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HEALTH ISSUES OF THE INDIGENOUS COMMUNITIES WITH SPECIAL REFERENCE TO THE PARTICULARLY VULNERABLE TRIBAL GROUPS (PVTGs) OF ODISHA: A REVIEW

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ABSTRACT

As India is a country in epidemiological transition, the indigenous populations agonise from a dual burden of illnesses, including undernutrition, infectious diseases and lifestyle-related issues like hypertension, obesity and diabetes. Few concrete efforts have been made to understand these emerging public health problems with emphasis on the indigenous populations living in this country. This review paper focuses on the epidemiological transition, prevalence of communicable and non-communicable diseases, nutritional status, dual burden of malnutrition and the availability, acceptability and accessibility of the health care services among the tribal communities with special emphasis on the Particularly Vulnerable Tribal Groups (PVTGs) of Odisha. This study is based on the review of published articles in different online databases using search engines like Google Scholar, Pub Med, INFLIBNET, JSTOR. A total of 195 articles published during the period from 1956 to 2022 were reviewed. The review is focussed on the indigenous populations living in the Indian state of Odisha. Migration and urbanization are the leading causes of epidemiological transition among them. The health scenario in terms of nutritional status, disease burden and availability of health care facilities of Odisha was found to be far behind the national average. Compared to other groups, the situation of the PVTGs of this state is the worst. The review suggests more action-oriented ground level research with targeted goals that would address the health needs of the indigenous populations at a micro level.

Keywords: *epidemiological transition; disease burden; communicable diseases; noncommunicable diseases; nutritional status*

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INTRODUCTION

Health is a prerequisite for human development and is an essential component for the wellbeing of mankind. It is not the mere absence of disease but, to a great extent, includes the cultural understanding of diseases, socio-economic disparities, availability and accessibility of health services, the quality of cost and care and the current bio-medical understanding of health and diseases [1]. Health of populations can be determined by assessment of their nutritional status, demographic parameters, health care practices, disease burden, life expectancy, and so on [2–4]. The relative contributions of these factors depend on the level of socioeconomic development, which can be measured by the level of skills acquired by the populations and by capital formation [5–7].

Despite India's recent economic growth, health and human development indicators of Scheduled Tribes (STs) lag behind the national average [8, 9]. Major occupational and techno-cultural shifts have taken place, and they are evident not only across geographic boundaries but also along ethnic divisions. As a result of the sociocultural, economic, and political changes, the indigenous community was unable to remain in its ostensibly inaccessible land, and now they confront the problems of the modern world. Hence, because of migration, socioeconomic transformation has been noticeable in tribal societies, which leads to epidemiological transition among the poor indigenous population of India. There is a great deal of evidence that migration and the subsequent environmental changes increase the risk of type 2 diabetes and other noncommunicable diseases, such as obesity, hypertension, glucose intolerance, high triglyceride levels, and cardiovascular diseases, especially among South Asians who have immigrated to different parts of the world [10, 11]. The movement of the indigenous peoples from rural to urban areas, mostly in quest of employment, education, and better living conditions, affects the survival and well-being of the people. On the contrary, their anguish becomes compounded due to lack of knowledge regarding the biomedical causes of diseases, their isolation, their own cultural understanding of illnesses, livelihood in a hostile environment, including poor sanitation, poverty, lack of safe drinking water, blind beliefs [12, 13], inadequate food intake [14], substance abuse [15, 16] as well as lower access to health care services [17–20].

The attention of the state to the health of the indigenous populations has not been adequate as they live in difficult terrains where access to health care services is complicated [21]. Still, 80% of tribal women suffer from triple burden of diseases due to lack of trained workers and the low quality of health infrastructure [22]. Studies have also reported a huge gap in health infrastructure and resources and access to health care services among the tribal areas [22, 23].

Furthermore, tribal populations are dependent on traditional practices of healing not just for general issues but also for chronic illnesses, since traditional medicines are easily available, acceptable and affordable [24–32]. Incidentally, they do not commute to receive contemporary medical care; instead, they choose to receive their treatment from locals using herbal remedies or traditional medications. So, it is necessary to develop behaviour modification models to encourage people to use both the high-quality Indian system of medicine and allopathic treatments along with the availability of modern, high-quality healthcare infrastructure.

Like many developing nations, India has experienced substantial shifts in the lifestyles, socioeconomic status, livelihood practices, and dietary pattern of the indigenous communities as a result of extensive continued development and urbanisation [33–38]. India has experienced rapid urban growth in the 20th century, and the total urban population has increased tenfold between 1901 and 2001 [39]. The proportion of Indians living in urban areas expanded from 17.9% in 1951 to 23.7% in 1981 and to 27.8% in 2001 [40]. Urban population growth accelerated between 2001 and 2011, reaching a rate of 28%, which suggests that, by 2040 or 2050, more people will live in urbanised than rural areas [41]. Hence, as a result of the economic and demographic developments that have been seen over the past few decades, India's rate of urbanisation is accelerating [41]. Likewise, migration to urban areas and the effect of urbanization is also observed among the indigenous population. For years, the indigenous populations have shifted their base towards urban centres, and, thereby, they are acclimatising to urban lifestyle and getting access to modern health facilities. Thus, indigenous populations of this country are experiencing phenomenal changes on the social, cultural, and economic fronts [36].

Health transition is an assorted aftermath of demographic, socio-economic and occupational transition and the most predominant epidemiological transition. Studies on demographic transition from India [3, 42, 43] and from Odisha [44] have revealed that indigenous communities are facing demographic transition nowadays. This review article will reveal the plausible factors responsible for this transition among the indigenous populations. Socio-cultural and economic shift among tribal populations, i.e., from agriculture to daily wage earning, is due to the upshot of urbanisation. It is relevant that rapid urbanization is mainly caused by rural-urban migration which is the major feature of developmental transition in India during the last few decades [45].

Studies on epidemiological transition from India [46, 47] demonstrate a higher risk of noncommunicable diseases (NCDs) in rural populations and people with low socioeconomic standards, indicating that the disease pattern is

shifting from the wealthy section to the deprived section [47–50]. Studies have emphasized that the ecological niche influences tribals' health status [51, 52].

Urbanization causes changes in migrants' economic conditions, eating patterns, food preferences, physical activity and lifestyle, which may have contributed to the early onset of obesity, hypertension, and other health issues in these indigenous groups [13, 53, 54]. The effect of urbanization has been observed among the Samoans [55] and Arizona and Mexican Pima indigenous communities [56]. These two studies support the hypothesis that changes in lifestyle associated with modernization play a major role in the global epidemics of type 2 diabetes and obesity [55, 56]. Among the migrated urban population, migrated indigenous populations of India are the worst sufferers. The rapid urbanization, industrialization, and globalization are the prime drivers of epidemiological transition among indigenous populations, which in turn increases their risk of NCDs.

It should be underlined that cardiovascular disease mortality has nearly doubled in developing nations [57, 58]. India is therefore anticipated to have the highest percentage in the global population with NCDs. For instance, the number of Indians diagnosed with diabetes mellitus is predicted to increase from 19.3 million (1995) to 57.2 million by 2025 [11]. Due to changes in dietary habits and lifestyles brought on by rural-urban migration, chronic illness risk in India has been found to have grown. But studies among the indigenous groups of India experiencing urbanization are scanty, and more studies need to be focused on the disease pattern and the on-going epidemiological transition and the effect of differential habitat on the health status. Furthermore, suggestive measures should be introduced to overcome this critical situation.

The world is in the stage of epidemiological transition and non-communicable diseases are overtaking communicable diseases [59, 60–71]. In 2016, 63% of the total deaths in India were due to NCDs [72], out of which cardiovascular diseases were responsible for 47.9% deaths [73]. Studies have reported that the pooled estimate of hypertension prevalence among tribes in India is 16.1%, which indicates an increasing trend in the prevalence of hypertension among the adult tribal populations of India [59]. Physical inactivity and consumption of tobacco, cigarettes and alcohol can also lead to lifestyle-driven diseases such as NCDs [74, 75]. Several studies have revealed that alcohol consumption, smoking and tobacco consumption were high among the different tribal populations of India such as Kerala [76], Madhya Pradesh [77] and Tamil Nadu [78]. An accelerated increase of diabetes and hypertension [79, 80] is also noticed among the aboriginal populations worldwide. Several studies have reported the prevalence of diabetes among the different tribal populations such as Banjara, Natt,

Sapara, Bawariya, Sansui, Bhopa and Gujjar tribes of Rajasthan [66], Kaani tribe of Kanyakumari [66, 67], native tribes of Andaman [69], Lambadas and Koyas tribes of Telangana [81], Gaddi tribe of Himachal Pradesh [82], etc. The prevalence of diabetes among tribal people in India varied from 0.7% in Rajasthan to 9% in Tripura [69]. One of the key variables influencing global public health is the burden of chronic diseases, which is steadily rising. According to WHO/FAO [83], 79% of chronic disease-related deaths have already taken place in the poor nations. Consequently, the variables contributing to the growing prevalence of NCDs include increasing urbanisation, changing standards of living, dietary patterns and occupation. Very few studies were found which observed the relationship between the associated factors and NCDs among the indigenous groups. More studies are required to create awareness among the people to overcome these global health issues. Effective screening strategies, therapeutic interventions, educational programmes and other preventive measures are urgently needed to reduce the alarming increase in the prevalence of NCDs in India.

Since India is in both developmental and epidemiological transition, it has to deal with the combined burden of post-transition, lifestyle-driven degenerative diseases like insulin resistance and hypertension as well as pre-transition disorders like undernutrition and infections [84, 85].

Considering the prevalence of communicable diseases among the indigenous communities of India we found that the foremost public health problem of India is malaria. Besides malaria, presumptive tuberculosis [86–88], leprosy [89, 90] and skin diseases like scabies [91] have also been reported among the indigenous groups of India. Despite the rising cases, no situational analysis has been testified. Therefore, the present review report should instigate a platform for the policy makers to initiate apposite measures to control the above condition.

India is the homeland of more than half of the world's undernourished people [92–98]. There are 104.3 million indigenous people in India, and they may be the most disadvantaged and malnourished group [25, 99, 100–105].

India has the largest aboriginal populations in the world, i.e., around 705 types including 75 Particularly Vulnerable Tribal Groups (PVTGs) out of which the maximum number of PVTGs, i.e., 13 PVTGs live in Odisha [25]. PVTGs are identified based on four characteristics features, such as they live in isolation and are largely unaffected by the developmental process, have low level of literacy, pre-agricultural level of technology and stagnant population, and, as a result, the PVTGs suffer from triple burden of diseases, such as communicable diseases, non-communicable diseases and high incidence of malnutrition.

Under these circumstances the review article focuses on the current health-related issues, such as epidemiological transition and/or disease burden, nutritional status, availability of healthcare services among the tribal communities with special emphasis on the Particularly Vulnerable Tribal Groups of Odisha.

MATERIALS AND METHODS

This study is based on the review of published articles in different online databases using search engines like Google Scholar, Pub Med, INFLIBNET, JSTOR. The following keywords were used for searching the literature: tribal health, health transition, demographic transition, socio-economic transition, occupational transition, epidemiological transition, disease burden, communicable diseases, non-communicable diseases, nutritional status, undernutrition among PVTGs, health care services among the indigenous communities of Odisha. The database on tribal populations generated by this process was used to prepare this review report. Some libraries were also visited, like the national library of Kolkata, library of SCSTRTI, Bhubaneswar and library of the University of Calcutta. All the published articles and abstracts used in this review report were cross-sectional studies on adult populations. References from retrieved articles were used to identify additional relevant publications. The reference lists of included studies were manually searched for potential additional studies. A total of 195 articles were reviewed for this article. Additional articles published in different journals of India were also used, like 'ADIVASI' which is published by SCSTRTI (Scheduled Caste and Scheduled Tribe Research and Training Institute), Bhubaneswar, Odisha. The publication period of the reviewed articles was from 1956 to 2022.

