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Being a Hunter-Gatherer in the 21st Century: Health Knowledge System, Problems and Paradoxes

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Abstract: In the due course of evolution, maintaining health and coping with aggrievances and illnesses for survival or adaptation has always been the goal of organisms, which has been verified by the narrative aeons of ancient culture and archaeological shreds of evidence of natural and non-natural/synthetic diseases, accidents and injuries. The earlier discussion on hunter-gatherers' health, illness and healthcare management knowledge systems involves the discourse of epidemiological transitions. This research aims to understand the health knowledge systems of present-day hunter-gatherers through cross-cultural comparison, beyond the dichotomy of natural diseases and rational treatments. The researcher has focused on four contemporary hunter-gatherer communities, i.e., Aranadan, Cholanaicken, Kattunayakan, and Paniyan/Kattupaniyan of the Nilambur Valley, Kerala, to understand the hunter-gatherer's perception and conception of health and illness, and what mechanisms of healthcare and healing are among them. This research has highlighted the problem of static versus dynamic in the conception of health in the spatio-temporal transition and the existing uniformity in the conception of health despite the diversity in socio-cultural practices. The research also delineates hunter-gatherers' relations to the landscape (in the context of health and healthcare) and questions assumptions of ecofeminism and axioms of knowledge distribution systems among the hunter-gatherers based on Marxian division of labour. The study includes an appropriate ethnographic survey among the colonies of the selected tribes to understand the placement of land, life and living of hunter-gatherers in the contemporary context.

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Introduction

Hunting and gathering, as a subsistence strategy and mode of cognitive production behaviour, most likely began in the last phase of the Pleistocene geological epoch (~2 million years ago) with the upright human, *Homo erectus,* the first member of the genus *Homo* (Coqueugniot et al. 2004; Ungar and Grine 2006; Joordens et al. 2009; Steele 2010; Ben-Dor et al. 2011; Melamed et al. 2016; Groeneveld 2016; Herries et al. 2020). Hunting-gathering is considered one of the oldest uninterrupted, enduring modes of livelihood support mechanism that was chosen and developed to interact with the environment, landscape and other non-human organisms (Ingold 2002; Steele 2010; Ben-Dor et al. 2011; Widlok 2020). Multiple theories have been used and advanced to reinterpret and remodel the hunting and gathering mode of subsistence strategy, social organization and economic prototypical, but these models are devoid of remodelling the hunter-gatherer's knowledge of health and healing system and the problem of the existing paradox of static belief, which conceptualises diseases and the dynamic nature of health and diseases due to the transmutational relationship of the human organism with the environment and non-human organisms. Though the problem of remodelling health and disease dynamics from archaeological data has been addressed in terms of "Osteological Paradox" (Wood et al. 1992), sometimes the model of caregiving (McDonald 1999; Anderson and Kirkham 1999; Tilley 2015; Thorpe 2016; Shaw and Sykes 2018; Spikins et al. 2018) and use of medicinal plants and their secondary compounds by the Palaeolithic population (Hardy 2018, 2019; Hardy et al. 2012, 2013) addresses the mode and method of healing system among Palaeolithic hunter-gatherers.

Earlier studies on hunter-gatherers incorporated evolutionary and adaptationist approaches and questioned those approaches with archaeological approaches and social theories (Lee 1968a, 1968b; Barnard 1983; Bettinger 1987). Whereas, human behavioural ecological description attempts to sketch hunter-gatherers with the help of natural and social science archetypal like (a) natural selection (Darwin 1859; Flannery 1972; Harris 1979; Winterhalder and Smith 1981; Smith 1983; Scheiner 1993; Ingold 2002; Bettinger 2006; Grafen 2006; Reyes-Garcia and Pyhala 2017), (b) sexual selection and practice of polygamous and polyandrous social structure (Darwin 1871; Levi-Strauss 1949; Murdock 1949; Lee 1968; Alexander 1979; Flinn and Low 1986; Miller 2000; Hawkes et al. 2001; Marlowe 2003; Apostolou 2007; Chapais 2008; Walker et al. 2011), (c) cooperative breeding (Kramer 2005, 2010), (d) optimal foraging model (Winterhalder and Smith 1981; Martin 1983; Smith 1983; Foley 1985; Bettinger 1987; Ingold 1992; Marwick 2013), and (e) hunter-gatherer as an ecologist (Flannery 1968, 1972; Lee 1968). Conversely, the 'developmental model' considers hunter-gatherers as primitive and labels the projectile trajectory of becoming complex from simple as 'progressive social evolution' (Tylor 1871; Spencer 1876; Morgan 1877; White 1959; Hobbes 1962; Service 1962; Fried 1968; Flannery 1972; Powell 1983, 1985, 1988). Mason's techno-geographical archetypal attempts to cohere hunter-gatherer's socio-political, cultural, technical and other intellectual knowledge systems with the description of "centripetal" and "centrifugal" forces of techno-environmental approach, which negates cultural diversity and hypnotises the world as a single cultural unit (Mason 1894). Schools like "new ecologist" (Murphy 1970) and "neo-functionalism" (Vayda and Rappaport 1968) also followed the guidelines of their techno-environmental predecessors and showed their

interest in cultural materialism, which was guided by the techno-environmental 'determinist interpretations' (Harris 1968; Orlove 1980; Bettinger et al. 2015).

