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The indigenous bioculture of the Pungalá parish of Ecuador an approach to their culinary and medicinal heritage

Ronald Mauricio Zurita-Gallegos[1*], María Belén Bastidas-Arauz[1], Angélica María Saeteros-Hernandez[1], Renato Hernán Herrera Chávez[2] and María Yadira Cardenas-Moyano[1]

Abstract

The food and culinary heritage with medicinal uses are a fascinating field that combines history, culture, and health through food. Over the centuries, various cultures have developed knowledge and practices related to the use of specific ingredients and culinary preparations with medicinal properties. In the Pungalá parish in Ecuador, these generational knowledge and traditions form a valuable biocultural heritage that helps us understand the close relationship between food and traditional medicine. Through qualitative and documentary research, interviews and community workshops are conducted to gather information using different techniques. Among the findings regarding the food and culinary heritage of Pungalá are extinct culinary traditions, as well as important culinary techniques and processes that play a role in nutrition and medicine, valuing traditional and ancestral knowledge as part of their culture. The inventory includes 22 plants used in Andean medicine and 38 preparations, including beverages, porridges, stews, soups, and wrapped dishes that become an integral part of everyday routines, dietary habits, and festive traditions. It is concluded that this knowledge constitutes a valuable food and culinary heritage, and its biocultural is based on ancestral knowledge of the healing properties of local plants and foods, contributing to the health and identity of the community. Measures should be taken to preserve and promote this heritage in the face of current challenges.

Keywords Heritage, Food, Medicinal, Bioculture, Culinary, Ecuador

Introduction

Culture is the special and exclusive product of humankind, and it is the quality that distinguishes humans in the cosmos. Culture is both the totality of social human products and an enormous force that affects all human beings, socially and individually [1], while heritage is part of the cultural inheritance of a people or state and constitutes the values that are passed down to future generations. It is worth mentioning that there are determining values of cultural heritage such as authenticity and integrity. In some cases, heritage is a non-renewable resource as it cannot return to its original temporal state, so it must be preserved and properly managed by the public, private, and community sectors [2]. Each culture represents a unique and irreplaceable set of values, as the traditions and forms of expression of each people constitute their most accomplished way of being present in the world [3].

We consider cultural heritage to be the collection of material and immaterial objects, both past and present, that define a people: language, literature, music, traditions, craftsmanship, fine arts, dance, gastronomy, clothing, religious manifestations, and, of course, history and

*Correspondence:
Ronald Mauricio Zurita-Gallegos
ronald.zurita@espoch.edu.ec
[1] Carrera de Gastronomía, Escuela Superior Politécnica de Chimborazo (ESPOCH), Riobamba, Ecuador
[2] Carrera de Turismo, Universidad de Chimborazo, Riobamba, Ecuador

its material remains, that is, the historical heritage [2]. The importance of intangible cultural heritage lies not only in the cultural manifestation itself but also in the body of knowledge and techniques that are passed down from generation to generation. The social and economic value of this transmission of knowledge are relevant for both minority and majority social groups within a state, and it is equally important for developing countries as well as developed ones [4]. The domains of intangible cultural heritage are as follows: Domain 1—Oral traditions and expressions, including language as a vehicle for intangible cultural heritage; Domain 2—Performing arts; Domain 3—Social practices, rituals, and festive events; Domain 4—Knowledge and practices concerning nature and the universe; Domain 5—Traditional craftsmanship techniques [5].

In recent decades, intangible cultural heritage, including food heritage, has received specific attention in the tourism sector [6]. Food traverses' categories that belong to the realms of tangibility and intangibility; it can be defined as a dish or a recipe, an agricultural product or a ritual object, a basic need for survival or an item of social distinction, a glimpse into the future or an object of nostalgia [7].

Within Ecuadorian culture, the term "Sumaq Causay" embodies an Andean concept that emphasizes the holistic well-being of the community, deeply rooted in the indigenous language of Kichwa [8].

The adoption of Sumaq Kawsay in Ecuador represents a pivotal shift from the conventional neoliberal development model, signaling a move toward postneoliberalism and alternative modernization strategies [9]. This change reflects a critical reevaluation of neoliberal principles, emphasizing a right-based approach to development that prioritizes individual well-being, environmental sustainability, and equitable resource distribution. Particularly beneficial for marginalized indigenous populations which are major stakeholders and custodians of knowledge.

Considering the context, an earlier analysis introduced the concept of heritage food through three critical dimensions: legacy, people, and place. Moreover, it emphasized the pivotal role of cultural food heritage in advancing environmental and social sustainability.

The Andean Ayllu concept, fundamental to the indigenous cosmovision, offers a profound understanding of the interconnectedness among three distinct communities, shaping a holistic and sustainable way of life known as Sumaq Causay (well-being). At its core are the three communities, each playing a crucial role in maintaining equilibrium and fostering collective well-being. The first community, represented by RUNA, encapsulates the human and domesticated realm, encompassing human settlements, cultivated plants, and domesticated animals. The second community, embodied by SALLKA, symbolizes the wild, embracing the natural environment, uncultivated flora and fauna, and untamed landscapes. Finally, the third community, AUKI, personifies the sacred, intertwining spiritual and ceremonial elements with the natural and human domains.

These indigenous philosophies showcase the profound wisdom inherent in the biocultural heritage framework, highlighting the intimate relationship between human communities and the natural environment. The figure illustrates how these cultural paradigms offer comprehensive perspectives on holistic living, emphasizing the importance of ecological harmony, spiritual interconnectedness, and sustainable practices. Integrating these philosophies into the biocultural heritage framework contribute to the preservation and revitalization of traditional food systems, fostering a deep understanding of the intricate connections between culture, biodiversity, and sustainable living practices [10, 11] (Fig. 1).