RESULTS AND DISCUSSION

The tribal map of India places the state of Odisha, Eastern India, in a distinctive position since it is home to several tribal populations that are widely spread over forested and mountainous terrain. They mostly survive on collecting forest products and shifting agriculture [25]. The tribal people of Odisha are more prone to certain communicable and non-communicable diseases [58, 106].

Due to socio-economic changes in the state, the health situation among the tribes of Odisha exhibits a prismatic mosaic of different infectious and non-communicable diseases. The widespread poverty, illiteracy, malnutrition, poor hygiene and sanitation, poor maternity and child health care, and inadequate

access to national health and nutritional services are the main contributors to the poor health status of the indigenous communities of Odisha [107,108]. Despite the tremendous advancement in the field of preventive and curative medicine, the health care delivery services and system among the indigenous communities are still poor in Odisha [108]. The health scenario in terms of nutritional status, disease burden and availability of health care facilities in Odisha was found to be far behind the national average [109,110].

Table 1. A comparative health profile of India and Odisha based on the data of NFHS 4 and 5

Sl No.	Data Summary	NFHS-4		NFHS-5 NFHS-5	
		India	Odisha	India	Odisha
1	Women Undernourished	22.9	26.5	18.7	20.8
2	Men Undernourished	20.2	19.5	16.2	15.3
3	Women Anaemic	53.1	51.0	57.0	64.3
4	Men Anaemic	22.7	28.4	25.0	28.5
5	Blood Sugar Women	5.8	7.3	6.1	6.5
6	Blood Sugar Men	8.0	10.7	7.3	7.3
7	Blood Pressure Women	6.7	6.9	12.4	12.9
8	Blood Pressure Men	10.4	9.7	15.7	16.8

The prevalence of undernutrition and hypertension is reported among very few tribal populations of Odisha. Therefore, the present study is an attempt to represent an overview of the prevalence of undernutrition, communicable and non-communicable diseases among the different tribes of Odisha with special emphasis on the PVTGs.

Nutritional Status

The state of Odisha continues to occupy the second highest position for undernutrition among the ten states of India [111]. A high rate of malnutrition has also been observed in the tribally populated districts of Odisha [3, 112]. In 2016, nineteen Juang PVTG children of Nagada village, Jajpur district of Odisha, died due to extreme malnutrition, and the causes behind this were early age at marriage, inaccessible supply of government facilities, weakening of livelihood opportunities, food insecurity, etc [113, 114]. Frequent transfers and absenteeism of the staff, favouritism and corrupt practices hinder the smooth functioning of the Primary Health Centre, which has adverse health effects on the aboriginal population.

The health status based on the nutritional status of the indigenous people of Odisha is very poor due to their socio-economic status, habitat, difficult terrains, varied ecological niches, non-literacy, poverty, unhygienic living conditions, no proper diet and sanitation, excessive level of substance abuse and unavailability of health care services [107]. The state of Odisha continues to have the second highest level of undernutrition among the ten states [111].

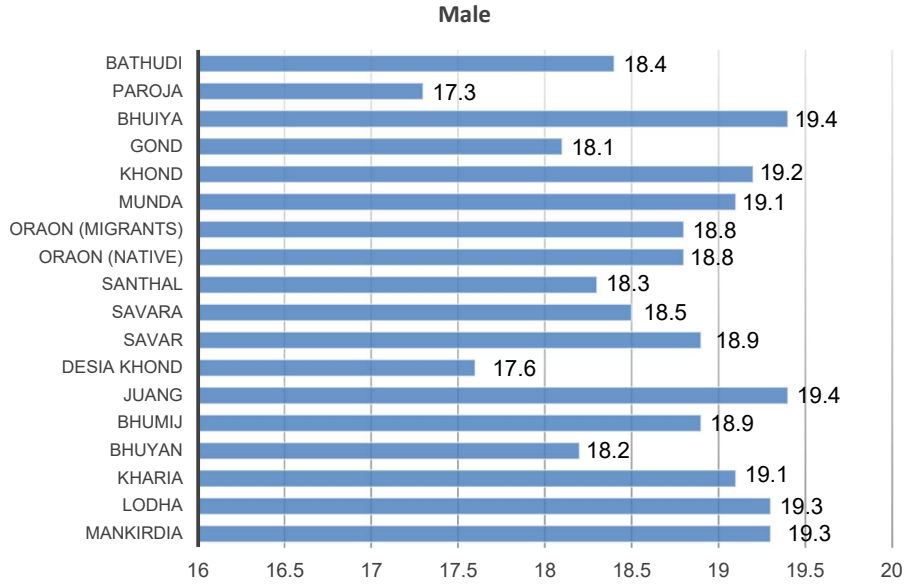

Figure 1a. Mean BMI of male tribal populations of Odisha including PVTGs

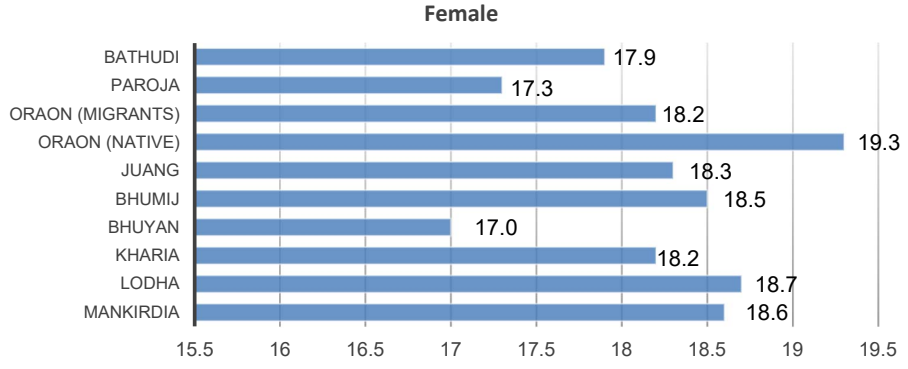

Figure 1b. Mean BMI of female tribal populations of Odisha including PVTGs

Figures 1a and 1b reflect the mean BMI of the different (male and female) tribal populations of Odisha, such as Bathudi [100], Oraon [115], Santhal (male) [116], Paroja [116], Gond (male) [116], Oraon (native) [117], Oraon (migrant) [117], Bhumij [118], Savar (male) [119], Savara (male) [119], Desia Khond (male) [120], Juang [121], Mankirdia [122], Lodha [123], Bhuyan [123], Kharia [123].

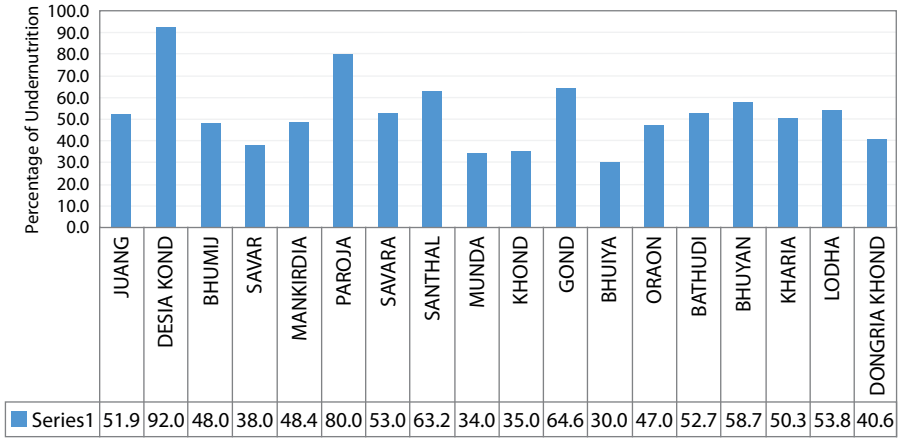

Figure 2a. Prevalence of undernutrition among the different tribal male populations of Odisha

Figure 2a shows the prevalence of undernutrition (based on chronic energy deficiency, CED) of different tribal male populations of Odisha including PVTGs, such as Dongria Khond [124], Bathudi [100], Oraon [117], Santhal [116], Gond [116], Paroja [116], Savara [119], Desia Khond [120], Bhumij [118], Juang [121], Mankirdia [122], Bhuyan [123], Lodha [123], Kharia [123].

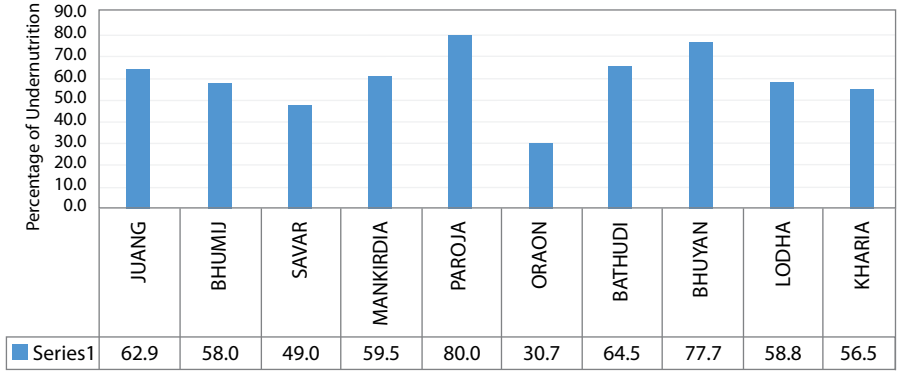

Figure 2b. Prevalence of undernutrition among the different tribal female populations of Odisha

Figure 2b shows the undernutrition (based on CED) of the different tribal female populations of Odisha, such as Bathudi [100], Oraon [117], Paroja [116], Bhumij [118], Savar [119], Juang [121], Mankirdia [122], Bhuyan [123], Lodha [123], Kharia [123].

Nutritional Status of the Tribal Groups of Odisha (with special emphasis on PVTGs)

The PVTGs in India are considered vulnerable, marginalized, disadvantaged and backward groups both socio-economically, educationally and politically. They are also more prone to poor health conditions and diseases. Various developmental initiatives, health programmes and huge budget allocated for the all-round development of PVTGs have not percolated through the lives of primitive tribals as evident from the existing vulnerability among the PVTGs [125]. Poor maternal and child health, ineffective coverage of health services, and malnutrition have been found to be the possible factors contributing to the distressing health conditions prevailing amongst the tribal groups of Odisha. The health status of the PVTGs is found to be very poor in India and the worst in Odisha [3]. Odisha has the highest number of PVTGs – that is 13 out of the 75 PVTGs in India. Literature reveals that the tribal people have high exposure to subsistence lifestyles as their diets are unique and interdependent on local ecology, socio-economic structure and traditional cultural practices [38, 126, 127]. The economic pursuits among the PVTGs, low food intake and unavailability of proper food have resulted in severe malnutrition and subsequently low fertility, high infant mortality and low life expectancy [128, 129–135]. On the other hand, displacement and acculturation or the effect of urbanisation as a result of migration are the main contributing factors that lead to a dramatic change in the lifestyle of the tribal communities.

