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Traditional practices and childhood cryptosporidiosis in Nigeria: A review

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ABSTRACT

Cryptosporidium infection is known worldwide as an important aetiology of chronic diarrhoea that can become fatal in children (below 5 years of age) and immunocompromised individuals. This review was aimed at identifying some traditional practices that may be risk factors for childhood diseases like cryptosporidiosis in a country like Nigeria with different tribes and cultures. Information gathered from literature search and informal sources identified some indigenous practices like birth rituals, special childhood menus, traditional nanny practice, local management of childhood diarrhoea and some myths among others, as factors that may negatively impact childhood health in a multi-cultural population like Nigeria. A proper understanding of these traditional practices will enable the prevention and control of childhood disease like cryptosporidiosis in a multi-ethnic setting.

Contents

1. Introduction

1.1. Nigeria

Nigeria with a population of about 152 million is the most populous country in West Africa.[1] The country has a land mass of 923,768 sq km and lies between Latitudes 4–14° North and between Longitudes 2°2′ and 14°30′.[2] Nigeria has a rich cultural diversity with over 250 different ethnic groups, all having their unique languages, customs and traditions. However, three main tribes Hausa, Igbo and Yoruba dominate the northern, southern, and western Nigeria respectively[3] (Fig. 1). Nigeria has a warm tropical climate with relatively high temperatures throughout the year. There is a rainy season (mid-March to November in the South and from May to October in the north) and dry season during the other months of the year.[4] Agriculture (crop production, animal husbandry, fishery and forestry) is the major occupation of the people in the rural areas of Nigeria.

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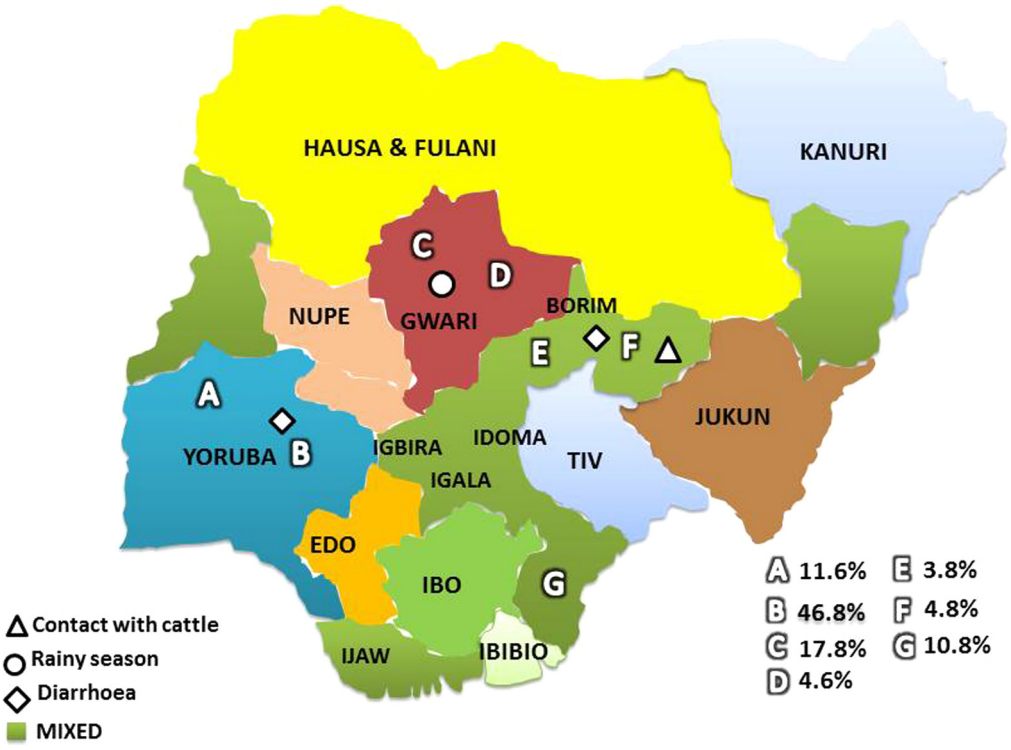

Fig. 1. Major tribes in Nigeria with reported prevalence and risk factors for cryptosporidiosis.

