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# Scabies in the developing world—its prevalence, complications, and management

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## Abstract

Scabies remains one of the commonest of skin diseases seen in developing countries. Although its distribution is subject to a cycle of infection, with peaks and troughs of disease prevalence, this periodicity is often less obvious in poor communities. Scabies is a condition that affects families, particularly the most vulnerable; it also has the greatest impact on young children. Largely through the association with secondary bacterial infection caused by group A streptococci and *Staphylococcus aureus*, the burden of disease is compounded by nephritis, rheumatic fever and sepsis in developing countries. However, with a few notable exceptions, it remains largely neglected as an important public health problem. The purpose of this review is to provide an update on the current position of scabies with regard to its complications and control in resource-poor countries.

**Keywords:** Developing countries, glomerulonephritis, neglected tropical diseases, rheumatic fever, scabies

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## Epidemiology

The prevalence and complications of scabies make it a significant public health problem in the developing world, with a disproportionate burden in children living in poor, overcrowded tropical areas [1,2]. The exact number of infected cases worldwide is not known, but is estimated to be up to 300 million [3].

Exhaustive and complete data are not available from many countries, but such data as can be utilized suggest that scabies is endemic in tropical regions, with an average prevalence of 5–10% in children. A WHO review collated data from 18 prevalence studies between 1971 and 2001, and reported a scabies prevalence ranging between 0.2% and 24% [4]. Selected prevalence studies since 2001 are shown in Table 1. It is notable that particularly high prevalence figures have been reported in India, the South Pacific, and northern Australia. For example, in a study of young people in a rural Indian village, the prevalence of scabies was 70% [5] In Australian Aboriginal communities, prevalence figures of up to 50% have been reported, and studies in Fiji, Vanuatu and the Solomon Islands have found the prevalence of scabies in children to be 18.5%, 24%, and 25%, respectively, with the prevalence being as high as 42% in one Fijian village [6,7]. In all regions, the burden of scabies is associated with increased rates of pyoderma and complications of secondary bacterial infection with group A streptococci and *Staphylococcus aureus* [8]. For example, in Fiji, children with scabies were 2.4 times more likely than children without scabies to have active impetigo lesions [9].

A number of epidemiological factors have been proposed as influencing the distribution of scabies infestation in populations, including: age, gender, ethnicity, overcrowding, hygiene, and season. Scabies prevalence was previously thought to be cyclical, but studies of long-term incidence suggest that epidemics and other observed fluctuations are multifactorial,

**TABLE 1. Prevalence studies of scabies in developing areas since 2004**

| Year | Country | Environment | Ages | Study area | Diagnosis | No of people seen | Scabies (%) | References |
|---|---|---|---|---|---|---|---|---|
| 2005 | Turkey | Urban | 4–6 years | Preschool | Clinical and scrapings | 1134 | 0.4 | [102] |
| 2005 | Nigeria | Rural | 4–15 years | School | Clinical | 1066 | 4.7 | [103] |
| 2005 | Brazil | Urban | All ages | Slum | Clinical | 1185 | 8.8 | [20] |
| | | | | Village | | 548 | 3.8 | |
| 2007 | Timor-Leste | Rural | All ages | Four districts | Clinical | 1535 (245)[a] | 17.3 (39.1)[a] | [16] |
| 2008 | Nepal | Rural | All ages | Village | Clinical | 878 | 4.7 | [104] |
| 2009 | Malaysia | Urban | 13–17 years | Boarding schools | Clinical | 944 | 8.1 | [105] |
| 2009 | Brazil | Rural | All ages | Village | Clinical | 1014 | 9.8 | [106] |
| 2009 | Fiji | Rural/urban | 5–14 years | Schools | Clinical | 3462 | 18.5 | [9] |
| 2010 | Malaysia | Urban | Children | Welfare home | Clinical | 120 | 31 | [22] |

[a]In brackets - children < 10 years.

being related to social and environmental changes such as wartime, overcrowding, and climatic changes [10–14]. Endemic rates in many tropical countries, without the significant fluctuations reported elsewhere, suggest that the role of herd immunity is likely to be more limited than previously thought [15].

Whereas in developed nations the rates of infestation are similar across age ranges [12], the highest rates in developing countries are among preschool children to adolescents; rates significantly decrease in mid-adulthood, and increase in the elderly [13,16]. The attack rate is probably equal between the sexes, and the differences in prevalence reported in some studies are probably attributable to confounding factors [17]. Differences among racial groups have also been described, and are probably attributable to socio-economic and behavioural factors [10,17].

Overcrowding is an important factor in the spread of scabies. Studies from Mali, India, Brazil and northern Australia all show an association with overcrowding, especially sleeping quarters [7,18–20]. Closed communities and institutional environments experience high endemic rates and epidemic outbreaks in tropical and developing countries. For example, 86% of children in a Sierra Leone displacement camp [21], 31% of children in a Malaysian welfare home [22] and 87% of children in a Thai orphanage had scabies [23]. The role of hygiene is controversial [24]; although poor hygiene has been associated with high impetigo prevalence, and the use of soap and water has been shown to reduce the prevalence of impetigo [8,25], the available data suggest that hygiene is not a significant factor for scabies infestation [26].

Overwhelmingly, the highest global rates of scabies are seen in countries with hot, tropical climates [24]. However, scabies is not limited to these regions. For example, studies from Scotland and Israel demonstrated higher rates during cooler seasons [11,27]; it has been suggested that this may be related to increased human personal contact and overcrowding, as well as increased mite survival and fertility in cold weather [28,29], possibly because of microenvironmental conditions at the skin surface.

Crusted scabies is usually seen in immunocompromised patients, especially in those with human immunodeficiency virus infection, human T-lymphocytic virus I infection, or medical immunosuppression, as well as in those with leprosy and developmental disability, including Down syndrome. However, there are reports of crusted scabies in those with no identifiable immunodeficiency, especially Aboriginal Australians [15,30,31].

## Transmission

The transmission of scabies occurs with the burrowing of *Sarcoptes scabiei* into the epidermis of the skin. Fertilized adult female mites burrow into the stratum corneum, laying 0–4 eggs per day for up to 6 weeks before dying. The entire developmental life cycle, from egg to adult, involving three active intermediate stages or instars, takes *c.* 2 weeks. However, classic transmission studies have documented the first observation of an adult female 3 weeks after initial colonization [32]. In primary infestations, an increase in *S. scabiei* numbers for up to 4 weeks has been reported, with a gradual reduction to *c.* 10–12 mites as host immunity develops. In contrast, the severe form of the disease, crusted scabies, is characterized by extremely high mite burdens and severe crusting of the skin [33].

The most common source of transmission is prolonged skin-to-skin contact with an infected individual (hand-holding, sexual contact, etc.). It takes *c.* 15–20 min of close contact for successful direct transmission, and for this reason scabies is also considered to be a sexually transmitted disease. Intrafamilial transmission is frequently reported, and genotyping results confirm long-held beliefs that transmission events for *S. scabiei* tend to be localized in time or space, and that the family/household is the focus of transmission [34,35]. However, cultural changes, such as the increasing use of institution-