Malnutrition increases the susceptibility to various infectious diseases and is one of the major reasons of illness and death [136–140]. The nutritional status of PVTGs of Odisha was lower compared to other major tribal groups [141, 142]. 66% of the PVTGs of Mayurbhanj and Sundergarh districts were found to be malnourished (Regional Medical Research Centre for Tribals, Bhubaneshwar) [134]. A study conducted among the Paudi Bhuyan PVTG of Sundergarh district showed that 85% of people were suffering from different grades of anaemia [143]. Chronic Energy Deficiency (CED) was found to be very high among the Langia Saora (89.4%) and Kutia Kondh (88.9%) of Rayagada District of Odisha [135]. Severe malnutrition was observed among the Bondo, Didayi, Juanga and Kutia Kondh PVTGs of Odisha. The majority of

the Bondo, Didayi, Kondh and Juang PVTGs of Odisha had different grades of anaemia. Anaemia was found to be more common among females than males.

Tribes are comparatively more vulnerable to food and nutrition uncertainty than their rural counterparts. Studies carried out among the tribal groups in different States of the country revealed that their socio-economic conditions and nutritional status were largely influenced by the ecosystem. The above studies mainly unveiled the prevalence of malnutrition among the PVTGs of Odisha, but no such study reported the associated factors of malnutrition, and why it is mostly prevalent among the aboriginal populations, and what the effects of habitat, occupational pattern or food intake on malnutrition are. More studies are advisable to combat this type of problem in indigenous populations. There is also a need for a complete mini hospital or health unit (including a medically qualified doctor, a laboratory technician, a pharmacist and a staff nurse with required medicines and basic laboratory testing set-up, etc.) in a mobile van which will satisfy the health needs of the tribal community. Although there has been a gradual increase in knowledge about the nutritional and socio-demographic status of tribes in the last decades, there is still a paucity of data and information on more than approximately 600 tribes regarding their bio-social profile. However, previous studies have clearly indicated the need to enhance the health and nutrition status of the tribes by providing job opportunities and food security. Since the prevalence of CED is higher (critical to serious situation) in tribal populations, concerted efforts should also be made to improve the health status and initiate nutrition supplementation programmes. Government and policy makers should emanate some tactically framed nutritional intervention programmes.

Disease burden

Odisha is the most backward state of Eastern India [144]. Odisha's tribal population is adversely affected by unique health issues such anaemia, leprosy, TB, anaemia-related disorders, and malaria. The tribal population has a poorer health status than the country as a whole. Districts of Odisha with a significant concentration of tribal people have also been shown to have a high rate of malnutrition. The general health and standard of living of the tribal people of Odisha are portrayed in a very negative light by this scenario. To lessen the suffering of the diminishing population in the state of Odisha, it is necessary to address the health issues and implement rehabilitation strategies. The tribal groups of Odisha have been shown to be particularly susceptible to the following significant health threats.

1. Communicable Diseases

In their daily activities, people disrupt the ecology and ecological components of their habitat, either knowingly or unknowingly, which enhances their vulnerability to infectious diseases. The communicable infections are spread by direct or indirect methods, such as breathing, sputum, excrement, saliva, urine, etc. The transmission of TB occurs through indirect contact, such as breathing, whereas the transmission of venereal infections occurs through direct touch. Hence, through direct or indirect exposure to infectious agents, communicable diseases can spread from an infected person to a healthy one. Bacterial or viral outbreaks result in mass fatalities (known as epidemics) and endanger humankind.

One of the most common tropical infections, lymphatic filariasis (LF), causes severely swollen limbs and genitalia. Over 40 million individuals worldwide – roughly in 80 of the countries where the illness is endemic – have clinical LF, and an additional 80 million people are parasite-infected. More than a billion people reside in endemic regions and are at risk of getting the illness. When the parasite infects a person, it damages the lymphatic vessels, which can result in a variety of short-term or long-term impairments. Filariasis is a serious endemic disease in the state of Odisha. It is possible to eradicate the LF from society. According to the Global Plan to Eliminate Lymphatic Filariasis, all residents of the areas where LF is endemic should receive treatment once a year, using a single dosage of an effective antifilarial medication, such as diethylcarbamazine (DEC). This medication has only a little impact on adult filarial worms, but it removes microfilariae from infected people and prevents mosquitoes from spreading infection from the sick host to healthy individuals.

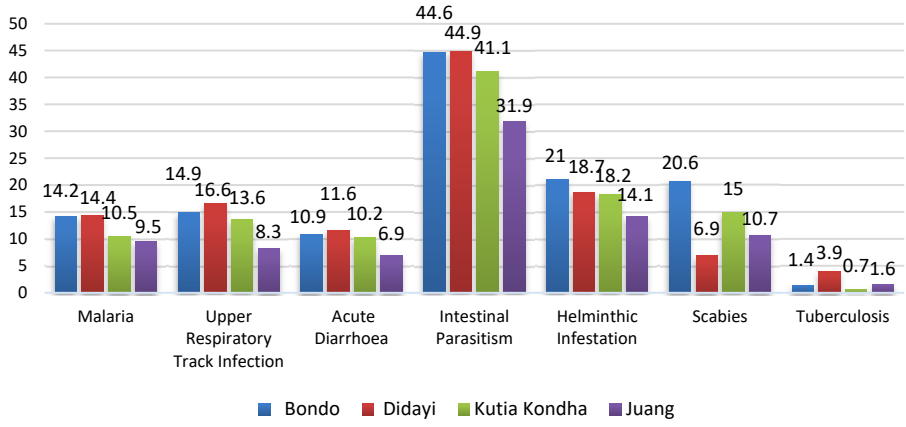

Figure 3. Prevalence of communicable diseases among the adult tribal populations of Odisha [3]

The primary public health issue affecting all Odisha's tribes is malaria. Malaria outbreaks are often frequent, and the disease's morbidity and fatality rates cause concern. The environment supports mosquito growth, survival, and longevity, all of which contribute actively to the proliferation of the malaria pathogen. Due to abundant rainfall and high humidity, there is a varied range of nesting grounds and a rich mosquito fauna. In Odisha, malaria transmission is ongoing and chronic.

Malaria of this kind is frequently referred to as tribal malaria. Most residents of the tribal enclaves have suboptimal socioeconomic status and are susceptible to malaria, which is spread by effective vectors. Chloroquine resistance is also widespread in Plasmodium falciparum infections. Chloroquine is a regularly used anti-malarial drug. In some tribal areas of Odisha, chloroquine resistance to malaria has developed recently. Poor administrative management of organised malaria control programmes makes the issue much worse. Odisha had the greatest number of deaths (442) in 2000 [145]. More than 60% of Odisha's tribal residents reside in malaria-prone regions [128].

One method to prevent the dreadful vectors and minimise mosquito contact with humans is to use mosquito nets or treated nets. This approach is easy, affordable, ecologically friendly, sustainable and incorporates the crucial community involvement that is essential to the accomplishment of any health programme. This strategy of vector control will give a long-lasting solution in accordance with the worldwide plan for malaria control when combined with health promotion, inter-sectoral collaboration, biological control, early identification, and rapid treatment.

Few of the tribal communities are exposed to HIV risk factors, and migration is the leading cause for spreading of HIV/AIDS among tribal population. HIV/AIDS is emerging as a high risk for those tribal groups who are facing displacement problems for employment opportunities [146–147]. A study from Odisha reveals that prevalence of HIV/AIDS was higher among those participants whose spouses were non-agricultural labourers, such as truck drivers or migrants [148]. A number of studies have found that tuberculosis control programs for scheduled tribes require special attention due to difficult terrain and limited drug supplies in many aboriginal areas [149–152]. Odisha figured among the top ten states in the country for tuberculosis incidence. District-wise details reveal that Gajapati has the highest incidence in this state and is followed by Mayurbhanj, Malkangiri, Rayagada and Sundergarh [153–155]. Therefore, awareness, knowledge and suitable fortification should be administered from acquiring the infection by direct or indirect contact. Also, apposite measures

ought to be taken to control the spread of these diseases from an infected individual to a healthy person.

Leprosy is another communicable disease occurring among the tribal people, and scabies is also a major health issue among the PVTGs, i.e., in the Bondo (20.6%), Didayi (6.9%), Juang (10.7%) and Kutia Kondh (15%) of Odisha. The rate of leprosy has also been found to differ among different tribal groups. In Odisha, the incidence of leprosy and also of scabies have been reported among the Bondo, Didayi, Kondha and Juang tribes [89]. Leprosy and scabies are transmitted through close, sustained contact with the afflicted. Leprosy is a disease induced by the mycobacterium leprae and is manifested in the skin, mucous membranes, and nerves. Unhygienic environments have a significant impact, and also inadequate nutrition and food make them susceptible for the transmission of the communicable diseases. In contrast to the national incidence of 1.34 per 10,000 people, Odisha now has a leprosy prevalence rate of 1.91 per 10,000 people. Additionally, the tribes of Odisha have also recorded cases of measles, typhoid, and influenza [3].

Substantial morbidity and mortality are caused by transmissible water-borne infections called diarrheal disorders. The diarrheal/dysentery infections, such as cholera, are prevalent year-round in Odisha's tribal communities, peaking during the rainy season (from June to October). Acute diarrhoea affects the adults of Bondo (10.9%), Didayi (11.6%), Juang (6.9%), and Kutia Kondh (10.2%) tribes. In Odisha, intestinal parasitism (protozoan and helminthic infection) affects the Bondo (44.6%), Didayi (44.9%), Juang (31.9%), and Kutia Kondh (41.1%) indigenous people on a regular basis. The dearth of safe drinking water, poor hygiene, improper disposal of human waste, illiteracy, low socioeconomic status combined with blind cultural belief, and a lack of accessibility to medical facilities were the primary causes of the acute diarrheal problems and intestinal parasitism, which led to serious public health issues. Good hygiene practices, safe sanitation and drinking water, knowledge and awareness should be instigated among the poor tribal populations. Improvement of this current situation needs strategic plans, and government and policy makers must come up with certain measures to combat this global issue.

2. Non-communicable Diseases

The incidence of hypertension in indigenous areas varied from 10% to 55.5%. Prevalence was higher in males than in females, and the main contributing factors were age, body mass index (BMI), diabetes, smoking, and extra salt intake [156]. Among the Bhumij, Bathudi and Savar tribes of Odisha, age and

salt intake were significant predictors of blood pressure, but it was observed that in the Bhumij and Bathudi tribes, prevalence was higher among females than males [157]. Satpathy et al. [158] revealed that the Munda, Santal, Bhumij, Bathudi and Savar tribes of Odisha are in transition in terms of blood pressure and also observed that hypertension was associated with socio-economic and demographic factors resulting from exposure to developmental forces. It was also reported that among all the tribes studied, the Munda and the Bhumij tribes showed a higher prevalence. Prevalence of hypertension was also found to be higher among the Santal, Bhumij and Bathudi tribes of Odisha [99]. Age, literacy, physical activity, consumption of tobacco and alcohol, and obesity were significantly associated with hypertension among the tribes of Odisha [159]. Low socio-economic groups were becoming more vulnerable to the risk of hypertension, and this supports the concept of "shift from early adopters to late adopters which explained that the burden of CVDs shifts from the richer and better educated sections to the poorer less educated sections as risk behaviour shifts from early adopters to late adopters" [160].