The shift in paradigm from the traditional archaeological approach to "new archaeology or processual archaeology" can be seen to appreciate the dynamic culture of hunter-gatherers in a systemic and scientific manner by defining culture as "extra somatic means of adaptation" (Caldwell 1959; Binford 1962, 1968; Flannery 1967, 1968; Hill 1968; Longacre 1968). For now, approaches to "ethnoarchaeology" (Campbell 1968, Gould 1978; Kramer 1979) and "behaviour archaeology" (Schiffer 1976, 1983) have processed an analytical approach of "middle-range theory" (Schiffer 1976; Binford 1981; Thomas 1983) which started considering contemporary hunter-gatherers' sustenance strategy, reasoning and production-consumption-distribution nexus as the reference point and proxy to 'bridge the gap between the known, observable archaeological contexts and the unknown, unobservable systemic contexts' (Thomas 1979, 1986). However, the application of approaches like "post-processual archaeology" (Hodder 1979, 1982a, 1982b) offered a meaningful alternative to the description of modern cultural materialism by Harris (1968, 1979) through the Marxian description of the production-distribution of hunter-gatherer society being egalitarian (Marx and Engels 1967; Engels 1972; O'Laughlin 1975). This approach was later enhanced by the inclusion of Lévi-Straussian structuralism with Marxism to explain hunter-gatherer socio-economic structure and the formation and transformation processes through 'structural causation' (Althusser 1970; Althusser and Balibar 1970), which was later incorporated into the practices of ethnography and ethnoarchaeology (Campbell 1968; Kramer 1979).

Biology has been integral to anthropological discourse, e.g., optimal foraging theory (MacArthur and Pianka 1966), and establishes the intricate relationship of time and energy via the 'diet breadth model' (McNamara and Houston 1987; Alvard 1993; Levi et al. 2011). Though this utilitarian standpoint has been developed from the reference of non-human foragers, the "inclusive fitness" (Hamilton 1963, 1964; Kaplan and Hill 1985, 1991), "tolerated theft" (Blurton Jones 1987) and neo-Darwinian description of energy efficiency, genetic fitness (Boyd and Richerson 1983) and cultural transmission through the double inheritance model (i.e., genotype and phenotype) (Boyd and Richerson 1983, 1985, 1995, 2005, 2009; Bettinger et al. 1996; Bettinger and Eerkens 1999; Henrich and McElreath 2003, 2007; Richerson and Boyd 2005; McElreath et al. 2005; Mesoudi and O'Brien 2008a, 2008b; Bettinger and Winterhalder 2010), these are fitness-oriented analytical approaches to cultural evolution and cultural transformation but do not discernibly engage with the problem of health and its social implications in hunter-gatherer society, which causally effects the micro-level socio-economic structure and course of cultural construction.

This article is an attempt to understand the components and magnitudes of health, healing, problems and paradoxes in the conception of health and healing and their insinuation among the four contemporary hunter-gatherer communities of Kerala. It also focuses on (a) the role of the landscape in the health management system, (b) types of health problems, (c) methods of healing, (d) problems in health management at the stage of transition (in contemporary context), (e) the decision-making process in the course of health management, and (f) the distribution of the health management knowledge system in the form of collective intelligence among the selected hunter-gatherer tribes.

Materials and Methods

Case studies

The research focuses on the four hunter-gatherer tribes of Kerala, India, namely Aranadan, Cholanaicken, Kattunayakan and Paniyan/Kattupaniyan.

1) Aranadan: As the name (*ara nadu ara kadu*) implies, they live half of the year inside the forests and rest half outside of them. They belong to PVTG (Particularly Vulnerable Tribal Groups), and are autochthonous and mostly endogamous, but they are now strating to marry outside of their tribe because they do not have enough genetic mutation. They speak a mix of Tamil, Malayalam, Kannada, Tulu and Telugu, and their subsistence mode includes food gathering, non-wood-forest product (n.w.f.p.) collection and sometimes forest labour. They have distinctive physical feature of short stature and are distributed in Karulai and Kalikavu ranges of Nilambur south forest division and Vazhikkadavu range of the Nilambur north forest division of Nilambur taluk in Malappuram district, Kerala. They live in traditional dwelling units called "pira", which is a temporary shed-like structure built on six bamboo poles. However, many of them now live in "pakka houses" that the government has built for them.

2) Cholanaicken: Etymologically, they are the forest king/lord, autochthonous and mostly endogamous PVTG, and the remaining 'primitive' hunting-gathering tribes (Census of India 1971). They currently live in natural rock shelters (*alai*) and huts (*manai*) in the upper *ghat* section where the forests are wet evergreen in nature. However, some of them now live in *pakka* houses in the Menchari, Alakkal and Poochappara colonies on the banks of various rivers and rivulets, namely Karampuzha, Panapuzha, Taalipuzha and Nanjakkadavu of the Nilambur Valley. Their subsistence practices include food gathering and n.w.f.p. collection. They speak a mixture of Malayalam, Tamil and Kannada, and have physical characteristics that are similar to those of the Aranadans.

3) Kattunayakan: Etymologically, they are the king/lord of forest, and literally, they are those who were born in the forest. They are autochthonous and mostly endogamous with the exception of some relationships with Cholanaicken. They are distributed in Wayanad, Malappuram and Kozhikode districts of Kerala, as well as in the states of Andhra Pradesh, Karnataka and Tamil Nadu. They live in kudi, a temporary shelter in forest near a water source and practices food gathering, n.w.f.p. collection.