1.2. Cryptosporidiosis

Cryptosporidium infection is known worldwide as an important aetiology of diarrhoea in both immunocompromised and immunocompetent individuals.[5,6] In the developed and developing countries, cryptosporidiosis occurs more often in infants and children than in adults.[7,8] The infection is transmitted to the susceptible host via the fecal-oral route from the consumption of food and water contaminated with oocyst from an infected host.[9] Other suggested sources of Infection include contact with infected humans, animals, and contaminated recreational waters.[10–12] Cryptosporidiosis is characterised by a self-limited diarrheal illness in healthy individuals but may cause chronic diarrhoea that may be fatal to infants and individuals with compromised immune systems, such as persons with HIV/AIDS.[13] In children, cryptosporidiosis is mainly characterised by watery diarrhoea that can persist for up to 12 weeks and this condition is usually fatal in malnourished children.[14–17]

Several published reports are available on the epidemiology of *Cryptosporidium* infection in children and associated risk factors that might influence the pattern and outcome of the disease (Table 1 and Fig. 2).

1.3. Childhood Cryptosporidium in Nigeria

There are few available studies on the prevalence of childhood (aged 0–5 years) *Cryptosporidium* infection in children. Three of these studies investigated the infection in both diarrhoeic and non-diarrhoeic children[33–35], while the others studied the infection in only diarrhoeic children[36,19,37] and in malnourished children.[38] Methods employed by these studies include Modified Ziehl-Neelsen staining method; enzyme-linked immunosorbent assay technique (ELISA) and molecular methods (Table 2). Few available information on childhood cryptosporidiosis were reported for two states (Oyo and Osun) in south-western Nigeria,[33,35] two state (Jos and Zaria) in Northern Nigeria[19,34,37] and only one state in South

Table 1
Data on childhood cryptosporidiosis from some other countries in different continent.

Continents	Country	Methods	Prevalence (%)	Study population	Risk factors	Reference
African	Kenya	Molecular	4	Children	13–24 months, persistent diarrhoea	14
	Gabon	Immunofluorescence & microscopy	24	Children	6 and 12 months, malnutrition, rainy season	18
	Nigeria	Microscopy	17.8	Children	Rainy season	19
Asia	Iran	ELISA	5	Children	2–12 months, less breastfeeding, lower birth weight	20
	Indian	Molecular	45	Children	Stunting at 6 months of age, older children	21
Americas	Mexico	Indirect immunofluorescence	**	Children	<1 year, malnutrition, absence of breast feeding	22
	Brazil	Microscopy	7.4	Children	Low-birth-weight, overcrowding, persistent diarrhea	23
Australia	Australia	Case study		6 years old boy	Organ transplant	24
Europe	Spain	**	**	Children	Tap water consumption, gastroenteritis	25
	Italy	Microscopy	1.9	Children	Persistent diarrhea	26

