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# Taboos, food avoidances, and diseases: Local epistemologies of health among Coastal Endenese in Eastern Indonesia

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To advance interventions targeting malnutrition among small-scale fishing societies, knowledge on the role played by taboos and dietary avoidances on the consumption of fish related products becomes crucial. The article builds upon ethnographic fieldwork (participant observation, focus groups and interviews), dietary questionnaires (n: 112), and archival research among Coastal Endenese in Eastern Indonesia to understand the role played by taboos and dietary preferences in regulating intake of marine products. Moving beyond binary notions of “good” and “bad” when considering the food-system implications of taboos, it explores how local beliefs about illness and food shape dietary practices that can have concrete consequences for an individual’s health. Endenese consider fish as having originated from terrestrial creatures, creating a continuous cycle of movement from land to sea and back. Within this cosmology, food is seen as a medium that can bring about healthy outcomes but also disease. Results emphasize the need to understand taboos and food avoidances within the larger cosmological and religious system but also underscore the changing nature of dietary preferences and values due to market integration processes which may have long-term repercussions on health. This information is key to the design of culturally sensitive dietary strategies and alternative livelihoods approaches that seek to minimize poverty.

## KEYWORDS

food, fisheries, nutrition, traditional societies, Indonesia

## Introduction

Widely spread throughout the Indo-Pacific, taboos, nutritional prohibitions, and avoidances, constitute essential elements of Indigenous cosmologies. Whether informal or formal, dietary restrictions embody cultural institutions that regulate social interactions and delimit what is considered normal or desirable (Forth, 2020). Food prohibitions are mostly family based and associated with gender, with the large majority of taboos imposed on women (Vasilevski and Carolan-Olah, 2016). Passed down from generations, taboos shape behaviors and preferences that may have long-term consequences for the health of a population. Studied by anthropologists, religious experts, ecologists, and public health specialists, diverse explanations have been proposed to account for their existence (Begossi and Braga, 1992; Meyer-Rochow, 2009; Foale et al., 2011).

For example, according to social anthropologists, taboos can have protective purposes. By curtailing the consumption of food items associated with cultural and societal norms, they prevent illness and disasters stemming from disruptions of the cosmological order (Malinowski, 1918; Douglas, 2002; Alaszewski, 2018). To scholars of religion and symbolism, taboos, a subsection of ritualized prohibitions, are part of value-based avoidances that characterize religious belief systems. These institutions reflect the complex relations between

humans and the natural world (Durkheim and Mauss, 1967; Levi-Strauss, 1971; Valeri, 2000). Among environmental scientists and ecologists, because prescriptions prevent individuals from extracting and consuming specific food items, taboos have been associated with biodiversity conservation goals (Alvard, 1998; Colding and Folke, 2001; Singhal et al., 2021).

Within public health and medical fields, taboos are considered potential sources of malnutrition and dietary insufficiency (Ogbeide, 1974; Ekwochi et al., 2016; Köhler et al., 2018). Numerous studies in Africa and Asia have shown that observing food taboos during pregnancy can lead to significant health impacts for the mother and the baby (Triratnawati et al., 2016; Vasilevski and Carolan-Olah, 2016; Köhler et al., 2019). Affecting the intake of key animal and vegetable protein and micronutrient sources, prohibitions have long-term consequences for the cognitive development, growth, and immunological system of children, and can increase the risks of a dangerous delivery for the mother (Iradukunda, 2020). In some cultures, the extent of restrictions concerns entire groups of foods such as red meat, raising questions about the rationale behind such practices and the ultimate benefits associated with taboos (Vasilevski and Carolan-Olah, 2016). To some extent, public health and biomedical perspectives echo classic anthropological debates regarding the study of food preferences and the utility of taboos. Case studies within societies in India, Papua New Guinea, Brazil, and Iran (Harris et al., 1966; Rappaport, 1968; Sahlins, 1985; Begossi et al., 2004), have tried to shed light on the more concrete consequences from avoidances, the potential advantage or ecological/material cause for their existence, and their connection to symbolic and religious beliefs. Failing to coalesce into a single explanation, these studies have demonstrated that diets may manifest more than one motivation and confound both cultural and utilitarian reasons. Because taboos, avoidances, and prohibitions are deeply embedded in belief systems with direct consequences for the environment a population lives in, scholars have questioned the value of separating between different kinds of explanation (Meyer-Rochow, 2009).

While the relationship between taboos, health, and malnutrition continues to be a topic of interest (Köhler et al., 2018, 2019), the systematic study of dietary avoidances, food preferences and of their nutritional consequences among traditional societies, and especially, on coastal groups, remains somewhat limited (but see Begossi et al., 2004; Gibson et al., 2020, 2021). Over the past decades, attention has grown toward the challenges faced by Indigenous fisheries (Charles, 2012; Chuenpagdee et al., 2013). Due to their high reliance on subsistence fishing, small-scale coastal communities are highly vulnerable to disturbances in their food systems that may endanger their wellbeing (Arthur et al., 2022). Recent exposure to climate change, extreme events, overfishing, and urban development have further implications for the survival of millions of people that rely on fish as their main source of nourishment (Loring et al., 2019). In fact, fish diets have been shown to provide important amounts of animal protein, vitamins, and key micronutrients that can significantly contribute to food security and health (Béné et al., 2016; Hicks et al., 2019).