The term "biocultural" emphasizes the inseparable links between cultural and biological diversity, aiming to enhance opportunities for livelihoods and promote community-conserved areas and ethical codes [13]. Biocultural is an assessment of how sociocultural factors impact some aspect of human biology, often related to health [14]. The concept of Indigenous Biocultural Heritage encompasses a wide range of other concepts from diverse study disciplines and political forums. Bioculture encompasses the interconnectedness of biological diversity and cultural diversity. It reflects the intimate

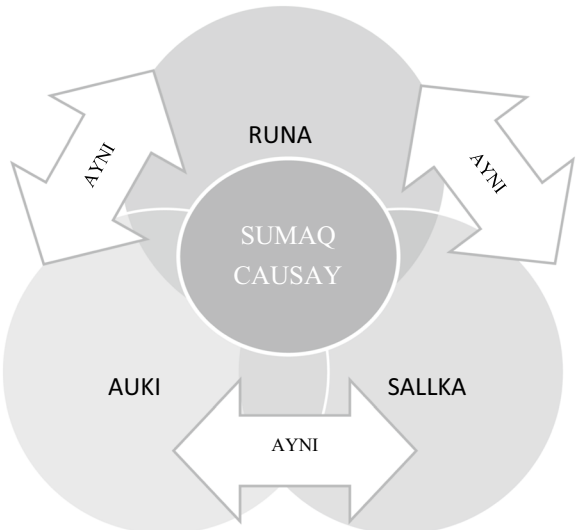

Fig. 1 The Andean Ayllu concept of Holistic Well-Being. Runa Ayllu includes human beings, domesticated plants, animals, water; Sallka Ayllu comprises wild plants and animals; Auki Ayllu represents the sacred and the ancestors; Ayni signifies reciprocity [12]

relationship between a community and its natural environment, including the practices, rituals, and knowledge associated with the use of biological resources [15]. Its comprehensive scope encompasses insights and practices related to food, medicine, agriculture, handicrafts, and other essential skills crucial for the sustenance of local populations [16]. The intricate relationship between traditional knowledge and biocultural diversity underscores their mutual significance in promoting the sustainable development of communities residing in mountain ecosystems [17].

In the context of this study, traditional knowledge holds paramount importance as a repository of accumulated wisdom developed over generations through close interaction with the natural environment [16]. This localized and cumulative knowledge system is shaped by the specific environmental conditions, with its transmission facilitated through various cultural practices.

They believe that all diseases can be cured with healthy food prepared with natural products with medicinal properties. Unfortunately, most of these diseases are not well-documented [18]. Adults, particularly the elderly, hold a wealth of popular knowledge regarding the applications of medicinal plants and culinary resources, which are deeply ingrained within the local communities. In this region, women play a pivotal role as key stakeholders and guardians of this knowledge. They actively engage in the conservation of food and medicinal plants. Their dedicated efforts contribute significantly to the preservation and propagation of traditional practices and resources vital for the well-being of the community. Indigenous communities heavily depend on plants for their food, shelter, and medicine. However, the extent to which their survival is threatened by the loss of plant species or knowledge about their services is still unknown. Here, we present the networks of indigenous knowledge that describes the wisdom of indigenous peoples regarding plant species and the services they provide [19]. It is important to highlight that documenting indigenous knowledge with patterns of use of diverse traditional indigenous foods and nutrient analysis is essential for widely and interculturally sharing traditional and scientific knowledge to accelerate the change that will strengthen the food systems of indigenous peoples [20].

Indigenous biocultural knowledge frequently offers profound insights into sustainable resource management. Drawing on their intimate familiarity with local ecosystems and traditional methods, indigenous communities have honed sustainable techniques for utilizing and preserving natural resources. Moreover, their traditional healing practices and expertise often provide valuable insights into the preparation and preservation of food, as well as the treatment and prevention of various diseases.

Biocultural heritage represents critical components of indigenous and traditional communities worldwide. Embedded within these systems are centuries-old practices, beliefs, and values that dictate the interactions between people, nature, and food [21]. These systems extend beyond mere sustenance, reflecting a profound connection to land, culture, and spirituality [22]. In many indigenous cultures, food is not solely a source of nourishment; it is a vessel for preserving history, transmitting cultural values, and maintaining ecological equilibrium. The intricate knowledge of seed selection, cultivation techniques, and traditional food preparation methods is intricately woven into the fabric of their society, representing a living testimony to their rich heritage.

Biocultural heritage, in this context, encompasses not only the tangible elements such as diverse crop varieties, livestock breeds, and food-producing landscapes but also the intangible components, including traditional knowledge systems, spiritual beliefs, and customary laws governing their relationship with the environment [23]. It is a holistic framework that underscores the inseparable link between cultural and biological diversity, emphasizing the importance of recognizing and preserving indigenous people's rights over their biodiversity and ancestral territories. Consequently, the study and revitalization of these food systems serve as an avenue for not only protecting indigenous knowledge but also promoting sustainable and equitable partnerships that celebrate the richness of their heritage [24].

Overall, safeguarding biocultural knowledge remains critical for ensuring the continuity of culture, effective management of resources, the perpetuation of traditional medicine, the promotion of food security, and the empowerment of indigenous communities. By recognizing and valuing the knowledge held within bio cultures, we can contribute to the preservation and promotion of diverse cultural practices, ensuring their longevity and benefiting both present and future generations, and Safeguarding this knowledge and ensuring the viability of intangible cultural heritage, including its identification, documentation, research, preservation, protection, promotion, valorization, and transmission, primarily through formal and non-formal education, as well as revitalization of this heritage in its various aspects [25]. Individuals, communities, peoples, and nationalities have the right to the protection of their ancestral knowledge, the recognition of their worldviews as forms of perceiving the world and ideas, as well as the safeguarding of their tangible and intangible heritage and the diversity of social organization and ways of life linked to their territories [26]. Safeguarding intangible heritage is understood as a methodological process that seeks to develop actions aimed at energizing, revitalizing, transmitting,

communicating, disseminating, promoting, fostering, and protecting intangible heritage [27], to ensure the continuity of cultural practices, traditions, and values that have been passed down through generations.