4) Paniyan/Kattupaniyan: They are numerically dominant tribe among the 35 Scheduled Tribes of Kerala. Etymologically, they are panikkaar (labourers), and they make their living through agricultural labour related to paddy cultivation, n.w.f.p. collection, and gold collection from the river. They are distributed both inside and outside of the deep forest (known as kattupaniyan) in Kerala's Malappuram, Kozhikode and Wayanad districts, and they live in a hamlet known as padi (Fig. 1).

Method of data collection

This ethnographic research is designed to do a cross-cultural comparison of indigenous healing traditions among the selected hunter-gatherer tribes of the Nilambur Valley, Kerala, India with a possible slice of historical research. The researcher used both primary and secondary data (i.e., Government reports like ITDP reports, Forest

Department reports and data from previous research). The primary qualitative data collection includes the following methodology: (1) participant observation, (2) in-depth interviews, (3) focus groups, (4) textual analysis, and (5) direct/non-participant observation, which have focused on both behavioural and material observation. Before starting the data collection, the researcher first conducted a social survey to investigate and analyse the socioeconomic/cultural and demographic profile and then adopted a specific survey method supported by a mixed questionnaire having contents carrying the parts of the research objective like the concept of health and healing in tribal knowledge systems, method of recognition of diseases, method of diagnosis, method of treatment, mode of treatment and the role of gender and religion in the healing process.

Uniformity in Diversity: Connection with the Landscape in the Time of 'Third Cognitive Revolution (TCR)'

For the people of Aranadans, Cholanaickens, Kattunayakans and Paniyan, the landscape is both the source of nourishment as well as the source of knowledge because it provides them with the mode of life, habitat and diets, and serves in the form of medicine or therapeutic remedies (plant and animal origins) in need. People in these communities use their knowledge to form reciprocal relationships with people from the outside world in order to thrive during the transition phase of the third cognitive revolution (i.e., the era of the World Wide Web). The people of these communities do not know the names of most of the medicinal plants but can identify them when they see those plants in an environmental context like a growing area/place, the colour and shape of the plants and other associated plants or trees. They are also aware of the value of the knowledge system because they utilise the knowledge system as a commodity (the selling of the

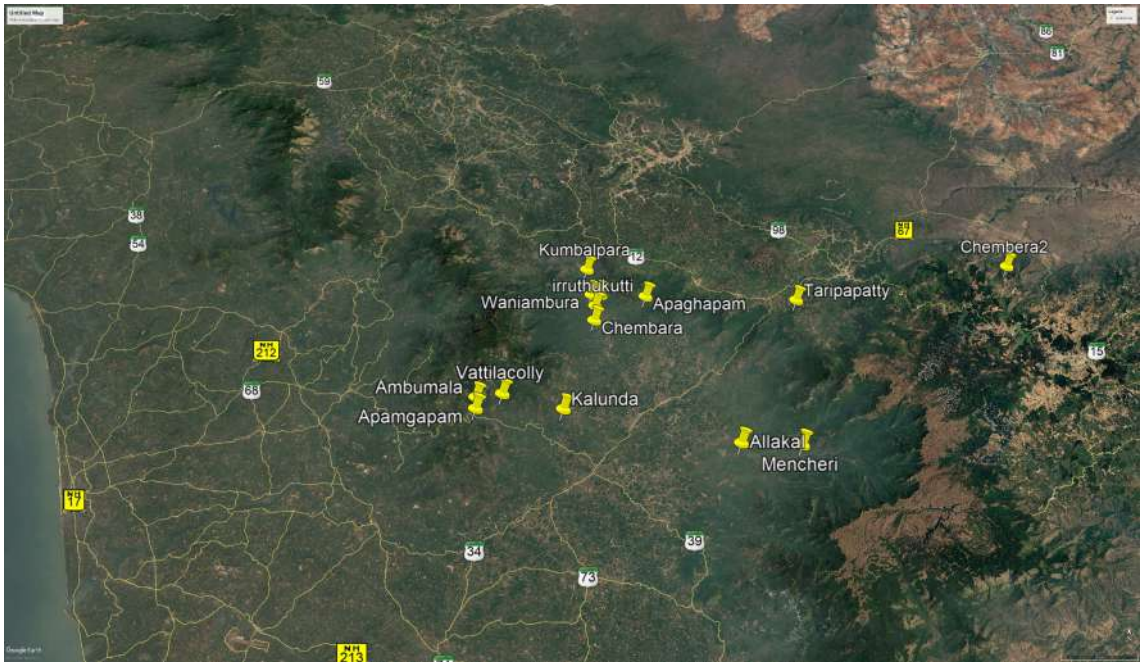

Fig. 1: The distribution of the colonies of the selected hunter-gatherer community of Nilambur Valley

collected medicinal plants is one of the economic quests) for exchange, communication, learning and transformation.

Let us just look at one of the responses to a hypothetical situation: "What do you do when you get a bone breakage or fracture?" One of the hunter-gatherers of the Nilambur Valley replied, *"I don't know the name of that plant. It grows near the river. He (Deven, a member of Kattukaicakn colony of Kumbalpara, Nilambur, Kerala) had a bone fracture and applied that paste,…a creeper was used for bone fracture. After grinding, it turns into a yellow colour,...actually we do not use these names. When we need them, we just collect them."* What do these statements mean? It gives an insight into their deeply rooted practical connection with their landscape and the environment around them.