To advance interventions targeting malnutrition among these societies, knowledge on the role played by taboos and dietary avoidances on the consumption of fish related products becomes crucial. Lack of information on how decisions are made within fishing households in terms of diets, as well as their symbolic

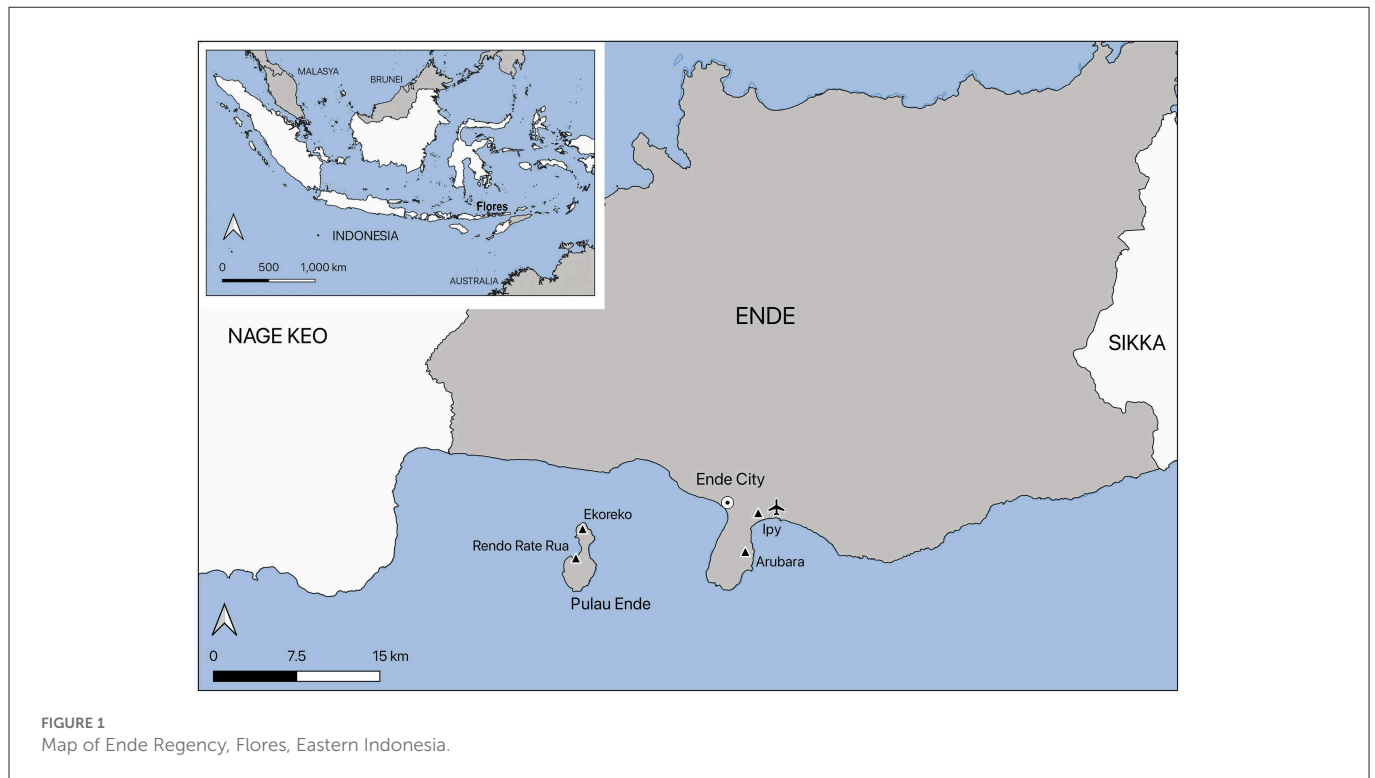
connections to disease and ill health, poses an interesting obstacle (Gibson et al., 2020, 2021). This article proposes as its main goal to explore how different types of prescriptions and beliefs about the spiritual world regarding the consumption of maritime and coastal items shape dietary practices within a small-scale fishery in Ende, Eastern Indonesia. Experiencing some of the highest rates of poverty, stunting, and nutritional pathologies in Indonesia, Endenese rely heavily on subsistence fishing for their livelihood (Anonymous, 2016; Ramenzoni, 2017; Matondang 2017). By eliciting prohibitions and common prescriptions observed by this society, the article emphasizes the need to understand taboos and dietary avoidances within the larger cosmological and religious system. As such, food-based institutions are parts of a local epistemology of health where illnesses and maladies constitute disruptions to a normal cosmological and societal order. Failure to apprehend the interconnections between dietary prohibitions, illness, and the spiritual world giving shape to a complex etiology of disease may affect the efficacy of behavioral interventions (Triratnawati et al., 2016). Indicating the widespread practice of food avoidance, the article also underscores the changing nature of dietary preferences and values which may have long-term repercussions on health, moving beyond binary notions of “good” and “bad” when considering the food-system implications of taboos and other prohibitions. This information is key to the design of culturally sensitive dietary strategies and alternative livelihoods approaches that seek to minimize poverty. To conclude, the article discusses the importance of identifying changes in societal trends and structural conditions to elucidate the real factors behind dietary diversity and food security.

## Background

The result of a mix between local hinterland and migrant groups from South Sulawesi, Endenese have inhabited the regency of Ende, in Central Flores, Eastern Indonesia, for at least 400 years (Figure 1). Known as avid seafarers, there are over 40 small-scale fishing villages dispersed along the northern coasts of the Savu sea. Communities are predominantly Muslim, with elaborate syncretic beliefs and cultural practices surrounding, circumcision, birth, and wedding ceremonies. Endenese are loosely organized in clans, with village leaders, shamans, and Imams constituting the main political forces at the village level. The coastal area was organized into a sultanate from 1630s until the mid 1950s. The sultanate exercised nominal and limited power in regulating military activities and trade (Van Suchtelen, 1921; Needham, 1980).

