International Journal of Scientific Research in Science and Technology
Print ISSN: 2395-6011 | Online ISSN: 2395-602X (www.ijsrst.com)
doi : https://doi.org/10.32628/IJSRST

Polychronic knowledge of Health and Healthcare and Polythetic Culture : A Diachronic Perspective

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Article Info
Volume 8, Issue 3
Page Number : 1092-1107

Publication Issue
May-June-2021

Article History
Accepted : 10 June 2021
Published : 30 June 2021

ABSTRACT - The geological stratigraphy and archaeological record documents the patterns of continuous adaptation of human being over generations. However, within the archaeological discourse, the concept of health and healthcare has always conversed as disease evidence or injuries in palaeopathology or occasional description of surgical involvement (interface between survival need and disease) as a mechanism or skill of healing. Bio-anthropologist and archaeologist used to find out causal explanation for the reasons of death from the excavated skeleton by practising paleopathology (which includes palaeohistology. Paleoepidemiology, DNA analysis, and differential Analysis). But fails to create an informal space where biology unites with culture. This theoretical paper will critically examine the possibilities to highlight the diluted concept of health and healthcare in the archaeological debate of the organic evolution with the help of community-based archaeology with the acknowledgement examination of material residue to remodel past health in present as a bio-cultural component.

Keywords : Health, healthcare ,Archaeology, Paleoepidemiology and bio-cultural

Introduction - Structurally, the likelihood for any living being to survive in the system highly depends on the variables of the Fitness Maximizing Optimum Process (FMOP) i.e. the health, food, healthcare mechanism etc (Tobias, 1997) (Gamble , 1997) (Garine , 1997). The FMOP use to transcribe the new mechanism of survival into the genotype as an inheritance to transfer into the next generation in the form of mutation for the greater survival (Boyd & Robert, 2005) (Ingold , 1997) (Ingold , 1997). This process of capitalizing the method of aptness has been understood as health by the evolutionary biologists/bio-archaeologist in the biostatistical term. Placing the concept of health within the anthropocentric discussion in archaeology abandoned the possibilities of discourse which can involve non-human agencies in the discourse of health in primordial society. The procedure of categorization or difference between healthy and non-healthy include the concept: 'impairment of normal functional ability i.e. reduction of one or more functional abilities below typical efficiency or a limitation on functional ability caused by environmental agents' (Broose, 1975). What is

normal functional ability needs a separate and full discussion, which I am not dealing with here? The concept of health has been modelled and defined subjectively like health as the absence of disease; health as role performance; health as adaptation; health as maximizing human potential and heath as a socially constructed ideology (Simmons, 1989) (Coward & Ratanakul, 1999). The dependence of health on the biological, socio-political, cultural and other abstract function and action make it as a bio-cultural variable which is arduous to remodel in archaeology from the residue of knowledge embedded in material culture in the absence of direct visible evidence and co-relations.

The disruption of life narrative, the invisibility of the mutual relationship between organism and environment, multiple effects of human action, environmental maladaptation and the changing relationship between disease vectors and bio-cultural process in archaeological records can be visualised through the appropriate methodology which is able to control the context and chronology of events. The methodology should also have a proximate reference for the comparative analysis of the materials. Therefore, to remodel health form archaeological records should necessarily incorporate the methodology which include population-based perspective on disease processes along with the individual evidence of disease vectors and healing mechanism (e.g. lesions, trephinations, other survival evidence form infectious disease) and would also examine the co-evolutionary relationship of human and their pathogens from the closest proxy of the distant past.

Why Health and Healthcare are Diluted in the Archaeological Discourse?- Health and healthcare system is an amalgamation of lived knowledge, experiential knowledge and enacted knowledge. In that sense the determinant of health's are body, history and culture consisted of belief, perception, behaviour and worldviews and the act of healthcare depends on the social act of acknowledging. It is difficult to extract the experiential knowledge from the residue of knowledge embedded in materials/artefacts of the dynamic past. Tough Middle-Range theory (MRT) (Binford, 1962) and Behavioural Archaeology (BA) (Schiffer, 1976) have tried to address the problem of remodelling the dynamic past through static archaeological record with the inclusion of ethnoarchaeology, modern material culture studies, and experimental archaeology in the investigation and analogy based generalised interpretation of cultural phenomena. However, (Hodder, 1991), on the other hand, highlighted the limitation of MRT & BA approach of generalizing of the explanation by bridging the gap between the archaeological context and systemic context in the investigation by using the transformation theory (c-transformation and n-transformation). For Post-processualism (Hodder, 1991), the essence of culture does not reside only in the relationships between human behaviour and material culture (correlates) formation processes of the archaeological record but the very kernel of culture is rooted in the notion of meaning (belief) and action and the context of particular place and purpose.