** Not determined.

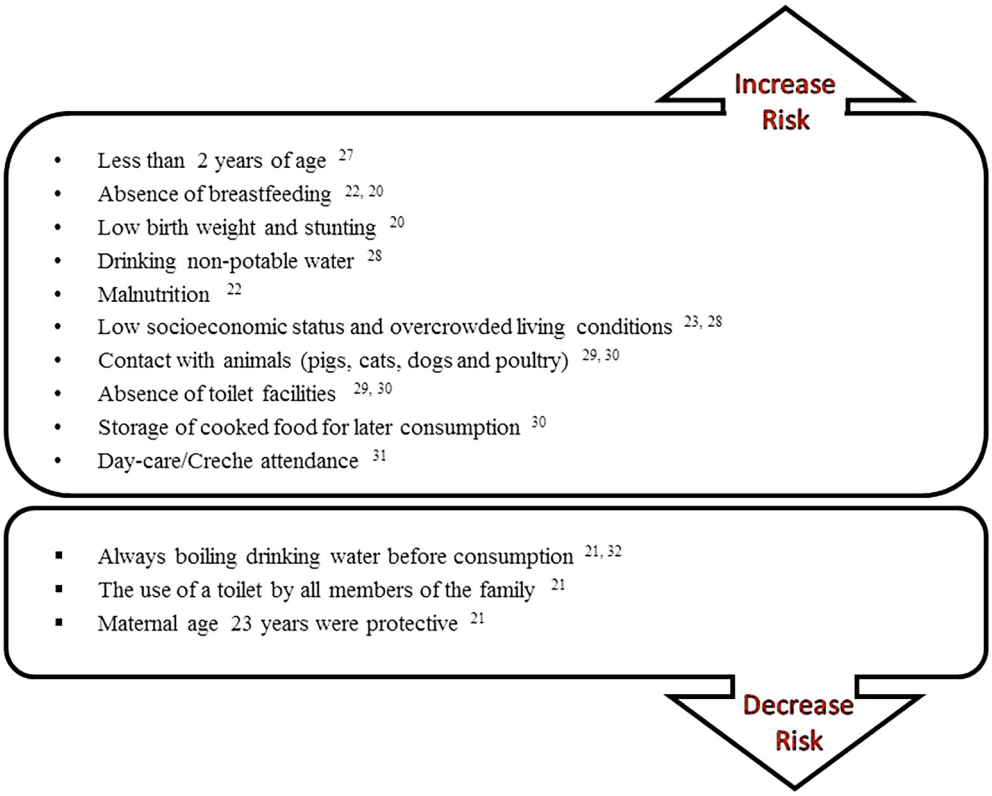

Fig. 2. Some risk factors suggested to be associated with childhood cryptosporidiosis. (See above-mentioned references for further information.).

Table 2
Cryptosporidiosis prevalence in children (0–5 years) in Nigeria.

Location	Method(s)	Prevalence (%)	Study population	Risk factor(s)	Reference
Port-Harcourt	Microscopy	10.8	Diarrheic children	0–2 years of age	36
Jos	Microscopy	3.8	Under-nourished children	Diarrhoea	38
Oyo	Molecular	11.6	Diarrheic & non-diarrheic	**	33
Zaria	Microscopy	4.6	Diarrheic & non-diarrheic	**	34
Zaria	Microscopy	17.8	Diarrheic children	Rainy season	19
Jos	Molecular	4.8	Diarrheic children	Diarrhoea, contact with cattle	37
Osun	Microscopy & ELISA	38.3 & 46.8	Diarrheic & non-diarrheic	Diarrhoea	35

** Not determined.

Eastern Nigeria.[36] The overview of these reports according to tribes is represented in Fig. 1.

The control of Cryptosporidiosis in multi-cultural population would require a more holistic approach that would not only depend on modern science but also harness indigenous knowledge for effective prevention and control of the disease. This paper, therefore, aims at reviewing different traditional practices that may impact the prevalence of childhood cryptosporidiosis in Nigeria. Information for this review was obtained through literature search on data bases that include PubMed, ISI, Google Scholar, Scopus and African journal online (AJOL) using key words like diarrhoea in Nigerian children, traditional practices in Nigeria, and cryptosporidiosis in Nigeria. We also gathered information from non-indexed articles from libraries and personal communications.

2. Traditional beliefs and practices that may negatively impact childhood health in Nigeria

Traditional practices associated with cultural belief systems are very important to the care of the new born and children in countries with diverse tribes and cultures like Nigeria. The following practices may directly or indirectly be potential risk factors for childhood cryptosporidiosis in Nigeria. The probable relationship between identified traditional practices, growth phases of children and risk of cryptosporidiosis is summarized in Fig. 3.

