (Begossi *et al.* 2004; Meyer-Rochow 2009; Koster *et al.* 2010). Individuals recuperating from illness, menstruating or pregnant women, as well as those who may be prone to an "allergic" response, such as fever or inflammation, to a specific species or category of meat may be subject to dietary restrictions for various amounts of time.

Some scholars have argued that resource and habitat taboos, including dietary restrictions placed on the consumption of game meat, can be ecologically adaptive (Rappaport 1968; Moran 1974; Balée 1985; Colding and Folke 2001; Meyer-Rochow 2009; Pezzuti *et al.* 2010; but see also Alvard, 1993 for an alternate perspective). For example, Balée (1985) argued that among indigenous peoples of the eastern Brazilian Amazon dietary restrictions prohibiting all meats aside from tortoises caught by specific relatives for menstruating and pregnant women, as well as the parents of newborns, helped to maintain a steady supply of animal protein. Drawing on hunting return data, Balée argued that while these dietary restrictions generally led to the local extirpation of tortoises, they also prevented overexploitation of other harvest-sensitive game species such as primates and peccaries. When nutritionally and culturally important tortoises were locally depleted, hunters would shift their efforts to new areas before hunting pressure on other game species reached critical levels. Of course, despite their meaning within a specific cultural context, dietary taboo systems may have no clear relationship with wildlife management systems (Alvard 1993).

Some researchers (e.g., Yost and Kelley 1983; Redford and Robinson 1987) have argued that contact with western society can lead to the erosion of dietary taboos. However, we argue that the erosive effects of contact with western society on indigenous dietary taboos cannot be assumed a priori. In contemporary Amazonia, the vast majority of indigenous peoples have had at least some level of exposure to Christian missions (Vilaça 2009). Given the long history of Christianity and missionary activities in Amazonia, indigenous dietary taboos today generally exist within the context of Christianity, a religious system that has often been promoted by the national society, as well as by missionaries (Hemming 1978), and at times by members of indigenous societies themselves (Grotti 2009; Vilaça and Wright 2009; Luzar and Fragoso 2012). The relationship between Christianity and indigenous belief systems is often complex, ranging from antagonistic to synchronistic (Vilaça and Wright 2009). Christian beliefs and practices can alternately erode, coexist with and even reinforce indigenous resource habitat taboos.

These relationships also vary among church types and societal contexts (Belaunde 2000; Dean 2009). For example, although the acceptance of Evangelical Christianity by the Airo-Pai peoples of lowland Peru resulted in a general rejection of shamanism, it did not represent an epistemological rupture with earlier Airo-Pai values. Belaunde (2000) notes that Airo-Pai converts to Evangelicalism readily adopted Evangelical rituals and beliefs, adapting them to indigenous shamanistic concepts about health and healing. In the case of Sabbatarian churches, such as the Seventh Day Adventist Church, whose teachings include various dietary restrictions on specific meats, new food taboos may replace or even replicate indigenous dietary taboos (Meyer-Rochow 2009; Santos-Granero 2009).

Given other studies showing less acceptance of indigenous beliefs and practices among converts to Evangelical and Sabbatarian churches (Vilaça 1997; Bacchiddu 2009; Laugrand and Oosten 2009), combined with our own findings that members of these churches were less likely to visit and accept the legitimacy of shamans than their Anglican and Catholic neighbors (Luzar and Fragoso 2012), we predicted that conversion to Evangelical and Sabbatarian Christianity would lead to a break-down in the dietary taboo systems that have historically been associated with shamanism. However, we expected that this breakdown in dietary taboos would manifest differently between Evangelicals and Sabbatarians, given that Evangelical doctrine does not require avoidance of any form of meat and Sabbatarian doctrines proscribe the use of animals prohibited in the Hebrew Bible.

In this study we demonstrate how indigenous and Christian belief systems interact in ways that affect the dietary consumption of wildlife by Makushi and Wapishana households. Due to the extensive yet uneven adoption of Evangelical and Sabbatarian forms of Christianity in the area, the Rupununi region of Guyana provides insight into the potential implications of a conversion process that currently is at an earlier state in many other areas of the neotropics. Given the widespread presence of Christianity among many indigenous peoples in various parts of the neotropics (Grotti 2009; Vilaça 2009; Wright 2009), indigenous beliefs and practices, including those related to natural resource use and game meat consumption, can rarely be understood as cultural isolates. Rather, they must be understood in conjunction with the Christian beliefs and practices that have become increasingly interwoven into the fabric of indigenous cultures.

Christianity in the Guyanese Amazon

Contemporary Makushi and Wapishana culture is characterized by the coexistence of and syncretism between indigenous beliefs and Christianity (Henfrey 2002; Luzar and Fragoso 2012). While missionaries were present in the region since the seventeenth and eighteenth century (Hemming 1978; Farage 1986), widespread adoption of Christianity among the Makushi and Wapishana of Guyana and neighboring Brazil occurred through the influence of Catholic and Anglican missionaries in the nineteenth and early twentieth century (Forte 1996; Instituto Socio-Ambiental 2012). Aside from the general avoidance of meat (other than fish) during the Lenten season by some Catholics, church teachings do not proscribe the consumption of any form of meat. Similarly, Evangelical churches, first introduced in the region in the 1950s, do not mandate the avoidance of any form of meat.

