Naveen Shodh Sansar (An International Refereed / Peer Review Research Journal)
RNI No.- MPHIN/2013/60638, ISSN 2320-8767, E- ISSN 2394-3793, Scientific Journal Impact Factor (SJIF)- 7.671
January to March 2024, E-Journal, Vol. I, Issue XLV

# The Importance of Biodiversity and Human Health

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**Abstract** - Biodiversity promotes all life on Earth, and refers to biological variety in all its forms, from the genetic make up of plants and animals to cultural diversity. People depend on biodiversity in their daily lives, in ways that are not always apparent or appreciated. Human health finally depends upon ecosystem products and services such as availability of fresh water, food and fuel sources which are necessary for good human health and productive livelihoods. Biodiversity loss can have significant direct human health impacts if ecosystem services are no longer adequate to meet social needs. Indirectly, changes in ecosystem services affect livelihoods, income, local migration and, on occasion, may even cause or exacerbate political conflict. Futhermore, biological diversity of microorganisms, flora and fauna provides extensive benefits for biological, health, and pharmacological sciences. Significant medical and pharmacological discoveries are made through greater understanding of the earth's biodiversity. Loss in biodiversity may limit discovery of potential treatments for many diseases and health problems.
**Keywords:** health, habitats, immune,tolerance, disease, environment.

**Introduction -** More than half of the world's human population lives in cities. In Europe the figure is 70%, and the degree of urbanization is increasing everywhere [1]. Moreover, people spend more than 90% of their lives in buildings[2], with little physical activity. Sedentary lifestyle has become a serious concern in modern societies and increases the risk of many chronic diseases. Much time spent sitting is associated with diabetes but also with other chronic diseases, including heart disease, cancer, and high blood pressure, both in adults [3] and in adolescents[4]. The situation is particularly alarming among children. Parental fears ('culture of fear'), loss of natural environments in cities, increasingly busy schedules of families, and the ever-increasing time in front of electronic screens are some of the factors involved Biodiversity, ecosystem services, health, microorganism, livelihoods.

Urbanization and other forms of land conversion have caused massive loss of biodiversityaffecting populations and species and their natural habitatswhich is becoming a serious threat to humankind as loss of biodiversity adversely affects vital ecosystem processes related to the supply of food, water, and energy, as well as climate stability [5]. Less attention has been paid to the significance of natural environments on human health and well-being. However, the awareness of the formerly rather abstract concept of biodiversity loss is increasing with the accumulating data of its adverse health effects . The epidemics of chronic inflammatory diseases (allergic and autoimmune diseases, inflammatory bowel disease, and even certain cancers and depression) [6] are prime examples of such effects. Exposure to natural environments enhances physical and mental health as well as cognitive functions[7]. Urban upbringing and dwelling affect neural systems that influence social stress processing in humans and may lead to mental diseases, particularly anxiety and mood disorders.

**The current public health challenge:** Urban living in built, asphalt-covered environments with little green space, together with the use of processed water and food, may not provide us with the broad microbial stimulation necessary for the development of a balanced immune function. Many chronic diseases, including allergic, autoimmune, metabolic, and psychiatric diseases, are linked to alteration in the commensal microbial communities and the disappearance of ancient vertically and environmentally derived species from these indigenous communities. [8]

Psychiatric diseases and the gut–brain axis have gained much attention in recent years. Consistent evidence from animal models and increasingly also from humans indicates that there is a bidirectional communication between the gut microbiota and the central nervous system (CNS)via neural, endocrine, and immune pathwaysthat further affects brain function and behaviour. For example, stress appears to influence the composition of the gut microbiota, and the microbiota in turn influences stress reactivity. Further evidence of this communication has been obtained from human studies showing that a mixture of probiotics in long-term use alleviated psychological distress

and affected the activity of brain regions that control emotion and sensation processing.[9]This interesting field of research has been comprehensively reviewed elsewhere

**The Biodiversity and the role of microbes in immune tolerance:** Biodiversity can be broadly defined as the variety of life on Earth. It includes the genes in all living cells, populations, species and their communities, the habitats in which they occur, and the ecosystems they comprise The Biodiversity Hypothesis proposes that reduced contact of people with natural diverse environments, including environmental microbiota, adversely affects the assembly and composition of human commensal microbiotas and may thereby lead to inadequate stimulation of immunoregulatory circuits and ultimately to clinical disease. Ecologists often consider different components of biodiversity, such as species richness, evenness of the abundance, distribution, and diversity of functional traits. At present, we do not know about the relative importance of these features of biodiversity of animals and plants on the composition of the environmental microbiota.

**Factors involved in poorly developed or broken immune tolerance:** Compelling evidence indicates that a child's early environment, including signals transferred by the mother in prenatal life, can decisively affect the maturation of the immune system and modify the disease risk in later life[10]. Experiments on mice have revealed that maternal TLR signalling (exposure to commensal/ environmental bacteria) has a protective effect against asthma in the progeny. Novel findings suggest that transfer of microbes or microbial components to the child by the mother begins already in pregnancy, indicating that adequate microbial stimulation, not only postnatally, but also prenatally, may be necessary for normal immune development. Important issues in early microbial colonization include also route of birth and breast-feeding Environmental conditions may have effects that extend beyond several generations. The apparent heritability of cardiovascular and metabolic diseases may in fact stem from stressors experienced by (recent) ancestors early in life. Evidence from humans shows that environmental conditions during pregnancy can change the birth characteristics and health in later life, not only of the children but also of the grandchildren. Experimental data from rodents and other animal models have provided further support for such epidemiological findings.