2.1. Breastfeeding and weaning practices

Breastfeeding is known to be one of the simplest, healthiest, least expensive and the oldest feeding practice that satisfies the infant's needs.[39] As important as breastfeeding is, there is evidence to show that breastfeeding is deliberately delayed in some places in Southwestern and northern part of Nigeria due to the cultural belief that colostrum is dirty and harmful to the new born.[40] In such places, mothers expressed and throw away early milk (colostrum), and feed pre-lacteal such as animal milk, honey, boiled water and herbal preparation while waiting for the 'appropriate time' to initiate feeding with the "clean breast milk". This practice may lead to low immunity that could make infant susceptible to cryptosporidiosis and other childhood diseases.

Traditional force-feeding is a popular practice among the Hausas and Yorubas of the Northern and Southwestern, Nigeria respectively.[41,42] This is a practice where mothers (usually elderly women) feed their babies by force through oral drenching using

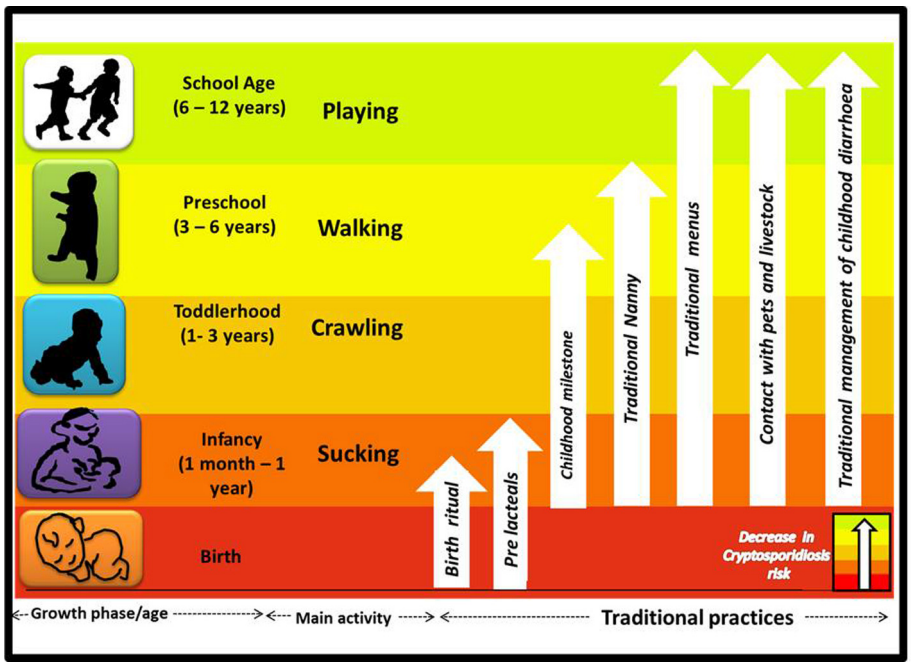

Fig. 3. Coloured chart showing levels of susceptibility with age to *Cryptosporidium* infection in relation to identified traditional practices.

bare hands in order to ensure that the children take in enough food for proper growth. The risk of using bare hands (which in most cases might not be properly washed) for feeding babies may enable the transmission of contaminative infection like Cryptosporidiosis from infected adult to infants' children.

In some traditional settings, the idea of exclusive breastfeeding is considered unsafe for infants because it is believed that infants do get thirsty and require water to "quench" their thirst. In addition, the practice of complementary feeding is popular among some native that believed that ordinary fluid from the mammary gland may not be enough as a meal for an infant. These practices create an opportunity for the ingestion of food and water contaminated with *Cryptosporidium* oocysts shed from infected individuals. Non-compliance with the practice of exclusive breastfeeding could also increase susceptibility to *Cryptosporidium* infection.