Ancient Indian medical texts like the *Atharvaveda*, the *Caraka Saṃhitā* (CaS), the *Suśruta Saṃhitā* (SuS), the *Aṣṭāṅga Saṃgraha*, and the *Aṣṭāṅgahṛdaya Saṃhitā* have emphasised the importance of the landscape in the course of the evolving relationship of people with plant and animal habitats as well as the human environment. Charaka, in the *Caraka Saṃhitā*, describes the types of landscape (i.e., *deśa*, CaS 3.3.47–48), the characteristics of *deśa* (CaS 7.1.8), and the types of diseases that are possible when a person interacts with other organisms and the environment that are available in that particular deśa (CaS 3.3.47–48, CaS 7.1.8) (Angermeier 2017).

The landscape of the study area (Nilambur, Kerala) falls under the *ānūpa* (CaS 7.1.8) category of *deśa* (landscape), i.e., tropical-humid regions of the subcontinent which never dry out completely and "…receive little sunlight, are sheltered from the wind but nevertheless affected by frosty winds, are richly wooded, mostly situated along rivers or the ocean, and are provided with overgrown mountains… being the home of delicate people, and being abundant in wind and phlegm" (Angermeier 2017: 43). Suśruta (SuS 1.35.42) also discusses similar disease-causing factors, i.e., the morbific factors like wind and phlegm in the *ānūpa* region (Angermeier 2017). All the above-discussed conditions describe the uniformity of the environmental landscape and anomalous exposure to disease-causing factors or vectors for the selected diverse group (in terms of socio-economics, cultural practices, methods of healing, the problem of health management at the stage of transition, and decision-making processes) of hunter-gatherers of the Nilambur Valley. The landscape also gives you the chance to interact with the same environment and animal habitat in a similar way.

The uniformity in diversity exists not only in the perception and construction of a relationship with ecology, but also in the practical and technical management of the environmental resource. The concerned hunter-gatherers of the Nilambur Valley perceive nature as a culturally constituted form, such as mother and father, and not as an external world of nature. However, this might seem a paradox because nature is something that is a physical substance and culture is a conceptual form (Ingold 2002). This culturally constituted connection with the ecology intuitively eternalises animals, plants, rivers, mountains, non-human organisms, and even non-living beings into the internal structure of nature and establishes an ancestral relationship with the ecology. For example, all four tribes unanimously revered Maldivian (the mountain god who provides all food, medicine, and other necessities except the government PDSes) as their father and ancestral god. This homogeneity in beliefs (among the people of all four tribes) of perceiving the environment which is culturally created, models the production-distribution-consumption pattern in a fashion where emotional attachment

(due to a personalistic relationship with the environment/landscape like father or mother) devices the method of procurement (foraging with care) and makes the hunter-gatherer subsistent strategy (a reciprocal relationship with nature) sustainable. Though there exists a variance (among the four tribes) in lived experience, meaning-making processes, and 'imaginatively constructed' myths, religion, ceremony and other practices. For example, the Cholanaickens' burial practices are unique in themselves because the people of this community bury their dead within the habitational area and, after completing the rituals, members of the family abandon that habitation area and settle into a new place adjacent to the previous habitation area.

All four studied groups' knowledge economies are shaped by ethos and philosophy of life, and they have a deep time correspondence link with micro/macro-economic practices, cultural consciousness, and socio-political governs, making them historical, spiritual, and personal. Therefore, it appears that knowledge is distributed among every member of the community. For example, both the males and females of these communities have knowledge of medicinal plants because both of them are actively involved in the process of collecting medicinal plants and other forest products like honey from the field (forest). Whereas children and old members help in the sorting of the collected plants at the shelter. This diffusion of knowledge systems into the community and the interconnectedness with culturally constituted nature shapes the collaborative economics of need-oriented means of procurement, which assists in evolving collective intelligence among the hunter-gatherers. The above example also calls into attention two other aspects of collective intelligence: (1) the exercise of labour division and cooperation, and (2) the method of information transfer and social learning.

The division of labour (man: the producer; women, children and age-old members: the consumer) has been a relentless point of discussion for the past and present hunter-gatherer modes of sustenance strategy (Childe 1935; Binford 1962; Washburn and Lancaster 1968; Isaac 1978; Binford 1981; Isaac and Crader 1981; Kaplan and Hill 1985; Jochim 1988; Brightman 1996; Waguespack 2005; Gurven and Hill 2007; Marlowe 2007; Gurven et al. 2009; Hurtado and Hill 2020). This producer-consumer stratigraphy has the pit of inherent inequality and the hierarchical difference in social evolution, which has been a focal point in the debate on ecofeminism (Mellor 1997; Mies and Shiva 2010). However, perceiving *Maldivian* as a father (varied from the common conception of mother nature) by the Aranadans, Cholanaickens, Kattunayakans and Paniyan, and distributed knowledge (from procurement to processing) in the form of collective intelligence (among both the male and female) questions the assumption of ecofeminism in context of hunter-gatherer society.

In response to the inquiry, "Have you ever come across any new medicine that your father hasn't tried? If that's the case, how did you figure out the medical properties?" *"My father's mother educated me about medicine…I only utilise medicines that my forefathers and mothers used. There hasn't been any new treatment that I've come across,"* the respondent replied.

It also questions the axioms of inequality in knowledge distribution, which are fundamental to the dichotomy (producer and consumer) of the division of labour, subsuming productive capacity (both biophysical and cognitive) in the communal effort of production cognition and social consumption.