Fishing is of a highly artisanal nature, with no industry operating in the district. Endenese harvest over 100 species of fish, including pelagic and coral species. The fish species typically targeted are: flying fish (*Exocoetidae*, *Cypselurus* spp.), billfish (*Istiophorus*, *Xiphias gladius*, *Istiophorus platypterus*), tuna (*Thunnus tonggol*), skipjack (*Katsuwonu pelamis*), needle fish (*Belonidae*, *Tylosorus* spp.), scad (*Caesionidae*), snapper (*Lutjanidae*, *Lutjanus* spp.), and shark (*Alopias* spp., *Charcharinus* spp., and *Sphyrnidae* spp.).

A household head spends between 19 and 20 days per month fishing, and ~9 h each day. Each household includes about five to six members, with an average of 1.5 individuals still in primary school and reliant on their elders for food provision. A large proportion,



if not all, of Endenese households own their home. However, only about half of these domestic units cultivate land in addition to fishing growing cassava and bananas, and seasonal crops such as beans and maize. There are virtually no other sources of income in the village but fishing and weaving, with the latter only marginally contributing to subsistence by the selling of sarongs. Occasionally, fishermen find employment in construction work, but these opportunities are not frequent. It is also common for younger sons to migrate to Malaysia and send remittances every few months. These irregular sources of income help families diversify their diets by including store bought items such as rice, noodles, snacks, and sugar. There is a large market in Ende city that is often visited by middlemen and household heads to buy coffee, green leafy vegetables, and other agricultural produce. Sharing represents a buffering strategy among households to reduce food insecurity and meet nutritional needs. Items commonly shared include fish and grown produce.

In terms of human well-being, recent studies in Ende regency have shown that <10% of families participating in the government program “Healthy Family”, which includes about 4,700 family units, can be considered healthy (PPSDM, 2018). The index includes measures such as immunizations, sanitation, access to health services, monitoring, and medication. In what concerns disease incidence and prevalence rates for non-infectious pathologies, hypertension, diabetes, gastrointestinal issues such as ulcers, gastritis, acid reflux, and intestinal blockages, along with gout and kidney stones exhibit high values in the regency (Anonymous, 2016). Morbidities have a strong connection to diets and water quality. High levels of diarrhea (about 411/1,000 cases in Anonymous, 2016), malnourishment, and stunting constitute critical problems in Ende, and the larger Nusa Tenggara Timur Province (NTT; Anonymous, 2018). About 13.5% of children under 5 months of age were born with low weight in 2017 (Saleh et al., 2020), and 14% of all infants in 2020 were

malnourished (BPSKE, 2022). Insufficiency in the intake of omega-3 fatty acids and chronic energy deficiency among pregnant mothers have been found in 61,5% of the population sampled (Saleh et al., 2019, 2020). Staggering rates of poverty also place the Nusa Tenggara province as one of the poorest in the whole country (Jotzo et al., 2009; Matondang, 2017). It has been estimated that one-fifth of the population of NTT, and close to 27 % of its children, are among the poorest of the poor (Anonymous, 2022). In Ende, poverty predominates in the rural segments reaching 25% of households (BPSKE, 2022). Thus, out of a population estimated around 280,000, close to 67,000 people live below the poverty line. The latter was placed at Indonesia Rupiah 14,277 per person per day in 2021 or at about one U.S. dollar (BPSKE, 2022). Due to poverty and precarious living conditions, NTT has become a place for slave work and human trafficking (Anonymous, 2021). These issues, in combination with infant mortality, and lack of economic development, suggest the urgency of developing nutritional interventions (Jotzo et al., 2009; Triratnawati et al., 2016; BPSKE, 2022). In the past decades, efforts have been made at the provincial level to increase the consumption of animal protein, and particularly, fish products. Unfortunately, the absence of industrial facilities that may allow for the processing and refrigeration of seafood limits capacity. While both the regional and local governments have encouraged an increase in marine landings, there is scarce support for long-term development of the fisheries and some issues of potential overfishing have been observed by the communities (Ramenzoni, 2017).

## Methods

The main methods for this study include participant observation, focus groups, interviews, and surveys with fishing household heads

in four villages of Ende, Flores, Indonesia. Fieldwork data was complemented with additional conversations with key informants in village health centers, with official statistical reports from the regency, and with archival research. Statistical reports were collected over multiple field seasons from the Statistical Bureau of Ende, (Badan Pusat Statistik Ende or BPS), the Ende Regency Fishing Commission (Dinas Kelautan dan Perikanan or DKP), and the Health Services Office (Dinas Kesehatan, Diskes). Interviews and archival research were carried out from May until August 2009, from November 2010 until January 2011, and from June 2011 until January 2013. Additional trips were carried out in 2019 and 2020 to Jakarta, and 2022 to Ende to further validate findings. During the beginning of the main fieldwork phase in 2010–2011, three exploratory focus groups including three to six participants were conducted in the village of Arubara to elicit information about food security, consumption patterns, favorite foods, access and availability of key food items, prohibitions and avoidances, and health and illnesses associated with food. Focus groups were not recorded, and fieldnotes were collected by the main researcher. In 2011, 35 semi-structured interviews were carried out with household heads to further explore food consumption, dietary preferences, prescriptions or practices of food avoidance, taboo obligations, the individuals to whom such prohibitions applied, and their causes. A total of 12 of these exploratory conversations recorded with previous consent from participants. In late 2011 to 2012 a survey of food frequency, dietary diversity, and common illnesses. Exhaustive sampling was conducted in 3 smaller subdivisions of Ipy (RT 06, 02, and 01) and the village of Rendo Rate Rua, Pulau Ende. A total of 112 household heads which relied on fishing to meet subsistence needs, were interviewed to assess frequency of seafood consumption by seasons (wet and dry) and during the month of Ramadan. Further interviews with key informants (n: 15) were conducted to assess dietary prohibitions in childbirth and pregnancy. Consent was obtained from these interlocutors, interviewed household heads, and village leaders to discuss ceremonies and ceremonial principles while interviews took place. Information about ceremonies, as presented in this manuscript, combine findings from interviews as well as participant observation. Additional information about consumption was obtained by regularly weighing portions and special food items with a digital nutritional scale in two households during 3 months of fieldwork (March through May 2012). In 2019 and 2020 trips to Jakarta, the researcher obtained additional archival and statistical information which is generally accessible to the public and discussed findings with academic colleagues and non-governmental organizations. During 2022, a final trip allowed the researcher to visit previously interviewed households to validate findings in relation to avoidances and formal taboos, identify modifications or new inclusions of items in diets, and discuss aid programs. Finally, the researcher consulted academic and institutional partners, including local government officers, regarding the prevalence of issues related to stunting and nutritional deficiencies. In 2011 and 2012, two Indonesian field assistants helped the main author with data collection and translation while conducting their own master-level research on other topics related to fisheries and patronage. The main author supervised both students in their projects, developed protocols, and carried out measurements in the field. The field assistants participated in interviews and surveys along with the main author. Data collected for this article was transcribed and analyzed by the lead researcher.