2.2. Traditional taboos and childhood nutrition

Most Nigerians wean their infant at about three to four months of age. Although some as early as the first two months of life by giving food like cereals made from maize (*Zea mays*), millet (*Pennisetum americanum*), or guinea corn (*Sorghum* spp) popularly referred to as pap, akamu, ogi, or koko in Yoruba land, and akamu in Hausa. Staple foods such as mashed, thinned, or pre-chewed form of yam (*Dioscorea* spp.), rice (*Oryza sativa*), gari (fermented cassava grits), and cocoyam (*Xanthosoma sagittifolium*) are then gradually introduced. These traditional menus, that are consistently fed to infants are known to be high in carbohydrate and low protein and may not be adequate to support the development of a strong immune system without supplements. However, the effort to encourage the feeding of a balanced diet to children in some cultures in Nigeria is hampered by the myth that described feeding of protein-rich food like meat, fish and eggs as a taboo, because it is believed that children fed on such meal will later become thieves, witches or wizards.[43–46]

2.3. Traditional perceptions and management of childhood diarrhoea

In some cultures in Nigeria, rural dwellers believe that diarrhoea is a normal occurrence that must accompany a major milestone such as teething and crawling during the child's development. Many also believe a heavy infant has diarrhoea to shed weight and thus be able to walk while others believe that diarrhoea is associated with the appearance of the anterior fontanel.[47] All these perceptions about diarrhoea do not allow those inclined to them to seek medical attention. Children infected with *Cryptosporidium* species are usually overwhelmed with chronic diarrhoea that could be fatal due to persistence loss of body fluid and electrolytes.

In many rural communities in Nigeria, childhood diarrhoea is often managed by traditional interventions. In some cultures, diarrhoeic infants are given prescription like burnt corn stalk, raw or partially cooked corn starch, and/or other herbs (concoctions).[48] While these treatments may have some effect on the severity of diarrhoea, in most cases, they cannot mitigate the causative pathogen, hence result in chronic infection.

2.4. Birth rituals

Bathing for a new born baby is an important event in most traditional settings in Nigeria. A respected individual in the family usually handles the bathing process which is more or less like a ritual in some culture. It is believed that a child's destiny is affected negatively if the process is not well conducted.[49] In some cultures, herbal concoctions are given to newborn babies for protection from diseases or misfortunes from evil spirits. Furthermore, there is the practice of throwing new born babies into the river as an initiation to the marine life in some traditional settings in the riverine areas of Nigeria. These practices may enable early exposure to water-borne infection through ingestion of water and concoction contaminated with bacteria pathogens, and protozoan agents like *Cryptosporidium.*

2.5. Traditional child care

It is a common practice in some traditional settings in Nigeria for mothers to engage their parents, siblings or non-relative as a caregiver (nanny) in bringing up their children. Unlike the modern daycare centers where children are kept in environment equipped with nursery facilities that include indoor playground for the

maintenance of proper strict hygiene. The situation in the rural setting is, however, different as babies are often allowed to play on bare floor where they could come in contact with food and water that have been contaminated with infected oocyst from animal faeces and other infectious sources of cryptosporidiosis. Direct contact with animals has been implicated as the source of *Cryptosporidium* infection for growing up children.[50–53] While the indirect contact, faecal matters from animals containing oocyst can contaminate environmental samples such as soil, manure and water[54–57] thus, serving as infectious sources of cryptosporidiosis.

3. Conclusion

Although this paper has the obvious limitation of the absence of data that links the aforementioned unhealthy traditional practices with the prevalence of cryptosporidiosis in Nigeria. It however, identified some unwholesome practices that may render ineffective control programmes for a disease like cryptosporidiosis in a multi-cultural population like Nigeria. This review, therefore, suggests the need for comprehensive study of cultural beliefs and practices of a population, as well as the promotion of best health practices among the custodians of different traditions for the design of appropriate strategies for disease prevention and control.

Conflict of interest

None.