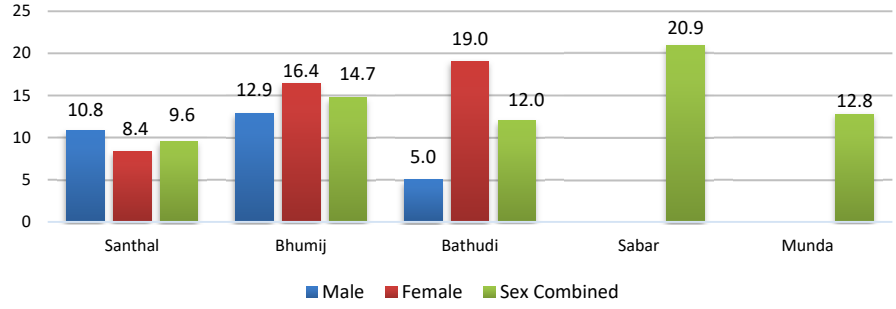

Figure 4. Prevalence of hypertension among tribal populations of Odisha [99]

In Odishan tribes, increasing age, urban residence, extremes of wealth index, the status of having been married, obesity, diabetes, and tobacco usage (particularly of smokeless tobacco) were the predictors of hypertension [161]. The relationship of high blood pressure and tobacco consumption was also reported among the poor women of the reproductive age group [162]. A screening programme is needed for detection of hypertension, particularly in low-socio-economic groups, to develop and implement effective intervention for the control of CVDs [163]. Several studies have revealed that indigenous communities are mostly affected by hypertension, but studies among them are meagre [164–166]. Acculturation, tobacco addiction and consumption of salt are presumed to be the main factors contributing to the higher prevalence rate of hypertension among the tribal populations. Moreover, the tribal populations residing in

the urban fringe contribute to the emerging burden of chronic diseases. The disparities in socio-economic conditions, dietary intakes, physical activity and lifestyles among the migrated tribal population may be responsible for their predisposition to different NCDs. Therefore, a community-based programme is required to identify individuals with hypertension, bringing them into medical facilities for further evaluation and initiating a high proportion of long-term control programme.

In the ST dominated district (Malkangiri) of Odisha, prevalence of diabetes was found to be 13.9% [156]. Available literature mainly focusses on the nutritional deficiency diseases, vector-borne diseases, tuberculosis and skin diseases, but studies on chronic diseases are limited and are pay least attention to the tribal people of Odisha [167]. A review article that included twenty-one studies over a span of nineteen years emphasized the fact that non-communicable diseases, especially diabetes, in the indigenous population of Odisha is an ignored issue [156]. Earlier it was evident that tribal populations were untouched by NCDs, but recent studies have reported that they are also experiencing NCDs due to the combined effect of increasing urbanisation and lifestyle conditions. Therefore, specific research of tribal population is very much awaited to understand the tangible causes of these diseases, the disease pattern, the severity of these diseases and the cultural dimensions of socio-economic and/or rural-urban differences in health or risks of chronic diseases.

Thus, understanding human biology and disease risk responses to the changing habitat from the viewpoint of economic modernization and globalization point is a prerequisite for biological anthropology and human biology research [59, 99].

Health care practices

Health care is one of the most important aspects of all human endeavours to improve the quality of life, especially among the tribal people [107, 111, 168]. Tribal health system and medical knowledge over ages known as the traditional health care system depends on herbals, wild plants, flowers, seeds, animals and other naturally available substances, and this formed the major basis of treatment. This practice always had a touch of mysticism, supernatural and magic, often resulting in specific magico-religious rites [168]. The common beliefs, traditional customs, myths, practices concerning health and disease in turn influence the health-seeking behaviour of the indigenous people [169].

Studies have revealed that aboriginal groups have their own beliefs and practices about health care and magico-religious practices are also prevalent in their indigenous treatment methods [170–173].

If residents of a region fail to utilize an accessible healthcare facility, it is not possible to conclude that they are in excellent health. Many studies have revealed that the indigenous community uses advanced healthcare services at a relatively low rate. According to research done on tribal women in Odisha by Mahapatro and Kalla [174], just 6% of participants utilise purely allopathic therapy, while 49% of them seek traditional measures of treatment, mostly from local quacks. It was also revealed that 21.2% of women believed their condition was not serious and could be treated with a home remedy or conventional medicine.

Studies from different parts of India like Karnataka [175], Andhra Pradesh [176, 177], Maharastra [178], Rajasthan, Madhya Pradesh, Odisha, Chattisgarh [179], Tamil Nādu [180, 181] all reported that the health care infrastructure in these states was very poor. An expert committee report has recommended to the Ministry of Health and Family Welfare as well as to the Ministry of Tribal Affairs to develop policies and programmes for providing preventive, promotive, curative and rehabilitative services in health subcentres in tribal areas. These areas also lack health care professionals [182].

The tribes of Bhatra, Khond, Gond and Paraja of Odisha residing adjacent to Chhattisgarh, need an appropriate, acceptable and affordable locality-specific and tribe-specific health care delivery system to achieve the true goal of health for all in India. Among the Bhatra group, 49% women depend on traditional methods of treatment, and the main cause for not seeking government or private health care services was the long distance to primary health centres and non-availability of doctors [174]. The Saora tribe utilizes several herbs and roots in conjunction with magico-religious rites because faith healing is a part of their traditional health care system [168]. The tribal communities of Mayurbhanj district of Odisha reported that they were still practicing traditional medicine to cure the diseases [12, 183–185]. Another study suggests that tribal people, mainly the migrated tribal group, need a migrant-sensitive health care system [186].

There are indigenous communities which still practice the traditional health care system [187]. Over the years, indigenous communities' dependence on their traditional healing practices has decreased, and their dependence on modern health and disease management institutions has increased [188–192]. A study has shown that the acceptance of a particular health care system among

the tribal people mostly depends on its availability and accessibility [193]. The Lodha tribe of Mayurbhanj district of Odisha reported that "gunins" – traditional healers who treat snake bites, ghost fearing, fever, dysentery, malaria, anaemia, tuberculosis, chickenpox, etc. – are found in Lodha villages [194]. So, it is evident that the health culture of a community does not change so easily with changes in access to various health services [169]. The culture of a community is also indirectly influencing its health because certain cultural practices, such as child rearing, food and drinking habits, pregnancy and childbirth practices are directly related to community health problems generation after generation. These problems and health practices of any community are profoundly influenced by the interplay of a complex of social, economic and political factors [195]. Studies focusing on the acceptability, availability and affordability of the health services are to be encouraged since the reasons behind the practice of traditional medicines are still unclear, and more efforts are required towards the acceptance of modern medicines. Even though the public in general has access to western medicine, studies by anthropologists reveal that traditional medications do exist and continue to be used. To make traditional tribal medicine and healing systems accessible, acceptable, and affordable for the underprivileged tribal people, scientific research of these systems is indispensable.

Starting region-specific, indigenous community-specific, action-oriented health research in conformity with the prerequisites of the indigenous populations is crucial. The objective of the research should be to enhance the quality of life for these indigenous people. It should also have legitimate applicability. Due to the diversity of their socioeconomic, cultural, and biological environments, indigenous peoples occupy a variety of ecological niches and confront an array of health and nutritional issues [107]. However, this type of research based on their ecological, ethnological, cultural and biological diversity is lacking in India, including the state of Odisha. The health care services and challenges in tribal areas are a complicated phenomenon due to several reasons, like lack of motivation of indigenous people for seeking medical care at the initial stage of diseases, inaccessibility of medical care services due to under-developed communication and transport facilities, non-availability of qualified medical practitioners – private or government doctors – when need arises.

Despite the astounding progress in the field of precautionary and curative medicine, the health care delivery system in tribal areas, especially in Odisha, is still poor and needs advancement and strong targeted goals to achieve health for all in India. The health care system should be locality-specific, tribe-specific and authentic, available, cost-effective, convenient and trustworthy.

Traditional healers, who frequently provide the initial level of treatment, can be educated to give modest therapies and determine when they should send patients to more specialised facilities. The primary healthcare system as a whole has to be reinforced. Tribal boys and girls with less education can be taught to become community health workers and encouraged to work in their own community.

Anthropologists may play a vital role to overcome the gap between the healthcare delivery system and indigenous people because they are the experts on these populations and know very well the situations these populations have been facing. In this regard, anthropologists play the role of counsellors and give various options on these matters to indigenous populations.

Traditional herbal products used by tribal people warrant more studies, and their application should be advocated wherever it is advantageous. States need to take prompt action and identify the requirements and priorities of their own tribal populations before establishing objectives and targets to attain the same using effective public health approaches.

It is important to establish a deadline for bridging the present gap in the health conditions of indigenous people and bringing health coverage and outcome indicators up to par with the state average. Therefore, the expert committee has made certain suggestions. The primary healthcare system has to be strengthened according to these recommendations: to knowingly reach the unreachable.

CONCLUSION

Odisha as the most backward state of eastern India is also facing developmental transition. Migration and urbanization are the leading cause of epidemiological transition among the indigenous population of this state. The ongoing developmental activities have shaped conditions of vulnerability among the indigenous communities in general and PVTGs in particular. PVTGs, who have differential livelihood practices based on habitat, are likely to offer variation in lifestyle practices and availability of health services and, as a result, consequently, undergo health transition or epidemiological transition. The health scenario of the indigenous populations of Odisha is far behind the national average. Apart from malnutrition, high prevalence of communicable and non-communicable diseases has also been noticed among the indigenous population of Odisha. A high rate of undernutrition is also observed among the PVTGs of Odisha. The health care delivery system is poor in tribal areas, and the situation is worst in

case of PVTGs of Odisha. To overcome this situation, action-oriented ground level research is very much needed, which would implement strong targeted goals to achieve health for all in India. Health care system should be locality specific, tribe specific and need best health care delivery system which should be authentic, available, cost-effective, convenient and trustworthy for indigenous people. While there seems to be a vague consensus amongst policymakers that tribal communities have poor health and restricted access to healthcare, there are still no comprehensive policies that meet this need, and no reliable data are available about the state of health in Odisha's tribal population.

Studies on the overall health status among tribal populations of India and especially Odisha are scanty. Most of the earlier studies, however, indicate rising risk conditions. Our findings regarding increasing prevalence of non-communicable diseases among tribal groups of Odisha show that it is time to consider these unrepresented populations for large-scale studies. The status of the tribal population with respect to these health outcomes implicates the susceptibility of the community towards cardiovascular diseases. Drastic changes in various aspects of the life of tribal people might make them more prone to these lifestyle disorders. Urbanization-triggered lifestyle changes and marginalization in the broad socioeconomic context are crucially associated and/or are suggestive factors of a non-communicable disease burden and nutritional extremes not only among the Indian tribes in general but also among the tribes of Odisha. The study also presented for the first time a comprehensive picture of adverse health conditions among the Odishan tribal populations, especially the PVTGs, which are largely disadvantaged groups of India. Therefore, a systematic and comprehensive health policy along with timely intervention programmes is strongly recommended.

Identifying the community specific risk factors might help in implementation of health programmes at grass root level leading to reduction in the common disorders among the tribal population. Hence, establishing an effective surveillance system for chronic diseases will help to understand the complex interplay of urbanization and associated factors with chronic diseases.

As a long-term measure, developmental planning for the PVTGs is to be incorporated as a bottom-up approach, and participation of local community members is indispensable. Failure in these aspects will lead to extinction of the already declining PVTGs population in India.