Though (Binford, 1981) has used the medical metaphor to interpret his observation of cause-and-effect relationships between the causal dynamics and the derivative statics of past at the same time he didn't discuss the method to reconstruct the bio-cultural component (like health) of the past dynamic culture. For Binford, '*…..MRT as an observational language for diagnosing the archaeological record whose properties are regarded as "symptoms" of past dynamics analogous to the physiological symptoms of a disease. To decode these*

symptoms, we need an understanding of how living, contemporary cultural systems work, how they differ, and what factors condition the differences' (Binford, 1981).

The post-processual methodological interpretations are also not very clear on the reconstruction bio-cultural element because of their anthropocentric approach to explain the visible pattern of the archaeological data. For example, post-processualism use to discuss the role of agent and environment in the creation of social reality but fails to recognize the role of virus and pathogens in the creation of social reality and structure. For example, In the case of Leprosy/ HIV or Nippa/Ebola, virus and pathogens are able to create vulnerability in social reality in the form of rapid social change, fear, alienation, cultural stress, exploitations, migrations, change in the social hierarchy, access to the resource, identity and reorganizations. Some of these social realities are very much visible from the mortuary practices and graves goods of the ancient past (Spikins, et al., 2018).

Instead of driving towards the conclusion let me discuss the issue in more detail and the problematize the factor of the ignorant approach towards health and healing in archaeological discourse. (1) The person's health status is heavily influenced by the interaction between genetically controlled biochemical processes and a myriad of biocultural influence & lifestyle factors e.g. nutrition, exercise, and exposure to toxic substances. It is very difficult to trace the biocultural residue through the mere application of the 'law of the superposition' of archaeology which seeks to see the relationship of material-time-place in a linear fashion and analyse events or periods associated with separate layers of artefacts (isolated in time and space) (Schaepe, et al., 2017). The process of adaptation and maladaptation to the environment and cultural factor makes health a complex phenomenon in relation to human, non-human and their environmental interactions (Ferreira Júnior & Albuquerque, 2018) (Trevathan, 2007). It is very much explicit that the primary concerns of maintaining health with the response to the occurrence of disease are reproduction, quality preservation and prevent the losses of lives throughout the evolutionary process (Coward & Ratanakul, 1999). (2) The archaeologist visualizes past as a distant entity that is evidenced by artefacts, therefore to discuss health (as a biological phenomenon) in the absence of direct evidence is problematic for the archaeologist in the Spatio-temporal gap. Though in various cultural worldview 'past is a part of daily exitance it is relevant only as it exists in present' (Szlemko, et al., 2006). (3) The anthropologist has highlighted the importance of the food from socio-cultural and eco-political perspective by identifying the qualities of food as single commodities and substances; food and social change; food insecurity; eating and ritual; eating and identities; and instructional materials but at the same time fails to look food as a medium to connect the cultural and biological evolution through accepting the nutrition in the food as a primary need for the survival (Odling-Smee , 1997) (Garine , 1997). Alternatively in the bio-archaeological discourse also food has been ignored as a primary value instrument for good health because for the bio-archaeologist health is a biological concept.

The Possibilities of Disease and It's a vector in Archaeological Database : Structurally health has always been a dependent variable of environment and gene together. The Lewontin model defies the reciprocal relationship between organism and environment and delineates the concept of coevolution of both participants (Lewontin, 1982) (Lewontin, 1983). But in archaeological practices problem lies when archaeologists choose a biased baseline of determining appropriate biological level for normal species functioning. Archaeologist mostly

discussed the health and health management mechanism from tangible and discernible observations of the evidence of diseases in skeleton or occasional identification of the archaeobotanical remains having toxicant in nature lead to the conclusion of or association with medicinal qualities. However, it is very difficult to visualize the healthcare practice from the scum of past material culture and anatomical record because only in the severe case of pathology (such as bone trauma and severe degenerative diseases) left their signature on the skeleton for identification whereas many life threating disease leaves no pathological evidence to be envisaged (Wood, et al., 1992) (Siek, 2013) (Spikins, et al., 2014) . Hence, to decode the changing relationship between human, environment, pathogens and other diseases it is necessary to understand the concept of the epidemiological transition and analyse the pathology in its social and cultural context not in isolation i.e. health as a biological maladaptation.