Ecuador is known for its exceptional biodiversity and multicultural society, is deeply intertwined with a diverse tapestry of cultural heritage [28]. Communities across the nation have long relied on traditional agricultural practices and indigenous knowledge, forming a close bond with forests, and utilizing ethnic foods and medicinal resources. This interaction has helped preserve a rich repository of traditional wisdom deeply embedded in the culture, serving not only to protect biodiversity and ecological equilibrium but also to nurture the vibrant cultural diversity inherent in the region. Pungala Parish and its indigenous people preserve a rich culinary heritage, stands out for its diverse culinary techniques and indigenous food practices that reflect a deep connection with the local environment. The study aims to explore the distinctiveness of Pungala Parish's culinary heritage and its significance in understanding indigenous food cultures and sustainable practices. The community of Pungala and its indigenous people have maintained a culturally diverse culinary heritage and have demonstrated a deep connection to the local environment through their indigenous food practices and techniques. This study focuses on exploring the distinctive culinary heritage of the Pungala community and how it is used to understand sustainable practices and Indigenous food cultures.

Materials and methods

Ecuador is located on the northwestern coast of South America on the torrid zone of the American continent [29]. From the north to the south the mountainous system of the Andes crosses thru Ecuador, this gives origin to the natural regions [30]. Pungala is in the Sierra region southeast of Riobamba's city, Chimborazo Province, surrounded by Andean peaks and pristine highlands with mountains and snowy peaks reaching 6268 m from where you can see large valleys [31]. Undoubtedly the Sierra region of Ecuador stands as a testament to nature's grandeur, boasting an awe-inspiring landscape that captures the essence of their indigenous, presenting a breathtaking panorama characterized by a rich tapestry of biodiversity and culture. The Sierra embodies an unparalleled fusion of natural beauty and ecological diversity, serving as a vital cornerstone of Ecuador's biocultural heritage.

The study area, Pungala Parish, Ecuador, is located within an irregular polygon spanning approximately 276.5 km^2, which constitutes 28.2% of the total provincial space. The region is home to a significant indigenous population of the Puruha culture, comprising approximately 6.110 inhabitants. The primary language spoken in the area is kichua, reflecting the cultural richness and diversity ingrained within the local community (Fig. 2).

For this research, a qualitative case study approach was applied. Yin [32] recommends a case study approach when the research objective is to understand real-life phenomena and the contextual conditions that make this phenomenon unique, significant or important. The case of this study is culinary and medicinal heritage in indigenous bioculture.

The research adopted a comprehensive non-experimental, ethnographic, exploratory, cross-sectional, and documentary methods [33–35]. This approach allowed for an in-depth exploration of the culinary traditions of Riobamba within its cultural context. The study was conducted under the framework of an institutional cooperation agreement established among the Polytechnic School of Chimborazo, the Autonomous Decentralized Government of Riobamba, and the Pungalá parish, thereby ensuring a collaborative and community-driven research process.

Data for this study were obtained by conducting semi-structured interviewed using a validated guide, specifically focusing on the aspects of Intangible Cultural Heritage, particularly those related to gastronomic and medicinal use, the researchers received training, and interview guides were developed based on the Safeguarding Plan for Intangible Cultural Heritage [25] and Technical Sheets from the National Institute of Cultural Heritage and Culture Zone 3 of Ecuador (INPC Zone 3) [27]. These validated scripts were used to gather comprehensive information about the local biocultural heritage, encompassing food, medicinal plants, and culinary practices. The president of the GAD selected a focus group of 60 adults possessing ancestral knowledge, and community workshops were conducted with their participation.

The participants contributed by providing insights and demonstrating the use of plants, food, and utensils in their daily lives. A photographic was obtained through the observational technique. Additionally, in collaboration with a representative from the GAD, efforts were made to reach individuals who were unable to travel, ensuring that holders of traditional knowledge in everyday and festive preparations, soups, broths, beverages, and medicinal plants were included.

Authorization for data usage was obtained from the knowledge bearers, and the interviews were recorded using digital cameras, creating a repository for subsequent data systematization. Interviews with the ancestral knowledge holders were scheduled in coordination with the president of the parochial GAD, taking place from Monday to Friday in the mornings, with prior notice and access to the communities.