REFERENCES

1. Dalal A. K., Ray S. (2005). Social dimensions of health and well-being: An overview of research trends. In: Dalal, A. K., Ray S. (eds.), Social Dimensions of Health. Jaipur: Rawat Publications, 1–33.
2. Pritchett L., Summers L. H. (1996). Wealthier is Healthier. The J Hum Reso, 31 (4), 841–868. https://doi.org/10.2307/146149
3. Indian Council of Medical Research (ICMR) (2003). Health status of primitive tribes of Orissa. ICMR Bulletin 2003, Vol. 33, No. 10.
4. Basu S. (2000). Dimensions of Tribal Health in India. Health and Popul, 23 (2), 61–70.
5. Scrimshaw N. S. (1996). Nutrition and health from womb to tomb. Nutrition Today, 31, 55–67. https://doi.org/10.1097/00017285-199603000-00004
6. Bhargava A. (1998). A dynamic model for the cognitive development of Kenyan school children. J of Educ Psych, 90, 162–166. https://doi.org/10.1037/0022-0663.90.1.162
7. Fogel R. W. (2004). The Escape from Hunger and Premature Death, 1700–2100: Europe, America, and the Third World. Cambridge: Cambridge University Press.
8. Sarkar S., Mishra S., Dayal H., Nathan D. (2006). Development and Deprivation of Scheduled Tribes. Econ Pol Weekly, 41 (46), 4824–4827.
9. Subramanian S. V., Davey S. G., Subramanyam M. (2006). Indigenous health and socioeconomic status in India. PLoS Medi, 3, 1794–1804. https://doi.org/10.1371/journal.pmed.0030421
10. McKeigue P. M. (1997). Cardiovascular disease and diabetes in migrants – interactions between nutritional changes and genetic background. In: Shetty P. S., McPherson K. (eds.), Diet, Nutrition and Chronic Disease. Lessons from Contrasting World. London: John Wiley & Sons.
11. Deedwania P., Singh V. (2005). Coronary artery disease in South Asians: Evolving strategies for treatment and prevention. Ind Heart J, 57 (6), 617–631.
12. Shrivastava S. R., Shrivastava P. S., Ramasamy J. (2013). Implementation of public health practices in tribal populations of India: challenges and remedies. Healthcare in Low- resource Settings, 1(1), 3. https://doi.org/10.4081/hls.2013.e3
13. Kapoor A. K., Dhall M. (2016). Poverty, malnutrition and biological dynamics among tribes of India. Health Sci J, 10 (3:5), 1–5.
14. Ghosh R., Bharati P. (2005). Women's Status and Health of Two Ethnic Groups Inhabiting a Periurban Habitat of Kolkata City, India: A Micro-Level Study. Health Care for Wom Internat, 26, 194–211. https://doi.org/10.1080/07399330590917753

15. Neufeld K., Peters D., Rani M., Bonu S., Brooner R. (2005). Regular Use of Alcohol and Tobacco in India and its Association with Age, Gender, and Poverty. Drug and Alcohol Dependence, 77 (3), 283–291. https://doi.org/10.1016/j.drugalcdep.2004.08.022
16. Rao V., Bhat J., Yadav R., Muniyandi M., Bhondeley M. K., Wares D. (2016). Smoking and alcohol consumption: Risk factors for pulmonary tuberculosis among the tribal community in central India. Ind J Tuber, 64 (1), 40–43. https://doi.org/10.1016/j.ijtb.2016.11.009
17. Nanda S., Tripathy M. (2005). Reproductive Morbidity, Treatment Seeking Behaviour and Fertility: A Study of Scheduled Caste and Tribe Women. J Hum Ecol, *18,* 77–83. https://doi.org/10.1080/09709274.2005.11905812
18. Dolla C., Meshram P., Verma A., Shrivastav P., Karforma C., Patel M., Kousal L. (2006). Health and Morbidity Profile of Bharias – A Primitive Tribe of Madhya Pradesh. J Hum Ecol, 19 (2), 139–141. https://doi.org/10.1080/09709274.2006.11905868
19. Jana S., Rajak M. (2006). Health Care Services in Tribal Areas of West Bengal: Need for a New Paradigm. https://www.researchgate.net/publication/215463113_Health_Care_Services_in_Tribal_Areas_of_West_Bengal_Need_for_a_New_Paradigm (accessed on 22 November, 2022)
20. Meher R. (2007). Livelihood, Poverty and Morbidity: A Study on Health and Socio-economic Status of the Tribal Population in Orissa. J Health Manag, 9 (3), 343–367. https://doi.org/10.1177/097206340700900303
21. Bhattacharya S. (1994). A Dictionary of Indian History. Vol. 1. Cosmo Publications.
22. Chandana K. R., Kumar R. 2020. Health status of tribal women of Bhadradri Kothagudem district in Telangana state. Int J Health Sci Res, 10 (1), 53–62.
23. Rural Health Statistics Rural Health Infrastructure in Tribal Areas. Statistics Division, Ministry of Health and Family Welfare, Government of India. 2016–2017.
24. Uniyal S. K., Singh K. N., Jamwal P., Lal B. (2006). Traditional use of medicinal plants among the tribal communities of Chhota Bhangal, Western Himalaya. J Ethnobiol Ethnomed, 2, 14. https://doi.org/10.1186/1746-4269-2-14
25. Das S., Bose K. (2015). Adult tribal malnutrition in India: An anthropometric and socio-demographic review. Anthrop Rev, 78 (1), 47–65. https://doi.org/10.1515/anre-2015-0004
26. Ramalingareddy K. (2016). Improving health services for tribal populations. Int J Res Soc Sci, 6 (11), 345–57.
27. Debbarma M., Pala N. A., Kumar M., Bussmann R. W. (2017). Traditional knowledge of medicinal plants in tribes of Tripura in Northeast, India. Afr J Tradit Complement Altern Med, 14 (4), 156–68. https://doi.org/10.21010/ajtcam.v14i4.19

28. Muniyandi M., Singh N. (2011). Tribal health inequity: challenges remain. Tribal Health Bull, 17 (1 and 2), 8–17.
29. Gandhi S., Verma V. R., Dash U. (2017). Health seeking behaviour among particularly vulnerable tribal groups: A case study of Nilgiris. J Pub Health Epidemiol, 9 (4), 74–83. https://doi.org/10.5897/JPHE2017.0911
30. Raj A. J., Biswakarma S., Pala N. A., Shukla G., Vineeta K. M., et al. (2018). Indigenous uses of ethnomedicinal plants among forest-dependent communities of Northern Bengal, India. J Ethnobiol Ethnomed, 14 (1), 8. https://doi.org/10.1186/s13002-018-0208-9
31. Negi D. P., Singh M. M. (2018). Tribal health and health care beliefs in India: a systematic review. Int J Res Soc Sci, 8 (1), 219–26.
32. Patra J. K., Das G., Kumar S., Thatoi H. N. (Eds). (2019). Ethnopharmacology and biodiversity of medicinal plants. Palm Bay, Florida: Apple Academic Press.
33. Ghurye G. S. (1963). Anatomy of a Rural Urban Community. Bombay: Popular Prakashan.
34. Gautam, M. K. (1977). In Search of an Identity: A case of the Santal of northern India. Unpublished PhD Dissertation. Leiden: Leiden University.
35. Nair, M. K. S. (1987). The Tribal Economy: Continuity or Change? New Delhi: Inter-India Publications.
36. Gopalan C. (1992). Nutrition in developmental transition in South-East Asia. Regional Health Paper, SEARO, No. 21. New Delhi: World Health Organization, Regional Office for South-East Asia.
37. Morang H. C., Barman H., Bezbaruah M. P. (2018). Development transition of a Riverine tribe: A study of the missing in the Brahmaputra valley. Ind J Hum Develop, 12 (1), 52–73. https://doi.org/10.1177/0973703018778129
38. Sahani R., Gautam R. K., Golnabi A. H., Vedwan N. (2018). Comparative study of chronic energy deficiency among adult males of Andaman and Nicobar Islands and their counterparts. Anthrop Rev, 8 (1), 1–7. https://doi.org/10.2478/anre-2018-0001
39. Batra L. (2009). A review of urbanisation and urban policy in post-independent India. Working paper series. Centre for the Study of Law and Governance. Pp. 1–47. New Delhi: Publish Inc. JNU.
40. Mohan R., Dasgupta S. (2004). Urban Development in India in the Twenty First Century: Policies for Accelerating Urban Growth**.** The Fifth Annual Conference on Indian Economic Policy Reform at the Stanford Centre for International Development. Working paper no. 231, pp. 1–63. https://www.bajkulcollegeonlinestudy.in/StudyMaterialFinal/Geography/169%20PG%204th%20Sem%20Urban%20Development%20of%20India%2021st%20century%20%20Mintu%20Jana.pdf(accessed on 3 December 2022).

41. Colmer J. (2017). Urbanisation, Growth, and Development: Evidence from India. London School of Economics. World Bank, Washington, DC. Department of International Development. Working Paper. Pp. 1–52. https://www.shram.org/uploadFiles/20180110111049.pdf (accessed on 15 July 2022).
42. Kapoor A. K., Kshatriya G. K. (2000). Fertility and mortality differential among selected tribal population groups of north-western and eastern India. J Biosoc Sci, 32, 253–264. https://doi.org/10.1017/S0021932000002534
43. R. G. I. 2011. https://censusindia.gov.in/census.website/data/census-tables (accessed on 2 January 2023).
44. R.M.R.C.T. Bhubaneswar. (2000–2001). http://www.rmrcbbsr.gov.in/facilities_services.php (accessed on 25 February 2023).
45. Shetty P. S. (2002). Nutrition Transition in India. Pub Health Nutr, 5 (1A), 175–182. https://doi.org/10.1079/PHN2001291
46. Gupta, R., Sharma A. K. (1994). Prevalence of hypertension and subtypes in an Indian rural population: clinical and electrocardiographic correlates. J Hum Hyperten, 8, 823–829.
47. Haddad S., Katia M., Kendra S., Geneviève M. (2012). "Health divide" between indigenous and non-indigenous populations in Kerala, India: Population based study. BMC Pub Health, 12, 390. https://doi.org/10.1186/1471-2458-12-390
48. Jeemon P., Reddy K. S. (2010). Social determinants of cardiovascular disease outcomes in Indians. Ind J Med Res, 132 (5), 617–22.
49. Soman C. R., Kutty V. R., Safraj S., Vijayakumar K., Rajamohanan K., Ajayan K. (2011). All-Cause Mortality and Cardiovascular Mortality in Kerala State of India: Results From a 5-Year Follow-up of 161 942 Rural Community Dwelling Adults. Asia Pacif J Pub Health, 23 (6), 896–903. https://doi.org/10.1177/1010539510365100
50. Sathish T., Kannan S., Sarma P. S., Razum O., Thankappan K. R. (2012). Incidence of hypertension and its risk factors in rural Kerala, India: A community-based cohort study. Pub Health, 126 (1), 25–32. https://doi.org/10.1016/j.puhe.2011.11.002
51. Barth F. (1956). Ecological relationship of ethnic groups in Swat, North Pakistan. Amer Anthrop, 58 (6), 1079–1089. https://doi.org/10.1525/aa.1956.58.6.02a00080
52. Singh B. (1994). Factors influencing health of tribal population groups. In: S. Basu (ed.). Tribal Health in India. Delhi: Manak Publisher. 40–56.
53. Vatta K., Budhiraja P., Dixit S. (2017). Vulnerability of Tribal Rural Households in India: Measuring the Current Status, Risks of Climate Shocks and Impact of Potential Interventions for Improving Rural Livelihoods. Ind J Agricul Econ, 72 (3). https://ageconsearch.umn.edu/record/302271/files/19Kamal%20Vatta%2001.pdf (accessed on 20 October 2022)

