Amoebiasis is a disease caused by a single-celled protozoan organism, amoeba which belongs to the class Rhizopoda possessing organ of locomotion known as pseudopodia. Vast majority of amoebae are free-living in soil, water and decaying organic matter. A few are parasitic. In man, the parasitic species belong to four genera: Entamoeba, Endolimax, Iodamoeba and Dientamoeba. Of all these, only the genus Entamoeba contains species of medical importance which include E. coli, E. gingivalis, E. polecki, E. hartmanni and E. histolytica (Neal, 1966; Elsdon Dew, 1968; Smyth, 1999).

Entamoeba histolytica is the most medically important species of amoeba of man. Infection of man by E. histolytica commonly results to amoebiasis. However, E. histolytica is not always pathogenic in man: Majority of individuals infected by E. histolytica show no symptoms of the disease, and is referred to as non-invasive infection caused by small “minuta” race of the parasite. When infection of E. histolytica results to results to clinical symptoms, the disease is referred to as invasive amoebiasis. The invasive amoebiasis is caused by the large “magna” race of the parasite which is pathogenic invading and hydrolysing the tissue of the intestinal lining, blood cells and other organs of the body, causing the disease known as human amoebiasis. The life cycle of this parasite is through faecal-oral route, simple and direct; and man is the only host. The clinicopathological complications of invasive amoebiasis is serious and are grouped into intestinal and extra-intestinal (which may involve the liver, lungs, spleen, brain and skin) human amoebiasis. Details of these have been highlighted by Neal (1966); Abiyo and Endington (1972), Nnochiri (1975), Ukoli (1990) and Smyth (1999). In this present, the disease distribution, the burden on infected persons and communities as well as the impact of Nigerian environment on the prevalence and intensity are brought to focus. It is written to create a better understanding of the disease epidemiology and its eventual control/eradication in the country.

Disease distribution and burden

Amoebiasis is widespread in its distribution, occurring in all parts of the world. The invasive amoebiasis is more prevalent in certain areas of the world including West and South East Africa, China, the whole of South East Asia, Mexico and Western portion of South America, and the India subcontinent (Smyth, 1999). Poor environmental sanitation, personal hygiene and overcrowding as well as ignorance are some of the major factors that influence the high incidence and prevalence of E. histolytica in these regions. In Nigeria, amoebiasis is prevalent and widespread.

All races are susceptible to amoebiasis. Although the disease is often milder in European, this is probably related to sanitary standard, diet and freedom from debilitating disorders rather than a genuine racial factor (Ukoli, 1992). Infants under a year old are rarely infected with amoebiasis. The incidence gradually increases during childhood and usually reaches its highest incidence in young adults (Chandler and Read, 1961). Several results including Abioyo & Edington (1972) and Rivera (1972) showed that any observed differences that have been reported in the incidence and prevalence of amoebiasis between sexes are probably related to exposure rather than a true sex susceptibility to infection.

In the tropical and other developing countries, amoebiasis cause some 450 million infections per annum, and about 50 million incidents and an estimated 100,000 deaths annually (Ruvdin, 1988). Sargeaunt (1987) and Mirelman (1988) noted that about 10% of the E. histolytica infection result in invasive amoebiasis; while the remaining 90% of infected persons remain asymptomatic carriers who pass cysts of E. histolytica in their stool.

The socio-economic burden of amoebiasis is enormous. It causes death, impairs the physical, mental and intellectual development of the infected individuals as well as affects the educational performance of infected school children. In his observation, Ukoli (1992) stated that obviously, any disease which causes death or results in acute illness (such as amoebiosis) must exert an impact on productivity and hence the economy of the individual and the community.
On the issue of productive capacity, amoebiasis exerts considerable impact on the health of infected persons, “thereby limiting their productive capacity and ultimately adversely affect the national economy” as well as community development.

In their study, Halloran et al (1989) noted that many studies have provided convincing data to show the existence of a direct link between parasitic diseases, such as amoebiasis and school performance. And they further said that the impact of parasitic diseases on educational performance can be measured either quantitatively in terms of absenteeism, under-enrollment, drop-out rates and repetition of class or qualitatively in terms of school performance, alertness and capacity to process information. In an African University community, Azikiwe (1984) pointed out that amoebiasis and other gastrointestinal protozoan infections are often times the culprits of most cases of retarded physical development of children and young adolescents between the ages of five and fifteen years. No wonder then Onubuogu (1978) working on intestinal parasites (including *E. histolytica*) of school children in urban and rural areas of Eastern Nigeria observed that many children come to school with various poor health condition such as general weakness, nausea, vomiting, anaemia, diarrhoea, stomach upsets, distended abdomen, fever and headache. “This subscribes to the fact that such (infected) children are inattentive in the classroom and unable to participate actively in school activities; absenteeism becomes rampant in the school and consequently there is poor academic performance.”