References

1. Central Intelligence Agency, "Nigeria," in The World Factbook. <https://www.cia.gov/library/publications/the-world-factbook/geos/ni.html>; 2011.
2. FOS. Federal Office of Statistics; 1989.
3. Nigeria Fact Sheet (published by: Nigeria High Commission, New Delhi); 2001:3.
4. Oyenuga VA. *Agriculture in Nigeria*. Rome, Italy: Food and Agriculture Organization of the United Nations). FAO; 1967. 308.
5. DuPont HL, Chapell CL, Sterling CR, Okhuysen PC, Rose JB, Jakubowski W. The infectivity of *Cryptosporidium parvum* in healthy volunteers. N Engl J Med 1195;332:855–859.
6. Kjos SA, Jenkins M, Okhuysen PC, Chappell CL. Evaluation of recombinant oocyst protein CP41 for detection of *Cryptosporidium*-specific antibodies. *Clin Diagn Lab Immunol*. 2005;12:268–272.
7. Snelling WJ, Xiao L, Ortega-Pierres G, et al. Cryptosporidiosis in developing countries. *J Infect Dev Ctries*. 2007;1:242–256.
8. Putignani L, Menichella D. Global distribution, public health and clinical impact of the protozoan pathogen *Cryptosporidium*. *Interdiscip Perspect Infect Dis*. 2010. https://doi.org/10.1155/2010/753512. pii: 753512.
9. Nichols G, Lane C, Asgari N, et al. Rainfall and outbreaks of drinking water related disease and in England and Wales. *J Water Health*. 2009;7:1–8.
10. Yoder JS. Beach MJ *Cryptosporidium* surveillance and risk factors in the United States. *Exp Parasitol*. 2010;124(1):31–39.
11. Chalmers RM, Smith R, Elwin K, Clifton-Hadley FA, Giles M. Epidemiology of anthroponotic and zoonotic human cryptosporidiosis in England and Wales, 2004–2006. *Epidemiol Infect*. 2011;139:700–712.
12. Koch KL, Phillips DJ, Aber RC, Current WL. Cryptosporidiosis in hospital personnel. Evidence for person-to-person transmission. *Ann Intern Med*. 1985;102:593–596.
13. Davies AP, Chalmers RM. *Cryptosporidiosis BMJ*. 2009;339:b4168. https://doi.org/10.1136/bmj.b4168.
14. Gatei W, Wamae CN, Mbae C, et al. Cryptosporidiosis: prevalence, genotype analysis, and symptoms associated with infections in children in Kenya. *Am J Trop Med Hyg*. 2006;75:78–82.
15. Tumwine JK, Kekitiinwa A, Nabukeera N, et al. *Cryptosporidium parvum* in children with diarrhoea in Mulago Hospital, Kampala, Uganda. *Am J Trop Med Hyg*. 2003;68:710–715.
16. Molbak K, Hojlyng N, Gottschau A, et al. Cryptosporidiosis in infancy and childhood mortality in Guinea-Bissau, West Africa. *BMJ*. 1993;307:417–420.
17. Sodemann M, Jakobsen MS, Molbak K, Martins C, Aaby P. Episode specific risk factors for progression of acute diarrhoea to persistent diarrhoea in West African children. *Trans R Soc Trop Med Hyg*. 1999;93:65–68.
18. Duong TH, Dufillot D, Koko J, et al. Digestive cryptosporidiosis in young children in an urban area in Gabon Sante. 1995;5(3):185–8.
19. Musa S, Yakubu AM, Olayinka AT. Prevalence of Cryptosporidiosis in diarrhoeal stools of children under-five years seen in Ahmadu Bello University Teaching Hospital Zaria, Nigeria. *Niger J Paed*. 2014;41(3):204–208.
20. Khalili B, Mardani M. Frequency of *Cryptosporidium* and risk factors related to cryptosporidiosis in under-5-year-old hospitalized children due to diarrhoea. *Iran J Clin Inf Dis*. 2009;4:151–155.
21. Sarkar R, Kattula D, Francis MR, et al. Risk factors for cryptosporidiosis among children in a semi urban slum in southern India: a nested case-control study. *Am J Trop Med Hyg*. 2014;91:128–1137.
22. Javier Enriquez F, Avila CR, Ignacio Santos J, Tanaka-Kido J, Vallejo O, Sterling CR. *Cryptosporidium* infections in Mexican children: clinical, nutritional, enteropathogenic, and diagnostic evaluations. *Am J Trop Med Hyg*. 1997;6:254–257.
23. Newman RD, Sears CL, Moore SR, et al. Longitudinal study of *Cryptosporidium* infection in children in northeastern Brazil. *J Infect Dis*. 1999;180:167–175.
24. Acikgoz Y, Ozkaya O, Bek K, Genc G, Sensoy SG, Hokelek M. Cryptosporidiosis: a rare and severe infection in a pediatric renal transplant recipient. *Paediatr Transpl*. 2011;16. Version of Record online.
25. Rodriguez-Salinas PE, Aragon Pena AJ. Outbreak of cryptosporidiosis in Guadarrama (Autonomous Community of Madrid). *Revista Espa~nola de Salud Publica*. 2000;74:527–536.