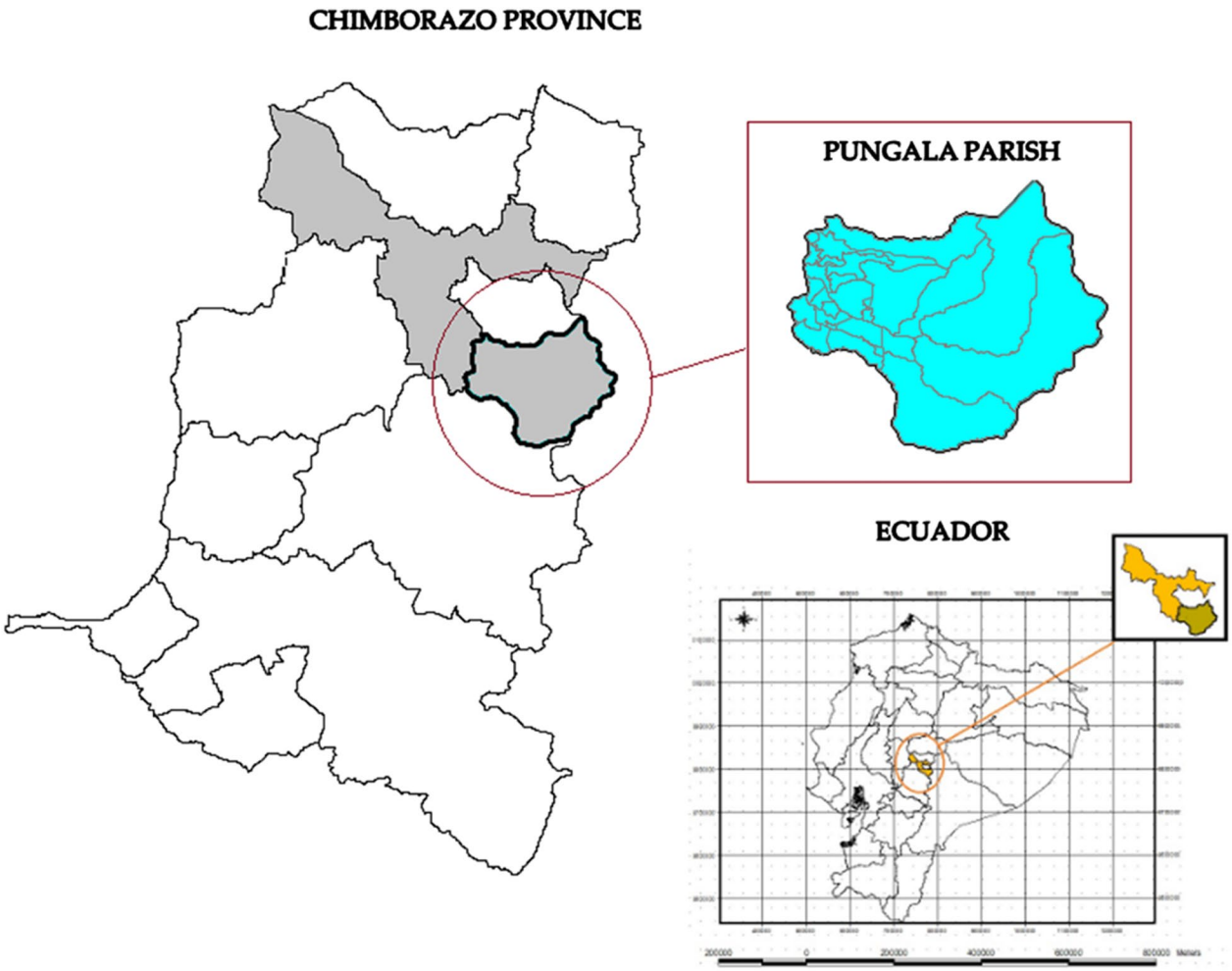

Fig. 2 Study map

Results

The research on indigenous bioculture in the Ecuadorian parish of Pungalá revealed a rich tapestry of traditional knowledge, practices and values deeply rooted in the culinary and medicinal heritage of the community. Through extensive fieldwork, interviews, and participatory experiences, we gained valuable insights into the interconnectedness between indigenous peoples and their natural environment, highlighting the importance of biocultural diversity. The main findings of our study focus on the culinary practices and medicinal knowledge of the community. By delving into their traditional food practices and healing traditions, we shed light on the unique ways in which the indigenous communities of Pungalá Parish interact with, utilize, and preserve their biocultural resources.

Pungala's culinary heritage

The examination of the culinary heritage revealed a diverse array of traditional food practices deeply rooted in the indigenous communities of the Pungalá parish; its biocultural knowledge includes traditional agricultural practices, crop diversity, and traditional food preparation methods. These practices are often adapted to local environmental conditions and contribute to food security and nutrition [20].

Interviews, especially with adults, showed that a wide variety of products that have disappeared or have been lost because people acquire new seeds, leaving aside the old ones.

If food heritage is not revitalized through culinary and gastronomic preparations, it can become extinct due to the social impact of population consumption.

This has led to certain tubers losing their value over time and eventually becoming extinct, such as Uvilla potato—It was a round and very thick potato, so similar in size and shape to an orange, Puña potato—Unlike the previous one, this one had an elongated shape and a purple color, Gercur potato—this potato had a reddish hue and was grown on the "Hacienda Borja." Catalina potato—It was a yellow-colored potato, best known for being creamy and elongated, which was excellent for making the famous llapingachos (mashed potato served with peanut sauce), and Turkish potato—This type of potato is white in color and has an elongated shape, also people talk about of some varieties of melloco (tubercule); the lead-colored, white, yellow, and red one.

This has led to new types of potatoes, for example, the Gabriela potato, the red Frig, Chola, and Super Chola, introduced by INIAP as they have better yield in their production and are more commercialized.

In the parish, people's diet varies depending on the location. In the lower area with a warm climate, rice and blackberries can be grown, unlike in the higher area where melloco and ocas are produced.

The diet in the lower area of the parish is quite varied and nutritious. Different types of food are prepared, such as barley rice with potatoes and cabbage, noodle soup, rice soup, Machica porridge, herbal infusions, plantain porridge with milk, and Swiss chard soup with meat.

Daily consumption products in Pungalá: Hominy, Roasted corn, Machica (toasted barley flour), Corn on the cob, Ocas (Andean tubers), Fruits, Lima beans, Melloco (Andean tubers), Ledo (herb for seasoning), Red onions, Cilantro, White onions, Annatto, Chili peppers, Parsley, Garlic, Corn, Canary beans, Bean cake, Regular lentils and pusa lentils (lentils variety), Green peas, Barley.