**Amoebiasis And The Nigerian Environment**

Infection of *E. histolytica*, as pointed out earlier occurs when man ingests food stuffs, vegetables or drink water, milk, yoghurt etc. faecally contaminated by cysts of the parasite. Amoebiasis has higher prevalence and incidence in the tropical and subtropical developing countries such as Nigeria. This is not because of the tropical high temperatures and humidities of these countries, for these factors are in fact known to destroy *E. histolytica* (Nnochiri, 1975). Rather the higher prevalence and incidence are a reflection of the poor environmental sanitation and very poor personal hygiene and unclean habits practiced by endemic villagers compounded by public ignorance and illiteracy. In addition, in Nigeria, surveys by Azikiwe (1984), Kogi et al (1991) and Asaolu et al (1992) among others (Table 1) indicated that intestinal parasitic infections such as amoebiasis are growing problem in the country as the economic situation and availability of basic social amenities and infrastructure become very unsatisfactory.

In Nigeria, there are multiple environmental sources of transmission of amoebiosis: contaminated water, cysts passed by food handlers (in homes, eating houses or on the street), flies and direct faecal hand-to-mouth contamination. (Fig 1 and 2) Other environmental factors which aid and abate the acquisition of *E. histolytica* and related parasites include occupation and standard of living within the population (Oyerinde, 1981). Spencer et al (1976) and Koopman (1978) observed a striking correlation between prevalence of intestinal parasites such as *E. histolytica* and domestic water supply, toilet facilities, sewage and garbage disposal as well as environmental sanitation. In urban and semi-urban areas of Nigeria, Okpala (1961) further outlined the following factors as being responsible for high prevalence of *E. histolytica* and other parasitic infections:

- poor personal hygiene
- Poor housing and overcrowding
- Poor environmental sanitation and inadequate methods of disposal of human faeces and public refuse (Fig. 3)

As regards water contamination in the transmission of amoebiasis, sewage-contaminate water supplies have been shown to be the source of infection in some community-wide outbreaks of amoebiasis (WHO, 1968). The major cause of this contamination is usually due to defects of plumbing and sanitation. It is a common occurrence in our cities to observe leakages of pipes of public water supplies due to normal bursting of old pipes and or destruction during road and house construction activities. These leakages result in low water pressure and consequent contamination of the chlorinated piped water. And because of the fact that cyst of *E. histolytica* survive for long period in unchlorinated waters, faecal contamination of springs and streams in our rural communities or in semi-urban settlements which rely on such waters can be a source of major outbreaks of amoebiasis.

The role of food-handlers and vendors in the spread of faeco-oral parasitic diseases such as amoebiasis is epidemiologically significant. In Nigeria as in many other developing countries, the selling of ready-cooked foods on the streets of towns and cities as well as in rural areas is now a common practice. It is important to point out here that cyst of *E. histolytica* remains viable for up to 5 minutes on the surface of the hand and for about 45 minutes under the fingernails (Beaver et al, 1984). Also, in liquid foods (e.g. yoghurt, milk etc.), the cysts may survive for as long as 15 days at 4°C (Nnochiri, 1975). The import of this is that the involvement of these numerous food-handlers and vendors, with poor personal hygiene and dirty habits all over the country in conveying viable cysts to ready-cooked foods, sandwiches and other foods consumed without further processing is very significant in introducing and disseminating amoebiasis. In fact, the habit of purchasing and consuming meals and snacks prepared outside the home is typical of the present life style of some homes in the country. FAO (1989) reported that “20%-30% of the household expenditure in developing countries (including Nigeria) now is on street foods.” And pathogenic microorganisms that are indicators of faecal contamination, such as *Entamoeba histolytica*, *Escherichia coli*, *Shigella*, *Staphylococcus aureus* and *Bacillus cereus* are frequently present, and street food may cause outbreaks of amoebiasis, cholera, typhoid and hepatitis A (Abdussalam and Kaferstein, 1993).

The habit of hand feeding (Fig 2), which is a common practice by most Nigerians, especially in the rural areas may play important role in the faecal oral transmission of *E. histolytica* and related parasites. This is epidemiologically more significant in the rural and semi-urban communities where the filthy environment is
Complexed by poverty, ignorance and low standard of living. The use of hand feeding of babies by housemaids and baby seaters (most of whom are brought from the rural villages), who themselves are riddled by ignorance and poor personal hygiene need not be over emphasized.