## Results

### Diet characterization

Based on nutritional observations and surveys, an average Endenese household consumes two full meals a day, lunch and dinner (see Table 1). In some cases, like among lactating or pregnant women, leftovers from previous days are consumed for breakfast constituting a third meal. Morning and afternoon snacks consisting of tea or coffee with three spoons of sugar, and fried bread or biscuits are also frequently eaten. As measured during fieldwork, a meal usually consists of  $\pm$  150 g of rice and/or cassava, cooked vegetables including papaya or manioc leaves, water spinach, or tomatoes, and a small portion of fish. Measured fish portions, excluding bones and large scales for larger fish, are about 150–300 g per individual per meal, with an average observed intake of 225 g a day (0–600 g total). Noodles or a fried egg are used as substitutes for protein when fish is not available. Fish are commonly fried in coconut oil with a paste of garlic and red onion, and black pepper, salt, and turmeric used for seasoning. They can also be grilled or chopped into small parts and cooked in a coconut sauce. Boiled or fried leafy vegetables, red beans, eggplant, or calabash may be added to the sauce. All preparations are often accompanied by small peppers, either ground and sprinkled on top or incorporated into the meal during the cooking process (see Table 2). In all, total intake of kcal per day is somewhere between 2,100 and 1,600, with observations matching district level figures

TABLE 1 Example of daily consumption.

Daily consumption	Energetic value
Rice 158 g (2 plates)	205 kcal
Fish grouper 120 g (2 portions)	142 kcal
Sambal (tomato, garlic, onion, etc.)	324 kcal
Fish sauce (100 g)	35 kcal
Santan (coconut shredded)	120 kcal
Coconut oil for cooking (2 spoons)	234 kcal
1 Cassava root (408 g)	653 kcal
Coffee (2 cups) and sugar (8 spoons)	145 kcal
Total	1,858 kcal

TABLE 2 Frequency of food consumption by item type.

Meats, vegetables, and fruits	Frequency of consumption
1. Cassava or manioc ( <i>Manihot utilissima</i> ); rice ( <i>Oryza sativa</i> ), chili peppers, red onions garlic, tomato (in small portions as condiment); tea, coffee.	Daily.
2. Coconuts and bananas. Fried bread and cakes of rice or maize flour.	2 times a week.
3. Manioc and papaya leaves, water spinach, breadfruit, spinach, eggplant, pumpkins, noodles.	1 or 2 times a week.
4. Mango, papaya, guava and pineapple; occasional maize and beans.	Seasonal (~60 days)
5. Red and white meats (cow, chicken and goats). Milk (condensed) and butter.	In festivities. Yearly.

(BPSKE, 2022). Seafood is the main source of animal protein. Per capita intake of marine products among fishing households can be anywhere between 750 g and 1.8 kg a week, with consumption of seafood 5–6 times on average per week during the dry season. In the wet “Monsoon” season, per capita intake is 450 g to 1.2 kg a week, and seafood is on average consumed 3–4 times per week. The fish most frequently eaten are smaller tuna (“kembung”, *genus Rastrelliger*) and scad (“kolo”, *Decapterus macrosoma*), with other species availability varying according to the month of the year (see Table 3).

Although respondents indicated that fish is consumed daily whenever possible, they also indicated that depending on landing sizes bigger fish are sold to the market to higher profits. Direct-to-market species included red snapper, big tunas, marlin, rays, or sailfish. To substitute the larger captures, household heads would buy smaller size (and cheaper) fish such as sardines or pieces of bigger fish such as tuna. The consumption of marine products decreases dramatically in the full moon or during the Monsoon storms when fishing activity declines and prices rise. Restrictions in the consumption of fish by women by skipping meals or reducing portions to prioritize the nutritional sufficiency of children in the household are also observed then (Gibson et al., 2020, 2021). In all, ecological and economic conditions explain why a large proportion of the diet is characterized by carbohydrates (manioc, tubers, and rice), highly processed foods (noodles) or items of low nutritional value (snacks). Dry salted fish are also used as replacement for fresh seafood, becoming increasingly popular in hinterland villages throughout the island.

Among the most significant findings are issues related to food security, a topic to be further explored in future research activities. Discussing the Household Food Insecurity Access Scale and the Food Insecurity Experience Scale (Coates et al., 2007; FAO, 2022) during the exploratory focus groups and interviews, respondents indicated that their main difficulty was not related to hunger or scarcity but was related to “always eating the same” or “being bored with sardines”. Preliminary results suggest issues with dietary variation and the access to healthy alternatives when fish was not available.