The possibilities of the health and disease problem in the past have been explained in Omran's model of Epidemiological Transition (ET) in the evolutionary context (Omran, 1971) (Orman, 1971). According to his model, the hunter-gather's quest for food leads to interact with Bactria who are capable of causing infectious diseases in the host (Armelagos & Barnes, 1999) (Barnes, et al., 1999) (Armelagos, et al., 2005). These transmissions of disease from non-human animals to human (for example, a zoonotic disease in which zoonoses primary hosts are non-human animals) had infected humans host (Armelagos, et al., 2005). Apart from the indirect interaction between the non-human animal and human the direct interaction i.e. bites of poisons insects and reptiles (Snake) and processing and eating contaminated food (meat) were also sources of zoonotic disease (Armelagos, et al., 2005). For example, Avian or ichthyic, tuberculosis, leptospirosis, relapsing fever, schistosomiasis, scrub typhus, tetanus, trichinises, trypanosomiasis and tetanus were among the zoonotic diseases that likely to affect the earlier gatherer-hunters (Audy, 1961) (Cockburn, 1971) (Lederberg, 1998) (Livingstone, 1958) (Sprent, 1962) (Sprent, 1969) (Wiesenfeld, 1967) (Armelagos, et al., 2005)

However, the nomadic demographic pattern with continues shifts in the habitat, trivial population size and frail network (sub-grouping) of the Palaeolithic hunter-gather have impeded the trajectories of zoonotic disease to spread among the wider population by limiting it to the infected individual (Armelagos, et al., 2005) (Kessler, et al., 2017) (Kessler & et.al., 2018) . Despite the small size with less chance of spreading to the maximum population, the infectious disease were not only affected the hunting individuals but also the processing, gartering and consuming groups because these groups had also the chance of getting exposed to the zoonotic disease due to the hominin networks appear to have connected spatially distant subgroups, facilitating transmission within a fission-fusion, and multi-level society interaction e.g. man as hunter, women as processor or gatherers and children consumer (Hill, et al., 2011) (Hill, et al., 2014) (Grove, et al., 2012) (Kessler, et al., 2017) (Kessler & et.al., 2018). Nonetheless the evidences of deadly contagious disease like influenza, measles, mumps, and smallpox are devoid in the Palaeolithic population (Armelagos, et al., 2005) but there exist the evidences of trauma and implication of violence (especially in case of the Neanderthal) on the skeleton and the evidence of recovery from those injuries (Zollikofer, et al., 2002) (DeGusta, 2002) (Hublin, 2009) (Thorpe, 2016) (Spikins, et al., 2018) (Spikins, et al., 2016) (Spikins, 2014) (Spikins, et al., 2014) (Tilley, 2015) (Tilley, 2015) (Trinkaus, 1985) (Trinkaus & Zimmerman, 1982) (Trinkaus & Villotte, 2017) (Zollikofer, et al., 2002) (Thorpe, 2016) (Cunha, 2016) (Kessler & et.al., 2018) (Wu, et al., 2011). After the hunting-and-gathering, the transition

happened with the change in the subsistence pattern from carnivorous to omnivorous in the side-line of the 'agricultural revolution' at ~10,000 BCE. This development had created the first wave of Epidemiological Transition (ET) along with the population booming (both in density and size) and sedentary subsistence system by domesticating plants and animals (Armelagos, et al., 2005) (Omran, 1971). This development had raised the possibilities of spreading infectious diseases among the group member (Armelagos, et al., 2005) (Boyd & Robert, 2005). The preference of landscape for the continues habitation adjacent to water source with having poor wastewater management, and the proximity of habitation with the animal domestication area might had increased the risk of infectious disease (among early farmers) caused by the parasites e.g. Tapeworms of cattle, ships, dogs, goats and pigs (Armelagos, et al., 2005). This process of spreading infectious disease is not the one-way process, the studies have shown that human being had also caused the infectious disease among animal in Palaeolithic times (Hoberg, et al., 2000). Possibilities of getting infected by the disease was not only because of interactions with parasites but also due to process and requirement of cultivation have increased the chance of interactions with 'arthropod vectors parasites' (which are responsible to cause yellow fever) and 'non-vector parasites' (resides in human waste) e.g. scrub typhus and malaria (Audy, 1961) (Livingstone, 1958) (Wiesenfeld, 1967) (Cockburn, 1971) (Armelagos, et al., 2005) (Sattenspiel,, 2000) (Watts, et al., 1998)