For example, in response to the question "Is there any difference between men and women when it comes to plant knowledge?", the response was *"... no, everyone is familiar with the same types of medicinal procedures. If new therapeutic herbs are discovered, they will be shared with others."* When questioned, "Do males or females practice medicine?", the response was, *"...Both of them, Ooru muppan (tribe leader) or elders in the Aranadan community do not discuss medications with the next generation. It is still practiced today. As a result, we don't know everything there is to know about every medicine."*

The answers lay in two different sets of questions. On one hand, it raises the question of why there is a need for secrecy in information sharing. This has been deliberated upon in the discussion section of this article. On the other hand, the researcher also finds uniformity in the transfer of information to the next generation through social learning. The community people have established an enhanced social network, which helps in the building of social cogitation and deposits information in the cultural cloud and ecology.

"*I watched and learned from my father*," one respondent said in response to the question "Do you pass this medicinal knowledge to your children? "*My father was using such plants for medicinal purposes, which I witnessed. I learned from him that a range of plants have therapeutic properties that can help with a variety of health problems. Similarly, my children will observe and gradually learn. It's a part of our everyday existence." "We got this information from our parents and grandparents. They showed us how to use the herb as well as a variety of tasty medical plants for healing,"* said another.

This eco-cultural cloud is later used as a repository for the process of information transfer to the next generation. The people of these communities store information in the environment, outside of the mind and body, in the form of images and actions (as described in the first paragraph of this section), and the same is transferred to the next generation through everyday subsistence activity. This eco-cultural repository is not only limited to information sharing. The environment as storage is inherent in the structure of life activity. For example, when asked if they stockpile medicine in advance in case they need it late at night or during a season when it is unavailable, they responded, *"...this type of challenging circumstance occurs during the summer. In our area, we are unable to obtain some medications at that time. However, this drug is not collected in advance by anyone. We collect medicine from the interior forest if we require it immediately. Because that woodland area is very cold, all herbal medicine, such as plants, roots, leaves, creeps, and so on, is always available."* They further said, *"… we are not preserving medicine. When we need medicine, we will prepare and consume it at the same time."*

The significance of storage has always been a topic of debate in hunter-gather society. It has been discussed in the context of *'temporal incongruities'* (i.e., seasonal research shortage) and *'spatial incongruities'* (i.e., a locational mismatch between population and resource) due to nomadic behaviour of hunter-gatherers (Bettinger et al. 2015). Tim Ingold (1983) has described this issue of the need for storage as 'expectation of delayed return' and 'storage as one manifestation of delayed return' in the context of hunting-gathering societies. For Ingold (1983), ecological storage is an 'interruption in the flow of nutrients from animals and plants to human consumers' because he finds a human relationship with the environment is functional and not only spatial. This eco-functional approach of Ingold does not match well with the social-functional value of storage in

hunter-gatherer's need-oriented means of economic practices because it annotates the function of storage in spatio-temporal context.

Uniformity in Diversity: Health, Problems and Paradoxes in the Time of Transition

A) Hunter-gatherer health perception and the problem of static vs. dynamic

Uniformity in diversity among the concerned hunter-gatherers of the Nilambur Valley is not only limited to the perception of the landscape and relationship with the environment. It also exists in the conception of health (e.g., in the method of recognition of diseases, the method of diagnosis and the method of healing). Health has been defined in the literature in multiple ways, like the absence of disease, role performance, adaptation and maximising human potential (Simmons 1989; Anderson and Kirkham 1999; Coward and Ratanakul 1999; McDonald 1999). But for hunter-gatherers of the Nilambur Valley, health is something related to causal contribution to the socio-economic goal pursued by the community and has some degree to do with normal functioning.

For example, in response to the question, "How can you know if a child is sick or unhealthy if they don't come and tell you?" the answer was, *"...the mother can understand the child's mood or condition. It's a common occurrence. When they contract the sickness, they stop playing with other kids, eat less, cry more, and so on...the older individuals have knee and back problems, therefore they are unable to join us in the forest."*

But the conception of health as a causal contribution to the goal pursued and normal functioning is not temporally universal. Health in hunter-gatherer communities is also somewhat associated with social and cultural construction and has become a resource in everyday life. For example, take the case of pregnancy. In this case, women are neither functional during pregnancy nor able to contribute to the causal goal of society, but they are still not considered sick, ill or diseased. The perception of health, the perceived causal root of the disease (e.g., ancestral anger, supernatural forces, evil eye), and the recognition and classifications of illness, etc. are planted in the beliefs and native logic that people of these communities hold in the subsequent management of health. This results in a static perception of health and illness among hunter-gatherers, which does not change even if a primary milieu, such as living place or settlement pattern, changes.

Health and illness are things that have been understood as dynamic in nature and that undergo change with the change in both internal and external circumstances (Simmons 1989; Anderson and Kirkham 1999; Coward and Ratanakul 1999; McDonald 1999; Angermeier 2017). Omran's (1971) model of Epidemiological Transition (ET) (from infectious to contagious to degenerative to chronic illness) has explained how health is a dynamic element also in the hunter-gatherer way of living because of its multifaceted interface and collaboration with bio-social components and variables depending on outside coefficient. In hunter-gatherer society, ET depends on factors like the hunter-gatherer's quest for food that exposes them to bacteria and indirect contact with zoonotic disease vectors that are capable of causing infectious diseases among hunter-gatherers (Armelagos and Barnes 1999; Barnes et al. 1999; Armelagos et al. 2005). The ET model also explains how the direct interaction with non-human animals during hunting, taking

