



Universiteit
Leiden
The Netherlands

Skin diseases among schoolchildren in Africa

Hogewoning, A.A.

Citation

Hogewoning, A. A. (2012, December 13). *Skin diseases among schoolchildren in Africa*. Departments of Dermatology and Parasitology, Faculty of Medicine / Leiden University Medical Center (LUMC), Leiden University. Retrieved from <https://hdl.handle.net/1887/20277>

Version: Corrected Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/20277>

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/20277> holds various files of this Leiden University dissertation.

Author: Hogewoning, Arjan

Title: Skin diseases among schoolchildren in Africa

Date: 2012-12-13

A dark green world map with a grid of latitude and longitude lines serves as the background for the entire page. The map is centered on the Atlantic Ocean, showing the continents of North America, South America, Europe, and Africa.

Chapter 1

General introduction

**Children are the most vulnerable citizens in any society
and the greatest of our treasures.**

Nelson Mandela

Nobel Peace Prize Ceremony, Oslo, Norway, 1993

General Introduction

Skin diseases in developing countries are present in large numbers, especially among children and deserve our sincere and full attention.¹⁻⁶ They are accounting for a high percentage of visits to hospitals and primary healthcare centers and create a serious impact on health care services.⁷⁻⁹ In a review of prevalence studies in children by the WHO, the prevalence of skin diseases were ranging from 21% to 87%.¹⁰ These high figures warrant the study of morbidity, causative factors and economic costs.^{1,11} Skin diseases are often considered less important in health priority programs compared with diseases that cause high mortality like tuberculosis, HIV/AIDS, meningitis or hepatitis.² Compared with other diseases, skin diseases have a lower mortality rate but can affect the wellbeing, quality of life and health conditions of children who already form a vulnerable group.²

Using a comparative assessment of disability-adjusted life years (DALY's) the World Health Organization's 2004 report on the global burden of diseases showed a total amount of 376.525.000 DALY's in Africa which was at least two times higher than in any other region in the world. For skin diseases in Africa there was a total of 902.000 DALY's (0.2% of the total burden) which was similar to that caused by several psychiatric disorders.¹²

Most of the prevalence data in Africa come from hospital or dispensary-based records and therefore are less reliable when estimating the prevalence on a national scale. Population-based prevalence figures are needed for reliable planning of national health and prevention programs. Only a few population-based studies on this subject are available.^{5,9,13,14} Most of these studies have been conducted on schoolchildren. In most recent prevalence studies, conducted in sub-Saharan Africa the majority of the skin diseases found among schoolchildren are dominated by infections like tinea capitis and pyoderma.^{5,10,13-20} This is a pattern found in most countries with poor socio economic circumstances. We performed several studies to gain more insight in the prevalence of tinea capitis and the causative organisms, to determine the burden of this infectious disease in communities and to identify possible strategies for prevention and treatment. In industrialized countries the highest burden of skin diseases is formed by inflammatory diseases like acne vulgaris and eczema but recent studies from Africa reported also an increase in prevalence.^{21,22} Therefore, we performed several studies focusing on "western" skin diseases and the impact of socio-economic developments on the prevalence by comparing rural versus urban schools.

The prevalence of classical tropical diseases like leprosy or filarial lymph edema is low although the socio economical impact can be enormous.^{10,23-29}

This thesis focuses on three skin diseases in particular, namely, tinea capitis, eczema and acne, which diseases are discussed in some more detail below.

The most common skin diseases among children in Africa are described in **Chapter 8**. In this chapter several skin diseases among preschool children and some typical tropical diseases are presented. With this chapter (and a website to match: www.african-skindiseases.org) the author hopes to offer an easy access to basic information and pictures for healthcare workers in Africa.