In the narrative synthesis during the interpretation of the event or phenomena from archaeological activities archaeologists only explore the complex relation of epistemology, methodology and practice in linear fashion i.e. facts lead to one causal relation. For example, shift from foraging to primary food production, domestication of plants and animals in the Neolithic (~10000 BCE) brought about a marked increase in the prevalence of infectious disease and the increase in population size and density, domestication of animals, sedentarism cultivation and social stratification created a dramatic shift in disease ecology. Doesn't it appear that anthropocentric description and with liner interpretive approach hardly discussed the contribution of non-human animals & human interaction for creating the social reality and disregard the other prosaic possibilities of disease trajectories which are driven by cultural factor and socio-economic practise more than by biological factors? For example, the social reality of the division of labour provides equal chances of getting exposed to disease vectors (as discussed earlier) during the practice of daily subsistence.

An Agreeable Disagreement : Possibilities in Counter Condition : With the agreement on the possibilities and availabilities of either the prevalence of the diseases in the past or the potential conditions of disease vectors in the primordial society, let me describe two frequently asked fundamental questions. (a) How can archaeologists say that there exists the healing mechanism in the Palaeolithic hunter-gather society? (b) How do archaeologists trace a bio-cultural component (like health) of the past dynamic society from the static material representatives of past? On both the epistemological and ontological ground one hard problem for archaeologists to answer these question is the practice of methodology i.e. archaeologist don't recognize the phenomena of healing in structural behaviour of social and biological evolution as symmetry between cognitive and material interaction, whilst by doing paleopathology archaeology hardly discuss the factor of the preventative or curative measures (entrenched in culture) taken by the people during the process of diagnosis, healing and medical practices in the Palaeolithic societies.

Though archaeologist and anthropologist unanimously describe the origin and development of disease with post agrarian development in the prehistoric period. They also recognize the importance of intuition and social networks while explaining the functional aspect of past static object and event but reluctant to consider the utility of the social network and caregiving concept of healing in the Palaeolithic societies. The possible explanation again grounded on the assumption of considering health and healing is something related to rational science of organ and germ-based models of the human body and disease.
Nevertheless, evidences of survival with injuries or from disease vectors and the knowledge of herbal medicine amongst Neanderthals have been considered as a part of our evolutionary story and is widely accepted as a knowledge systems for health care in the form of hygiene maintenance, fever management, knowledge of required nutrition and rest to recover sever wounds and fractures, managing the rate of low and high infection, skill of controlling the blood loss in case of injuries and wounds and importance of care in social context for survival despite traumatic injuries (Angermeier, 2017) (Ackerknecht, 1946) (Spikins, et al., 2018) (Spikins, et al., 2016) (Trinkaus & Zimmerman, 1982) (Hardy, et al., 2012) (Hardy, 2018) (Hardy, 2019) (Hardy & et.al, 2013) (Lukacs, 1992) (Hublin, 2009)

Scholars have the counter-arguments on the understanding of healthcare practices in prehistoric society (especially example are based on Neanderthals) from wider social care behaviour in an evolutionary context. These arguments are based on the models like a batter self-healing capacity (deduced from non-human animal health care system) in which the recovery from injury may not be the 'evidence for active healthcare' provided by the society (DeGusta, 2002) (DeGusta, 2003) (Dettwyler, 1991). The other counter-argument against the social health care system is based on the socio-economic function model of society where the supply of energy is governed by the rule of the cost-benefit model for example, here, in this case, the possibilities of providing health care only to those who can contribute in future not everyone. (Berger & Trinkaus, 1995) (Wynn & Coolidge, 2011) (Whiten & Erdal, 2012) .