prey to the home after hunting, consuming contaminated prey, getting bites from insects and snakes, etc. makes hunter-gatherers susceptible to getting diseases (Armelagos and Barnes 1999; Barnes et al. 1999; Armelagos et al. 2005). In the archaeological context, scholars have extensively discussed zoonotic diseases like avian or ichthyic, tuberculosis, leptospirosis, relapsing fever, schistosomiasis, scrub typhus, malaria, tetanus, trichinises, and trypanosomiasis which had likely affected the hunter-gatherers of the past (Livingstone 1958; Audy 1961; Wiesenfeld 1967; Sprent 1962, 1969; Cockburn 1971; Lederberg 1998; Armelagos and Barnes 1999; Armelagos et al. 2005). Scholars have also emphasized how, despite having a nomadic demographic profile with a small population size, a weak network, and the proper division of labour, hunter-gatherers are affected by the dynamic problem of health because they are either consumers or producers (Hill et al. 2011, 2014; Grove et al. 2012; Kessler et al. 2017, 2018), and how the transition in the form of either change in diet (carnivorous to omnivorous) or settlement pattern (hunter-gatherer to sedentary) or subsistence strategy (hunting-gathering to agriculture) makes hunter-gatherers vulnerable to dynamic disease vectors because of the booming pollution, proximity to domesticated animals, poor waste management, etc., and result in the increased possibility of spreading infectious diseases among the group members (Orman 1971; Armelagos et al. 2005; Boyd and Richerson 2005).

Now, consider the current situation of the concerned hunter-gatherers of the Nilambur Valley. Hunter-gatherers of this valley are gradually moving from a hunting-gathering nomadic lifestyle to permanent settlement with the help of government-built houses and PDS systems. This transition is happening due to many factors, such as forest regulation on hunting, conflict over space, etc., but the cause of this transition is not the concern of this article. Let us analyse the new situation in this transition phase. The hunter-gatherer's relationship with the landscape in the process of change leads to an internal conflict (inside the mind of hunter-gatherers) between modern space and pre-modern comfort. For example, a change in the habitation and settlement pattern. *"...the government houses are small, compartmentalised, confined and claustrophobic, and not equipped to cope with the threat of wild animals,"* the hunter-gatherers of Nilambur complain. *"Hunter-gatherers established settlements that are open and have a space for escape in the event of human-wildlife conflict,"* they claim. As a result, they have built their sort of shelters on the roofs of government houses or abandoned the houses and started to live in natural caves (Fig. 2).

There are also a number of other reasons. For example, if they choose to settle in a new permanent settlement, the lack of forest products in the immediate vicinity will force them to travel an additional distance (which cannot be covered in a single day). The relationship of hunter-gatherers has not changed only with wild animals but also with domestic animals and other non-human organisms. Now, hunter-gatherers are bound to share space with their domestic animals and birds. This reduced proximity distance with animals makes hunter-gatherers more defenceless towards getting zoonotic diseases like monkey fever and scrub typhus (due to bacteria called *Orienitia tsutsugamushi*). These diseases are reported among the Cholanaickens colonies of the Karulai forest in Nilambur (Fig. 3).

The arrival of sedentary settlements has not only brought a change in human and non-human relations but also led to a change in their diet and food habits. Now, the community people are getting only rice and salt because these items are made easily

Fig. 2: The conflict of modern and pre-modern in new settlement pattern among the Cholanaickens of Mencheri colony, Kerala

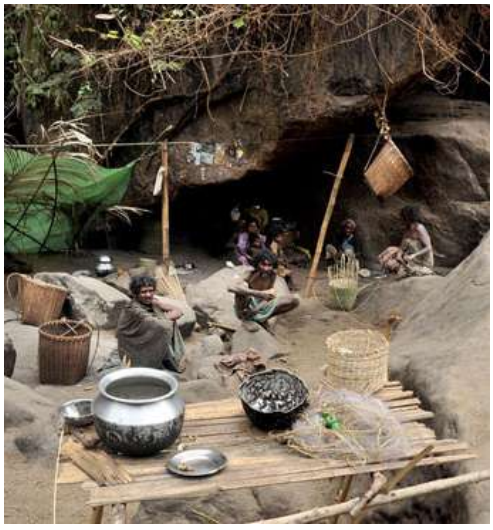

Fig. 3: The member of Cholanaicken community living in natural cave of Nilambur Valley

available by the government. This is leading community members to stop collecting food items from forests. Government hunting regulations can sometimes force a shift in diet from omnivorous to pescatarian. This shift has brought a major change in food habits, and now people are eating only *kanni* (rice and salt) and occasionally fish and crabs, along with a new habit of drinking black tea, which leads to nutritional imbalances and causes diseases like iron deficiencies and nutritional anemia (in females and children), vitamin deficiencies that lead to night blindness, etc. among the contemporary hunter-gatherers of the Nilambur Valley. The shift in diet and landscape preference for continuous habitation adjacent to a water source with poor wastewater management has made the Nilambur Valley hunter-gatherers vulnerable to new diseases and ET ranging from infectious to contagious to degenerative to chronic illness.