Sabbatarian churches, present in the study region since the 1980s, adhere to various aspects of Jewish religious law and as part of their doctrines prohibit the consumption of various animal species considered to be unclean based on interpretations of commandments in the Hebrew Bible (Meyer-Rochow 2009). Various scholars have noted that maintenance of distinct diets by various religious groups plays a central role in promoting group identity and solidarity (Meyer-Rochow 2009; Santos-Granero 2009). Dietary restrictions include the avoidance of certain varieties of seafood and freshwater fish as well as mammals that are non-ruminant and/or do not have cloven hooves, such as pigs (*Suidae*), horses (*Equidae*) and camels (*Camelidae*). Using this classification scheme, Sabbatarians are prohibited from consuming several common Amazonian game species such as peccaries (*Tayassuidae*), which like pigs do not ruminate, and tapirs (*Tapiridae*), which like horses and camels do not have cloven hooves (Santos-Granero 2009).

We explore the influence of various forms of Christianity on indigenous dietary restrictions concerning wildlife species among two Amazonian indigenous peoples, the Makushi and Wapishana. We compare the meat taboo profiles for the three main Christian church types in the indigenous communities of the region. We then measure and test the degree to which dietary restrictions of each church group deviate from indigenous dietary taboos as defined by dietary advice given by resident indigenous shamans. Given our focus on religion in the present study, we did not explore other variables potentially affecting dietary preference such as ethnicity, wealth and education.

We expected that Evangelicals would be least likely to report avoiding some form of meat given the weak role of shamanism relative to Anglicans and Catholics and given the fact that these churches, unlike Sabbatarian churches, do not promote new dietary restrictions. Due to the opposition of Evangelical and Sabbatarian church teachings to shamanism, we also posited that households affiliated with these churches would be less likely to avoid meats proscribed by shamans than Anglicans and Catholics. Specifically, we hypothesized that 1) households belonging to Evangelical churches would be less likely to report avoiding some form of meat than members of established and Sabbatarian churches, 2) patterns of meat avoidance by members of established churches would be statistically similar to the norms defined by shamans, and 3) patterns of meat avoidance by members of Sabbatarian and Evangelical churches would differ significantly from the norms represented by shamanic advice, implying that decisions to avoid some form of meat among members of those church types are made independently of any directives from shamans.

Study Location and Population

The Rupununi Region is a predominantly indigenous area of southern Guyana characterized by a mixture of upland and seasonally flooded savannahs and tropical forest (Fig. 1). The approximately 48,000 km^2 area is bisected east to west by the Kanuku Mountains, a largely forested and uninhabited range reaching elevations of slightly more than 1,000 m. Human impacts on the forest environment consist largely of localized hunting pressure and swidden agriculture. Savannah ecosystems are also influenced by occasional fires (mostly anthropogenic) and by low-intensity cattle grazing in some areas. At the time the study was conducted, the Rupununi had been spared high-intensity resource exploitation such as the large-scale timber removal, deforestation and mechanized agriculture that have resulted in greatly altered ecosystems in other areas of Amazonia.

The Wapishana, speakers of an Arawakan language, live in the South Rupununi (i.e., south of the Kanuku Mountains) and the Makushi, members of the Carib linguistic group, are the dominant ethnic group in the North Rupununi. Despite this general spatial segregation, few villages are ethnically homogenous, with representatives of at least one other indigenous group present (Read *et al.* 2010). Aside from the multi-ethnic administrative and population center of Lethem (approximate population 2,000), which borders Brazil, all communities in the Rupununi are predominantly or exclusively indigenous in ethnic composition. Outside of Lethem, most households follow largely subsistence-oriented livelihoods, with heavy reliance on swidden agriculture, hunting and fishing for both household consumption and for occasional sale. Additional sources of income include salaried positions, principally as government-paid health workers and teachers, as well as temporary wage labor on ranches and in urban centers outside the region in Guyana and neighboring Brazil.