Findings were corroborated in 2022; follow up visits indicated no significant introduction of new items in the diet. Electricity reached villages in 2019 and has become accessible to all households for the duration of the day. However, given the costs of domestic

appliances only a couple of homes possess a refrigerator. Changes in electricity have not resulted in the inclusion of items such as dairy nor in the increased consumption of perishable items. Even so, in order to capture a potential dietary transition and assess changes in nutritional health, more research is being planned with support from Indonesian sponsors to take place in the upcoming years.

## Avoidances, taboos, and prescriptions

Endenese recognize two major types of dietary prohibitions: taboos and avoidances. Of the first one, the term “piré” is used in Endenese to designate a taboo. There are three sorts of taboos: Clan, family, and individually based, all of which will be briefly discussed below. Regarding the second type of dietary prohibitions, avoidances, there is no term within the Endenese language that refers to them. Avoidances, representing a generalized and widespread set of abstentions, are spoken of as behaviors or practices that are simply not done. Within Islamic beliefs, the terms “haram” or “halal” are used to denote prohibitions related to the consumption of red meat, blood, and particular animals such as pigs and dogs. These terms were not employed during conversations to account for other dietary avoidances and were not used to designate taboos. It should be said that, beyond general avoidances there is no encompassing set of taboos that applies homogeneously to every household among this population. Because coastal Endenese are a combination of Bajau and Bugis groups intermarrying with local Lio families, variation in taboos reflects the family of origin and the village from which ancestors emigrated.

### General avoidances

These constitute, by far, the most common and adhered to prohibitions by the coastal Endenese. There are 7 different species groups which are not consumed: whales, dugongs, sea cucumbers, eels, snakes and snake-like fish, soles or flounder fish, and some coral fish such as pufferfish (Tetraodontidae family). Explanations for these avoidances are predominantly related to issues of flavor and taste, but also include beliefs about the abnormal morphology, physiology, and behavior of these species. Because of its high liquid and fatty content, whale meat is not considered tasty and is very

TABLE 3 Frequency of consumption of marine products.

Small tuna	Coral fish*	Sharks	Billfish	Dried fish	Octopus	Squid*	Frequency of consumption
72%	12%	5%	0%	11%	0%	43%	Daily
18%	16%	7%	4%	24%	0%	19%	2–3 times a week
4%	9%	20%	5%	29%	2%	9%	Weekly
4%	34%	34%	30%	25%	29%	10%	1–2 times per month
0%	0%	10%	20%	1%	8%	3%	>4 times a year
2%	26%	18%	30%	11%	55%	16%	No consumption
0%	3%	5%	9%	0%	4%	1%	Taboo

\*Indicates seasonal consumption.

difficult to prepare and cook. Interviewees indicated aversion given the resemblance of whale's tissue to terrestrial mammals, including humans. Disgust was also associated to eels and snake-like fish such as needlefish (family Belontiidae), hardtail (family Trichuridae), and halfbeak (family Hemiramphidae), because of their oily texture, slithering movement, and oblong shape. An equal feeling of rejection was extended to flatfishes, which are considered "dirty fish" for they feed on debris and garbage. There are some cues that suggest that some of these avoidances, especially related to whales, snakes, and dugongs, may respond to foundational creation stories as reported by early colonial officers who visited the area (Roos, 1877; Van Suchtelen, 1921). However, they were not mentioned by interviewees at the time that nutritional surveys were conducted. Suggesting changes in traditional knowledge, more research needs to be carried out to clarify this aspect. Most significantly, all avoidances were of marine or coastal origin, as it will be discussed below.

### Clan and family based taboos: Endenese cosmology

Unlike avoidances, clan and family-based taboos vary according to family origin and household, making their number lower. In fact, findings from surveys showed that taboos were present in close to 38% of the sample while avoidances are generalized to the whole population. In addition, the connection between taboos and family of origin refers to the migration of Buginese groups from South Sulawesi to Ende, a process that has reduced significantly nowadays. In the present, it does not suggest a different economic status, only a particular ethnic identity affiliation with a migrant clan. Taboo prohibitions are distinguished here based on the origin of the element that they apply to, with a special focus on discussing marine and coastal organisms as these are the ones subject to conservation concerns.

Representing a wide set of vegetal and animal groups, taboos of terrestrial species included water buffaloes, domestic fowl, ginger, beans, lemongrass, eggplant, and opo squash. They have a key significance for farming households among the coastal Endenese of Lio descent, with findings mimicking what has been established for nearby groups (Forth, 2020). On the other hand, marine species comprised billfish, sharks, octopus, squids, dolphins, and some coral fish like the surgeon fish (Balistidae family). The most frequently tabooed species group was that of billfish (Istiophoridae family) found in ten households. Sharks and octopus were the second largest taboo, with six and five households, respectively, reporting prohibitions. It should be said that the largest number of taboos was family-based, and prohibitions only applied to women. Taboos were acquired by marrying into a different clan, a less preferred type of marriage but the most prevalent nowadays. According to coastal Endenese descent principles, taboos became intergeneration impositions to be adopted by the new wife and not transmitted from mother to daughter, only from mother-in-law to daughter-in-law. Taboos were irrevocably acquired by the new bride upon relocation to a new patrilineal group, and if not followed they would ultimately result in death and misfortune. On the other hand, clan-based prohibitions were only found in two cases, indicating institutions that apply to the whole lineage. The result of breaking a taboo may produce skin infections and rashes, blisters or boils, breast pain, gastrointestinal diseases but also death. For instance, consumption of surgeon fish by pregnant women it is said to make the heads

of the children itchy if eaten during pregnancy and immediately after labor (see below). Although varying according to each family, the way to lift an offense may require ceremonial offerings to the ancestors. Such ceremonies are supposed to appease the angry spirit and point to the rich symbolic beliefs tied to prohibitions. Along with numerous legends and stories, the existence of taboos in Ende is closely connected to the notion that ancestors were or became marine animals or that animals may have helped and guarded the ancestors at some primordial time. In both cases, the animal associated with the ancestor is regarded as sacred. It must not be eaten, it must be looked after, and it must be treated with respect. For instance, among the billfish group, the swordfish (*Xiphias Gladius*) was considered the king of the ocean. Upon capture, it was to be released immediately and not disturbed. Explanations about familiarity or kinship were offered in the case of sharks and dolphins, where eating their meat equated to eating human meat.