Daily culinary traditions thrive, inspired by the abundant Andean ingredients that surround them. These cherished practices intertwine nature, culture and sustenance, creating flavors that accompany their daily lives. Guided by ancestral wisdom, the community prepares a series of traditional dishes with Andean cereals and other products, showing the harmonious relationship between their environment and their sustenance.

The ingredients used for these preparations can be traced back to the tradition of cultivation of the Andean region of South America, characterized by its intricate landscapes and diverse agroecological zones, a practice shaped by the region's challenging terrains and climatic variations across altitudes ranging from 1500 to 4200 m [36]. The indigenous communities relying on terraced farming on steep mountainsides, a tradition dating back to the time of the Incas. The Incas, renowned for their agricultural prowess, cultivated a rich tapestry of plant species, estimated at around 70 distinct crops, encompassing an array of roots, grains, legumes, vegetables, fruits, and nuts. Notably, the indigenous food products of the Andean region, particularly quinoa (Chenopodium quinoa) and kiwicha (Amaranthus caudatus), have garnered attention for their impressive nutritional profiles, boasting high-quality proteins, essential dietary fiber, and beneficial polyunsaturated fatty acids [36]. These attributes, coupled with the potential health benefits attributed to the bioactive compounds found in these crops, underscore their significance as functional foods for combating chronic ailments (Table 1).

In the festive culinary preparations of the indigenous community in Pungalá Parish, a diverse array of traditional utensils is utilized to create a variety of dishes, each deeply connected to their cultural heritage (Additional files 1, 2, 3). One particularly notable culinary tradition

Table 1 Culinary preparations

Category	Subcategory	Preparation name
Drinks	Sweet colada (thick drink)	*Daily*: Wheat pudding with milk, Cornstarch strain, Morocho beverage, Oatmeal pudding with milk, Barley rice colada, Quinoa colada with milk, Cauca colada *Festive*: Purple colada, Jucho (sweet colada)
	Fermented drinks	*Festive*: Chicha de morocho, Barley rice chicha, Rice chicha
Soups	Soups	*Daily*: Barley rice soup, Quinoa soup, Bean strain soup, Broad bean soup, Cauca soup, Pea soup with pork, Machica soup with guinea pig or pork *Festive*: Chicken soup
	Locros (type of soup)	*Daily*: Yahuarlocro, Melloco's locro, Zambo's locro, Alfalfa's locro, Swiss Chard's locro, Watercress locro, Broad bean locro, Cabbage's locro, Oca´s locro (tuber) *Festive*: Yahuarlocro, Locro of guinea pig with paico
	Coladas (thick soup)	*Festive*: Leg broth
Main dishes		*Festive*: Pork fry, Llama fry (Mammal domesticated by native Andean peoples)
Hors d'oeuvres		*Festive*: Humitas (flavored corn paste wrapped in corn leaves), Chigüiles (Dough made from corn flour, wrapped in corn husks, it is steamed), Corn tortilla, Corn fritters

is the "La pampa mesa" which translates to "food of all." This tradition represents a vital aspect of community, often taking place outdoors where ponchos (Andean typical clothing), tablecloths, or fabrics are laid out. In this communal gathering, each member of the community contributes cooked foods such as melloco, habas, choclo, papas, and chicha de jora, along with various culinary preparations. This offering is more than just a meal; it is a way to connect with the "pacha mama" or mother earth. Such acts are common during mass gatherings, festivities, and community work events known as "mingas." During these occasions, individuals partake in the "La pampamesa" tradition by enjoying the spread of food using their hands while seated or squatting, following an ancient practice. This cherished tradition symbolizes not only sustenance but also unity and a profound connection to their ancestral roots (Additional file 4).

In the same way daily culinary tapestry of Pungalá Parish, where the flavors of Andean heritage and nourishment intertwine harmoniously. Among the array of daily offerings, the sweet coladas stand out as a cherished tradition, particularly savored during breakfast and dinner. These hearty and indulgent beverages, each carefully crafted using an assortment of ingredients, encapsulate the essence of this indigenous community's relationship with their land and culinary customs (Fig. 3).

For these preparations, various utensils play a crucial role in crafting the community's culinary delights. Beverages like "Chicha de morocho" require festive utensils such as pots, grinding stones, wooden spoons, and mud ponds. Similarly, dishes like "Barley rice chicha" and "Rice chicha" involve the use of pots, wooden spoons, and clay ponds. Everyday favorites like "Chicken soup," "Barley rice soup," and "Quinoa soup" come to life through the skilled use of pots and wooden spoons. Moreover, festive and seasonal rituals, including "Purple colada" and "Chiguiles," depend on specific utensils like earthenware pots, pailas, and tamaleras (type of steam stove) (Table 2).

Pungalá's medicinal heritage

The investigation into Pungalá's medicinal heritage revealed a wealth of traditional knowledge and practices related to healing and healthcare within the community.

Fig. 3 Culinary preparations. **A** Barley rice in clay pot; **B** Barley rice (Máchica), tortillas, and Andean tubers

Through extensive engagement with indigenous healers, elders, and community members was documented medicinal plants and their traditional uses. The findings shed light on the diverse range of medicinal practices that have been passed down through generations and continue to be deeply embedded in Pungalá. These practices encompass a holistic approach to healthcare, addressing not only physical symptoms but also emotional, spiritual, and social well-being.

Traditional healers, often revered within the community, employ a range of techniques such as herbal remedies, spiritual ceremonies, energy healing, and massage (Table 3; Fig. 4).