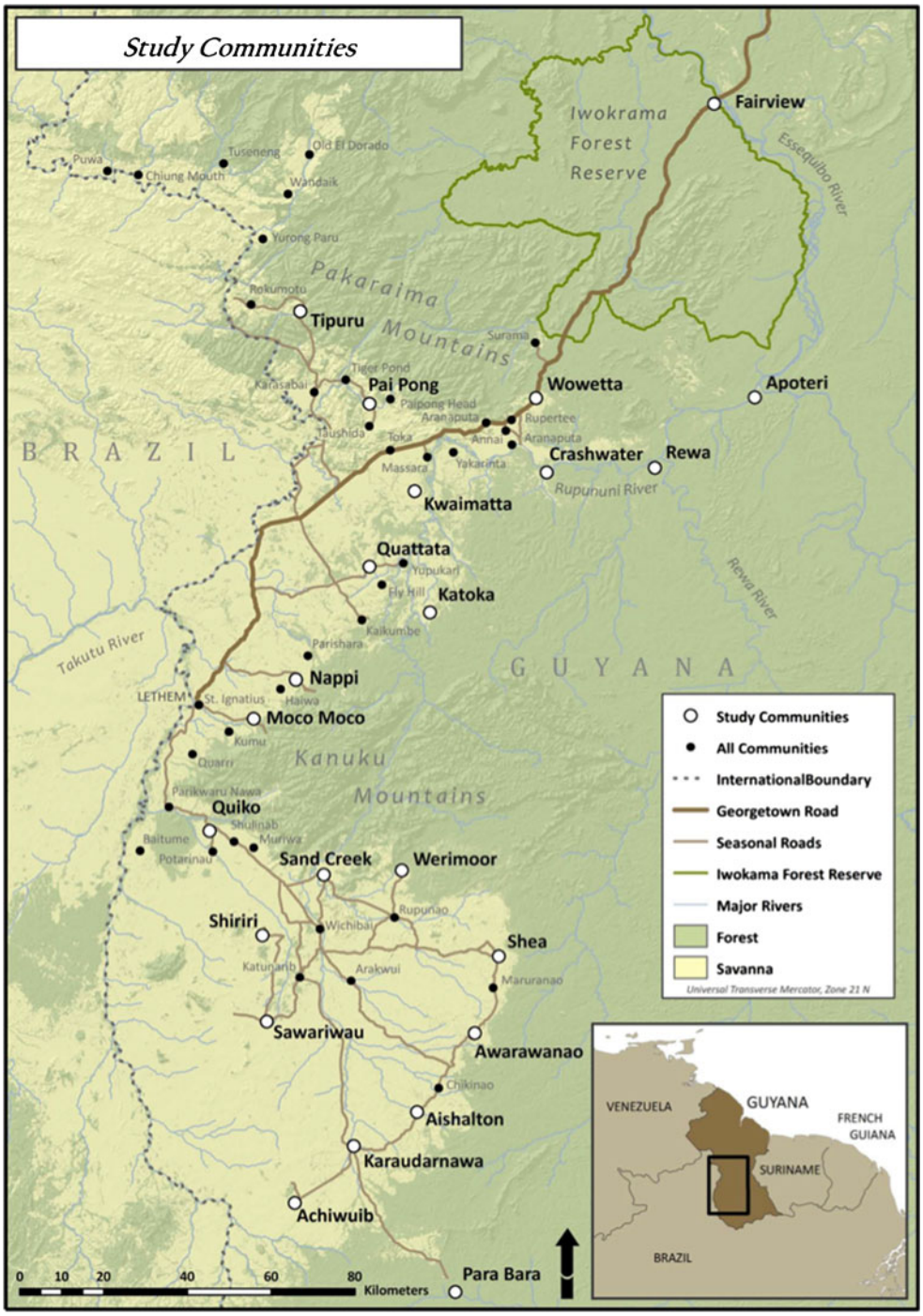

Fig. 1 The location of the Rupununi study region in Guyana. South America

Field Methods

The present study was part of a larger interdisciplinary effort examining the relationships among economic integration, indigenous culture, hunting and wildlife dynamics in the Guyanese Amazon (Fragoso *et al.* 2005). The research team, which included ecologists, geographers and anthropologists, as well as trained members of local communities, collected data from 2007 to 2010 in 23 predominantly indigenous communities of the North and South Rupununi (Fig. 1).[2] Due to the importance of a landscape-level perspective on hunting and wildlife dynamics in the overall research design, coupled with the desire of Makushi and Wapishana leaders to participate in the research project, the study was

[2] Due to the difficulty of evaluating hunting pressure around communities in close spatial proximity to others, seven predominantly Makushi and three predominantly Wapishana communities of the Rupununi region were not included in the study.

conducted in both the Makushi and Wapishana areas of the Rupununi region. Eleven communities were predominantly Makushi, 11 were predominantly Wapishana, and one community had a broad range of indigenous groups with no one group representing a clear majority (Luzar and Fragoso 2012). Members of collaborating communities were trained by project scientists to collect social and other data in their communities (Read *et al.* 2010; Luzar *et al.* 2011). These community members used a census approach to administer socioeconomic surveys of the households in each community in the study (n=1,774 households). A total of 132 households in the study area were not surveyed for various reasons such as extended absence from the village or opting out of the survey. Household heads generally ranged from 18 to 70 years of age. When possible, male and female household heads were interviewed together, though only one was surveyed when the other was not home or when there was only a single head of household (e.g., widows and widowers). Socioeconomic surveys included questions regarding church affiliation, principal source of protein, whether one or more household members avoided some form of meat and, if so, what species and why. Both wild and domestic forms of meat were considered.

Additionally, technicians recorded hunting activity by residents of their communities through hunting return surveys administered on a weekly basis to all households that hunted during that time period (Luzar *et al.* 2011), representing 831 hunters. While some hunts went unrecorded for various reasons (e.g., some hunters not wanting to share information with the technicians), one of the authors (Luzar) visited all communities in the study to verify hunting return data with hunters and local leaders and to identify and resolve problems leading to undercounts when they occurred. Technicians also administered surveys to 235 principal hunters (determined based on hunting records for each household) in 23 study sites. These surveys included information regarding the reasons for using or avoiding certain game species.

Finally, technicians conducted "shaman visit surveys" for visits to shamans and prayer people in six focal communities in which shamans were present (each village having one known shaman and multiple prayer people). While no shamans agreed to be surveyed on a regular basis, three did agree to informal interviews with one of the authors (Luzar), providing additional qualitative context to the quantitative data. These six focal communities represented all but three of the communities in the Rupununi in which shamans were reported to reside.[3] During interviews technicians recorded data from all households pertaining to visits to shamans that had occurred during the prior week including information on dietary advice given by the shaman. Over the three and a half year study period, project scientists and community technicians also collected qualitative data, including key informant interviews about shamanism, food taboos and the history of churches in the region.