The prevalence and causative organisms of tinea capitis in Africa

Tinea capitis is endemic among schoolchildren in tropical Africa.³⁰ Factors like overcrowding, malnutrition and climatic conditions such as heat and humidity can lead to an increase in fungal infections in tropical and semi-tropical countries.³¹

The prevalence of tinea capitis is higher among schoolchildren in rural areas due to the lack of anti-fungal treatments, poor hygienic conditions, and school and household overcrowding.^{32;33}

Superficial infections of the scalp are caused by Trichophyton and Microsporum species. Those causing an endotrix infection are frequently seen in Africa. The most important causative agents are Trichophyton soudanense, Trichophyton tonsurans, Trichophyton violaceum and yaoundei. The species that cause an ectotrix infection are Microsporum audouinii, Microsporum canis and gypseum. Microsporum audouinii is frequently seen in Africa while canis is seen more often in European countries.^{34;35}

Which species is causing tinea capitis is highly dependent on geography, time and social status. During the past 60 years the predominant etiologic agent of tinea capitis in the USA has changed from M. audouinii to T. tonsurans most probably due to the sensitivity of M. audouinii to griseofulvin treatment and the import of T. tonsurans by immigrants. During the late 19th and 20th centuries, M. audouinii and M. canis were the most frequent etiologic agents in Western and Mediterranean Europe while Trichophyton schoenleinii was often seen in Eastern Europe.^{34;36;37} In Africa the most frequently seen agents were Trichophyton soudanense, violaceum and tonsurans and Microsporum audouinii. These agents are all anthropophilic and are spread rapidly in circumstances of overcrowding.^{18;38-42}

The prevalence and characteristics of eczema among schoolchildren in Africa

Higher prevalences of eczema are found in developed countries like Northern Europe, North America, Japan and Australia compared with African countries. Recent studies however show a sharp increase in African countries, especially amongst infants.^{5;14;21;43-49} Most of these studies are hospital based and therefore less reliable than community based studies. The questionnaire based period-prevalences are higher than the point-prevalences as measured by physical examination, which can be explained by the chronic relapsing character of eczema.⁵⁰⁻⁵⁴

The rising prevalence of eczema might be related to improved sanitation and reduction in childhood infections, the so called hygiene hypothesis.⁵³⁻⁵⁸ Also helminthic infections have shown to induce hypo responsiveness and are negatively associated with atopy and allergy.^{57;59-62} Other risk factors for the development of eczema are changes in lifestyle because of a higher socio-economic status, reduced crowding at home, changes in food consumption. Also the growing urbanization in Africa has been associated with an increased risk of eczema.^{10;43;63;64}

Prevalence and risk factors of acne vulgaris in Africa

Acne vulgaris is a common skin condition in children and adolescents between the age of 10 and 18 years which is much more frequently seen in the industrialized world compared with developing countries.^{21;22;65;66} Community-based studies, studying acne vulgaris in Africa are scarce. Most studies are hospital based and don't give a correct figure about the prevalence.⁶⁷ In industrialized countries this condition affects between 31% and 95% of the adolescent population while in Africa percentages of 2.8% and 8.9% are reported.^{14;68;69}

With the changing socio-economic situation in developing countries, especially westernization in urban areas, it is believed that the prevalence of acne vulgaris in developing countries will increase to the level of industrialized countries.^{67;70}

Aim and structure of the thesis

The aims of the thesis were:

- 1) *To measure the point-prevalence of different skin diseases (with special attention for childhood eczema, acne and tinea capitis) among schoolchildren in both rural and urban schools and in three different African countries (Gabon, Ghana and Rwanda).*

Between 2004 and 2007 cross-sectional studies with 4839 schoolchildren were conducted in Ghana, Gabon and Rwanda in urban and rural schools with different social economic levels (low, middle, high). All children were included in the study and were investigated by a dermatologist or a team of dermatologists.

- 2) *To determine causative agents for tinea capitis in Ghana and Gabon.*

In June 2004, 463 school children from 2 rural and 2 urban schools in the Greater Accra Region were fully examined by a team of dermatologists. The same happened in January 2005 in the region of Lambaréné, Gabon when 454 children in one rural and one urban school were examined. When there were clinical signs of fungal infection on

the scalp (scaling, hair loss, black dots, pustules and scars), samples were taken for analysis and transported at room temperature to the Mycology Laboratory of the Department of Dermatology of the Leiden University Medical Centre in Leiden, The Netherlands.