Discussion

The intangible cultural heritage, which focuses specifically on the third area of social practices, rituals and festive events, includes culinary traditions that assert the identity of the communities or societies that practice them, whether they are performed in public or in private [4]. It has established a significant relationship between these events, as outlined in its citation: it is closely linked to the world view of the "Sumaq Causay" of the indigenous peoples of the Andes, in which the concept of the Andean Ayllu of holistic well-being is central. The Runa Ayllu includes human beings, domesticated flora and fauna, and water. The Sallka Ayllu consists of its wild flora and fauna. The Auki Ayllu is dedicated to the sacred and the ancestral. Finally, Ayni means reciprocity and is an integral part of the Andean cosmovision [12].

Further exploration of the concept of bioculture among indigenous peoples provides a holistic framework that stresses the inextricable link between cultural and biological diversity. It highlights the importance of recognizing and protecting the rights of indigenous peoples to their biological diversity and ancestral territories [32]. Ecuador's Central Sierra region, home to diverse indigenous communities, epitomizes the integration of ancestral food heritage and medicinal practices. The local food heritage, consisting of native foods, represents the biological and cultural diversity of the region [38]. These unique foods in flavors and textures reflect the history and culinary traditions of indigenous communities in the Central Sierra of Ecuador [39].

The holistic knowledge of the biocultural heritage of the indigenous people of the Pungalá Parish includes food, culinary practices, drinks, soups, main dishes and hors d'oeuvres, all of which are classified as both everyday and festive cuisine.

Furthermore, according to López and Flores [40], native foods have high nutritional value and are balanced in terms of vitamin, mineral, and other essential nutrient content.

Table 2 Utensils

Nombre	Descripción	Uso	Fotografía
Wood fired oven	Adobe and mud construction with a brick base and a door for adding firewood. Once converted to charcoal, it is collected to one side to retain heat	Bake the bread, roast the pig	
Bread tin	It is made of tin folded at the sides to prevent the elements placed on it from falling	Used for bread, pigs, guinea pigs, turkeys or rabbits	
Fired clay vessel	Earthenware is made from clay, a natural material found throughout our planet	It is used to cook corn or wheat tortillas, heat grains that will become flours such as corn, beans and peas	
Tray	Wooden object made from a trunk dug to give it shape	For the preparation of bread dough, tortillas, cereals after heating in the pot	
Wooden spoon	Utensil made by wood which in one of its points have a concave space and the rest straight in order to take it	To mix feeding, serve the food and measure the ingredients	

Table 2 (continued)

Nombre	Descripción	Uso	Fotografía
Guagua rumi	Rounded stone object	It is used to complement the whetstone, dressing and other elements	
Large copper frying pan	A bronze cauldron is a large vessel for the cooking or boiling of liquids and requires a series of processes that require expertise in metallurgy and casting	It is used to prepare food, from savouries like fritadas and chigüiles to sweets like coladas and jams	
Mud Pondo (Pid)	It is made of clay and baked with straw and takes the form of a pot, usually with handles on the sides	Used in culinary practices for cooking, making soups, baking and fermenting	
Tamalera pot	It is constructed of aluminum and typically has two internal compartments with their respective dividers, which are perforated to allow the passage of steam	Used to prepare wraps such as humas(flavored corn paste wrapped in corn leaves), tamales(ground maize and sometimes meat or a sweet filling wrapped in a banana or maize leaf), chigüiles (dough made from corn flour, wrapped in corn husks, it is steamed) and quimbolitos	
Grinding stone	An object carved in stone with a concave shape, complemented by the guagua rumi	It is used to grind and crush cereals	

Table 2 (continued)

Nombre	Descripción	Uso	Fotografía
Earthenware pot	It is made of iron and finished with a layer of earthenware and has handles on both sides	Storing water and preparing different kinds of food	
Sieve	It is a wooden hoop with a horsehair weave and stitching around the edges	Particularly useful when making a dessert, this tool is used to sift flour and remove the remains of apples and quinces	
Sifter	This object is made of pewter. It has two handles and a perforated base	Used for separating small residues when cleaning dry crops and washing husked maize	
Mill	This machine is made of cast iron and consists of a base, hopper, handle and screw	Capable of grinding all types of cereals and grains	