Analysis

For the purposes of the analyses, we divided 15 of the 16 church affiliations present among households included in the study into three categories—"established," "Evangelical" and "Sabbatarian." Given their rarity in the region (n=9), we did not include in the analysis Jehovah's Witness households, nor did we consider those households that claimed no church affiliation (n=5). We also did not consider "mixed" households in which members belonged to more than one church type (n=60), due to the internal heterogeneity of this group (e.g., a "mixed" household might include any proportion of the three church types).

In order to test our first hypothesis regarding church affiliation and adherence to one or more food taboos, we used R (Crawley 2007) to conduct a chi-square test of the relationship between church affiliation and adherence to a meat-based dietary taboo by at least one member of a household. To test the second and third hypotheses regarding patterns of meat avoidance, using Excel we derived meat avoidance profiles for each church type by compiling frequencies of species or categories of meats avoided by one or more members of households in each religious group and for all meats proscribed by a shaman (Fig. 2). We then

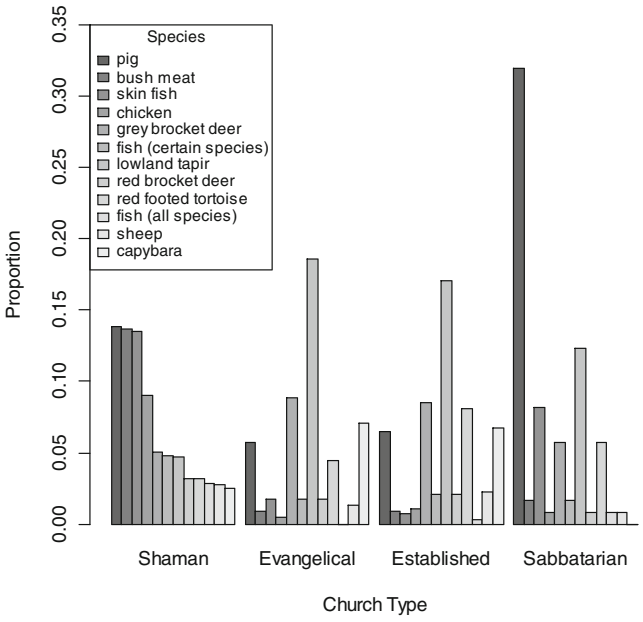

Fig. 2 The twelve species and animal categories most frequently recommended to be avoided by Makushi and Wapishana shamans, with frequency of avoidance by church type

[3] Data were not available for shaman visits in two villages due to unreliable data in one community and reticence by villagers to be surveyed on the matter in the other. A third village in which a shaman was resident was not among the study communities.

selected the 12 species and animal categories most frequently recommended to be avoided by shamans, representing 79.1% of all animals and categories mentioned by shamans. This cut-off was selected as it represented the point where values for the church categories began to decline substantially. Using R, we conducted a Jaccard's distance test of similarity of these 12 species and categories most frequently recommended to be avoided by shamans against the frequencies of dietary restrictions among the three church affiliations.

Results

Game Meat Consumption and Avoidance Among the Makushi and Wapishana

Game meat serves as an important component of local livelihood systems. Slightly more than 20% of all surveyed households (n=363) reported that game meat had been the primary source of animal protein in the past year (Table 1). Across the study area, the two most commonly hunted animals were agouti (*Dasyprocta leporine*; 13.5%, n=1,135 of 8,435 total recorded animal kills), and paca (*Cuniculus paca*; 13.4%, n=1,131), followed by white-lipped peccary (*Tayassu pecari*; 10.4%, n=876), though considerable variation occurred among villages (Read *et al.* 2011).

Percentages of households per village in which one or more members deliberately avoided some form of meat ranged from 0% to 97.9%, with the mean level for all villages being 37.9% of households. The village with the lowest level of reported dietary taboos was located in a savannah region whereas the village with the highest rate was located in an entirely forested area. Across the study site, more than one third of all households (n=630) had at least one member who deliberately avoided the meat of one or more animal species. Of this subset of households, 76.7% (n=483) indicated concerns about illness as a reason for avoiding meat. Key informant interviews revealed that in some of these cases meats were avoided by the entire household, especially when the health of children was a concern, since the consumption of prohibited meats by parents was often linked to an allergic reaction by children. In other households, the affected individual (usually an adult) would abstain while other household members could still consume the meat. Lowland tapir (*Tapirus terrestris*) was the most commonly avoided species (14.9% of households, n=265), followed by grey brocket deer (*Mazama gouazoubira*; 8.2% of households, n=146), domestic pigs (*Sus scrofa*; 7.5% of households, n=133), tortoises (*Geochelone* spp; 7% of households, n=124), and capybara (*Hydrochoerus hydrochaeris*; 5.7% of households, n=102) (Table 2).

Primates, which are abundant in most forested regions of the study site (unpublished data), represented an anomaly when comparing datasets. While the sum of kills of all primate species represented only 0.43% (n=36) of total kills, only 0.56% of households (n=10) reported deliberately avoiding the consumption of one or more types of primates and only two of the 1,170 recorded shaman visits yielded advice to avoid the consumption of one or more primates. In the specific case of spider monkeys (*Ateles paniscus*), when asked whether or not they hunted the animal, 213 of 235 hunters claimed to never hunt it. Of these 213, only three hunters mentioned allergies within their household or some other analogous reason for not hunting primates. The overwhelming majority of hunters avoided hunting spider monkeys due to "no custom" (n=155). Key informant interviews with village leaders and hunters revealed that the Makushi and Wapishana rarely, if ever, considered direct risks to their health from consuming primates and many older individuals recalled having consumed the meat as children with no ill effects.