This description of the condemnatory hunter-gatherers' conditions at the transition stage seems to be a proxy and imprecise snapshot of the Neolithic transition experience. However, this might be a problematic and paradoxical statement because of the vast spatio-temporal gap. Therefore, let it be clear that the author is not making a conjecture that the present hunter-gatherer is experiencing a similar experience to the Neolithic transition. The central focus of this discussion is the problem of the static vs. dynamic conception of health among contemporary hunter-gatherers of the Nilambur Valley. All of the aforementioned conditions cause health and illness to be dynamic vectors in hunter-gatherers, but community members conceptualise health, recognise diseases, and diagnose diseases using static beliefs and native logic (as described in the first paragraph of this section).

As an answer to the question, "Have you been impacted by any disease that is spread by domesticated animals? they said, "*...nothing like that has ever happened before... the animals were fed what we eat since that's what we fed them.*"

B) Dimensions of healing among hunter-gatherers of the Nilambur Valley

Let me put the statement of Sumati Amma from the Aranadan community before I start discussing this section.

"We learned from our elders. For various diseases, a variety of medications are employed. Dysentery and poisoning are treated with the same medications. Some examples include Paada kizhangu (Pata root), Amalpuri (Indian Snakeroot), Chathuramulla (Myxopyrum), and Karlakam (Aristolochia india). All of this is visible inside the forest. Venga (Indian Kino) bark is used to treat body pain and Payar Valli (pea plant) is utilised to treat skin problems. If someone in our family dies, we do kali (a type of dance performed by tribals and Scheduled Castes in Kerala) the night after their burial. It will be started by Ooru Mooppan, and both males and females will participate. The ancestor's soul evokes the Ooru moopan body, and then the soul of the dead evokes, and everyone requests the dead person's soul to stay in their home. They may reject it at times. Then they practise "Nali Vekkal" on the seventh day. They give the soul their favourite items and then agree to stay with the family. They trust in the grace of that soul's presence at all times. If someone in the family suffers a disease, they beg that soul to heal them. Family members contribute money to people who participate in "Nali vekkal." Our major god resides on the crests of the hills. We'll go there once a month or once a year. Those hilly areas were home to our forefathers. Following the British invasion, we were forced to abandon those areas where the British had planted teak trees."

Healing is defined in the medical literature as "restoring the person to their life context" (Kok 2016). Two dimensions of healing can be deduced from the above statement, i.e., the dimension of individual healing and the dimension of collective healing. Individual healing involves personal health and healing of mind and body through spiritual and emotional healing. The individual dimension of healing also involves plants and animals in the dimension of healing. Let us have a look on the given statements.

"...we utilise elephant teeth to treat fever in children. In order for them to recover quickly, a small amount of elephant tooth powder is administered to their heads...elephant teeth can be obtained without risk in the jungle. These are sometimes taken directly from deceased elephants, and other times with the assistance of the Forest Department. We seek for elephant teeth for therapeutic purposes at the time when officers conduct a post-mortem on an elephant that has died in the wild…in the past, we used python fat to cure cracked heels in addition to plants."

Whereas the dimension of collective healing signifies cultural wellbeing along with individual wellbeing. Now the question is, why are these two dimensions of healing so intertwined?From subsistence to settlement (as described above), hunter-gatherers have been a part of the healing process. Therefore, they get tuned into nature in such a way that a little disturbance in nature creates an unsettling situation among the hunter-gatherers. For example, in response to a query regarding how you survived a recent flood (a flood hit Nilambur in 2019 after more than 200 years; thus, none of the present generation of hunter-gatherers had ever faced this predicament), Cholanaickens said:

"...the night before the flood, we felt that the scent of the earth had changed, and we also received negative vibes from birds and animals in the air... so, we promptly left our current living quarters, crossed the river, and went that (pointing to the other side of the river) *side on the hilltop...and that very night, the flood, combined with boulders from the hills, had completely demolished our previous residence."*

Since hunter-gatherers believe in ecological and social storage (as discussed in the above section), a little change in the landscape and environment has a larger impact on the health and health management systems. Let me explain this case again through the example of the flood. The flood in the Nilambur Valley has bewailed the Nilambur landscape and deposited a pile of sand in the affected area, which resulted in the extension/destruction of many medicinal plants that used to grow either near the river or waterbody. This deposition of sand wrought a change into the landscape, which is an intrusion in cultural wellbeing and ultimately resulted in the devastating experience of transition among the hunter-gatherer's health management ecology. This interconnectedness and relatedness with the landscape bring a sense of belonging among the community people, and they share a common core in the healing process that shapes the healing methods.

Before going into the many details of methods and modes of healing, let me first analyse the hunter-gatherers' method of diagnosis. Somehow, their way of diagnosing is linked to how they think about health and illness, which includes things like changes in abilities, touch, observation of behaviour, changes in colour (of the body or waste), temperature, and so on. It doesn't use the methods of ayurvedic or any other codified medical system. In response to the question, "How can you find the disease/illness if a child is sick and has come to you crying, and she/he has no idea what has happened to her/him?" Kattunayakans says, *"We will check if there is any pain throughout the body…we can learn through observation…we will examine and touch the patient."* This method is not solely practised by Kattunayakans, but it is a common methodology of diagnosis among all the other community people also.

Again, let's come back to methods of healing and their dimensions. It is discussed that caregiving was one of the methods of healing among the community people. The

method of caregiving is inadequately rooted in the practice of cooperative breeding among the hunter-gatherers of the Nilambur Valley (Nair 2010). The researcher discovers in the field survey (and later confirmed by government population register data) that many children do not know who their actual father is, and that a few unmarried girls have a child. In this case, it resembles the social structure of a free society, where the child becomes the responsibility of grandparents and shapes the culture of cooperative breeding (Kramer 2005, 2010).