Behind all the agreement and disagreement among the archaeologist the central point is, what (Wood, et al., 1992) called as an " Osteological Paradox". This paradox describes that while doing paleopathology archaeologist rely on bony lesions for bifurcating between heath and diseased individual. The production of lesions is a indiscriminative biological phenomena irrespective of age and sex and follow the pattern in which individual or group who capitulate to death shortly after coming in the contact with diseases will show negative pieces of evidence of disease or lesions on bone with respect to those who survived for a much longer time and ability to develop and demonstrate the positive shreds of evidence of lesions on skeleton. Herein lays the osteological paradox i.e. the diseased individual who was unable to survive longer and left no lesions on the skeleton are healthier or those who were able to survive longer and left enough evidence of lesions on bone are healthier (Siek, 2013) (Wood, et al., 1992). Though the biologists are having contrary opinion to the paradox and proposed the method of determination between health and diseased at death as well as throughout life with the help of information gained from the skeletal and dental remains e.g. nutritional and biological maladaptation functional disabilities status through stature and tooth enamel (Haviland, 1967) (Rose & Rathbun, 1987). These explanations don't make heath an independent vector of environmental force, the immune response and access to health care which are the components of bio-cultural responses to FMOP (Siek, 2013).

Why there is a need for community-based investigation : Acknowledging the variation in health due to the change in subsistence and settlement pattern, human-environment interaction, different levels of complexities of dynamic culture and inequalities for the access to facilities fostered by agricultural revolution, the bio-archaeologist has also emphasized the facts of improved nutrition and medicine resulted in declines the first epidemiological transition i.e. the emergence of infectious diseases (created by agricultural subsistence economy) (Omran, 1971) (Kunitz , 1997) (Cohen , 1997). While improved nutrition and medicine resulted in declines in infectious disease but have created another epidemiological wave of a rise in non-infectious, chronic and degenerative diseases and the process is still continued in the contemporary evolutionary process (in both host and pathogens) (Kunitz , 1997) (Armelagos, et al., 2005).

If it is very much clear that health and disease are the processes of adaptation and maladaptation of biological function to the environment and cultural factor. Then it represents the complex relation of human, non-human and their environment with the objects, bits of knowledge, ancestries, ecosystems, and worldviews in the temporal course of cultural evolution. The defensive attitude toward the disease (chasing health by escaping from diseases for grater survival) makes the process of health management a social phenomenon (as discussed above) and hence to understand health and healthcare practices completely we have to understand the social concept of health of the past cultural. But the problem here is how to get access to the abstract social conception of health at in Spatio-temporal gap? Of course, there is no straight answer to this question but the integrated methodology (connecting past in the present via looking for the proxy of the primordial society) can explore possibilities for maximizing information via bridging the Spatio-temporal gap. As I discussed in the earlier section the question of Spatio-temporal gap arises due to linear understanding of time and application of the 'law of superimposition' to discuss the space-time-place relationship of the past, whereas, in the various cultural worldviews, there exists a non-linear or cyclic understanding of time which connect the past with the present and bridges the Spatio-temporal gap (McGhee, 2008) (Schaepe, et al., 2017).

It is very much evident that the complexity of social network (of individual and different demographic) is directly proportional to the chance of spreading diseases (McCabe, et al., 2015) (Armelagos, et al., 2005) (Kessler, et al., 2017). But at the same time dense social network provides communities to explore the possibilities information transfer, grater social caring, social learning, cooperation and social cognition by linking different long-distance social networks and subgroups have identified that disease recognition and social cognition have evolved together with the repeated introductions of novel diseases into immature populations (Hill, et al., 2014) (Grove, et al., 2012) (Layton, et al., 2012) (Whiten, 2000) (Tomasello , 2014) (Byrne & Bates, 2007) (Kessler & et.al., 2018) (Kessler, et al., 2017) (Burkart, et al., 2009). This could have produced sustained selection for increased disease recognition and caregiving behaviour which might lead to the evolution of increased cognition, social complexity, and eventually medical care in humans. Overall the evidence from the fossil record and animal studies indicates that while various fossils have clearly survived from severe health conditions, it is very difficult to rule out the possibility that they may have survived without care (DeGusta, 2003) (DeGusta, 2002) (Dettwyler, 1991).