Indigenous Belief Systems and Dietary Taboos

Adverse reactions attributed to specific foods (most commonly meat of some category or species of wild game, domestic animal or fish), generally referred to in English

Table 1 Principal animal protein sources for surveyed Makushi and Wapishana households, Guyana

Type of meat	Households (n)	Households (%)
Fish	1004	56.6
Domestic meat	406	22.9
Wild meat	363	20.5
Total	1773	100

Table 2 Commonly avoided species among the Makushi and Wapishana of Guyana

Species	Households avoiding	Proportion of households avoiding
Lowland tapir	265	0.15
Grey brocket deer	146	0.08
Domestic pig	133	0.07
Tortoises	124	0.07
Capybara	102	0.06
White-lipped peccary	38	0.02
Sheep	34	0.02
Some form of meat (Total)	630	0.35

as "allergies" in the region, varied among individuals. They could be temporary or permanent and in some cases were related to specific segments of the populations (e.g., children and pregnant women being susceptible to harm from consuming meats not considered dangerous for the wider population). Allergies typically manifested as physical reactions, including skin rashes, fever and epileptic seizures (see also Pezzuti *et al.* 2010, for a discussion of allergies in the northern Brazilian Amazon). Key informant interviews revealed that allergic reactions to meat were commonly attributed to the spiritual guardian or "master" of an animal species killed or consumed (see also Henfrey 2002). For instance, the "deer master" associated with grey brocket deer is known by the Makushi and Wapishana to be especially harmful to small children. Hunters who are the parents of pre-adolescent children must either use the appropriate prayers to placate the deer master or avoid the meat entirely until their children are grown. Failure to do so is widely believed by many Makushi and Wapishana to cause "fits" (similar to an epileptic attack) among children who consume the meat or whose parents have consumed the meat of this animal.

Among both the Makushi and Wapishana, the shaman (*piaisan* in Makushi, *marunao* in Wapishana and *piaiman* in Guyanese Creole English) is a ritual specialist who can diagnose and treat illnesses, including, but not limited to, allergic reactions to food (see also Luzar and Fragoso 2012). Of the 1,170 recorded visits to shamans, 92% (n=1,076) were motivated by an ailment (physical and/or psychological) that the individual hoped to have cured. In addition to the use of prayers or other remedies designed to treat the ailment, shamans would often provide advice to the patient and/or to the patient's family about foods to be consumed or avoided. Of the recorded visits to shamans, 521 (44.5%) yielded advice about avoiding some form of meat or fish. Qualitative data included in shaman visit surveys along with key informant interviews showed that individuals who ignored such dangers by consuming the offending meat could expect a physical reaction, ranging from rashes and fever to nightmares and, on occasion, death. In addition to curing sickness, shamans were also sought to prevent possible illness (or reoccurrence of past illnesses) in the future. While the majority of shaman visits were due to a desire to treat an illness or avoid a relapse (86.3%, n=1,010), a sizeable minority of visits (5.8%, n=68) were "pre-emptive," designed to avoid future illness, particularly among children.

It was not uncommon for Makushi and Wapishana individuals to visit a shaman due to a meat-induced illness (9.7% of visits, n=113). Key informant interviews revealed that "prayer people" (individuals who are knowledgeable of and accustomed to using indigenous prayers and who tend also to be Anglicans or Catholics) would commonly use traditional prayers to render a potentially dangerous piece of meat safe to consume; in some isolated instances individuals visited shamans for this purpose (see Hugh-Jones 1994: 42–43 for a discussion of similar practice among the Vaupés of Colombia). For a more permanent result, some parents reported taking their young children to a prayer person or shaman for a "blessing" intended to safeguard the child against spiritual attack and illnesses, including those caused by dangerous foods. Once inoculated in this way by the shaman's prayers, the parents and infant could enjoy a broad diet relatively unrestricted by burdensome food taboos.

As an example of the former temporary type of blessing, a Wapishana father gave the following reason for visiting a local shaman: "this (visit to a shaman) was because I want (ed) to eat the meat of the grey brocket deer because this animal is dangerous for (a) small baby (and) it may affect them." In another village, a family member received from the village shaman a similar blessing on deer meat so that an elderly and infirm household member who had developed an allergy to venison could also partake of the meat. As an example of the latter, more permanent inoculation against allergies, a Makushi man in a third village took his small grandson to a shaman for a blessing to prevent possible illness in the event the child's young mother consumed fish capable of causing an allergic reaction in the child. As such treatments, even when designed to be permanent, were rarely foolproof, a household might still exercise caution by avoiding dangerous meats when possible. Should an individual suffer a reoccurrence of his or her illness, a prompt return to the shaman for further treatment and advice would be necessary.

Christianity and Dietary Taboos

In the study site, 99.7% of individuals in surveyed households (n=9,327 of 9,352 individuals) listed one of 16 Christian denominations as their religious affiliation. Of the 1,773 households providing information about their religion, 72.8% (n=1,290) were affiliated with the Anglican or Catholic churches. Twenty percent of households (n=354) claimed membership in an Evangelical church. Sabbatarians represented 2.9% (n=52) and mixed-church households 3.4% (n=60) of all households surveyed. Nine households were Jehovah's Witnesses and five claimed no church affiliation. Reported visits to shamans were more common in the most heavily Anglican and Catholic villages, whereas few or no visits were reported in predominantly Evangelical villages (Table 3).