54. Kuchimanchi B., Nazareth D., Bendapudi R., Awasthi S., D'Souza M. (2019). Assessing differential vulnerability of communities in the agrarian context in two districts of Maharashtra, India. Clim Deve, 11 (10), 918–929. https://doi.org/10.1080/17565529.2019.1593815
55. McGarvey S. T. (2012). Epigenetics and human biology and health responses to modernization in the Samoan Archipelago. Colleg Antrop, 36 (4), 1169–1173.
56. Schulz L. O., Chaudhari L. S. (2015). High-risk populations: The Pimas of Arizona and Mexico. Curr Obes Report, 4 (1), 92–98. https://doi.org/10.1007/s13679-014-0132-9
57. Reddy K. S. (1993). Cardiovascular diseases in India. World Heal Statis Quart, 46, 101–107.
58. Gupta R. (2005). Burden of coronary heart disease in India. Ind Heart J, 5 (6), 632–638.
59. Rizwan S. A., Kumar R., Singh K. S., Kusuma Y. S., Yadav K. (2014). Prevalence of hypertension in Indian tribes: A systematic review and meta-analysis of observational studies. Plos One, 9 (5), 1–10. https://doi.org/10.1371/journal.pone.0095896
60. Mukhopadhyay B., Mukhopadhyay S., Majumder P. P. (1996). Blood pressure profile of Lepchas of the Sikkim Himalayas: Epidemiological study. Hum Biol, 68, 131–45.
61. Schraer C. D., Adler A. I., Mayer A. M., Halderson K. R., Trimble B. A. (1997). Diabetes complications and mortality among Alaska Natives: 8 years of observation. Diabetes Care, 20, 314–21. https://doi.org/10.2337/diacare.20.3.314
62. Chobanian A. V., Bakris G. L., Black H. R., Cushman W. C., Green L. A., Izzo J. L., et al. (2003). The seventh report of the joint national committee on prevention, detection, evaluation and treatment of high blood pressure. Hyperten, 42, 1206–52. https://doi.org/10.1161/01.HYP.0000107251.49515.c2
63. Somannavar S., Ganesan A., Deepa M., Datta M., Mohan V. (2009). Random Capillary Blood Glucose Cut Points for Diabetes and Pre-Diabetes Derived from Community-Based Opportunistic Screening in India. *Diabetes Care,* 32 (4): 641–643. https://doi.org/10.2337/dc08-0403
64. Sachdev B. (2011). Prevalence of hypertension and associated risk factors among Nomad tribe groups. Antrocom Online J Anthropol, 7, 181–9.
65. Manimunda S. P., Sugunan A. P., Benegal V., Balakrishna N., Rao M. V., Pesala K. S. (2011). Association of hypertension with risk factors and hypertension related behaviour among the aboriginal nicobarese tribe living in Car Nicobar Island, India. Ind J Med Res, 133, 287–93
66. Sachdev B. (2012). Screening of Type 2 diabetes mellitus and its associated risk factors among select tribes of Rajasthan. Intern J Health Sci Res, 2, 33–44.
67. Beula M. A. (2012). Epidemiological studies on type-2 diabetes mellitus in Kaani tribes of Kanyakumari district, Tamil Nadu, India. Inter J Res Rev Pharm Appl Sci, 2, 651–61.

68. Hathur B., Basavegowda M., Ashok N. C. (2013). Hypertension: An emerging trend among the tribal population of Mysore; Jenu Kuruba tribe diabetes and hypertension study. Intern J Health and Allied Sci, 2, 270–274. https://doi.org/10.4103/2278-344X.126748
69. Upadhyay R. P., Misra P., Chellaiyan V. G., Das T. K., Adhikary M., Chinnakali P., et al. (2013). Burden of diabetes mellitus and prediabetes in tribal population of India: A systematic review. Diab Res Clin Prac, 102, 1–7. https://doi.org/10.1016/j.diabres.2013.06.011
70. Radhakrishnan S., Ekambaram M. (2015). Prevalence of diabetes and hypertension among a tribal population in Tamil Nadu. Archive of Med Health Sci, 3, 66–71. https://doi.org/10.4103/2321-4848.154948
71. Sathiyanarayanan S., Muthunarayanan L., Devaparthasarathy T. A. (2019). Changing Perspectives in Tribal Health: Rising Prevalence of Lifestyle Diseases among Tribal Population in India. Ind J Com Med, 44 (4), 342–346. https://doi.org/10.4103/ijcm.IJCM_40_19
72. World Health Organization. (2018). Non-communicable diseases country profiles. (2018). ISBN 978-92-4-151462-0 https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases. (Accessed on 14 September 2022).
73. World Health Organization. (2011). Global status report on non-communicable diseases 2010. Geneva: World Health Organization, 2011.
74. Deepadarshan H., Shweta D. H. (2017). Lifestyle factors and lifestyle diseases among rural population of Bengaluru rural district. Inter J Com Med Pub Health, 4 (5), 1558–1561. https://doi.org/10.18203/2394-6040.ijcmph20171763
75. Sajeev P., Soman B. (2018). Prevalence of noncommunicable disease risk factors among the Kani tribe in Thiruvananthapuram district, Kerala. Ind Heart J, 70 (5), 598–603. https://doi.org/10.1016/j.ihj.2018.01.022
76. Sadath A., Jose K., Jiji K. (2022). Prevalence and Determinants of Substance Use Among Indigenous Tribes in South India: Findings from a Tribal Household Survey. J Rac Ethn Health Dispar, 9, 356–366. https://doi.org/10.1007/s40615-021-00964-2
77. Verma P., Saklecha D., Akshar P. (2018). A study on prevalence of tobacco consumption in tribal district of Madhya Pradesh. Inter J Com Medi Pub Health, 5 (1), 76–80. https://doi.org/10.18203/2394-6040.ijcmph20175508
78. Murugaboopathy V. (2018). Tobacco usage among tribal population of Nilgiris, Tamil Nadu – a cross sectional study. Tobacco Induced Diseases, 16 (1), 916. https:/doi.org/10.18332/tid/84588
79. Kumar R. K., Tiwari R. (2016). A cross sectional study of alcohol consumption among tribal and non-tribal adults of Narayanganj block in Mandla district of Madhya Pradesh, India. Inter J Comm Med, 3 (4), 791–5. https://doi.org/10.18203/2394-6040.ijcmph20160737

80. Chakma T., Kavishwar A., Sharma R. K., Rao P. V. (2017). High prevalence of hypertension and its selected risk factors among adult tribal population in Central India. Pathol and Glob Health, 111 (7), 343–350. https://doi.org/10.1080/20477724.2017.1396411
81. Chaturvedula R. V., Rampure D., M. B. V., C. U. B., C. R. P., S. K. (2014). Anthropological status and prevalence of Type 2 Diabetes Mellitus in tribals and non-tribals of Khammam district of Andhra Pradesh – Interim report. Inter J Res Health Sci, 2, 335–339.
82. Kapoor D., Bhardwaj A., Dinesh K., Raina S. (2014). Prevalence of Diabetes Mellitus and Its Risk Factors among Permanently Settled Tribal Individuals in Tribal and Urban Areas in Northern State of Sub-Himalayan Region of India. Inter J Chron Dis, 2014, Article ID 380597. https://doi.org/10.1155/2014/380597
83. WHO/FAO (2003). Diet, Nutrition and Prevention of Chronic Diseases. WHO technical report series 916. Geneva: WHO.
84. Indian Council of Medical Research (ICMR) (2010). Nutrient Requirements and Recommended Dietary Allowance for Indians. A Report of the Expert Group of the Indian Council of Medical Research, New Delhi.
85. Kar S., Thakur J. S., Kaur N., Jain, S., Kumar R. (2010). Risk factors for cardiovascular diseases: Is the social gradient reversing in northern India? The National Medical Journal of India, 23, 206–9.
86. Kaulagekar A., Radkar A. (2007). Social status makes a difference: tuberculosis scenario during National Family Health Survey-2. Ind J Tuber, 54 (1), 17–23.
87. Yadav R., Rao V., Bhat J., Gopi P., Selvakumar N., Wares D. (2010). Prevalence of pulmonary tuberculosis among the Baigas – a primitive tribe of Madhya Pradesh, Central India. The Ind J Tuber, 57, 114–6.
88. Purty A. J., Mishra A. K., Chauhan R. C., Prahankumar R., Stalin P., Bazroy J. (2019). Burden of pulmonary tuberculosis among tribal population: A cross-sectional study in tribal areas of Maharashtra, India. Ind J Com Med, 44, 17–20.
89. Annual Report R.M.R.C.T. Bhubaneswar (1993–1994). http://www.rmrcbbsr.gov.in/pdf/Annual-Report-1993-1994.pdf (accessed on 3 March 2023)
90. Kumar M. S., Padmavathi S., Shivkumar M., Charles U., Appalanaidu M., Perumal R., Thiagarajan P. N., Somasekhar Y. (2015). Hidden leprosy cases in tribal population groups and how to reach them through a collaborative effort. Lepr Rev, 86 (4), 328–334.
91. Behera P., Munshi H., Kalkonde Y., Deshmukh M., Bang A. (2021). Control of scabies in a tribal community using mass screening and treatment with oral ivermectin -A cluster randomized controlled trial in Gadchiroli, India. PLOS NegTropiDisea. 15 (4), e0009330. https://doi.org/10.1371/journal.pntd.0009330

92. Krishnaswami K. (1998). Country profile: India. nutritional disorders – old and changing. Lancet, 351, 1268–1269. https://doi.org/10.1016/S0140-6736(98)03010-4
93. Nemer L., Galband H., Jha P. (2001). Commission on Macroeconomics and Health. The evidence base for interventions to reduce malnutrition in children under five and school-age children in low and middle income countries. CMH working paper on WGS: 11. Geneva: World Health Organization.
94. World Health Organization (WHO) (2002). The World Health Report 2002: Reducing Risks, Saving Lives. Geneva: WHO. https://www.who.int/publications-detail-redirect/9241562072 (accessed on 30 October 2022)
95. World Health Organization (2004). The World health report: 2004: Changing history. World Health Organization. https://apps.who.int/iris/handle/10665/42891 (accessed on 17 April 2023).
96. Müller O., Garenne M., Kouyaté B., Becher H. (2003). The association between protein-energy malnutrition, malaria morbidity and all-cause mortality in West African children. Trop Med Inter Health, 8, 507– 511. https://doi.org/10.1046/j.1365-3156.2003.01043.x
97. Black R. E., Morris S. S., Bryce J. (2003). Where and why 10 billion children dying every year? Lancet, 361, 2226–2234. https://doi.org/10.1016/S0140-6736(03)13779-8
98. FAO/WHO/UNU (2004). Report of a Joint Expert Consultation Human Energy Requirements. FAO, Food and Nutrition Technical Report Series 1, Rome, http://www.fao.org/docrep/007/y5686e/y5686e00.HTM (accessed on 23 March 2023).
99. Kshatriya G. K., Acharya S. K. (2016). Triple burden of obesity, undernutrition, and cardiovascular disease risk among Indian tribes. Plos One, 11(1), 1–19. https://doi.org/10.1371/journal.pone.0147934
100. Bose K., Chakraborty F. (2005). Anthropometric characteristics and nutritional status based on body mass index of adult Bathudis: A tribal population of Keonjhar District, Orissa, India. Asia Pacif J Clin Nutr, 14, 80–2.
101. Bose K., Ganguly S., Mamtaz H., Mukhopadhyay A., Bhadra M. (2006). High prevalence of undernutrition among adult Kora Mudi tribals of Bankura District, West Bengal, India. Anthrop Sci, 114 (1), 65–68. https://doi.org/10.1537/ase.050306
102. Banik S. D., Bisai S., Bhattacharya M., Das S., Jana A., Purkait P. (2007). Undernutrition among Adult Dhimals of Naxalbari, West Bengal: Comparison with other Tribes of Eastern India. Food and Nutrition Bulletin, 28. 348–52. https:/doi.org/10.1177/156482650702800311
103. Census of India (2011). New Delhi: Office of the Registrar of General and Census Commissioner.
104. National Health Profile (2011). http://www.cbhidghs.nic.in/WriteReadData/l892s/01%20d%20%20Index%202011.pdf (accessed on 2 February 2023).