Created by Allah, Endenese believe that all marine creatures originate in earthly beings. For example, elongated species such as needlefish and eels, are said to come from snakes; blowfish and pufferfish from porcupines; and fish with whiskers from rats and rodents. Endenese see the similarity between terrestrial and maritime animals' physiognomy and behavior as a sign of their common source. For example, in the case of a coral fish known as "take", it moves in the same way as the gecko, it burrows and hides in the ground when being pursued, and it is of a similar reddish orange color. The common land origin for all creatures can be glimpsed in the resemblance between the behavior of humans and animals. The displacement of terrestrial animals to sea, like fishers do every day, is a regular event stirred by their search for food.

In addition to the transfiguration of terrestrial animals into maritime ones, Endenese legends and stories refer to the metamorphosis of humans into fish. In these mythical stories the encounter with a sacred being and the breaching of a prescription is signaled as the foundational element for the transformation of a human into a marine creature. For example, a woman is transformed to a manatee after consuming eggs that were taboo, or a woman is kidnapped by the swordfish and becomes a fish. The significance of fish and marine creatures is also perceived in a foundational narrative. After the sinking the island of origin of the Endenese (Ramenzoni, in press), it is said that those who did not manage to escape turned into fish. Marine creatures helped the ancestors of some clans to reach safety and to establish their current abode.

### Dietary prohibitions during pregnancy and childbirth

During pregnancy or at the beginning of labor, Endenese families with connections to Bugis ancestors often follow a set of dietary prescriptions known as "mujó". According to this institution, new mothers are forbidden from eating rice and certain types of fish which may include sharks, surgeon fish, red snapper, or snakehead fish. The prohibition may occur during pregnancy, at the start of labor, and can extend several days after delivery. To prevent the mother-to-be from ingesting rice the whole household, usually other women, is forbidden from cooking it. If in the process of eating the mother drops a grain of rice it would be interpreted as a sign of misfortune and her child may die. When prohibitions are not respected, the child may suffer speech related pathologies or result in mental impairments.

While not all Endenese families follow mujó, there are a collection of prohibitions that are often respected during pregnancy. In general, restrictions about marine animals such as coral fish or red meat fish such as big tuna are related to beliefs about side effects of consuming certain organisms based on their qualities and morphology. For example, certain kinds of fish due to their presence of spines can endanger the pregnancy and the neonate. In terms of fruits and vegetables, women are discouraged from consuming durian, pineapple, and ginger for they may cause heat and lead to miscarriage (Triratnawati et al., 2016). Informal recommendations include abstention from cold beverages, sugarcane, and even certain weeds. Other prescriptions can extend to types of food based on their appearance, such as things that may look like a branch or may mirror the shape of a snake like a yam (Fernandez, 1990). These are said to make delivery more difficult.

To lift the taboos associated with mujó a formal ceremony is needed. Conducted among close kin and neighbors, special customary prayers would be uttered, and gifts given for the health of the baby. At the ceremony, the new mother is now allowed to eat yellow rice and fish. Once again, the fall of a single grain of rice may indicate danger, impairment, or death. A second larger ceremony would take place 40 days after the birth and when the baby is 6 or 7 months old. In these occasions, along with prayers the new parents would make offerings including rice and up to 44 different types of fruits.

### Personal taboos and diseases

Along with avoidances, personal-based prohibition that pertain to the whole familiar group are the most frequently found within the sample with ~45% of homes reporting at least one. These types of taboos are set idiosyncratically by household heads and usually respond to medical concerns such as hypertension, gout, or strokes. The highest item on the list of personal taboos was eggs. This was not surprising as most households reported having egg allergies (see Forth, 2020). Other personal taboos are associated with dry fish due to its high content of salt, noodles, and specific vegetables or fruits such as pineapple and papayas. As part of the survey, about one third of respondents also reported a list of different health complaints encompassing high blood pressure, strokes, diabetes, gout, kidney stones, parasites, gastritis, diarrhea, and skin infections. Prevalence for these diseases matched information reported from the local health office at the time.

### Food, spirit intermediation, and Endenese epistemology of health

Among the Endenese, food constitutes the medium for establishing a relationship among different families and between humans and the spirits. In the first instance, the initiation of wedding ceremonies is marked by the drinking of hot water (“minu ae petu”), when, for the first time, the families of the bride and the groom and members from both clans come together. The formal marriage is followed by a large feast including halal goat and chicken, with everybody in the village invited to partake. During parties, financial help is requested from others through the expression “koru kesa anga” which translates to the exhortation “add to the pot”. Commensality

is also essential to ceremonies such as circumcisions and funerals, during collective work, and on the eve of fishing expeditions to complement prayers. Within this logic, the kitchen is perceived by Endenese as the place of providence or good fortune. Embodying the main source of sustenance, ashes from the hearth are used during rituals accompanying the first launching of a boat and sprinkled on fishing gear. It is believed that if the fire of a kitchen dies while the fisher is at sea, death is certain. Therefore, it is carefully tended to every night by women.