Immigration studies have provided further evidence of the significance of environmental factors in early, even perinatal, life in modulating the disease risk. This immunomodulatory effect has proven to be surprisingly consistent for both chronic inflammatory and psychiatric diseases.[11]Although some adaptation occurs still in adulthood, many studies indicate that immigrants frequently retain the disease susceptibility level typical of their country of origin. The increase in disease risk (when moving from a low- to a high-risk area) often occurs first in the second immigrant generation; important determinants in the disease risk of immigrants are thus the age at immigration and whether a person is a first- or second-generation immigrant.

**Dietary factors:** Diet affects the composition of the gut microbiota and thereby maintenance of immune tolerance, but can modulate immunity via direct effects on immune cells as well. Altered or poor microbiota (dysbiosis) contributes to compromised epithelial integrity and disrupted tolerance[12]. Among the dietary factors, fat consumption (high-fat diets) profoundly affects gut microbiota composition . The deleterious effects of fat on the immune system and gut barrier may result from the decreased expression of specific peptides such as regenerating islet-derived 3-gamma and phospholipase A2 group-IIin the intestine. Interestingly, dietary factors such as prebiotics (food that promotes the growth of beneficial bacteria in the gut) can abolish these effects. Specific bacteria, e.g. *Akkermansia muciniphila*, may also reverse high-fat diet-induced metabolic disorders and reinforce intestinal immunotolerance

**Home and its surroundings:** A number of housing and lifestyle characteristics, including the type of dwelling, affect the quantity and diversity of microbial exposure in home environments. Examination of house dust has provided valuable information of the exposure to microbes in different home environments. House dust from urban environment is poor in microbial components and has a different immunomodulatory influence than dust from farm environment[13]. The link between microbial richness of farm/ rural dust and health has indeed been shown in a number of studies. In addition to house dust, drinking water, milk, pets, unprocessed food, as well as activities in nature are examples of everyday microbial exposures. Everything that we eat, Living in rural areas with agricultural and forested land is well known to confer protection against inflammatory diseases, but the protective factors at the molecular level are still only partly understood. A recent study showed that land-use around the home (within a radius of 3 km) affects the composition of the skin microbiota; classes of proteobacteria were more frequent in environments with more agricultural land and forests [14, 15]Contrasting healthy versus atopic individuals, the same study showed higher generic diversity of gammaproteobacteria on the skin of healthy than atopic individuals, and that the relative abundance of one gammaproteobacterial genus, *Acinetobacter*, correlated positively with the (unstimulated) expression of anti-inflammatory peripheral blood mononuclear cells (PBMC) in healthy individuals and conferred protection against allergic responses in mice. rink, touch, and breathe is reflected in our commensal communities .

**Antibiotics:** Recent evidence from humans indicates that the use of the most common antibiotics, â-lactams and macrolides, not only disturbs the composition of the gut microbiota (by decreasing its diversity and reducing the

number of core taxa, but can also affect many metabolic functions, including sugar metabolism and synthesis and degradation of intestinal/colonic epithelium components. Re-establishment of the gut microbiota often takes months after the cessation of the antibiotic use, although there are great variations between different antibiotics; their effect on the gut microbiota is dependent on the properties of the antimicrobial agent, the structure and function of the microbial community, and the presence of resistance genes in it Long-term metabolic effects of these changes in the gut community still remain largely unknown.

**Conclusion:** Biologically diverse environments modify and enrich our indigenous microbiota, which are fundamental for the development and maintenance of a balanced/well-functioning immune system. Changes in microbiota on skin and mucosal surfaces are linked to dysfunction in the regulatory network and broken tolerance. Dysbiosis in the gut microbiota has been associated, not only with immune-mediated intestinal diseases, but also Chronic inflammatory diseases in the context of increasing loss of biodiversity and increasing prevalence of sedentary lifestyle were the topics of the 60th Anniversary Yrjo Jahnsson Symposium. The following summary statements Meredith many extra-intestinal inflammatory conditions [16,17].

1. The epidemics of chronic inflammatory disease are largely the result of reduced exposure to natural environments, sedentary lifestyle, and changed diet. Naturally biodiverse environments include ancient micro-organisms important for human health.
2. Environmental biodiversity is reflected in the diversity of human skin and mucosal microbiota. Diversity is a central element of healthy microbiota in reducing the risk of chronic inflammatory diseases.
3. National Health and Nature Programmes (action plans) are needed to increase the public awareness of nature's health effects, and to affect attitudes and orientation. It is especially important to target children and adolescents; both the environment and the youngsters would benefit.
4. Politicians and stakeholders in urban planning must become more aware about the effects of natural environments on human health. People are not moving in masses back to the countryside, but elements of country life should be moved to cities, including measures that increase the diversity of microbiota.

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