Among the three major church groups, Sabbatarians were most likely to report avoiding some form of meat. Members of Evangelical and established churches were similar both in terms of rates of deliberate avoidance of meats as well as in

Table 3 Percentage of Makushi and Wapishana households[a] reporting membership in a church type and visiting a shaman in the prior year among villages included in study

Village	Evangelical (%)	Sabbatarian (%)	Estabished (%)	Jehovah's witness (%)	Mixed (%)	Visited Shaman (%)
1	0	0	97	0	3	38
2	0	0	99	0	1	37
3	8.5	1	90	0.5	0.5	33
4	3.5	0	92	0	4.5	31
5	35.5	0	59	0	5	24
6	0	0	100	0	0	21
7	1	0	99	0	0	20
8	25	0	70	0	5	15
9	20.5	0	66	10.5	1.5	14
10	4	18	63.5	0	15	13
11	23	5	68	0.5	3	12
12	16.5	14.5	60.5	0	7.5	12
13	5	0	95	0	0	11
14	0	0	97	0	3	9
15	20.5	0.5	75.5	0	3	8
16	53	0	44	0	3	6
17	13.5	0	84.5	0	0	5
18	75.5	0	20	0	4.5	4
19	2	4	93.5	0	0	4
20	85.5	0	14.5	0	0	0
21	95.5	0	2	0	2	0
22	9	0	82	0	9	0
23	16	6.5	74	0	3	0
mean	22.3	2.2	71.6	0.5	3.2	14

[a]To protect anonymity, numbers are used in place of actual village names

terms of the most commonly avoided species (Table 4). While Evangelicals and Sabbatarians were less prone to visit and accept the authority of shamans than members of established churches (Luzar and Fragoso 2012), key informant interviews showed that belief in the possibility of allergic reactions to specific meats was common, if not universal, for all groups. We found that the proportion of Sabbatarian households reporting that they avoided some kind of meat (86.5%; n=45) was significantly larger than for Evangelicals (31.5%; n=112; χ^2= 55.8391; df=1; p=7.865e–14). The proportion of Sabbatarian households avoiding some form of meat was also significantly higher than for households belonging to established churches (33.7%; n=437; χ^2= 58.4406; df=1; p=2.095e–14). Contrary to expectations, the results showed no significant difference in avoidance of meat between households belonging to established and Evangelical churches (χ^2=0.5443; df=1; p=0.4607).

From a total of 64 species and five categories that were either recommended to be avoided by a shaman and/or were avoided by members of at least one of the three church groups, we considered eight species and four categories representing 79.1% of recommendations by shamans in subsequent analysis (Table 5).[4] Domestic pigs were the species most commonly recommended to be avoided by shamans (13.9% of animals mentioned, n=191), followed by the categories "bush meat" (13.7%; n=188) and "skin fish" (13.5%; n=186). The three most commonly avoided meats among Anglicans and Roman Catholics were lowland tapir (15%; n=194), followed by grey brocket deer (7.5%; n=97), and red footed tortoises (*Geochelone carbonaria*; 7.1%, n=92). Patterns for Evangelicals were similar, with lowland tapir being the most frequently avoided (11.8%; n= 42), followed by grey brocket deer (5.6%; n=20) and capybara (4.5%; n=16). The animals most frequently avoided by Sabbatarians, however, were much different, including domestic pigs (75%, n=39), lowland tapir (28.8%, n=15) and "skin fish" (19.2% n=10). Contrary to expectations, the Jaccard's test revealed that all church types differed from advice by shamans in their avoided meat profiles, with the greatest similarity occurring between the dietary taboo

[4] Overlap exists between categories and species. For example, the category "wild meat" encompasses the various forms of terrestrial and avian fauna. The category "fish, certain species" referring collectively to fish that fall into subsets of groups that partially, but not completely, overlap with "skin fish" and "all fish" categories.

Table 4 Meat avoidance in Makushi and Wapishana households by church type

Church type	N households	N avoiding	Proportion avoiding	Avoided 1	N	Avoided 2	N	Avoided 3	N
Evangelical	354	112	0.315	lowland tapir	42	grey brocket deer	19	capybara	16
Sabbatarian	52	45	0.865	pig	39	lowland tapir	14	skin fish	10
Established	1290	437	0.337	lowland tapir	193	grey brocket deer	94	tortoise	82

profiles of Evangelicals and members of established churches (Table 6).

Discussion

Dietary Taboos in the Context of Christianity

Dietary taboos derived from indigenous and Christian belief systems are common among the Makushi and Wapishana. However, unlike Balée (1985), we found little evidence of proscriptive beliefs about the consumption of certain meats. As has been documented elsewhere in Amazonia (Moran 1974; Pezzuti *et al.* 2010), dietary taboos among the Makushi and Wapishana tended to be proscriptive responses to defined illnesses, such as allergic reactions to certain meats. Anecdotal evidence suggested that adherence to taboos may vary between villages partially due to first or second hand experiences in some villages but not others. For example, residents of villages where a well-known incident of a child becoming sick after his or her parents failed to observe the taboo on grey brocket deer may be more likely to avoid that meat than residents of other villages where no such cautionary instances have occurred in recent memory. Similarly, residents of communities surrounded by savannahs where the most commonly tabooed animals are rare to non-existent will have less reason to deliberately avoid dangerous meats than forest communities where commonly tabooed animals, along with cautionary tales associated with their consumption, are much more common.