3) *To study (socio-economic and environmental) risk factors for eczema.*

A matched case-control study was performed to identify risk factors in childhood eczema. Between February and December 2005, 86 schoolchildren with moderate to severe eczema were selected at the dermatological outpatient clinics of three hospitals in Accra, Ghana by a dermatologist. For each included child with eczema, one to three controls were selected from the same school and class. All children completed a questionnaire and were skin prick tested with a panel of allergens. Blood was drawn to determine the total and allergen-specific IgE.

4) *To provide information about the point and period-prevalence of eczema in West and Central Africa.*

Between 2004 and 2007 cross-sectional studies with 4839 schoolchildren were conducted in Ghana, Gabon and Rwanda. To determine the point-prevalence of eczema all children in all four studies were examined by at least one dermatologist or a team of dermatologists. In Ghana the period-prevalence was measured by questionnaires adapted from the International Study of Asthma and Allergies in Childhood (ISAAC).

5) *To investigate the prevalence and risk factors of inflammatory acne vulgaris in schoolchildren in Ghana.*

Between between January 2006 and February 2007 a total of 1394 schoolchildren from 11 urban and rural schools in the Greater Accra Region of Ghana were screened by two dermatologists for inflammatory acne vulgaris and other skin diseases. The height and weight of the schoolchildren were measured to calculate the Body Mass Index (BMI) as a marker of nutritional status and a questionnaire was administered to each child, collecting information concerning living conditions.

Our studies were supported by the local governments and conducted in cooperation with larger studies in which atopy and parasitic infections were investigated. Our study was facilitated by the fact that the primary investigator worked as a dermatologist in these countries at the time of the investigations and had easy access to local health care facilities.

Chapter 1 provides a short introduction and defines the aims of this study.

Chapter 2 presents prevalence estimates of most skin diseases diagnosed in our studies among schoolchildren in three different countries, Gabon, Ghana and Rwanda

Chapter 3 presents the point-prevalence of tinea capitis among schoolchildren in the greater Accra region in Ghana including the most important causative fungal species.

Chapter 4 presents, like the study in Ghana, the point-prevalence of tinea capitis among schoolchildren in Gabon and the result of the determination of the fungal species and summarizes the results of the most recently published studies on tinea capitis in Africa.

Chapter 5 focuses on the point-prevalence and period-prevalence of eczema among schoolchildren in the three mentioned countries. The point-prevalence obtained by physical examination by one or more dermatologists are compared with the period-prevalence obtained by questionnaires based on ISAAC (The International Study of Asthma and Allergies in Childhood).

Chapter 6 determines allergic characteristics and identifies possible risk factors for eczema among schoolchildren in an urbanized area in Ghana.

Chapter 7 presents the prevalence of acne vulgaris among Ghanaian schoolchildren. The difference between the prevalence rates among rural and urban schoolchildren is presented as well as possible risk factors like a higher body mass index.

Chapter 8 This chapter is aimed as a practical guide for medical healthcare workers in Africa and describes the etiology, clinical signs and treatment of the most prevalent skin diseases among children in Africa and also describes some typical tropical skin diseases and some diseases among preschool children. This chapter can be accessed on internet via www.africanskindiseases.org.

Chapter 9 summarizes our results and discusses our findings in a broader perspective. The findings presented in this thesis are discussed and summarized in the Summary.