105. Das S., Bose K. (2014). Anthropometric assessment of nutritional status of adult Hill Kherias of Purulia district, West Bengal. In: Sinha A. K., Sharma K. (eds). Human Ecology in an Era of Globalization and Urbanization: Anthropological Dimension, New Delhi: Serials Publications PVT. Ltd. 381–90.
106. Dash K. N. (2013). Health Status and Health Care Services: A Study among the Tribal Communities of Jajpur District of Odisha. J Adiva, 53 (1&2), 27–34.
107. Balgir R. S. (2000). Human genetics, health and tribal development in Orissa. In: Sharma P. D. (ed.). Environment, Health and Development: An Anthropological Perspective, 87–104. Ranchi, S.C. Roy Institute of Anthropological Studies.
108. Balgir R. S. (2009). Tribal Health Problems, Disease Burden and Ameliorative Challenges in Tribal Communities with Special Emphasis on Tribes of Orissa. https://www.semanticscholar.org/paper/Tribal-Health-Problems-%2C-Disease-Burden-and-in-wth-Balgir/20071aece1bf245dc1edcd6e38c09b305d0877e3
109. National Family Health Survey 4 (2015–2016). rchiips.org/nfhs/pdf/NFHS4/OR_FactSheet.pdf (accessed on 26 January 2023).
110. National Family Health Survey 5 (2019–2021). http://rchiips.org/nfhs/NFHS-5_FCTS/COMPENDIUM/Odisha.pdf (accessed on 15 February 2023).
111. Balgir R. S. (2005). Biomedical anthropology in contemporary tribal society of India. In: Behera D. K., Pfeffer G. (eds.). Contemporary Society: Tribal Studies (Tribal Situation in India), New Delhi: Concept Publishing Company, 292–301.
112. Chhotray G. P. Health status of primitive tribes of Orissa. ICMR Bulletin. 2003; 33. No. 10. India – Household Consumer Expenditure Type 1, July 2009 – June 2010, NSS 66th Round http://microdata.gov.in/nada43/index.php/catalog/122 (accessed on 14 March 2023).
113. Das P. (2016). The lost tribe of Odisha. The Hindu. https://www.thehindu.com/news/nation/The-lost-tribeofOdisha/article14553424.ece/amp/
114. Lahangir S. (2016). Malnutrition in Odisha's Nagada highlights the continuing discrimination against tribals. http://thewire.in/54484/odisha-juang-malnutrition/.
115. Mittal P. C., Srivastava S. 2006. Diet, nutritional status and food related traditions of Oraon tribes of New Mal (West Bengal), India. Rur Rem Health, 6 (2), 1–11. https://doi.org/10.22605/RRH385
116. Chakrabarty S., Pal M., Bharati S., Bharati P. (2008). Chronic Energy Deficiency among Tribal Communities of Orissa, India. Trib Trib, 2, 95–101.
117. Beck P., Mishra B. K. (2010). Socio-Economic Profile and Quality of Life of Selected Oraon Tribal Living in and Around Sambalpur Town, Orissa. Curr Res J Soci Sci, 2 (6), 340–349.
118. Goswami M. (2012). Reproductive Profile and Child Health Care Practices of the Tribals. New Delhi: Inter India Publications.

119. Bisai S., Bose K. (2012). Critical nutritional stress among adult tribal populations of West Bengal and Orissa, India. Nature Proceedings. https:/doi.org/10.1038/npre.2012.7068.2
120. Kapoor A. K., Saluja K., Verma D., Kapoor S. (2012). Predictors of Hypertension among Adult Tribal Males of India. Inter J Trop Dis Health, 2(4), 241–256. https://doi.org/10.9734/IJTDH/2012/1750
121. Goswami M. (2013). Prevalence of Under-nutrition among the Juangs: A study on a particularly vulnerable tribal group of Odisha, India. Antroc, 9 (1), 15–27.
122. Goswami M. (2015). Anthropometric Characteristics and Chronic Energy Deficiency of the Mankirdias – A PTG of Northern Odisha, India. Stud Trib Trib, 13 (1), 88–93. https://doi.org/10.1080/0972639X.2015.11886715
123. Goswami M. (2016). The Health Scenario of The Tribes of Odisha – A Review. Ind J Phys Anthrop Hum Gen, 35, 237–244.
124. Indian Council of Medical Research. 2003–2004. https://main.icmr.nic.in/sites/default/files/annual_repoorts/Annual-Report_2003-2004.pdf (accessed on 26 December 2022).
125. Dharanaik S. S., Prabhakar S. C. J. (2019). Health Status of Particularly Vulnerable Tribal Groups of Karnataka, India: A Critical Outlook. Inter J Adv Res, 7, 320–330. https://doi.org/10.21474/IJAR01/8638
126. Harper B., Harding A., Harris S., Berger P. (2012). Subsistence Exposure Scenarios for Tribal Applications. Hum Ecol Risk Assess, 18 (4), 810–831. https:/doi.org/10.1080/10807039.2012.688706
127. Schure M. B., Kile M. L., Harding A., Harper B., Harris S., Vesugi S., Goins R. T. (2013). Perceptions of the environment and health among members of the confederated tribes of the Umatilla Indian reservation. Environ Just, 6 (3), 115–120. https://doi.org/10.1089/env.2013.0022
128. Orissa Vision (2010): A Health Strategy – Orissa State Integrated Health Policy, Strategies and Action Points. 2003. Bhubaneswar: Health and Family Welfare Department, Government of Orissa.
129. Ray A. K., Rath E. A. (1984). Demography of the Juang tribal population of Orissa. Amer J Phys Anthrop, 65, 387–393. https://doi.org/10.1002/ajpa.1330650408
130. Ray A. K., Rath E. A. (1991). Indian tribal fertility patterns from Orissa. Man in Ind, 71, 235.
131. Patnaik N. (1986). The Juangs of Orissa: their work and food intake, demography and fertility. Adibasi, 26 (3), 22–65.
132. Basu, S. K. (1993). Study on Fertility and Mortality Trends among Tribal Population of India – A Review (Monograph). New Delhi: Indian Council of Social Science Research.
133. Mohapatra A., Geddam J. J., Marai N. S., Murmu B., Mallick G., Acharya A. S., Satyanarayan K. (1997). Nutritional profile of mothers and children

from Kalahandi district of Orissa. Annual Report 1996–1997. Bhubaneswar: Regional Medical Research Centre.
134. Balgir R. S. (1999). Physical growth, health and nutritional status of Ashram school children. Annual Report 1998–1999. Bhubaneswar: Regional Medical Research Centre.
135. Bulliya G., Mohapatra S. S. S, Kerketta A. S., Das R. K., Jangid P. K. (2001). Assessment of health and nutritional profile among the elderly population of Orissa primitive tribes. Annual Report 2000–2001. Bhubaneswar: Regional Medical Research Centre.
136. Pinstrup-Andersen P., Burger S., Habicht J. P., Peterson K. (1993). Protein–energy malnutrition. In: Jamison D. T., Mosley W. H., Measham A. R., Bobadilla J. L. (eds). *Disease control priorities in developing countries,* 391–420. 2nd ed. Oxford (UK): Oxford University Press.
137. Murray C. J., Lopez A. D. (1997). Global mortality, disability, and the contribution of risk factors: Global Burden of Disease Study. Lancet, 349 (9063), 1436–1442. https://doi.org/10.1016/S0140-6736(96)07495-8
138. Rice, A. L., Sacco, L., Hyder, A., Black, R. E. (2000). Malnutrition as an underlying cause of childhood deaths associated with infectious diseases in developing countries. Bull WHO, 78 (10), 1207–1221.
139. Black, R. (2003). Micronutrient deficiency – an underlying cause for morbidity and mortality. Bull WHO, 81, 79.
140. Brabin B. J., Coulter J. B. S. (2003). Nutrition-associated disease. In: Cook G. C., Zumla A. I. (eds). *Manson's tropical diseases*, 561–80. London: Saunders.
141. Basu S. K. (1994). A health profile of tribal India. Health for the Millions, 2 (2), 12–14.
142. Mohapatra A., Geddam J. J., Marai N. S., Murmu B., Mallick G., Acharya A. S., Satyanaraya, K. (1997). Nutritional profile of mothers and children from Kalahandi district of Orissa. Annual Report 1996–1997. Bhubaneswar: Regional Medical Research Centre.
143. Bulliya, G., Mohapatra, S. S. S., Kerketta, A. S., Nayak, R. N. (1999–2000). Assessment of health and nutritional profile among elderly population of Orissa primitive tribes. Annual Report, p. 40. Bhubaneswar: Regional Medical Research Centre.
144. Raghuram Rajan Committee report on states 'least developed'. (2013). September 27. https://economictimes.indiatimes.com/blogs/policypundit/raghuram-rajan-committee-report-on-states-least-developed/. (accessed on 13 January 2023).
145. G.O.I. Annual Report. Ministry of Home Affairs (2001–2002). https://www.mha.gov.in/document/annual-reports/annual-report-ministry-of-home-affairs-2001-2002 (accessed on 23 December 2022).
146. Rao V. G., Anvikar A., Savargaonkar D., Bhat J., Yadav R., Tiwary B. K. A. (2009). A: Prevalence of sexually transmitted disease syndromes in tribal