Despite the erosion of the shaman's role and legitimacy among members of Evangelical and Sabbatarian churches, dietary taboos appear to have been largely unaffected in the case of Anglicans/Catholics and Evangelicals or have even become more common in the case of Sabbatarians. The first finding shows that an unanticipated continuity appears to exist between members of established and Evangelical churches in terms of dietary taboos. The latter finding, however, was expected given that Sabbatarian church doctrine requires adherence to certain dietary restrictions based on Jewish religious law.

The convergence between dietary taboos among Evangelicals and members of established churches in the Jaccard's test of similarity was unexpected. This evidence further suggests that in the absence of a new taboo system, as in the case of Sabbatarian churches, indigenous dietary taboo systems can persist, even when other elements of indigenous belief systems (e.g., shamanism) have begun to wane. The unanticipated similarity of dietary taboos among members of established and Evangelical churches may be explained by the fact that Evangelical churches prioritize the delegitimization of shamanic practice and of the shaman's societal role (see Belaunde 2000; Grotti 2009; Luzar and Fragoso 2012) rather than specifically discrediting indigenous beliefs about meat and associated sickness. As Evangelical Christianity in the Rupununi tends to condemn shamanistic

Table 5 Twelve species and categories of animals most frequently advised to be avoided by Makushi and Wapishana shamans with avoidance frequencies for members of Evangelical, Sabbatarian and established churches

Species	Shaman	Evangelical	Sabbatarian	Established
Pig	191	13	39	74
Chicken	124	1	1	12
Grey brocket deer	69	20	7	97
Lowland tapir	65	42	15	194
Red brocket deer	44	4	1	24
Red footed tortoise	44	10	7	92
Sheep	38	3	1	26
Capybara	35	16	0	77
Categories				
Bush meat	188	2	2	10
Fish (all species)	186	4	10	8
Fish (certain species)	66	4	2	24
Skin fish	39	0	1	3

Table 6 Jaccard distance test of similarity for patterns of meat avoidance by Makushi and Wapishana shaman proscriptions and church type

Church type	Shaman	Evangelical	Established
Evangelical	0.715		
Established	0.698	0.17	
Sabbatarian	0.615	0.609	0.6

practice rather than associated beliefs (e.g., belief in the existence of a spiritual dimension to animal species, with the associated dangers of allergic reactions to specific meats) dietary taboo systems appear to be minimally disrupted in the conversion process to Evangelical Christianity, yielding similar rates and patterns of dietary restrictions to those practiced by Anglicans and Catholics.

Furthermore, a member of an established church who believes he or she has become ill due to the consumption of a spiritually dangerous food may consult a shaman seeking a cure, but the same is generally not the case for Evangelicals. If an Evangelical becomes sick due to a spiritually dangerous food, he or she will be less likely to consider consulting a shaman (Luzar and Fragoso 2012). When treatment by a shaman is no longer a possibility, either due to his elimination from the community and/or due to church norms, an Evangelical Makushi or Wapishana who knows him or herself to be allergic to a given meat may have little recourse but either to risk untreatable illness or to simply avoid the meat(s) in question. In contrast, an Anglican or Catholic, having ready recourse to treatment by a shaman without fear of incurring stigma in the church community, can more freely indulge in meats known to be potentially dangerous. Hence, avoidance of shamans by Evangelicals can encourage, rather than discourage, the adherence to indigenous food taboos.

The tendency of shamans to proscribe entire categories of meat while households tended to avoid individual species was also unexpected. This pattern suggests that the shaman's influence on dietary practice may be indirect. However, caution must be used when interpreting this result due to the data collection methodology used. Given the difficulty experienced in many of our attempts to interview shamans directly, we gathered information about recommendations from shamans from the individuals who visited them and not from the shamans themselves. The possibility exists that some informants tended to use a greater level of specificity with regard to the meats they actually avoided while drawing on more general categories (e.g., "bush meat" as opposed to a discrete list of game species) when recollecting the advice they received from shamans. Nonetheless, it is clear that a more direct driving factor influencing dietary taboos at the household level appears to be the beliefs and cultural norms regarding diet and sickness that we determined to be widely shared even within those churches that tend to avoid shamans.

While Evangelical and Sabbatarian Christianity pose doctrinal challenges to certain elements of indigenous beliefs and ritual, particularly shamanism, their relatively neutral stance toward underlying pre-Christian indigenous belief systems suggests that, at least for some species and categories of animals, indigenous food taboo systems remain viable despite the process of cultural change.

In the case of households belonging to Sabbatarian churches, church doctrines appear to reinforce or replicate, to some degree, the patterns of prohibitions against specific wild meats, especially lowland tapir. The potential ecological implications of dietary restrictions are especially evident in the case of this species, which is avoided at higher rates among Sabbatarians than among members of traditional and Evangelical churches. While stemming from a different source (i.e., the Hebrew Bible as opposed to indigenous conceptions of spiritually dangerous meats), Sabbatarian proscriptions on the consumption of tapir meat nonetheless have the net impact of reinforcing and/or replicating a key meat taboo present in the indigenous belief system it partially displaces. Given the low reproductive rate of tapir and its susceptibility to over-hunting (Fragoso 1991; Alvard 1993; Novaro *et al.* 2000), such Christianity-based taboos may have the effect of reducing the potential for over-harvest despite an overall process of cultural change, including the rejection of shamanism. While not documented quantitatively, key informant interviews suggest that a positive correlation may exist between frequency of church attendance and adherence to taboos among Sabattarians, which would explain the fact that some Sabbatarians do not report adhering to Sabbatarian dietary taboos.