The other healing methods and modes involve healing through herbal medicines and animal products (this analogy is deduced from all the above-cited examples and statements from community people). As far as knowledge of medicine for diseases and dosage of the medicine is concerned, the community people know about common diseases encountered (like fever, cough, cold, headache, stomach pain, tooth pain, ear pain, back and bone pain, wounds or cuts or injuries, skin diseases, menstrual pains, snake bites) and uncommon diseases (like cholera, mouth cancer, TB, diabetes, chickenpox, fertility-related issues, etc.). However, there is no definite measurement of dosages. The reasoning behind not having a defined system for the dose is rooted in the belief that one will not have side effects because the medicine is mostly natural or herbal.

Discussion

From the above discussion, it is clear that the knowledge system in hunting-gathering society has been situated in a culturally constituted ecology, and the transfer of this knowledge system to the next generation does not require an intuition-based pedagogy. Information transfer in hunter-gatherer society follows the cultural and practical way of bestowing it to the next generation, either via imitation, social learning, or individual experience, through the "cultural transmission theory" (Boyd and Richerson 1983, 1985, 2009; Richerson and Boyd 2005). We have also seen how this persisting information in the cultural cloud in the form of traditions, beliefs and native logic creates a static mechanism of knowledge economy that functions at the historical, spiritual and personal levels.

The analysis of the hunter-gatherer relationship with time and environment has described how the knowledge formation process with continuous interaction with the environment and through a cumulative decision-making process (because knowledge in hunting-gathering society exists in the form of collective intelligence) has contributed to the development of an unambiguous conception of health and health management mechanism among the hunter-gatherers. The inquiry into the healthcare knowledge system has shown how the formation of the knowledge system has been a communal effort and that there has been a system for the equal distribution of knowledge among community members irrespective of sex and gender, and also an equal opportunity for participation in the knowledge accumulation process. Although there is inequality in the community's knowledge system, this inequality is caused by a personal interest in learning, a formed limitation of cognitive capacity, and a flawed information transfer mechanism. This research has potentially highlighted the lacuna in the axioms of Marxian division of labour-based knowledge distribution in a hunter-gatherer society and has also questioned the underlying assumption of ecofeminism.

One major question often comes when a person from an outside community encounters any culturally rooted knowledge system, i.e., why is there secrecy and sacredness in knowledge management? The hunter-gatherer of the Nilambur Valley has explained that *"…these bits of knowledge have been transferred to them by their ancestor, and it is the only wealth they have."* This description comprises two major concepts in management, i.e., ownership and protection. In this context, knowledge becomes property, and secrecy and sacredness are used to demonstrate ownership and protect direct descendants. The hunter-gatherers' perception of health and illness is one such knowledge system that is grounded in experience and deeply embedded in environmental and cultural constructions. Whereas the knowledge of health management is rooted in history, is stored in an environmental context and comprises both the empirical (of plant and animal) and unempirical (faith healing) knowledge of healing.

The hunting-gathering subsistence strategy is older than current humans, and hunter-gatherers have experienced a transition, which is often linked to changes in climate, environment, demography and cognitive capacity. But the contemporary hunter-gatherer has some fundamental issues. On one hand, they are living in an eco-system like in the past. On the other hand, they are experiencing the dynamic social realities of being hunter-gatherers in the phase of 'third cognitive revolution' and within nation-state governance. The consequence of these issues is the negotiations between the past and present (or modern and pre-modern) and retarded adaptive response to the new sense of space, settlement pattern, and new relationship with nature and other non-human organisms, which has consequently become the paradoxical problem of static versus dynamic perception and management of health during the transition phase.

Conclusion

Health has always been a primary component of survival for every organism. The cross-cultural investigation of the perception and management (in the midst of transition in the landscape, food culture, settlement pattern and subsistence strategy) of health among contemporary hunter-gatherers of the Nilambur Valley has potently accentuated that healing mechanisms are intrinsic to fitness, maximising the optimum process of hunter-gatherers and are also acutely embedded in their bond with the environment and non-human organisms. For hunter-gatherers of the Nilambur Valley, health is a functional variant of human efficiency contributing to the perused goal of the community, and illness is an abruption in that normal functional ability. But illness among hunter-gatherers has not always been understood in bio-cultural terms; it has socio-cultural implications also (as described above). Whereas knowledge of the healing mechanism is an essential component of their tangible culture and ecology, such as plants, animals, and other materials, as well as their intangible worldview, faith, belief, customs, traditions, histories, and cognitive capacity. This duality in the conception of health and illness as bio-cultural components poses a paradoxical problem in front of people from outside the community on how to analyse the dichotomy of health being a dynamic phenomenon and conceptualised through static native beliefs and logic in hunter-gatherer worldviews. The analysis also revealed how minor changes in landscape, climate, diet, settlement pattern, and subsistence strategy can cause a

structural transformation in the dynamics of health, as well as how hunter-gatherer resistive enculturation processes adapt to the new world.

Nowhere in this article does it claim that the hunter-gatherer transition experience of the twenty-first century is an anomalous transition experience, which hunter-gatherers of the past (during the Neolithic transition) had experienced by taking into account the vast spatio-temporal gap and different environmental and ecological conditions. But the contemporary hunter-gatherer is facing an identical set of problems in the management of health due to similar kinds of transition circumstances. These circumstances create an episodic illusion where the hunter-gatherers of the present resemble a snapshot of hunter-gatherers from the past.

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