Now let me answer (the question which is in your mind i.e. how can the present hunger-gather society be the representative of past) and describes the integrated method of connecting past in the present via looking for the proxy of the primordial society. Ever since the last genetic mutation of *homo sapiens spines*, which happened roughly in upper Palaeolithic period (0.07 (+/-) 0 million years ago - 0.01 million years ago), all the adaptive mechanism (with response to environmental and cultural forces) except of some cognitive progression are the part of the same prehistoric genetic body (Eaton, et al., 1988). This means we are genetically and anatomically (not cognitively) similar to the prehistoric people. Therefore the contemporary gatherer-hunters might be the closest proximate of prehistoric society irrespective of a few cognitive functions because we know the genetic evolution is constant with respect of time (since ~ 0.07MYA). It is also clear that the socially transmitted intangible knowledge system embedded in the social formation processes because of the exitance of the complex relationships among people, places, objects, knowledge, ancestries, ecosystems, and worldviews (Schaepe, et al., 2017). Therefore, to unfold the layers of social formation and decipher the knowledge system in the exiting Spatio-temporal gap it is required to look for the closest proxy of experience and insights of that past society i.e. the practice community (the closed proxy of the past society) based archaeology. For example, if the investigation goal is to trace the Palaeolithic medicinal system, the investigator should also consider the community, in the defined landscape, which is closer to the Palaeolithic subsistence and lifestyle along with the excavated material remains and scientific analysis of the materials of the Palaeolithic culture. To understand the concept of healing or diseases curing mechanism of the past first we have to understand the social structure in which disease or illness are diagnosed. It is visible from the past material culture there was a higher degree of cohesion and complex relation between people, plant, animal and things in past societies (Hardy, 2019). The material value of these complex relationships is related to emotional to nutritional value in the process of adaptation (Fischer, 2017) (Gibson, 2006) (Smith & Lazarus, 1990). In this case model of medicine operationalized as a requirement of a cultural system in which the domain of heath is more precise and measured in a quantifiable way and healing activities incorporates the health-enhancing mechanism. The community-based archaeology can provide the access to investigate the intangible knowledge system which resides in the idea of interconnectedness and belongings and will also help in bridging the gaps among times, place and social setting by connecting the centuries, territories, and cultural legacy. As Schaepe and et.al (2017) has described *'…factors include the notion of self, cultural identity, connectedness, continuity to avoid the cultural stress- geographically, temporally, paradigmatically….'.* (Schaepe, et al., 2017)

Before heading ahead we have to understand the common perception of health and disease of society. In the social consciousness, the concept of health has been differentiated into two sub-division i.e. disease and illness (Anderson & Kirkham, 1999) (McDonald, 1999). Therefore, it is important to understand the conceptual differences between disease and illness in the context of self and society. In the social context, the disease is something related to malfunctioning in or of biological and/or psychological process whereas illness is the experience of disease and the societal reaction to disease (Anderson & Kirkham, 1999) (McDonald, 1999) (Coward & Ratanakul, 1999) (Broose, 1975). If this is the case then culture is a mediator between the external and internal parameter of medical system and cultural construction of illness is a socially learned and sanctioned experience. Because the gene and culture evolved together and also the genetic evolution created a psychology that allows the cumulative cultural evolution adaptation (McDonald, 1999). Hence health and

illness become the measure of the effectiveness of biological and cultural resource and their apt capacity to environmental adaption. The cultural construction of illness as socially learned and sanctioned experiences which include the management process of sickness, labelling and providing personalized and socially meaningful explanations. Therefore, it becomes essential for the researcher while encountering with the evidence of prehistoric disease to look for the social construction of the concept of diseases and illness of prehistoric societies from the living closest proxy.

To locate the health conditions of the past it is essential to understand the healing system of the past. Alike health healing has also been defined subjectively as the health-enhancing mechanism, control over disease vectors and the personal and social meaning for the experience of diseases and illnesses governed through the perception, valuation and expression of symptoms (Anderson & Kirkham, 1999) (McDonald, 1999). Therefore, the social model of illness and healing is important for the archaeology of health and healing because '*…it provides caution against imposing modern aetiological frameworks to archaeological indicators of past illnesses that were made sense of within very different epistemological frameworks …..'diagnosing' illness today from skeletal remains does little to illuminate the social arena of medicine or healthcare in the past unless accompanied by knowledge of the contemporary medical as well as social concepts of disease aetiology'* (Shaw & Sykes, 2018).