Hunting Technology and Passive Dietary Taboos

Despite the importance of dietary taboos based on indigenous culture and Christianity in shaping the game meat consumption of Makushi and Wapishana households, they do not adequately explain the anomalous cultural and dietary role of primates among the Makushi and Wapishana. While rarely if ever subject to explicit taboos, primates are nonetheless rarely consumed in the region. This pattern stands in contrast to many other regions of Amazonia where primates contribute substantially to local diets (Yost and Kelley 1983; Redford and Robinson 1987; Peres 1990; Peres and Nascimento 2006; Ohl-Schacherer *et al.* 2007). In the study area, unlike species such as lowland tapir and grey brocket deer that are considered part of the normal diet but are restricted for certain individuals, primates are protected by what we term a "passive taboo" which is akin to the disdain observed among other Amazonian populations for various species such as anteaters and sloths (*Xenarthra*); (Alvard 1993). Despite their abundance across most of the region's forested areas, primates form a minimal to non-existent part of diets in the region. For the vast majority of

the region's residents, while few individuals would fear or refuse a prepared dish consisting of primate meat, especially if no other options were available, primates generally are not considered to be within the domain of edible foods.

An explanation that emerged in key informant interviews for this anomalous passive taboo was one of technological change driving dietary change. Older individuals generally recalled consuming primates as children or young adults and that their parents or grandparents had hunted primates using poison darts propelled by blowguns, a technology that is highly effective for hunting arboreal species (Yost and Kelley 1983), but which gradually became extinct in the Rupununi as firearms were widely introduced into the region during the balata rubber tapping era of the mid-twentieth century (see Forte 1996). Either weapon facilitated the hunting of primates. Whereas the muscle relaxant qualities of traditional blow dart poisons and the impact force of bullets generally ensure that the animal will fall to the ground, the prehensile tail of an arboreal primate struck by an arrow (the main technology currently used in hunting) will often continue to secure a tree limb, even when dead, keeping it out of reach of the hunter (Fragoso personal observation; see Yost and Kelley 1983).

With increasing restrictions on the purchase and possession of firearms in the post-colonial era, particularly after the failed Rupununi Uprising of 1969 (see Farage 2003), few new weapons entered into circulation. As older firearms fell into obsolescence and ammunition became scarce and expensive, most hunters reverted to bow and arrow hunting, which is significantly less effective at hunting primates than either blowguns or firearms (Hames 1979; Yost and Kelley 1983). Due to this technological change, a generation of young Makushi and Wapishana grew up without ever having consumed or seen a primate prepared. As a result, while primates are seen as a food of last resort if one is fortunate enough to have a firearm and adequate ammunition, most individuals, particularly younger people, never having consumed them, no longer perceive them as within the domain of edible meat in much the way that most North Americans do not actively procure the meat of geese, squirrels and rabbits, yet would not decline the meat if no other options were available. While not rooted in a cultural belief system, the passive taboo on primates, due to its near uniformity across nearly all people in the region, has biological implications that are at least as great as the longer-standing and culturally-embedded taboos that apply to specific segments of the population only.

Conclusions

This study supports the conclusions of other researchers such as Ulloa *et al.* (2004) that taboos (both indigenous and introduced) related to the consumption of meats can function as a resource management tool analogous to hunting bans promoted by managers and biologists; this is especially evident in cases such as the lowland tapir, which has a low reproduction rate. In other cases, the environmental implications of meat taboos can be more complex. Pressure may simply shift to other animal species that may be more or less susceptible to overhunting or to domesticated animals such as cattle (which virtually no Makushi or Wapishana reported avoiding). In some cases, individuals with an allergy to a given meat may still kill the animal and give the meat to others, though this tendency is mediated by the fact that sickness is sometimes attributed to the mere killing of an animal, regardless of whether or not its meat is consumed by the hunter. Finally, given that some households reported avoiding meat for reasons that do not involve conscious dietary taboos (e.g., smell, taste, no custom, etc.), it is clear that taboos are an important but not exclusive explanation for meat preference among the Makushi and Wapishana.

It is important to note, however, that in addition to the dietary taboos that are directly reinforced by indigenous and Christian belief systems, passive taboos (those not connected with the deliberate avoidance of a given food) arising from technological and cultural change can have a complementary effect in shaping dietary preferences. The near absence of primates in Makushi and Wapishana diets, despite the lack of direct prohibitions on their consumption, is a case in point.

We conclude that indigenous taboo systems can play an important role in dietary preference and that such systems do not necessarily disintegrate through contact with outside society and conversion to Evangelical and Sabbatarian Christianity. Our results stand in contrast to other studies (e.g., Yost and Kelley 1983; Redford and Robinson 1987) showing that indigenous peoples abandon their taboo systems as they come into contact with outside societies. As the case of the Guyanese Rupununi region demonstrates, cultural change in the form of acceptance of various forms of Christianity tends to be highly complex and dynamic and can have unexpected and novel implications for the consumption of wild game. Future work is needed in order to link these culturally influenced dietary patterns with animal off-take by indigenous hunters. By testing the link between dietary taboos and hunting behavior, scientific research can better illuminate the role of both indigenous and Christian belief systems in the sustainable management of indigenous lands.

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