population of central India. J Epidemiol Comm Health, 63, 805–806. https://doi.org/10.1136/jech.2008.082909
147. Naik E., Karpur A., Taylor R., Ramaswami B. (2009). Rural Indian tribal communities: an emerging high-risk group for HIV/AIDS. BMC Inter Health Hum Rights, 5, 1. https://doi.org/10.1186/1472-698X-5-1
148. Santhakumar A., Mathiyazhakan M., Jaganathasamy N., Ganesh B., Manikandan N., Padmapriya V. M., Monika A., David J. K., Kumar A., Arumugam E. (2020). Prevalence and Risk Factors Associated with HIV Infection among Pregnant Women in Odisha State, India. Inter J MCH AIDS, 9 (3), 411–420. https://doi.org/10.21106/ijma.366
149. Narang P., Tyagi N. K., Mendiratta D. K., Jajoo U. N., Bharambhe M. S. 1999. Prevalence of sputum positive pulmonary tuberculosis in tribal and non-tribal populations of the Ashti and Karanjatahsils in Wardha district, Maharashtra State, India. Int J Tuberc Lung Dis, 3 (6), 478–482.
150. Datta M., Radhamani M. P., Sadacharam K., Selvaraj R., Rao D. L., et al. (2001). Survey for tuberculosis in a tribal population in North Arcot District. Int J Tuberc Lung Dis, 5, 240–249.
151. Rao V. G., Gopi P. G., Yadav R., Subramani R., Bhat J., Anvikar A. R., Sadacharam K., Tiwari B. K., Gadge V., Bhondeley M. K., Shukla G. P., Ukey M., Jain S., Wares D. F. (2008). Annual risk of tuberculosis infection among tribal population of central India. Trop Med Inter Health, 13 (11), 1372–1377. https://doi.org/10.1111/j.1365-3156.2008.02152.x
152. Bhat J., Rao V. G., Gopi P. G., Yadav R., Selvakumar N. (2009). Prevalence of pulmonary tuberculosis amongst the tribal population of Madhya Pradesh, central India. Int J Epidemiol, 38 (4), 1026–1032. https://doi.org/10.1093/ije/dyp222
153. TB India Report (2018). R. N. T. C. P. Annual Report Status. Central TB Division, New Delhi: Directorate General of Health Services, Ministry of Health with Family Welfare, Nirman Bhavan. pdf: 1–176. TB India 2018. https://www.tbcindia.gov.in. (accessed on 17 September 2022).
154. National Health Profile (NHP) of India (2018). https://www.cbhidghs.nic.in/index1.php?lang=1&level=2&sublinkid=88&lid=1138. (accessed on 29 October 2022).
155. Hussain T., Tripathy S. S., Das S., Satapathy P., Das D., Thomas B., Pati S. (2020). Prevalence, risk factors and health seeking behaviour of pulmonary tuberculosis in four tribal dominated districts of Odisha: Comparison with studies in other regions of India. PloS One, 15 (4), e0227083. https://doi.org/10.1371/journal.pone.0227083
156. Tripathi N., Kishore J., Babu B. (2020). Prevalence of Hypertension in Indian Tribal Adult population: A Scoping Review. J Adv Res Med, 7 (1), 5–13. https://doi.org/10.24321/2349.7181.202002

157. Mohapatra S., Satpathy K. C., Patra P. K., Das P. K. (2022). Epidemiology of blood pressure among some tribes of India: Bhumij, Bathudi and Savar. https://www.etribaltribune.com/index.php/volume-7/mv7i2/epidemiology-of-blood-pressure-among-some-tribes-of-india-bhumij-bathudi-and-savar 1/21 (accessed on 12 July 2022).
158. Satpathy K. C., Patra P. K., Mohapatra S. (2019). Epidemiology of Blood Pressure Among the Tribes of Odisha. In: Behera M. C. (ed.), Shifting Perspectives in Tribal Studies, Chapter 15, 291–312. Springer Nature Singapore Pte Ltd. https:/doi.org/10.1007/978-981-13-8090-7_15
159. Laxmaiah A., Meshram I., Arlappa N., Balakrishna N., Kodavanti M., Chitty G. R., Ravindranath M., Kumar S., Rachakulla H., Brahmam G. (2015). Socio-economic & demographic determinants of hypertension & knowledge, practices & risk behaviour of tribals in India. The Ind J Med Res, 141 (5), 697–708.
160. Howson C. P., Reddy K. S., Rayan T. J., Bale R. B. (1998). Control of Cardiovascular Diseases in Developing Countries, Research, Developing and International Strengthening. Report of Committee on Research Development and International strengthening for Control of Cardiovascular Disease in Developing countries. Washington DC: National Academic Press.
161. Satpathy S. P., Panda S. K., Panda P. C., Lakra K., Panda S. C., Dhawan P., Goel S. (2022). Association of tobacco with hypertension in adult females: Evidence from National Family Health Survey-IV for an aspirational Indian state. Clinic Epid Glob Health, 15, 101061. https://doi.org/10.1016/j.cegh.2022.101061
162. Datta B. K., Husain M. J. (2021). Uncontrolled hypertension among tobacco-users: women of prime childbearing age at risk in India. BMC Wom Health 21, 146. https://doi.org/10.1186/s12905-021-01280-x
163. Kusuma Y. S., Das P. K. (2008). Hypertension in Orissa, India. A cross-sectional study among some tribal, rural and urban populations. Pub Health, 22 (10), 1120–1123. https://doi.org/10.1016/j.puhe.2007.10.007
164. National Nutrition Monitoring Bureau (NNMB) Technical Report No: 24 (2006). Diet and Nutritional Status of Population and Prevalence of Hypertension among adults in rural areas.
165. Kusuma Y. S., Gupta S. K., Pandav C. S. (2008). Does recent migration explain elevated blood pressure? A study among migrants in Delhi, India. CurrntSci, 95 (10), 1408–1410.
166. National Nutrition Monitoring Bureau (NNMB), NIN (2009). Diet and Nutritional Status of Tribal Population and Prevalence of Hypertension among Adults – Report as Second Repeat Survey. NNMB Technical Report No. 25. Hyderabad: National Institute of Nutrition. https://scirp.org/reference/referencespapers.aspx?referenceid=3046708 (accessed on 23 January 2023)
167. Singh N. (2015). Understanding poor man's diseases in contemporary perspective. Ind J Med Res, 141, 501–4.

168. Balgir R. S. (1997). Khonds – health status. In: Madhava Menon T., Sivathanu C., Prasanth K. P., Sasikumar M., Mathur P. R. G. (eds.). Encyclopedia of Dravidian Tribes. Trivendrum: The International School of Dravidian Linguistics. pp. 21–29.
169. Balgir R. S. (2004). Dimensions of rural tribal health, nutritional status of Kondh tribe and tribal welfare in Orissa: a biotechnological approach. Proceedings of the UGC Sponsored National Conference on Human Health and Nutrition: A Biotechnological Approach (Lead Lecture). Thane, 12–13th December 2004. 47–57.
170. Shah, R., Belanger, D. (2011). Socioeconomic correlates of utilization of maternal health services by tribal women in India. Canad Stud in Popul, 38 (1–2), 83–98. https://doi.org/10.25336/P6Z89V
171. Islary, J. (2014). Health and health seeking behaviour among tribal communities in India. A Socio-Cultural Perspective. Journal of Tribal Intellectual Collective India, 2 (1) https://www.researchgate.net/publication/26574486.
172. Mahesh R. (2016). Tribals health status: A case study in Chamrajanagar district. J Adv Busin Manag, 2 (1), 42–44.
173. Dey S. M., et al. (2017). Assessment of periodontal health status among Koraga tribes residing in Mangalore taluk: a cross sectional study. Int J Res Med Sci, 5 (9), 3980–3984. https://doi.org/10.18203/2320-6012.ijrms20173966
174. Mahapatro M., Kalla A. K. (2000). Health seeking behavior in a tribal setting. Health Popul Perspect Issues, 23, 160–169.
175. Siddu V. H., Murthy K. K. D., Revankar R. (2012). Status and Infrastructure of the Health Sector in Karnataka. Artha J Soc Sci, 11 (3), 15–45. https://doi.org/10.12724/ajss.22.2
176. Rao K. S. (1998). Health Care Services in Tribal Areas of Andra Pradesh: A Public Policy Perspective. Eco Pol Week, 33 (9), 481–486.
177. Naik B. R. (2012). Health Status and Rights to Health among the Tribals in Andra Pradesh with special reference to Chittoor District. Sri Venkateswara University, Tirupati. Unpublished Thesis.
178. Powale T. V. (2015). A study of health care services in tribal area. Inter J Multidis Res, 1 (5). http://www.epitomejournals.com.
179. Adhikari T., Sahu D., Nair S., Saha K. B., Sharma R. K., Pandey A. (2016). Factors associated with utilization of antenatal care services among tribal women: A study of selected States. The Ind J Med Res,144 (1), 58–66.
180. Mohindra, K. S., Labonte R. (2010). A Systematic review of population health interventions and Scheduled Tribes in India. BMC Public Health, 10, 438. https://doi.org/10.1186/1471-2458-10-438
181. Sumirtha G., Veenapani R. V., Umakant D. (2017). Health seeking behaviour among particularly vulnerable tribal groups: A case study of Nilgiris. J Pub Health Epidem 9 (4), 74–83. https://doi.org/10.5897/JPHE2017.0911

182. Report of the Expert Committee on Tribal Health (2018). https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=1110&lid=630. (Accessed on 19 January 2023).
183. Bala S. M., Thiruselvakumar D. (2009). Overcoming Problems in the Practice of Public Health Among Tribals of India. Ind J of Comm Med: Off Publ Ind Assoc Preven Soc Med, 34 (4), 283–287. https://doi.org/10.4103/0970-0218.58383
184. Nayak K., Naik D. (2017). Indigenous knowledge and health care practices among the Santal communities: A case study of Mayurbhanj district of Odisha. Inter J Hum Soc Sci Res, 3 (3), 05–09.
185. Aradhana S., Jankisharan P., Virendra S. K., Ashish M. (2021). Cardiovascular Diseases Prediction using various Machine Learning Techniques. IOP Conference Series: Materials Science and Engineering, Volume 1022, 1st International Conference on Computational Research and Data Analytics (ICCRDA 2020) 24th October 2020, Rajpura, India. https://doi.org/10.1088/1757-899X/1022/1/012003
186. Mishra S., Kusuma Y. S., Babu B. V. (2015). Migration and health-care access: Barriers to access government health services by migrant tribal community living in an eastern Indian city. Inter J Med Sci Pub Health, 4 (1), 101–108. https://doi.org/10.5455/ijmsph.2015.0110201424
187. Verma M. K., Shah A. (2014). Health, Tradition and Awareness: A Perspective on the Tribal Health Care Practices. Res Proc, 2 (2), 82–91.
188. Sonowal, C. J., Praharaj, P. (2007). Tradition Vs Transition: Acceptance of Health Care Systems among the Santhals of Orissa. Ethno-Med, 1, 135–146. https://doi.org/10.1080/09735070.2007.11886306
189. Tekhre, Y. L., Sharma, A. (2009). Right to Health and Health Related Human Rights. Indian J Pub Administr, 55 (4), 848–866. https://doi.org/10.1177/0019556120090404
190. Mishra, M. (2012). Health Status and Diseases in Tribal Dominated Villages of Central India. Health and Popul Persp Iss, 35 (4), 157–175.
191. Sharma B., Giri G., Christensson K. (2013). The transition of childbirth practices among tribal women in Gujarat, India – a grounded theory approach. BMC Inter Health Hum Rights, 13, 41. https:/doi.org/10.1186/1472-698X-13-41
192. Saren G. (2013). Impact of globalizations on the Santals: A study on migration in West Bengal, India. Inter J Hum Soc Sci Inven, 2 (7), 29–33.
193. Guite N., Acharya S. (2006). Indigenous medicinal substances and health care: A Study among Paite Tribe of Manipur, India. Stud Trib Triba, 4 (2), 99–104. https://doi.org/10.1080/0972639X.2006.11886541
194. Mohapatra R. (2020). Development and Change of the People of Lodha tribe of Mayurbhanj of Odisha Eastern India. J Crit Rev, 7 (6), 327–333. https://doi.org/10.31838/jcr.07.06.57

195. Sahu S. K. (1986). Social Dimensions of Health of Tribals in India: A Case Study of Oraons of Orissa. In B. Chaudhuri, (ed.), Tribal Health: Socio-cultural Dimensions. New Delhi: Inter-India Publications. 330–310.

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