Table 3 Medicinal plants for culinary use in indigenous biocultural

Botanical name	Local name	Parts of the plant used	Biocultural use
Myrcianthes Fragrans	Myrtle Arrayan	Stem and leaves	The leaves possess potent anti-inflammatory properties, and farmers often rely on them to treat toothaches. Furthermore, the bark, prepared as a decoction, has proven efficacy in managing high cholesterol and diabetes [37]
Chamaemelum nobile	Chamomile	Stems, leaves and flowers	This plant is known for its calming, antispasmodic, and digestive properties. It is typically consumed as an infusion with water or milk to alleviate digestive discomfort and menstrual cramps and can also be enjoyed as a soothing beverage [37]
Borago officinalis	Borage	Leaves and stems	A plant with Old World tradition, borage is used to combat coughs. The infusion is effective in cases of the flu, fever, and cough, as it has diaphoretic and antitussive actions
Origanum vulgare	Oregano	Leaves and stems	An infusion is made for stomach upset
Tilia vulgaris	Linden flower	Flowers	Sometimes linden flowers are mistaken for elderflowers, but they are actually used to treat colds, coughs, and bronchitis. Elderflowers, on the other hand, are traditionally used to address nervous problems [37]
Acacia melanoxylon R. Br	Eucalyptus	Leaves	There are over 160 species of this tree from Australia. It is a potent and common medicinal plant, with antiseptic, hypoglycemic, and anti-inflammatory properties. It can be considered a natural antibiotic that facilitates the cleansing and expulsion of many toxins and microbes. It is used by laboratories to produce ointments useful for bruises and for people suffering from varicose veins, external traumas, and respiratory problems [37]
Aristeguietia glutinosa	matico	Stem and leaves	It is used for poisoning 4 leaves in a liter of water
Origanum majorana	Marjoram	Stem and leaves	An excellent calming and digestive plant. The leaves are advised to be taken as infusions frequently after meals, especially for dyspepsia [37]
Anethum graveolens	Dill	Stems and leaves	It is used for stress and stomach colic
Graveolens route	Rue	Stems and leaves	A plant from the Old World, considered an excellent circulatory and uterine tonic, calming and analgesic. The infusion can be taken to regulate menstrual disorders and circulatory conditions. It is also used for nervous crises and stomach pain [37]
Aloysia trphylla (L'Hér.) Britton	Kidron	Leaves	As fresh water or as a digestive
menthax piperita	Mint	Stems and leaves	For colds or stomach aches
Petroselinum crispum	Parsley	Stem and leaves	Plaster is made to place in the mouth when there is guactpacto
Melissa officinalis L	Melissa	Stems and leaves	It is given to women when they have colic with a little white onion
Plantago major L	Plantain	Stem and leaves	It is a plant with anti-inflammatory, antiseptic, healing, purifying, refreshing, and calming properties. It is one of the plants classified by the WHO as the most used popularly [37]
Aloe Vera (L)Burm. F	Aloe vera	Leaves	Aloe is extracted and used in pharmacies for its effects as a drastic purgative and cholagogue. In popular medicine, aloe crystals are consumed for bronchial problems and externally for inflammations and burns. Additionally, the liquefied crystal is used for the scalp as a tonic and excellent softener [37]
Cymbopogon citratus (DC.) Stapf	Lemon verbena	Leaves	It is a calming and analgesic plant. The infusion is recommended for nervous crises and stomach pain. It can be taken at night with apple water, lemon verbena, and chamomile to facilitate sleep [37]
Verbena litoralis Kunth	Verbena	Stems and leaves	It is effective for bronchial problems, digestive irritations, liver congestions, fever, headaches, migraines, and external inflammations. The flowers, leaves, and stems can be used simultaneously [37]
Taraxacum officinale FH Wigg	Taraxac	Stem and leaves	It is used to cleanse the liver and kidneys, the flower and leaves are used, this plant has been widely used as a diuretic and for liver cleansing. It has a bitter taste, and when taken continuously, it keeps the body clean [37]
Peperomia peltigera	Patancoyuyo	Leaves	As relaxing and for the bad heart
Clinopodium nubigenum (Kunth) Kuntze	Tiillo	Stems, leaves and flower	It is used for tummy pain and energy

Table 3 (continued)

Botanical name	Local name	Parts of the plant used	Biocultural use
Urtica urens	Black nettle	Stems and leaves	It is used to soothe cramps and as a poultice for sprains It can be directly applied to combat rheumatism and hives, as the relationship is more benign. It is advisable to apply black nettle as a whip on the limbs in people with neuralgia, rheumatism, or with chronic symptoms of cold hands and feet [37]

In the cultural and economic value, this heritage is evident in its potential for sustainable tourism and the preservation of indigenous identity [41]. While embracing new culinary influences can enrich traditional practices, a balance must be struck to ensure the preservation of cultural identity [42]. The evolution of ancestral cuisine does not necessarily imply a loss of cultural identity but reflects sociocultural dynamics and external influences that shape culinary practices [43].

Furthermore, the disappearance of ancestral crops represents a threat to agricultural biodiversity and the conservation of genetic diversity [44]. However, there are critical arguments that propose the adaptation and evolution of indigenous communities, the identification of local alternatives, the use of technology, and the complementarity with other health practices as possible approaches to preserve and revitalize ancestral medicine.

The use of the 22 registered medicinal plants is very important as they can relax the heart and help to purify the liver and kidneys. These herbs, leaves, and roots have been cultivated for various ailments such as colic, stomach discomfort, intestinal infections, digestive issues, relaxation, energy, stress relief, blood purification, anti-inflammation, and respiratory problems such as colds and dizziness. They have also been used for menstrual cramps and inflammatory or sprained muscles.

Fig. 4 Medicinal plants for culinary use in indigenous biocultural: **A** Myrtly *Myrcianthes Fragrans*; **B** lemon verbena *Cymbopogon citratus (DC.) Stapf*; **C** Linden flower *Tilia vulgaris*; **D** Matico *Aristeguietia glutinosa*

Regarding this, Patiño states that these ancestral knowledge systems reflect a deep understanding of the interconnection between health, nutrition, and the natural environment and have been validated by centuries of experience [45]. On the other hand, Chamba et al. [44] assert that ancestral medicine considers the person, addressing not only the physical symptoms of an illness but also the emotional, mental, and spiritual aspects.

It is also mentioned that ancestral medicine may have limitations in addressing serious or complex diseases that require specialized medical attention. In such cases, it is important to seek an integrative approach that combines ancestral medicine with modern medical advancements to ensure comprehensive and effective care [46].

Traditional medicine may not adequately address serious or complex conditions that require specialized medical care. In such cases, it is important to adopt an integrative approach that combines traditional medicine with the advances of modern medicine to ensure that comprehensive and effective care is provided [63].

Article 16 of the UNESCO Convention calls for the establishment of plans to promote awareness and appreciation of intangible cultural heritage, to encourage constructive communication among culturally diverse groups and to establish the significance of such heritage [25].

Preserving local food heritage and ancestral medicine requires joint efforts. Hence, this research emphasizes the fundamental importance of recognizing and valuing the knowledge passed down from generation to generation in these indigenous communities. Supportive policies, education, and promotion of sustainable agricultural practices are necessary to ensure the continuity of these traditions.