Reference List

- Gibbs S. Skin disease and socioeconomic conditions in rural Africa: Tanzania. *Int J Dermatol* 1996; **35**: 633-9.
- Hay RJ, Bendeck S, Chen S *et al*. Disease Control Priorities in Developing countries. 2nd edition ; Chapter 37, Skin Diseases. 37, 707-721.
- Henderson CA. Skin disease in rural Tanzania. *Int J Dermatol* 1996; **35**: 640-2.
- Morrone A. Poverty, health and development in dermatology. *Int J Dermatol* 2007; **46 Suppl 2**: 1-9.
- Ogunbiyi AO, Daramola OO, Alese OO. Prevalence of skin diseases in Ibadan, Nigeria. *Int J Dermatol* 2004; **43**: 31-6.
- Accorsi S, Barnabas GA, Farese P *et al*. Skin disorders and disease profile of poverty: analysis of medical records in Tigray, northern Ethiopia, 2005-2007. *Trans R Soc Trop Med Hyg* 2009; **103**: 469-75.
- Mahe A, N'diaye HT, Bobin P. The proportion of medical consultations motivated by skin diseases in the health centers of Bamako (Republic of Mali). *Int J Dermatol* 1997; **36**: 185-6.
- Mahe A, Faye O, N'diaye HT *et al*. Integration of basic dermatological care into primary health care services in Mali. *Bull World Health Organ* 2005; **83**: 935-41.
- Murgia V, Bilcha KD, Shibeshi D. Community dermatology in Debre Markos: an attempt to define children's dermatological needs in a rural area of Ethiopia. *Int J Dermatol* 2010; **49**: 666-71.
- Mahe A, Hay R. Epidemiology and management of Common Skin Diseases in Children in Developing Countries (http://whqlibdoc.who.int/hq/2005/WHO_FCH_CAH_05.12_eng.pdf). Dec 2005.
- Ferie J, Dinkela A, Mbata M *et al*. Skin disorders among school children in rural Tanzania and an assessment of therapeutic needs. *Trop Doct* 2006; **36**: 219-21.
- Mathers C, Boerma T, Ma Fat D. The Global burden of disease: 2004, update WHO report 2008. 2008.
- Figuerola JL, Fuller LC, Abraha A *et al*. The prevalence of skin disease among school children in rural Ethiopia--a preliminary assessment of dermatologic needs. *Pediatr Dermatol* 1996; **13**: 378-81.
- Komba EV, Mgonda YM. The spectrum of dermatological disorders among primary school children in Dar es Salaam. *BMC Public Health* 2010; **10**: 765.
- Hogewoning A.A., *et al*. Skindiseases among schoolchildren in Ghana, Gabon and Rwanda. July 2012: accepted for publication in the *International Journal of Dermatology*.
- Mahe A. Bacterial skin infections in a tropical environment. *Curr Opin Infect Dis* 2001; **14**: 123-6.
- Masawe AE, Nsanzumuhire H, Mhalu F. Bacterial skin infections in preschool and school children in coastal Tanzania. *Arch Dermatol* 1975; **111**: 1312-6.
- Menan EI, Zongo-Bonou O, Rouet F *et al*. Tinea capitis in schoolchildren from Ivory Coast (western Africa). A 1998-1999 cross-sectional study. *Int J Dermatol* 2002; **41**: 204-7.
- Ogunbiyi AO, Owoaje E, Ndahi A. Prevalence of skin disorders in school children in Ibadan, Nigeria. *Pediatr Dermatol* 2005; **22**: 6-10.
- Schmeller W, Dzikus A. Skin diseases in children in rural Kenya: long-term results of a dermatology project within the primary health care system. *Br J Dermatol* 2001; **144**: 118-24.
- Fung WK, Lo KK. Prevalence of skin disease among school children and adolescents in a Student Health Service Center in Hong Kong. *Pediatr Dermatol* 2000; **17**: 440-6.
- Kilkenny M, Merlin K, Plunkett A *et al*. The prevalence of common skin conditions in Australian school students: 3. acne vulgaris. *Br J Dermatol* 1998; **139**: 840-5.
- Mackenzie CD, Homeida MM, Hopkins AD *et al*. Elimination of onchocerciasis from Africa: possible? *Trends Parasitol* 2012; **28**: 16-22.
- Mengistu G, Laskay T, Gemetchu T *et al*. Cutaneous leishmaniasis in south-western Ethiopia: Ocholo revisited. *Trans R Soc Trop Med Hyg* 1992; **86**: 149-53.
- Molyneux DH, Malecela MN. Neglected tropical diseases and the millennium development goals: why the "other diseases" matter: reality versus rhetoric. *Parasit Vectors* 2011; **4**: 234.
- Murdoch ME, Asuzu MC, Hagan M *et al*. Onchocerciasis: the clinical and epidemiological burden of skin disease in Africa. *Ann Trop Med Parasitol* 2002; **96**: 283-96.