Combining the importance of the family kitchen with the sacred role of food, to placate the wrath, to obtain permission, or to extend gratitude, food offerings accompanied by hearth ashes are made to the ancestors and other supernatural beings. Spirits may respond back by granting favors or facilitating blessings from God. Fish are caught with the intermediation of marine spirits who teach humans the proper ways of fishing, effectively establishing an association among humans and the supernatural through the transmutation of fish into food.

However, the spirits may also use food to bewitch the incautious, a tactic that is employed by witches and sorcerers to poison their victims. An Endenese advice given to newcomers and children is captured in the sentence “jangan makan sembarangan” (do not eat random foods). It is believed that common food stuffs such as coconuts, tea, coffee, or bananas when offered in the house of a witch or when found randomly on the side of the road can become the vehicle for a magical attack. Spirits also use “fake” supernatural banquets and feasts, and gifts of food to trap their victims into stupefaction. Those that partake of the items offered would experience all the signs of a stroke, including slurred speech and paralysis. To a large extent, if not all, gastrointestinal diseases along with some chronic illnesses and their symptoms are considered by the Endenese to be caused by witchcraft hexes (“ru’u”). For example, intestinal blockage, a hard stomach, high fever, diarrhea (“nemba”), headache, heartburn, epigastrium pain, gastritis, and difficulty in intestinal movements are common signs of being cursed. Other signs like bruises (“penda pate” or red mark), neck or muscular pain, motor impairments, and afflictions that may turn the skin red or itchy can also be explained by the actions of a witch. Finally, issues with oral health such as teeth pain or mouth sores can also reflect maleficent spells. According to interviews, evil witches use their power to feed on the intestines of their victim from the inside out in a process that lasts 3 nights and 3 days. For instance, accompanying the tiredness and exhaustion that overcomes the sufferer is the feeling of pain in the stomach during sleep. Explained as the feeling of the insides being torn, this mortal disease is known as “nande” and there is no modern medical cure for it. Another mortal disease is associated with pain in the epigastrium (“dhuso mata” or “usu mata”) and the transformation and resemblance of the internal tissue to palm fibers. It should be observed that witchcraft or spiritual diseases are considered to be “man-made” (“ata tau”). Jealousy and envy of what others possess are what inspires a witch’s attack. Disrespect of the ancestors and transgressions of taboos make spirits angry. Thus, while there are illnesses that are the result of neglect or not looking after oneself, those brought about by magical or supernatural elements are ultimately caused by humans. Looking into this complex disease etymology, in its final section, the article will discuss the need to integrate Endenese epistemology of health into current efforts seeking to address malnutrition and dietary insufficiencies.

## Discussion

As the previous results have shown, Endenese have a complex cosmology that connects avoidances, taboos, and dietary restrictions, to witchcraft and the world of the spirits, and to ill health and gastrointestinal diseases. This cosmology underlines the existence of human-animal-supernatural interactions and reflects Endenese beliefs about the origin of life. Even when some of the meanings behind institutions, rituals, and norms have morphed or disappeared over time, and while not all dietary prescriptions reflect origin stories but issues of preference, essential cosmological notions are still respected (Ramenzoni, 2017). This can be seen in the existence of generalized avoidances among the whole group, the presence of taboos among 38% of interviewed households, and the observance of special prohibitions set individually or determined by life stages such as those followed during pregnancy. In the case of taboos, dietary prescriptions are examples of an intricate pattern of social relations between tabooed species and particular families, lineages, or clans. Relations may be of a positive nature involving common kinship, fosterage, and reciprocity, and reflect transfiguration from animals to humans. Prohibitions help maintain cosmological order and secure prosperity for the family and the health of individuals. On the other hand, the breaching of norms associated with taboos may bring injury to the ancestors, creating an imbalance that spreads danger and disease. Because of what is at stake, they continue to be respected and upheld.

Most significantly, findings from surveys and interviews underscore the existence of broad-scale avoidances based on flavor, taste, and disgust. Generalized avoidances are applied to whales, dugongs, and certain kinds of coral fish, all animals that challenge cultural and “common-sense” expectations of what constitutes a normal process of cooking and eating marine foodstuffs. In addition to preference-based abstentions, results also indicate that families rarely use larger size species such as snapper, grouper, or large tunas in their preparations becoming de-facto avoidances. Discussed in interviews, households that depend on fishing for their living progressively consume lesser amounts of fish and increasingly rely in highly processed food stuffs. The reasons behind lack of consumption are to be found in market demand and the ability to replace economically valuable species by cheaper alternatives. Yet, with the exclusion of whales, the absence of consumption of certain items does not indicate that they are not being harvested for other ends.

The significance of avoidances and personal prescriptions suggest the need to assess how cultural and personal values interact with decisions about nutrition and resource exploitation within local households. Issues of taste, gentrification of marine products, and local perceptions about what is normal or what is healthy in shaping diets are key determinants of diets among this population, a fact that is probably similar among other coastal societies. But, excluding studies about marine megafauna (Barnes 1997; Mazzoldi et al., 2019), few scholars have explicitly covered these more nuanced dimensions pertaining to the value of seafood among coastal populations, actual fish products consumption, and the role played by economic markets (Cai and Leung, 2022). A growing body of work regarding processes of expansion in rural fisheries,

however, can be found among developing countries (Salehe et al., 2017; Orire and Elijah, 2019). Trends in consumption indicate that preferences for fish products are significantly affected by socio-demographic factors including age, marital status, education levels, occupation, and place of residence (Wenaty, 2018). As fish is increasingly promoted as an essential source of micronutrients and proteins, the processes of commodification and market integration of artisanal producers has led to increasing prices and changes in dietary patterns (Loring et al., 2019; Arthur et al., 2022).