26. Brandonisio O, Marangi A, Panaro MA, et al. Prevalence of *Cryptosporidium* in children with enteritis in Southern Italy. *Eur J Epidemiol*. 1996;12:187–190.
27. Bhattacharya MK, Teka T, Faruque AS, Fuchs GJ. *Cryptosporidium* infection in children in urban Bangladesh. *J Trop Paediatr*. 1997;43:282–286.
28. Solorzano-Santos F, Penagos-Paniagua M, Meneses-Esquivel R, et al. *Cryptosporidium parvum* infection in malnourished and non-malnourished children without diarrhoea in a Mexican rural population. *Rev Invest Clin*. 2000;52:625–631.
29. Cruz JR, Cano F, Caceres P, Chew F, Pareja G. Infection and diarrhoea caused by *Cryptosporidium* sp. among Guatemalan infants. *J Clin Microbiol*. 1988;26:88–91.
30. Molbak K, Aaby P, Hojlyng N, da Silva AP. Risk factors for *Cryptosporidium* diarrhoea in early childhood: a case-control study from Guinea-Bissau, West Africa. *Am J Epidemiol*. 1994;139:734–740.
31. Pereira MD, Atwill ER, Barbosa AP, Silva SA, Garcia-Zapata MT. Intra-familial and extra-familial risk factors associated with *Cryptosporidium parvum* infection among children hospitalized for diarrhoea in Goiania, Goias, Brazil. *Am J Trop Med Hyg*. 2002;66:787–793.
32. Gualberto FA, Heller L. Endemic *Cryptosporidium* infection and drinking water source: a systematic review and metaanalyses. *Water Sci Technol*. 2006;54:231–238.
33. Ayinmode AB, Fagbemi BO, Xiao L. Molecular characterization of *Cryptosporidium* in children in Oyo State, Nigeria: implications for infection sources. *Parasitol Res*. 2012;110:479–481.
34. Gambo A, Inabo HI, Aminu M. Prevalence of *Cryptosporidium* oocysts among children with acute gastroenteritis in Zaria, Nigeria. *Bayero J Pure Appl Sci*. 2014;7:155–159.
35. Nassar SA, Oyekale TO, Oluremi AS. Prevalence of *Cryptosporidium* infection and related risk factors in children in Awo and Iragberi, Nigeria. *J Immunoassay Immunochem*. 2016. https://doi.org/10.1080/15321819.2016.1178652.
36. Chira FU, Nkaginieme KE, Oruamabo RS. Cryptosporidiosis in undernourished under five children with diarrhoea at the University of Port Harcourt Teaching Hospital in Nigeria. *Niger Postgrad Med J*. 1996;3:5–9.
37. Anejo-Okopi AJ, Okojokwu JO, et al. Molecular characterization of *cryptosporidium* in children aged 0–5 years with diarrhoea in Jos. *Pan Afr Med J*. 2016;25:253. https://doi.org/10.11604/pamj.2016.25.253.10018.
38. Banwat EB, Egah DZ, Onile BA, Angyo IA, Audu ES. Prevalence of *Cryptosporidium* infection among Undernourished Children in Jos, Central Nigeria. *Nigerian Postgrad Med J*. 2003;10:84–87.
39. Okafor IP, Olatona FA, Olufemi OA. Breastfeeding practices of mothers of young children in Lagos, Nigeria. *Niger J Paed*. 2014;41:43–47.
40. Umar AS, Oche MO. Breastfeeding and Weaning Practices in an Urban Slum, North Western Nigeria. *Int J Trop Dis Health*. 2013;3:114–125.
41. Osuhor PC. Weaning practices amongst the Hausas. *J Hum Nutr*. 1980;34:273–280.
42. Jegede AS, Ajala AS, Adejumo OP, Osunwole SO. Forced feeding practice in Yoruba community of Southwestern evidence from ethnographic research. *Anthropologist*. 2006;8:171–179.
43. Asu OT, Ishor DG, Ndom PJ. African cultural practices and health implications for Nigeria rural development. *Int Rev Manage Bus Res*. 2013;2:176–183.
44. Uwaegbute AC. Infant feeding patterns and comparative assessment of formulated weaning foods based on vegetable proteins. Doctoral thesis, University of Nigeria, Nsukka; 1982.
45. Onofiok N, Nnanyelugo DO. Nutrient intake of infants of high and low socio-economic groups in Nsukka, Nigeria. Occasional Paper. Nsukka: Department of Home Science and Nutrition, University of Nigeria; 1992.
46. Nnanyelugo DO. *Nutritional status of children in Anambra State: a comprehensive treatise*. Nsukka: University of Nigeria Press; 1985.
47. Iyun BF. Environmental factors, situation of women and child mortality in south western Nigeria. *Soc Sci Med*. 2000;51:1473–1489.
48. Jinaddu MK, Fajewonyomi BA, Odebiyi O. Feeding practices of mothers during childhood diarrhoea in rural area of Nigeria. *Nigerian J Paediatr*. 1994;21 (Suppl):22–29.
49. Eva-Marita R. Water and healing–experiences from the traditional healers in Ile-Ife, Nigeria. *Nord J Afr Stud*. 2001;10:41–65.