- Pfarr KM, Debrah AY, Specht S *et al*. Filariasis and lymphoedema. *Parasite Immunol* 2009; **31**: 664-72.
- Remme JHF, Feenstra P, Lever PR *et al*. Tropical Diseases Targeted for Elimination: Chagas Disease, Lymphatic Filariasis, Onchocerciasis, and Leprosy. 2006.
- Taylor MJ, Hoerauf A, Bockarie M. Lymphatic filariasis and onchocerciasis. *Lancet* 2010; **376**: 1175-85.
- Emele FE, Oyeka CA. Tinea capitis among primary school children in Anambra state of Nigeria. *Mycoses* 2008; **51**: 536-41.
- Jahangir M, Hussain I, Khurshid K *et al*. A clinico-etiological correlation in tinea capitis. *Int J Dermatol* 1999; **38**: 275-8.
- Hogewoning AA, Duijvestein M, Boakye D *et al*. Prevalence of symptomatic tinea capitis and associated causative organisms in the Greater Accra Region, Ghana. *Br J Dermatol* 2006; **154**: 784-6.
- Hogewoning AA, Adegnikaa AA, Bouwes Bavinck JN *et al*. Prevalence and causative fungal species of tinea capitis among schoolchildren in Gabon. *Mycoses* 54(5):E354-E359 Sep 2011.
- Elewski BE. Tinea capitis: a current perspective. *J Am Acad Dermatol* 2000; **42**: 1-20.
- Ngwogu AC, Otokunfor TV. Epidemiology of dermatophytoses in a rural community in Eastern Nigeria and review of literature from Africa. *Mycopathologia* 2007; **164**: 149-58.
- Fuller LC. Changing face of tinea capitis in Europe. *Curr Opin Infect Dis* 2009; **22**: 115-8.
- Korstanje MJ, Staats CG. Tinea capitis in Northwestern Europe 1963-1993: etiologic agents and their changing prevalence. *Int J Dermatol* 1994; **33**: 548-9.
- Ayanbimpe GM, Taghir H, Diya A *et al*. Tinea capitis among primary school children in some parts of central Nigeria. *Mycoses* 2008; **51**: 336-40.
- Ayaya SO, Kamar KK, Kakai R. Aetiology of tinea capitis in school children. *East Afr Med J* 2001; **78**: 531-5.
- Morar N, Dlova NC, Gupta AK *et al*. Tinea capitis in Kwa-Zulu Natal, South Africa. *Pediatr Dermatol* 2004; **21**: 444-7.
- Robertson VJ, Wright S. A survey of tinea capitis in primary school children in Harare, Zimbabwe. *J Trop Med Hyg* 1990; **93**: 419-22.
- Woldeamanuel Y, Leekassa R, Chryssanthou E *et al*. Prevalence of tinea capitis in Ethiopian schoolchildren. *Mycoses* 2005; **48**: 137-41.
- Haileamlak A, Dagoye D, Williams H *et al*. Early life risk factors for atopic dermatitis in Ethiopian children. *J Allergy Clin Immunol* 2005; **115**: 370-6.
- Haileamlak A, Lewis SA, Britton J *et al*. Validation of the International Study of Asthma and Allergies in Children (ISAAC) and U.K. criteria for atopic eczema in Ethiopian children. *Br J Dermatol* 2005; **152**: 735-41.
- Marks R, Kilkenny M, Plunkett A *et al*. The prevalence of common skin conditions in Australian school students: 2. Atopic dermatitis. *Br J Dermatol* 1999; **140**: 468-73.
- Mohrenschrager M, Ring J. Atopic eczema. *Curr Allergy Asthma Rep* 2006; **6**: 445-7.
- Nnoruka EN. Current epidemiology of atopic dermatitis in south-eastern Nigeria. *Int J Dermatol* 2004; **43**: 739-44.
- Olumide YM. The incidence of atopic dermatitis in Nigeria. *Int J Dermatol* 1986; **25**: 367-8.
- Onunu AN, Eze EU, Kubeyinje EP. Clinical profile of atopic dermatitis in Benin City, Nigeria. *Niger J Clin Pract* 2007; **10**: 326-9.
- Flohr C. The role of allergic sensitisation in childhood eczema: an epidemiologist's perspective. *Allergologia et Immunopathologia* 2009; **37**: 89-92.
- Flohr C, Weinmayr G, Kleiner A *et al*. How well do questionnaires perform compared to physical examination in detecting flexural eczema? Findings from the International Study of Asthma and Allergies in Childhood (ISAAC) Phase Two. *Br J Dermatol* 2009; **128**: 2557.
- Hogewoning AA, Bouwes Bavinck JN, Amoah AS *et al*. Point and period prevalences of eczema in rural and urban schoolchildren in Ghana, Gabon and Rwanda. *J Eur Acad Dermatol Venereol* Volume: 26, Issue: 4 Date: 2012 Apr, pages: 488-94.
- Williams H, Robertson C, Stewart A *et al*. Worldwide variations in the prevalence of symptoms of atopic eczema in the International Study of Asthma and Allergies in Childhood. *J Allergy Clin Immunol* 1999; **103**: 125-38.