Opting the method of remodelling the past into the present through the community-based archaeology has to answer two central questions (1) how to validate the findings and (2) how to select the community? To address these questions, the understanding of the placement of land, life and living is very significant because in communities the knowledge exists in the animals, birds, land, plants, trees and creation. Therefore, the selected communities for the investigation must address the evolutionary trajectories and stages of socio-cultural development. For example, to address the prehistoric social conception of health we have to carefully choose communities in such a way which represent the evolutionary model of society from hunter-gather to agro-pastoral to the agricultural community. This might lead to another set of debate where research validity will be questioned on the gourd of spatial gap (i.e. question of different landscape from which community comes and different landscape from which archaeological evidence comes) and difference in environmental condition in the temporal gap (i.e. prehistory & present) because health depends on both the landscape and environmental (as discussed in the earlier section). To answer these question we have to understand the shuttle concept of current socio-psychological lifestyle of people, the environment condition in which humans are currently living and the condition under which human biology has evolved. In this sense the seek for medical/ healing attention for illnesses or diseases should be not only viewed as individual with unique developmental history (in Spatio-temporal term) but rather human species with unique phylogenetic history (Salali & et.al, 2016) (Nunn, et al., 2015). This question can also be understood from the Omran's model of epidemiological transition which describes the continuous process epidemiological transition (in the current era) where one transition becomes the cause for the new epidemiological condition which is independent of spatial-environmental conditions (Omran, 1971). For example, the change in the subsistence pattern leads to some or more similar kind of epidemiological transition after agricultural revolution irrespective of spatial and environmental conditions (though the universal environmental change i.e. Pleistocene to Holocene occurred during that

temporal experiences). Apart from that with the increase in population density with swift in urbanization (started ~3500BC) and exploration of new habitat in various ecological zones has also upsurges the risk of infectious disease transmission like plague and other viral diseases such as measles, mumps, chickenpox, and smallpox (Armelagos, et al., 2005) (Lederberg, 1998) (Mayer, 2000) (McNeill, 1976) (McNeill,, 1978). Rapid urbanization has brought cross-border trade disease epidemic disease and knowledge of healing which was independent of ecological condition. For example, the spread of Chinese plague in Europe (Gottfried, 1983) (Garrett, 1994). If we analyse diseases of the past, for example, epidemics of smallpox, typhus, typhoid, diphtheria, measles, and yellow fever, tuberculosis and respiratory diseases such as sinuous, we found that these diseases are common and are associated with present population also (Robbins, et al., 2009) (Robbins, et al., 2009) (Schug, et al., 2013) (Polgar, 1964) (Rifkin, et al., 2017) (DeWitte, 2016). The presence of the past infectious disease at present is itself a counter-question to the question of the temporal gap of past and present with respect to ecological condition, space, time, knowledge system and landscape. As Armelagos et. al. (2005) has also described that *'…..the contemporary transition does not eliminate the possible co-existence of infectious diseases typical of the first epidemiological transition (some 10,000 years ago) and degenerative disease of the second'* (Armelagos, et al., 2005).

In other word questions are laying more emphasis on the visible excavated contextuality by ignoring the possibility of subjective validity in which reality is an independent variable of context and conditions and error lies in the methodology of validating the finding either via internal validity process (i.e. produce an outcome in an controlled environment) or via external validation process (i.e. consider the applicability of research outside the testifying condition). Now one valid question might be regarding the removal of methodological errors in cross-cultural and ecological investigation of health and healing mechanism. The answer to this is the by application of quantitative tools like Informant consensus Factor (Andrade-Cetto & Heinrich, 2011) (Uddin & Hassan, 2014) (Gebreyes & Melesse, 2017) (Khan & et.al , 2015) Fidelity Level (Uddin & Hassan, 2014) (Gebreyes & Melesse, 2017) (Khan & et.al , 2015), Disease-Consensus Index (Andrade-Cetto & Heinrich, 2011), Relative Importance Index (Andrade-Cetto & Heinrich, 2011) and Cultural Importance Indexes (Tardío & Pardo-De-Santayana, 2008) (Hoffman & Gallaher , 2007) and possible mathematical modelling of the past societies (Boyd & Robert, 2005).

Conclusion : From the above discussion, it is very much obvious that the concept of health and healthcare mechanism as a bio-cultural component are embedded and intrinsically linked to both the tangible (material residue) and intangible (knowledge/ traditions/ histories/ language/ worldviews/ cognition/ beliefs/ ecology) heritage of past. Hence to remodel the bio-cultural phenomena like health in archaeology required transdisciplinary and integrated approach (community-based archaeology) with the acknowledgement of the non-linear or cyclic notion of time along with the scientific investigations of past artefacts.

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