Finally, a third key finding from surveys is the importance of personal taboos which are based on medical concerns and individual preferences. This group of prescriptions includes an important source of animal protein such as eggs, and provides critical information about morbidities among Endenese families. Reported during interviews, personal taboos are seen as alternatives to biomedical treatments by poor households which cannot afford the long-term cost of medications.

In all, within Endenese cosmology, food constitutes an essential medium through which positive and negative dynamics play out. These dynamics, being of an economic, cultural, or moral nature, emphasize the importance of studying systems of representation surrounding dietary practices and food preparation in their own terms. Because food can also be a vessel of manipulation, where either human or supernatural spirits can utilize foodstuff to trap souls and bring about death. Illness and disease are closely related to diets and consumption behaviors. As seen in results, a large proportion of the pathologies that this community experiences are associated with gastrointestinal complaints. Despite widespread efforts by the UN in 2005 and 2006, given the precarity of many households in terms of resources, technology to store food, and access to clean water, diarrhea and poor nutrition continue to lead mortality among children (Anonymous, 2016). Endenese beliefs and practices surrounding food and disease mirror what has been discovered in other regions of Eastern Indonesia (Hasan and Suwarni, 2012; Fowler, 2016; Pauwelussen, 2021). Because most complaints are the result of witchcraft and black magic for which biomedical treatments are ineffective, local shamans and midwives are usually consulted first. When traditional medicine fails, patients reach health facilities in an acute state, reinforcing the belief that doctors often make the situation worse (Triratnawati et al., 2016). The perception that modern medicine is only good for certain things, such as dealing with headaches, colds, or backpain, continues to be prevalent.

Considering the efforts undertaken by Indonesia to improve food security and nutrition, information about food preferences and the etiology of gastrointestinal diseases is essential to government programs that seek to enact behavioral changes in resource consumption (Hasan and Suwarni, 2012; Triratnawati et al., 2016). With the goal of increasing success, intervention projects in Ende should consider the engagement of a wider set of local actors such as local middlemen, market vendors, shamans, and midwives not only to increase involvement and compliance, but also to address what are concrete needs of the population. Thus, in a port-town like Ende, the exploration of the motivations behind the consumption of seafood, the elicitation of nutritional trade-offs created by market opportunities, and the understanding the actual mechanisms that mediate a household's resource use are also key components to



support behavioral change. Among current needs, no less important is the understanding of the close relation between disease and food as well as the characteristics and steps associated with traditional treatments and local medicines. Moving beyond binary notions of “good” and “bad” when considering the biomedical implications of taboos and other avoidances within a certain food-system is a much-needed stage in this process.

The key seems to rely in the creation of culturally sensitive programs that can improve households’ nutritional well-being and health not just by eliminating what are seen as outdated or irrational institutions, but by formulating a true participatory and genuine co-management partnership to construct new consensus. For example, several community-based participatory research applications in the food-systems policy world have provided important insights in the development and promotion of healthy community practices (Zerafati-Shoae et al., 2020). Inclusion of communities not only provides a powerful strategy toward securing consistency and permanency in the adoption of policies, but also works as a mechanism in eliciting and diminishing what are perceived as “dietary-related” health disparities associated with environmental and cultural factors. These disparities can avoid detection when complex socio-cultural frames of interpretation are required to understand the dynamics of exclusion and marginalization through which inequalities operate. Short-term intervention programs or initiatives that rely on rapid appraisal mechanisms to unpack societal and cultural determinants may not be adept at recording or identifying such interactions (Walker et al., 2010). With both practitioners and communities engaging in an equal capacity in the identification, selection, and planning of a research agenda, local needs and opportunities can become center in the formulation of an intervention framework (Breckwich Vásquez et al., 2007). The inclusion of a diversity of actors—not just community leaders but also minority groups and underserved sectors of the population—results in a richer characterization of what it means to be healthy, along with the singling out of the possibilities and the constraints that limit policies. As studies have shown, most community participatory approaches have only been able to involve actors in a limited capacity, mostly concentrating in the empowerment of the population and not in securing its full and maintained participation in the decision-making processes that are the basis of successful policy change (Zerafati-Shoae et al., 2020). Collaborative consensus building through dialogue, the support of organization as well as engagement efforts with appropriate budgets, the inclusion of incentives, trust-building, and the recognition that cultural and societal representations in their own term must be a part of any behavioral training program are but a few of the elements that can result in meaningful change.

## Conclusion

Without a fine-grain understanding of local epistemologies of health and the role played by structural inequalities, nutritional policies and intervention mechanisms will fail (Anderson et al., 2003; Alvesson et al., 2013; Diaz-Cruz, 2019). Efforts that do not consider avoidances, taboos, and the diverse set of dietary prohibitions, beliefs, and possibilities that determine dietary choices in order to guide health programs targeting nutritional insufficiencies will struggle to achieve long-term relevance. This is

so as choosing between incorporating a foreign practice or item into the diet, Endene households may refer to economical or available solutions that have been proven effective in the past with partial rates of adoption of new treatments (Triratnawati et al., 2016). Furthermore, stigmatization and characterization by biomedical models of intervention of what are seen as the only alternatives under the rubric of “bad” practices will further alienate participants. Social scientists can help public health practitioners by working alongside community leaders in identifying local value systems, in eliciting the complex nature of socioeconomic structural factors behind health disparities and households’ decisions, and by building new collaborations across all parties that are inclusive and respectful.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving human participants were reviewed and approved by Institutional Review Board from the University of Georgia at the Office of Research Ethics, the University of Georgia. The patients/participants provided their written informed consent to participate in this study.

## Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

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## Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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