54. Williams HC, Strachan DP, Hay RJ. Childhood eczema: disease of the advantaged? *BMJ* 1994; **308**: 1132-5.
55. Gibbs S, SurrIDGE H, Adamson R *et al*. Atopic dermatitis and the hygiene hypothesis: a case-control study. *Int J Epidemiol* 2004; **33**: 199-207.
56. Yazdanbakhsh M, Kremsner PG, van Ree R. Allergy, parasites, and the hygiene hypothesis. *Science* 2002; **296**: 490-4.
57. Dunstan JA, Hale J, Breckler L *et al*. Atopic dermatitis in young children is associated with impaired interleukin-10 and interferon-gamma responses to allergens, vaccines and colonizing skin and gut bacteria. *Clin Exp Allergy* 2005; **35**: 1309-17.
58. Flohr C, Pascoe D, Williams HC. Atopic dermatitis and the 'hygiene hypothesis': too clean to be true? *Br J Dermatol* 2005; **152**: 202-16.
59. Flohr C, Tuyen LN, Lewis S *et al*. Regular antihelminthic therapy increases allergen skin sensitization: a randomized, double-blind, placebo-controlled trial in Vietnam. *Br J Dermatol* 2008; **159**: 1242.
60. Flohr C, Quinnett RJ, Britton J. Do helminth parasites protect against atopy and allergic disease? *Clin Exp Allergy* 2009; **39**: 20-32.
61. van den Biggelaar AH, van Ree R, Rodrigues LC *et al*. Decreased atopy in children infected with *Schistosoma haematobium*: a role for parasite-induced interleukin-10. *Lancet* 2000; **356**: 1723-7.
62. van den Biggelaar AH, Hua TD, Rodrigues LC *et al*. Genetic variation in IL-10 is associated with atopic reactivity in Gabonese schoolchildren. *J Allergy Clin Immunol* 2007; **120**: 973-5.
63. Harris JM, Cullinan P, Williams HC *et al*. Environmental associations with eczema in early life. *Br J Dermatol* 2001; **144**: 795-802.
64. Hogewoning AA, Larbi IA, Addo HA *et al*. Allergic characteristics of urban schoolchildren with atopic eczema in Ghana. *J Eur Acad Dermatol Venereol* 2010; **24**: 1406-12.
65. Cordain L, Lindeberg S, Hurtado M *et al*. Acne vulgaris: a disease of Western civilization. *Arch Dermatol* 2002; **138**: 1584-90.
66. Dogra S, Kumar B. Epidemiology of skin diseases in school children: a study from northern India. *Pediatr Dermatol* 2003; **20**: 470-3.
67. Hogewoning AA, Koelemij I, Amoah AS *et al*. Prevalence and risk factors of inflammatory acne vulgaris in rural and urban Ghanaian schoolchildren. *Br J Dermatol* 2009; **161**: 475-7.
68. Goulden V, McGeown CH, Cunliffe WJ. The familial risk of adult acne: a comparison between first-degree relatives of affected and unaffected individuals. *Br J Dermatol* 1999; **141**: 297-300.
69. Kane A, Niang SO, Diagne AC *et al*. Epidemiologic, clinical, and therapeutic features of acne in Dakar, Senegal. *Int J Dermatol* 2007; **46 Suppl 1**: 36-8.
70. Hartshorne ST. Dermatological disorders in Johannesburg, South Africa. *Clin Exp Dermatol* 2003; **28**: 661-5.