50. Shield J, Baumer JH, Dawson JA, et al. Cryptosporidiosis – an educational experience. *J Infect*. 1990;21:297–301.
51. Stefanogiannis N, McLean M, Van Mil H. Outbreak of cryptosporidiosis linked with a farm event. *N Z Med J*. 2001;114:519–521.
52. Hoek MR, Oliver I, Barlow M, et al. Outbreak of *Cryptosporidium parvum* among children after a school excursion to an adventure farm, south-west England. *J Water Health*. 2008;6:333–338.
53. Casemore D. Epidemiological aspects of human cryptosporidiosis. *Epidemiol Infect*. 1990;104:1–28.
54. Hong Semie, Kim Kyungjin, Yoon Sejoung, Park W-Yoon, Sim Seobo, Jae-Ran Yu. Detection of *Cryptosporidium parvum* in environmental soil and vegetables. *Korean Med Sci*. 2014;29:1367–1371.
55. Pam VA, Dakul DA, Ogbu KI, Echeonwu IE, Bata SI. The occurrence of *cryptosporidium* species in soil and manure in Jos and environs, Plateau State, Nigeria. *Greener J Biol Sci*. 2013;3:330–335.
56. Stinear T, Matusan A, Hines K, Sandery M. Detection of a single viable *Cryptosporidium parvum* oocyst in environ-mental water concentrates by reverse transcription-PCR. Appl Environ Microbiol 1996;62:3759–3763.
57. Coutinho Farias EW, Gamba RC, Pellizari VH. Detection of *Cryptosporidium* spp oocysts in raw sewage and creek water in the city of São Paulo, Brazil. *Braz J Microbiol*. 2002;33:41–43.