The local food heritage is an essential component of the cultural identity of indigenous communities in the Central Sierra of Ecuador. Preserving and valuing this heritage contributes to maintaining cultural identity and a connection with the past. The local food heritage also provides indigenous communities with the ability to be self-sufficient in terms of food production and access. This promotes autonomy and well-being within the communities. By promoting local food heritage, the conservation of agricultural biodiversity is encouraged, contributing to the resilience of communities in

the face of potential future challenges such as climate change. While native foods are important, it is also necessary to acknowledge that dietary diversity can be achieved through a balanced combination of local and non-local foods.

In this regard, Pazos et al. [47] propose that ancestral medicine not only focuses on treating diseases but also on preventing and promoting health. Through a balanced diet and the incorporation of medicinal foods into daily meals, the immune system is strengthened, diseases are prevented, and general well-being is promoted.

However, the vanishing biodiversity, exemplified by the extinction of staple tubers like potatoes, threatens the very essence of ancestral knowledge and exacerbates food insecurity, heightening the urgency to preserve these essential elements. This increases the likelihood of a drastic decrease in access to food or consumption levels due to environmental or social risks, or a reduced capacity to respond [48]. By cultivating and consuming traditional foods, these communities have greater control over their food security, reducing dependence on imported or processed foods [49]. Native foods are adapted to local ecological conditions and climate changes. These ancestral crops are resistant to diseases and have a greater capacity for adaptation [50].

Moreover, the concept of food sovereignty, empowering communities to determine their sustainable food strategies, emphasizes the role of gastronomic heritage in rationalizing food security, underlining the critical link between culinary traditions and cultural autonomy.

In this way, policies for food security can be proposed. Gastronomic heritage provides rational, objective, and humane logic to food security, and traditional cuisines support food sovereignty [27]. Food sovereignty, which is the right of people to define their own policies and sustainable strategies for food production, distribution, and consumption that ensure the right to food for the entire population, based on small and medium-scale production, while respecting their own cultures and the diversity of peasant, fishing, and indigenous modes of agricultural production and marketing [51].

Finding a balance between valuing tradition and adapting to contemporary changes and innovations is proposed. The collaboration between indigenous communities, scientists, and medical experts is highlighted as essential to strengthen traditional knowledge with scientific evidence, promote participatory research, and ensure that implemented policies and programs are culturally appropriate and respect the rights of indigenous communities.

Conclusions

Pungalá's food and culinary heritage is a vital part of the indigenous community, embodying traditional knowledge and serving essential roles in nutrition and medicine that represent a crucial aspect of the indigenous community. The 38 diverse culinary preparations, including beverages and various dishes, as part of the Intangible Cultural Heritage (ICH), along with the use of 22 Andean medicinal plants, underscore the importance of preserving traditional knowledge and pass down these customs.

Recognizing Pungalá's culinary heritage as Intangible Cultural Heritage could safeguard these traditions, promote sustainable gastronomy, and enhance the community's cultural identity, contributing to their food security and sustainable practices. Understanding and preserving biocultural knowledge are crucial in addressing contemporary challenges, including biodiversity loss and climate change.

Despite the challenges posed by modernization and external influences, the community has displayed resilience and adaptability, integrating modern healthcare while preserving their traditional healing practices.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s42779-023-00219-x.

Additional file 1. Academic Cooperation Agreement between the Superior Polytechnic School of Chimborazo "ESPOCH," facilitated by the Faculty of Public Health and School of Gastronomy, the Ministry of Culture and Heritage Direction of Chimborazo, House of culture "Benjamin Carrion" Chimborazo headquarters, and the Autonomous Decentralized Municipal Government of Canton Riobamba "GADM Riobamba." The agreement was established to conduct the research project titled "Registration of the Culinary Traditions of Canton Riobamba as part of its Intangible Cultural Heritage".

Additional file 2. Addendum of the Academic Cooperation Agreement between the Superior Polytechnic School of Chimborazo "ESPOCH," facilitated by the Faculty of Public Health and School of Gastronomy, the Ministry of Culture and Heritage Direction of Chimborazo, House of culture "Benjamin Carrion" Chimborazo headquarters, and the Autonomous Decentralized Municipal Government of Canton Riobamba "GADM Riobamba.

Additional file 3. Video recording of an interview with local participants engaging in a discussion about their culinary traditions. The recording incorporates an explicit explanation regarding the process of obtaining ethical consent from the participants.

Additional file 4. Supplementary details concerning the preparations, ingredients, and utensils employed in the culinary practices of Pungala, providing a more in-depth understanding of the local food traditions.

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Author contributions
RZ-G designed the study, collected the information, wrote the manuscript, and analyzed the data, MBB-A assisted with data analysis, data collection, AS-H contributed to the data collection and analysis and reviewed the manuscript, RH-C assisted with data analysis, data collection, YR-V contributed to the validation and manuscript review. All authors read and approved the final manuscript.

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Availability of data and materials
All data and materials are used in accordance with the guideline of the Ethnic Foods Journal as listed in the reference section. This study was conducted in accordance with ethical principles, and no specific ethical concerns were identified and readers can access to the datasets generated during the current study.

Declarations

Ethics approval and consent to participate
Permission was obtained through an institutional cooperation agreement to develop the project called "Registration of Culinary Traditions of Riobamba as part of its intangible cultural heritage" between the Polytechnic School of Chimborazo and the Autonomous Decentralized Government of Riobamba and the Pungalá parish. All participants who answered the interview and participated in the community workshop were informed about the research.

Consent for publication
All the authors have read and approved the content of this manuscript for a publication.

Competing interests
The authors declare that do not have competing interests.

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