House flies and other synanthropic flies come into contact both with substrata (such as faeces and other excreta, carcasses, garbage and other filthy matter) that may contain pathogens and then with human beings, their food and utensils. These flies pick up and carry many pathogens (viruses, bacteria, protozoa cysts, ova or larvae of helminths) both externally and internally (in their crop and intestinal tract). As a result these flies are potential and often important agents of transmission of several enteric parasitic diseases (Greenberg, 1971). In Nigeria, Dipeolu (1977) observed that such parasitic diseases that can be transmitted by these flies include amoebiasis and helminthic infections such as (Hookworm, Ascaris, Enterobius, and Trichuris). These flies breed in a variety of decaying, fermenting or rotting organic matter of both plant and animal origin; dung, garbage, and wastes from food processing, sewage, and organic manure other than dung.

Direct faecal contamination of the environment is another significant factor that predisposes our people to high incidence and prevalence of amoebiasis. Such direct contamination may occur when premises or homes are grossly contaminated by the habit of indiscriminate defaecation (Fig 3), especially in families who live in crowded conditions with poor sanitation. This type of environment is typical of what obtains in squatter/urban periphery and refugee settlements. Furthermore, Nnochiri (1975) noted that “some practices in certain tropical countries, e.g. ablutions after defaecation, may increase the frequency, of faecal contamination of hands and water” and assist in the transmission of amoebiasis. In Nigeria, the habit of indiscriminate defaecation especially among the poor rural communities aid and abate the spread of E.histolytica and other faecal-oral transmitted parasites.

All these are seen in filthy unhygienic environment. In Nigeria protozoa dispersed mainly by cysts such as E. histolytica have peaks of infections which coincide with the beginning and end of rains (Obiamwie, 1977). These peaks also coincide with “housefly season” which suggest contaminative transmission by the filthy flies as well as by contaminated water and food which such flies visit (Nnochiri, 1965; WHO, 1968). This is because during this fly season in the country, most parts of the urban and rural areas are littered with breeding grounds of the flies. On the other hand, during the non-fly season, these breeding sites are reduced, even with the littering of the environment. This because during this season most of the breeding sites are washed away by heavy storms (at the peak of rainy season). Also fly maggots (larvae) at this period are severely parasitized by micro-organisms in addition to being washed away and killed by the action of the run-offs. All of these reduce the relative abundance of the flies and their contaminative transmission at the peak of rainy season.
Table 1  Prevalence rate(%) of some of the faeco-oral/soil transmitted parasitic protozoans in Nigeria

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Area of study</th>
<th>E. Histolytica</th>
<th>E. coli</th>
<th>G. lamblia</th>
<th>E. nana</th>
<th>I. butschii</th>
<th>I. hominis</th>
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<tbody>
<tr>
<td>Amali &amp; Umeh (1997)</td>
<td>Rural farming Population in Benue state.</td>
<td>0.40</td>
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<tr>
<td>Amadi et al (1999)</td>
<td>Aba, Abia State</td>
<td>10.6</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Cowper &amp; Woodward (1960)</td>
<td>Moore Plantation, Ibadan</td>
<td>12.0</td>
<td>31.0</td>
<td>1.0</td>
<td>-</td>
<td>5.0</td>
<td>-</td>
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<tr>
<td>Gilles (1963)</td>
<td>Akufor near Ibadan, Oyo State</td>
<td>12.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Caundiri &amp; Okwuosa (2000)</td>
<td>Langtan LGA, Plateau state</td>
<td>12.1</td>
<td>5.3</td>
<td>1.0</td>
<td>-</td>
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<td>School age Fulani Children in Guduso, Girei LGA, Adamawa State</td>
<td>7.2</td>
<td>4.3</td>
<td>-</td>
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<td>Ikejian (1959)</td>
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<td>-</td>
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<td>-</td>
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<td>Eastern Nigeria</td>
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<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>Western Nigeria</td>
<td>10.0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mba &amp; Amadi (1991)</td>
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<td>13.3</td>
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<td>-</td>
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<td>Orient J. 1997</td>
<td>Pregnant and non-pregnant women in Nkpor, Idemili North LGA, Anambra State</td>
<td>13.64</td>
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<td>Mbanugo &amp; Arazie (2001)</td>
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<td>Nwoke &amp; Ajayi (1981)</td>
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<td>3.3</td>
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REFERENCES


